pneumatech
medical gas solutions

Multi-Movement Pendant

Installation, Operation and Maintenance Manual

CE
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Published by Pneumatech Medical Gas Solutions

All possible care has been taken in the preparation of this publication, but Pneumatech Medical Gas Solutions accepts no liability for any inaccuracies that may be found.

Pneumatech Medical Gas Solutions reserves the right to make changes without notice both to this publication and to the product which it describes.

Important
Personnel must make themselves familiar with the contents of this manual and the function of the unit before installing, operating or maintaining any Multi-Movement Pendant.

Information contained in this manual is correct at the date of publication. The policy of Pneumatech Medical Gas Solutions is one of continuous product improvement. Pneumatech Medical Gas Solutions reserves the right to make changes that may affect instructions in this manual without prior notice.

For any enquiry regarding the servicing or repair of this device, contact the nearest accredited Pneumatech Medical Gas Solutions agent, or communicate directly with:

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1. SAFETY, STORAGE AND HANDLING

Pressurised air from the system may cause personnel injury or property damage if the unit is improperly operated or maintained.

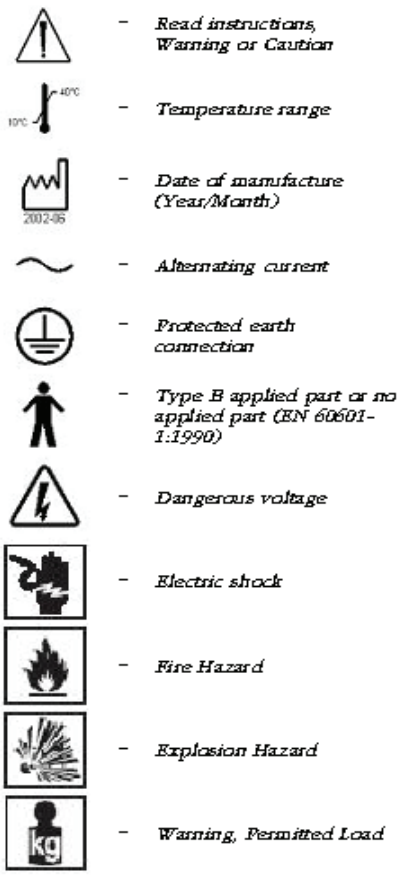
Operator should have carefully read and become familiar with the contents of this manual before maintaining the pendant systems.

Operator is expected to use common sense safety precautions, good workmanship practices and follow any related local safety precautions.

Circuit Diagrams, component descriptions and parts lists are available on request.

1.1 Applied Symbol Identification

The following symbols apply to and are used on this product or in this document. The meanings of these symbols are as specified below:



Do not over load the pendant system; see loading specification later in this document for guidance.

The motor fitted to the vertical movement arms has been designed for a maximum of 3 minutes continuous operation.

This equipment works in conjunction with other devices. See separate manufacturers documents for instructions.

Do not use oil or grease on any terminal units or pipework, for any reason. This could lead to a FIRE or an EXPLOSION. Only use approved OXYGEN COMPATIBLE lubricants, which can be purchased from Pneumatech MGS if necessary.

Before carrying out any maintenance on low voltage electrical services within the pendant, ensure that the circuits behind all fascias or covers that are to be removed are de-energised and isolated first.

1.2 Environmental Transport and Storage Conditions

Min ambient temperature -25 degrees Celsius
Max ambient temperature 70 degrees Celsius
Min relative humidity (non-condensing) 10%
Max relative humidity (non-condensing) 75%
Atmospheric pressure range 500-1060 hPa

1.3 Environmental Operating Conditions

Min ambient temperature 10 degrees Celsius
Max ambient temperature 40 degrees Celsius
Max relative humidity (non-condensing) 75%
Atmospheric pressure range 700-1060 hPa

1.4 Cleaning

Please refer to specific instructions in the user manual (ref. 2004135)

1.5 Environmental Protection

Legal regulations may require special methods for disposal of this equipment. In the interest of the environment and prevention of injuries we recommend that you contact us for guidance when decommissioning this equipment with the intention of discarding it.

2 INSTALLATION

2.1 Introduction.

The installation is made up from a first and second fix. The first fix consists of a ceiling plate, drop tubes, first fix plate and service termination points for installations within an intermediate ceiling. When installing directly onto the structural ceiling there is no requirement for the ceiling plate or drop tubes. For any installation with a ceiling void that
requires drop tubes longer than 800mm, additional structural steelwork will need to be installed. The second fix section of the pendant consists of flange plate, pendant arms, service head fitted with service connection point for the end user.

2.2 Structural Loading Requirements.

The characteristics of the ceiling must ensure that all pendant loads are taken and transferred safely. Regional construction regulations must be adhered to. A structural engineer must check the carrying capacity of the construction. The individual case of the concrete's suitability for each pendant installation must be taken into account, and an official permit must be obtained from the surveyor's office responsible for the concrete ceiling. For details of the loading requirements of the supporting structure see tables 1 to 4.

WARNING…

TABLE 1 TO 4 SHOWS MAXIMUM LOAD DATA FOR THE PENDANT SYSTEMS, WHICH INCLUDE THE MAXIMUM LOADS TO BE CARRIED BY THE PENDANTS. ANY PRESCRIBED

REGIONAL SAFETY FACTORS MUST BE APPLIED IN ALL CALCULATIONS WHEN USING THIS DATA. IF NO PRESCRIBED SAFETY FACTORS ARE IN PLACE, IT IS SUGGESTED THAT A MINIMUM SAFETY FACTOR SHOULD BE AS PER EN 60601-1 REGARDING SUSPENDED MASSES, WHICH STATES: -

'Where it is unlikely that supporting characteristics will be impaired by wear, corrosion, material fatigue or ageing, the safety factor of all supporting parts shall be not less than 4.
Where impairment by wear, corrosion, material fatigue or ageing is expected, relevant supporting parts shall have a safety factor not less than 8.'

NOTE…

Parts supplied as part of the pendant system are not liable to wear, corrosion, material fatigue or ageing. Any supporting structure such as concrete or prefabricated metal frameworks are out of the control of Pneumatech MGS and therefore a judgement shall be made by a competent materials expert as to the safety factor to be applied to these structures.

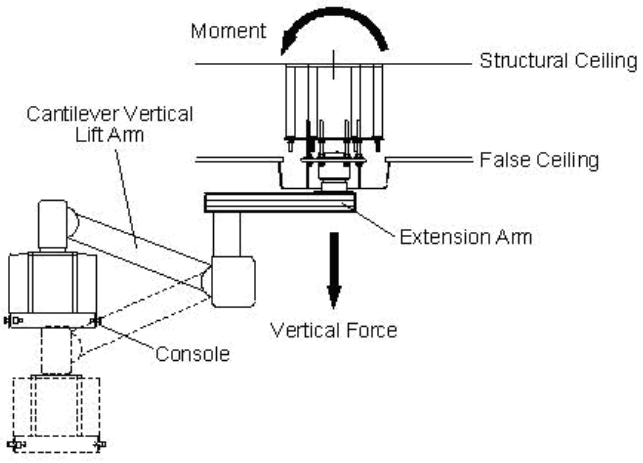
Table 1: Coronus – Lateral Movement Only

Arm Lengths		Safety Factor of 4 (towards yield)		
Extension Arm (mm)	Console Arm (mm)	Payload (kg)	Moment (Nm)	Vertical Force (N)
-	600	400	2470	5130
-	800	300	2520	4170
-	1000	230	2470	3520
-	1200	190	2520	3160
600	600	185	2475	3235
600	800	155	2475	2850
600	1000	125	2475	2710
600	1200	110	2475	2595
800	800	125	2475	2710
800	1000	110	2475	2595
800	1200	90	2475	2430
1000	1000	90	2475	2430
1200	1000	80	2475	2370

Table 2: Coronus – Lateral Movement and Cantilever Vertical Lift Console Arm

Arm Lengths		Safety Factor of 4 (towards yield)		
Extension Arm (mm)	Console Arm (mm)	Payload (kg)	Moment (Nm)	Vertical Force (N)
-	1000	90	1051	2369
600	1000	90	2562	2492
800	1000	90	2562	2526
1000	1000	75	2562	2560
1200	1000	65	2562	2447

Figure 1:- Typical solo double-arm pendant system for operating theatres



NOTES:

1. For tandem pendants the moment acting on each side of the pendant system should be added to give the worst case.

2. For tandem pendants the vertical force acting on each side should be added

3. Net payload will be reduced by the weight of the console and associated fixed equipment and fixtures.

4. The current edition of BS EN 60601-1 stipulates a safety factor of 4 should be applied to suspended masses.

5. A factor of safety of 4 will ensure a deflection of no more than 1 degree between fully loaded and unloaded. Lower safety factors will lead to a larger deflection under the payloads shown.

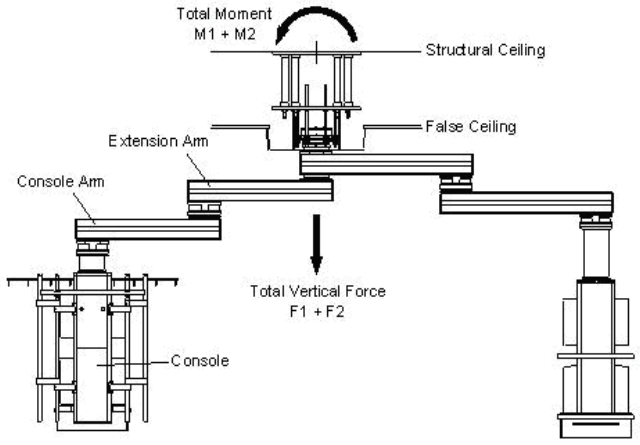
Table 3: Atlas – Lateral Movement Only

Arm Lengths		Safety Factor of 4 (towards yield)		
Extension Arm (mm)	Console Arm (mm)	Payload (kg)	Moment (Nm)	Vertical Force (N)
-	600	650	4000	8500
-	800	460	4000	6640
-	1000	360	4000	5680
-	1200	285	4000	4980
600	600	280	4000	5230
600	800	230	4000	4775
600	1000	190	4000	4425
800	800	190	4000	4425
800	1000	160	4000	4170
800	1200	140	4000	4020
1000	1000	140	4000	4020
1200	1000	110	4000	3770

Table 4: Atlas – Lateral Movement and Cantilever Vertical Lift Console Arm

Arm Lengths		Safety Factor of 4 (towards yield)		
Extension Arm (mm)	Console Arm (mm)	Payload (kg)	Moment (Nm)	Vertical Force (N)
-	750	200	1500	4150
-	1000	150	1500	3670
600	750	200	3100	4700
600	1000	150	2800	4300
800	750	200	3600	4750
800	1000	150	3200	4350
1000	750	145	3400	4400
1000	1000	137	3400	4400

Figure 2:- Typical tandem double-arm pendant system for critical care areas.



NOTES:

1. For tandem pendants the moment acting on each side of the pendant system should be added to give the worst case

2. For tandem pendants the vertical force acting on each side should be added

3. Net payload will be reduced by the weight of the console and associated fixed equipment and fixtures

4. The current edition of BS EN 60601-1 stipulates a safety factor of 4 should be applied to suspended masses

5. A factor of safety of 4 will ensure a deflection of no more than 1 degree between fully loaded and unloaded. Lower safety factors will lead to a larger deflection under the payloads shown.

2.3 Installing the first fix

The installation process will be split into 2 stages. This stage will deal with the pendant's supporting steelwork, from the structural ceiling to the intermediate plate. If the ceiling void requires drop tubes greater than 800mm then additional structural steel work is required. If there is no intermediate ceiling or the void is less than 220mm for Coronus pendants or 154mm for Atlas pendants, the first fix plate is fitted
directly to the structural ceiling.

2.3.1 Additional Structural Steelwork (If Required)

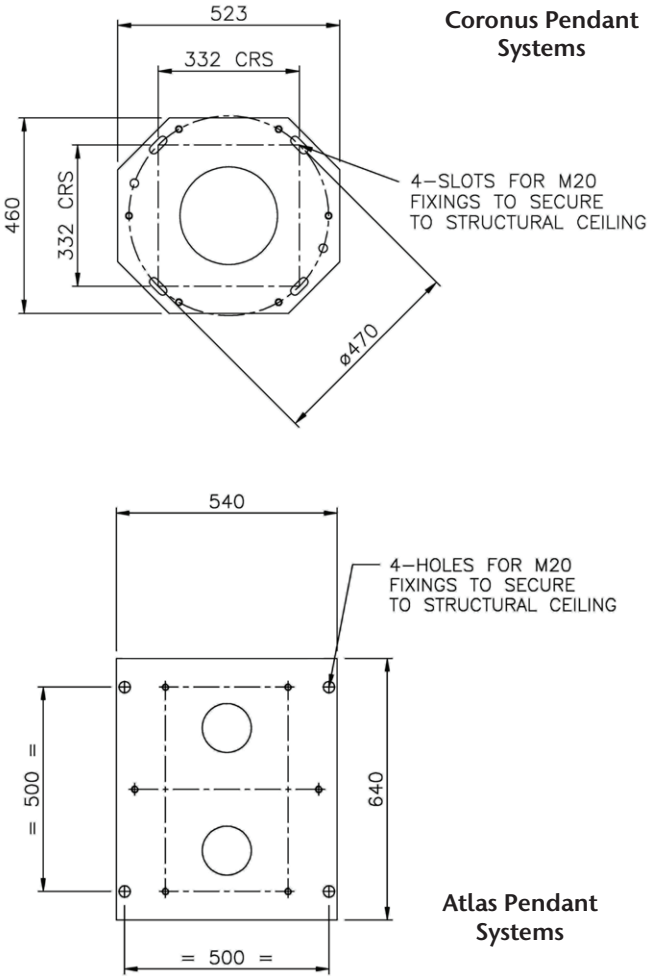
Any additional steelwork required to support the pendant must be assessed and designed by a structural engineer in accordance with regional construction regulations. Tables 1 to 4 can be used to determine the required carrying capacity of the additional structure. The structural steel-

work must match up with the ceiling plate mounting configuration shown in figure 3.

NOTE…

The loading values in tables 1 to 4 are the actual maximum working loads for the different pendant option, safety factors determined from regional construction regulations must be used for any structural calculations.

Figure 3 – Ceiling plate mounting details



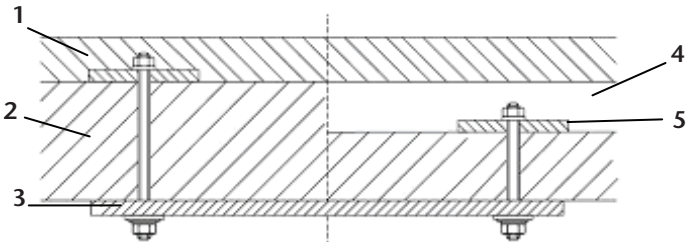
2.3.2 Ceiling Plate Installation (if required).

There are 3 recommended methods of fixing the ceiling plate to the supporting structure. These are fixing using counter-plates and continuous threaded bolts through the concrete ceiling, fixing using heavy duty anchors into the concrete ceiling or fixing with bolts to a pre-fabricated metal
framework attached to the ceiling. Refer to the relevant section as required.

WARNING…

1. IF A WRONG HOLE IS DRILLED, E.G. IF A HOLE IS DRILLED IN A STEEL REINFORCEMENT WITHIN THE CONCRETE, A CERTIFIED STRESS ANALYST MUST BE CONSULTED, SINCE THE STATIC LOAD DISTRIBUTION IN THE CEILING MAY BE DANGEROUS.

2. THE CEILING PLATE WEIGHS IN EXCESS OF 70 KG (154 LB). USE PROPER LIFTING EQUIPMENT AND TECHNIQUES. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY



OR EQUIPMENT DAMAGE.

NOTE…

1. None of the fastening options for connecting the ceiling plate to the supporting structure is supplied with any of the pendant systems.

2. The safest and best method of installing the pendant to an existing reinforced ceiling is by utilising counter-plates and continuous threaded bolts.

3. A 580mm (Coronus pendant systems) 680mm (Atlas pendant systems) square cut-out is to be equally spaced in the false ceiling for access. The shroud will later cover this.

2.3.3 Installation with Counter-Plates and Continuous

Threaded Bolts.

Before installing the ceiling plate Ensure the ceiling is flat and parallel to the floor below. The ceiling plate must be mounted flush to the ceiling i.e. the ceiling must be flat over the area in which the plate is to be fitted.

WARNING…IMPROPER TIGHTENING OF THE M20 NUTS MAY CAUSE THE PENDANT STRUCTURE TO FALL. UNDER TIGHTENING MAY RESULT IN THE FASTENINGS WORKING LOOSE, WHILE OVER TIGHTENING WILL OVER STRESS THE COMPONENTS. ENSURE THAT THE M20 NUTS OR TIGHTENED TO 395NM.

- When installing the uppermost mounting plate, make sure the plate is correctly aligned in the room, as shown in the architectural drawings.

• Mark out the 4 mounting hole positions, ensuring correct orientation of the plate is observed (see figure 3 for details).

• Check for steel reinforcements directly above the marked holes using a suitable metal detecting device. Drill a clearance hole for the M20 fixings through the concrete and check to ensure the integrity of the hole.

• Drop M20 threaded rods through counter-plates (not supplied) so that the thread is protruding through ceiling. Offer up ceiling plate, and loosely fit washers, spring washers and nuts consecutively into position to hold the weight of the plate (See figure 4).

• Tighten nuts to 395Nm using a calibrated torque wrench, ensuring that the ceiling plate is fully flush with the structural ceiling. Ensure that a minimum of 2 full threads protrude through the nuts at both ends of the threaded rods.

Figure 4 - Installation with Counter-Plates and Continuous Threaded Bolts.

1.	Floor
2.	Structural ceiling
3.	Intermediate plate
4.	Impact sound insulation
5.	Set of counter-plates

2.3.4 Installation with Heavy Duty Load Anchors.

Before installing the ceiling plate Ensure the ceiling is flat and parallel to the floor below. The ceiling plate must be mounted flush to the ceiling i.e. the ceiling must be flat over the area in which the plate is to be fitted.

WARNING…

1. SUITABLE HEAVY DUTY LOAD ANCHORS, WHICH ARE APPROVED BY PNEUMATECH MGS ARE MANUFACTURED BY HILTI, TYPE HSL-TZ M16/50. THESE ANCHORS ARE NOT SUITABLE FOR USE IN CRACKED CONCRETE AND MUST ONLY BE FITTED IN THE TENSION ZONE. ONLY ANCHORS APPROVED BY A QUALIFIED, COMPETENT STRUCTURAL ENGINEER MUST BE USED.

2. IMPROPER TIGHTENING OF THE LOAD ANCHORS MAY CAUSE THE PENDANT STRUCTURE TO FALL. UNDER TIGHTENING MAY RESULT IN THE FASTENINGS WORKING LOOSE, WHILE OVER TIGHTENING WILL OVER STRESS THE COMPONENTS. ENSURE THAT THE ANCHORS ARE FITTED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION.

NOTE…

Tightening torque for Hilti type HSL-TZ M16/50 anchors is 120Nm, and the hole should be 125mm deep with a 24mm drill bit. Load anchors from other manufacturers will have different dimensions and tightening torque.

• When installing the uppermost mounting plate, make sure the plate is correctly aligned in the room, as shown in the architectural drawings.

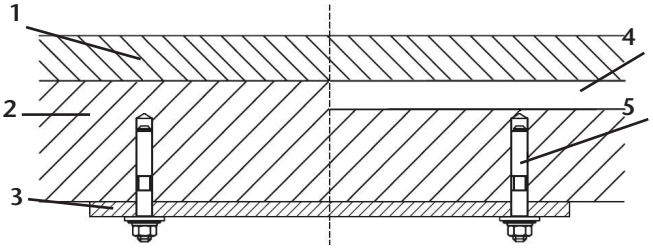
• Mark out the 4 mounting hole positions, ensuring correct orientation of the plate is observed (see figure 3 for details).

• Check for steel reinforcements directly above the marked holes using a suitable metal detecting device. Drill a hole suitable (check diameter and depth in manufacturers instructions) for the anchor to be used, through the concrete and check to ensure the integrity of hole. Blow out holes to ensure removal of dust and fragments.

• Offer up ceiling plate, and loosely fit washers, spring washers and nuts consecutively into position to hold the weight of the plate (See figure 5).

• Tighten nuts to desired torque (see manufacturers instructions) using a calibrated torque wrench, ensuring that the ceiling plate is fully flush with the structural ceiling.

Figure 5 - Installation with Counter-Plates and Continuous Threaded Bolts.



1.	Floor
2.	Structural ceiling
3.	Intermediate plate
4.	Impact sound insulation
5.	Heavy load anchor

2.3.5 Installation with Metal Framework.

Ensure the frame is flat and parallel to the floor below. The ceiling plate must be mounted flush to the frame i.e. the frame must be flat over the area in which the plate is to

be fitted.

WARNING…IMPROPER TIGHTENING OF THE M20 NUTS MAY CAUSE THE PENDANT STRUCTURE TO FALL. UNDER TIGHTENING MAY RESULT IN THE FASTENINGS WORKING LOOSE, WHILE OVER TIGHTENING WILL OVER STRESS THE COMPONENTS. ENSURE THAT THE M20 NUTS OR TIGHTENED TO 395NM.

NOTE…

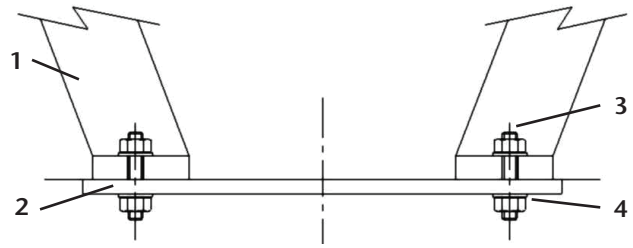
This is the most unfavourable type of installation, and should only be used where the first two methods are impractical.

- When installing the uppermost mounting plate, make sure the plate is correctly aligned in the room, as shown in the architectural drawings.

- Drop M20 threaded rods through mounting frame so that the thread is protruding underneath. Offer up ceiling plate, and loosely fit washers and spring washers and nuts consecutively into position to hold the weight of the plate (See figure 6).

- Tighten nuts to 395Nm using a calibrated torque wrench, ensuring that the ceiling plate is fully flush with the metal framework. Ensure that a minimum of 2 full threads protrude through the nuts and both ends of the rods.

Figure 6 - Ceiling Plate Attachment to Pre-Fabricated Metal Framework.



1.	Support Frame
2.	Ceiling Plate
3.	Threaded Rod
4.	M20 Fasteners

NOTE…

Installation with pre-fabricated metal framework (not supplied or designed by Pneumatech MGS).

2.3.6 Intermediate Plate Installation.

The intermediate plate can either be installed directly to the structural ceiling, or hangs from the ceiling plate via drop tubes and threaded rod.

WARNING…THE INTERMEDIATE PLATE WEIGHS IS IN EXCESS OF 50 KG (110 LB.). USE PROPER LIFTING EQUIPMENT AND TECHNIQUES. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR EQUIPMENT DAMAGE.

2.3.7 Direct Attachment of Intermediate Plate to Structural Ceiling.

If the distance between the structural mounting surface and the underside of the false or solid ceiling is 220mm for Coronus pendants or 154mm for Atlas pendants or less, the intermediate plate can be fitted directly to the ceiling. The intermediate plate can be fitted in the exact same manner as the ceiling plate. Follow the relevant procedure depending on the installation type. Figure 7 shows the mounting holes used to secure the plate to the ceiling for the various pendant systems.

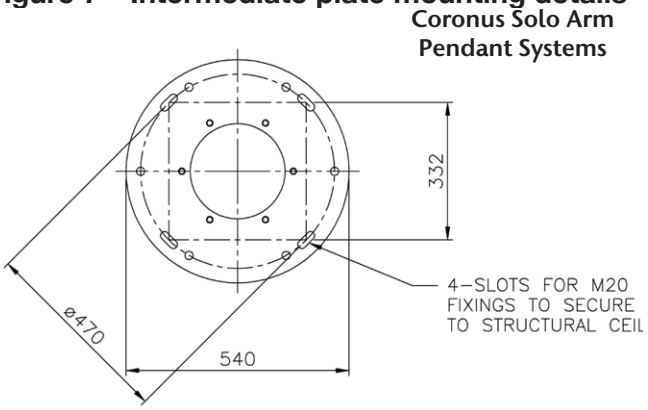
WARNING…IF A WRONG HOLE IS DRILLED, E.G. IF A HOLE IS DRILLED IN A STEEL REINFORCEMENT WITHIN THE CONCRETE, A CERTIFIED STRESS ANALYST MUST BE CONSULTED, SINCE THE STATIC LOAD DISTRIBUTION IN THE CEILING MAY BE DANGEROUS.

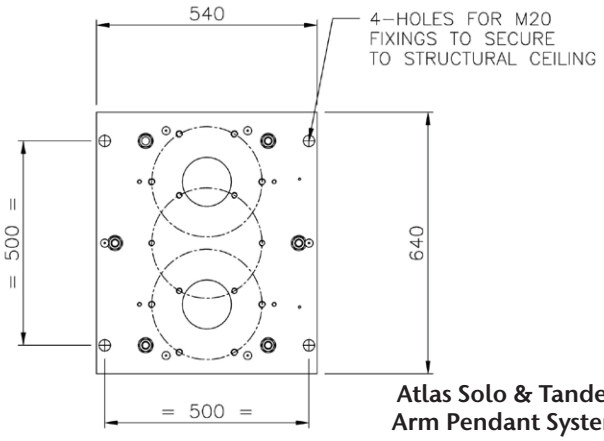
NOTE…

1. None of the fastening options for connecting the ceiling plate to the supporting structure is supplied with any of the pendant systems.
2. The safest and best method of installing the pendant to an existing reinforced ceiling is by utilising counter-plates and continuous threaded bolts.

- When installing the uppermost mounting plate, make sure the plate is correctly aligned in the room, as shown in the architectural drawings. A 580mm (Coronus pendant systems) 680mm (Atlas pendant systems) square cut-out is to be equally spaced in the false ceiling for access. The shroud will later cover this.

Figure 7 – Intermediate plate mounting details





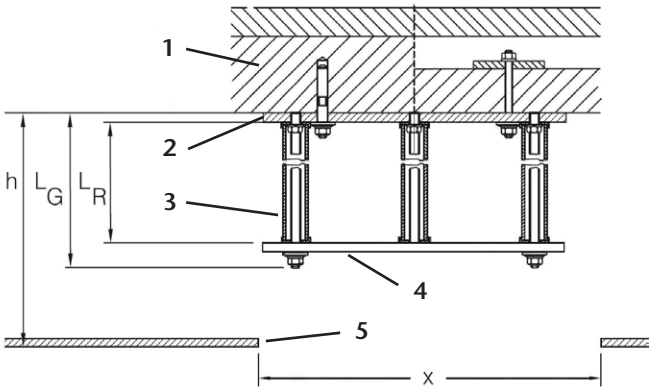
Atlas Solo & Tandem Arm Pendant Systems

2.3.8 Attachment of Intermediate Plate to Ceiling Plate.

If the distance between the structural mounting surface and the underside of the false or solid ceiling is greater than 220mm for Coronus pendants or 154mm for Atlas pendants. Then the intermediate plate should be fitted using the 6 threaded rods and drop tubes supplied with the first fix (See figures 8).

WARNING…IMPROPER TIGHTENING OF THE M16 NUTS MAY CAUSE THE PENDANT STRUCTURE TO FALL. UNDER TIGHTENING MAY RESULT IN THE FASTENINGS WORKING LOOSE, WHILE OVER TIGHTENING WILL OVER STRESS THE COMPONENTS. ENSURE THAT THE M16 NUTS ARE TIGHTENED TO 195NM.

Figure 8



h.	Distance between structural ceiling and underside of intermediate ceiling
LG.	Threaded rod length
LR.	Drop tube length
x	Intermediate ceiling opening
1.	Structural ceiling
2.	Ceiling Plate
3.	Drop tubes and threaded rod
4.	Intermediate plate
5.	Intermediate ceiling

Coronus system threaded and drop tube calculation	
LG	= h – 100mm
LR	= h – 180mm
x	= 550mm for solo arm system, 580mm for tandem arm system
Atlas system threaded and drop tube calculation	
LG	= h – 150mm
LR	= h – 230mm
x	= 680mm

- Calculate length of threaded rods as shown in figure 8. Cut rods and drop tubes to length and file any burr from ends of threaded rods to freely accept nuts. Ensure that tubes are cut square to allow a full face contact against plate faces.

- Fit nuts, spring washers and electrical insulating washers (large black cup washers) consecutively onto threaded rods into approximate final positions on all 6 off M16 threaded rods (See figure 9). This is made easier by fitting to the intermediate plate while it is resting on the floor.

- Screw rods fully home into ceiling plate, ensuring they bottom out on the ceiling surface. Tighten nuts up to underside face of ceiling plate to 195Nm. Fit the drop tubes over the threaded rods and hold them in place with further electrical insulating washers.

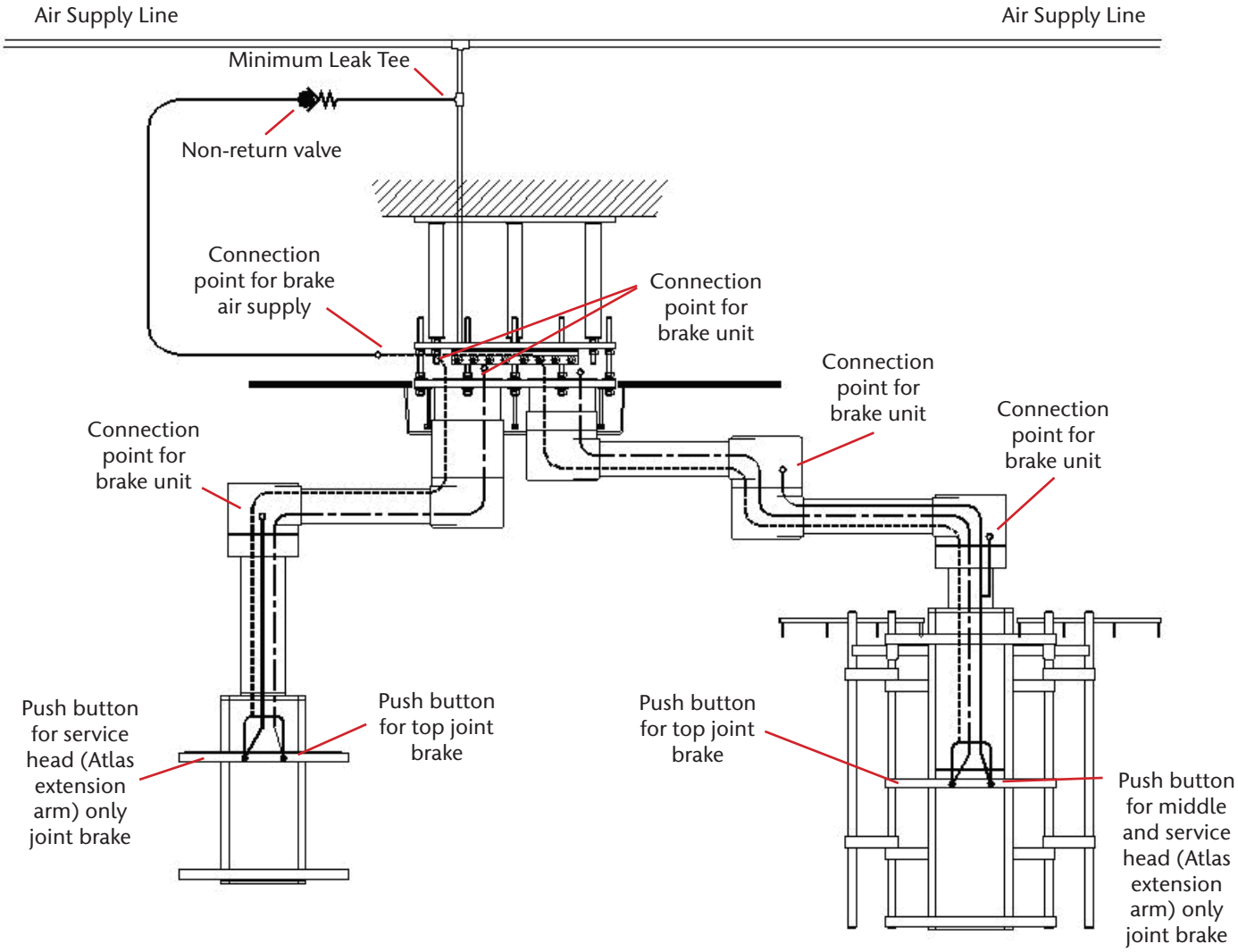
WARNING…THE PLASTIC INSULATING WASHERS WILL NOT HOLD THE TUBES SAFELY IN POSITION, AND THE TUBES MAY FALL DOWN. DO NOT ALLOW ANYONE TO BE UNDERNEATH THE INSTALLATION WHILST THE TUBES ARE HELD BY THE PLASTIC WASHERS. IF THE INTERMEDIATE PLATE IS NOT FITTED IMMEDIATELY, SECURE THE DROP TUBES WITH M16 NUTS AND WASHERS.

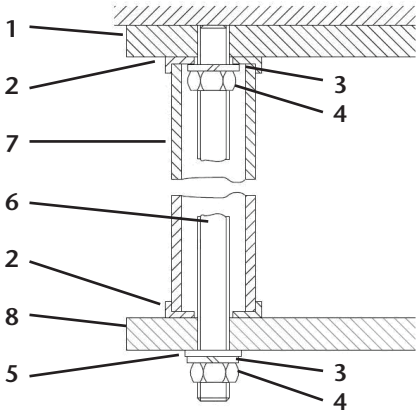
- Offer up intermediate plate, and loosely fit washers and spring washers and nuts consecutively into position to hold the weight of the plate. Ensure the plate is level, and the correct distance from the false ceiling. Tighten all nuts to 195Nm.

- Ensure there are at least 2 full threads protruding through the face of every nut.

Figure 9 – First fix drop tube assembly

Figure 11 - For a typical schematic of the pneumatic braking system.





1.	Ceiling plate
2.	Electrical insulating washer
3.	Lock washer
4.	M16 hex. Nut

5.	M16 plain washer
6.	M16 threaded rod
7.	Drop Tube
8.	Intermediate plate

2.3.9 Gas Service Kit Installation.

All service connections are mounted on the underside of the intermediate plate (See Figure 10). A set of terminals, junction box covers, gas service kits and gas service kit mounting bracket/s are supplied with the 1st fix kit.

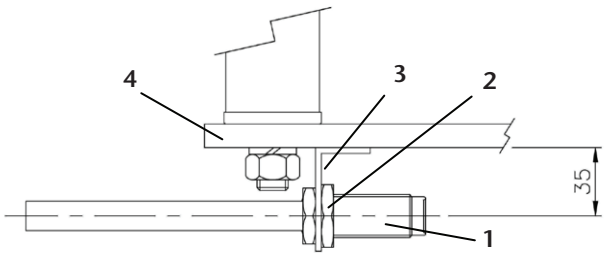


Figure 10 – Gas service kit mounting

1.	Gas service kit
2.	Locking nut
3.	Service kit mounting bracket
4.	Intermediate plate

NOTE…

The intermediate plate can be installed in 2 positions, at 180 Degrees about a vertical axis of the centre of the ceiling plate. This allows for gas services kits/electrical terminals to be mounted closer to the connecting pipework/ incoming cables.

- Screw gas service kits are positioned in the correct order as specified in HTM02-01 and HTM2022, which is O2, N2O, O2/N2O 50%/50%, Medical Air, Surgical Air, Vacuum and AGS.

WARNING…

1. ONLY COPPER TO COPPER BRAZING IS ALLOWED ON SITE. ALL BRAZING MUST BE CARRIED OUT IN ACCORDANCE WITH BS EN ISO 7396-1, HTM02-01 OR HTM2022, WHICH SPECIFY A DRY, OIL FREE NITROGEN PURGE.

2. ENSURE PIPELINE IS PROPERLY ISOLATED IN ACCORDANCE WITH REGIONAL STANDARDS BEFORE CARRYING OUT ANY MODIFICATIONS.

- Extend incoming pipework up to the gas service kits and braze in position.

2.3.10 Pneumatic Brake Connection.

The pneumatic braking system is powered from the Surgical Air pipeline system. The supply pressure for the brake system should be between 500 and 800kPa (5-8Bar). In order to comply with HTM02-01, HTM2022 and BS EN ISO 7396-1 a minimum leak tee is supplied for connection to the pipeline to limit the flow in the event of any down stream failure of components within the brake system. The pendant brake system is also fitted with a non-return valve to prevent any backpressure that could carry contaminates into the medical gas supply (See figure 11).

WARNING…

1. SUPPLY LINES ABOVE 8 BAR WILL NEED TO BE REGULATED DOWN TO PREVENT DAMAGE OR FAILURE OF THE BRAKE SYSTEM.

2. ENSURE PIPELINE IS PROPERLY ISOLATED IN ACCORDANCE WITH REGIONAL STANDARDS BEFORE CARRYING OUT ANY MODIFICATIONS.

- A tee adapter assembly (part number 2003142) must be fitted to the surgical air supply line as a feed for the pendant arm's pneumatic brakes. This should be blanked off with the supplied PTFE washer and blanking cap.

2.3.11 Electrical Terminal Installation

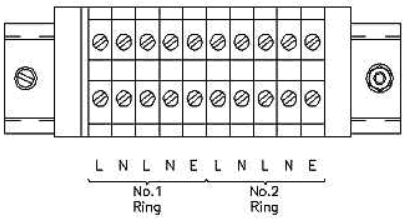
Electrical cables should be run into the junction boxes in conduit. Ensure that the power is isolated and remains isolated using the procedure laid down by the particular hospital. The power should not be turned on until final commissioning of the pendant electrical system.

- Build up the desired number of mains terminal blocks as shown in figure 12 and fit electrical terminal boxes over each terminal assembly. Ensure 2 warning labels are
fitted to each electrical box. One should be fitted on the top of the box, and one on the side at which access will be gained to the box.

NOTE…

Terminal connections not supplied

Figure 12 – Electrical Terminal Arrangement (2 ring main terminal block)



2.4 Installing the Second fix

This stage of the installation deals with the flange plate, various pendant arm and service head combinations, the gas and electric connections and final closure of the pendant covers.

2.4.1 Flange Plate

The flange plate assembly consists of the mountings between the intermediate plate and the pendant arms, rotational bearing, pneumatic brake and limiting stops. The connection between the ceiling plate and flange plate is made with 6 M16 threaded rods. The pendant arms are fastened to the flange plate with M8 hexagon socket head cap screws. Depending on the type of pendant system and whether the intermediate plate is installed directly to the structural ceiling or via the ceiling plate and drop tubes, see figures 13 or 14 for threaded rod length and fitting details.

NOTE…

For information on how to set the rotational stops see the commissioning section.

WARNING…

1. TO PREVENT THE THREADED ROD FROM EXPERIANCING STRESS OUTSIDE OF ITS DESIGN CAPACITY THE LENGTH SHOULD NOT EXEED 330MM.

2. IMPROPER TIGHTENING OF THE M16 MUTS MAY CAUSE THE PENDANT STRUCTURE TO FALL. UNDER TIGHTENING MAY RESULT IN THE FASTENINGS WORKING LOOSE, WHILE OVER TIGHTENING WILL OVER STRESS THE COMPONENTS. ENSURE THAT THE M16 NUTS ARE TIGHTENED TO 195NM.

3. FOR SAFE INSTALLATION OF THE PENDANT SYSTEM WHEN THE INTERMEDIATE PLATE IS FITTED DIRECTLY TO THE STRUCTURAL CEILING, ENSURE THAT THE THREADED ROD IS FULLY INSERTED INTO THE INTERMEDIATE PLATE.

4. TO PREVENT INJURY FROM FALLING OBJECTS,

ENSURE NOBODY IS DIRECTLY BELOW THE FLANGE PLATE ASSEMBLY WHILE INSTALLING.

NOTE…

1. For Coronus solo arm installations where the intermediate plate is fitted directly to the structural ceiling the M16 threaded rod will be cut down to 135mm.

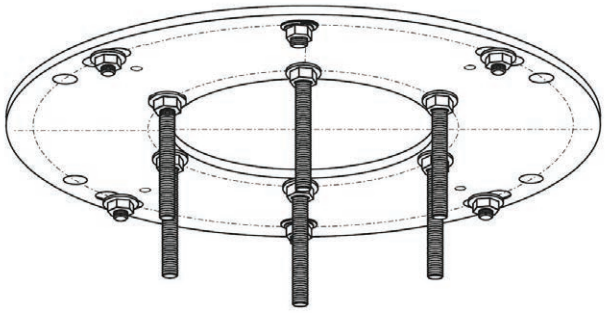
2. For Coronus tandem arm installations where the intermediate plate is fitted directly to the structural ceiling the M16 threaded rod will be cut down to 135mm for the 1st arm, and 260 mm for the 2nd.

3. For all Atlas systems where the intermediate plate is fitted directly to the structural ceiling the thread is cut down to 270mm.

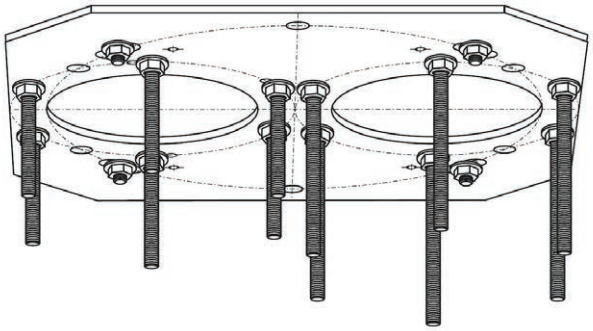
- If necessary cut the threaded rod to the correct length, and fit according to figures 13 and 14. Tighten the M16 nuts to a torque of 195Nm.

Figure 13 – Coronus system flange mounting rod installation

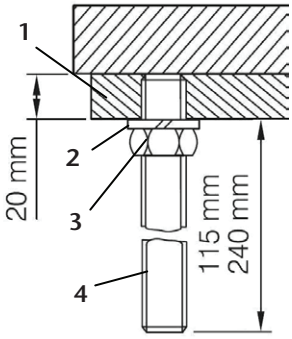
Coronus solo arm system



Coronus tandem arm system

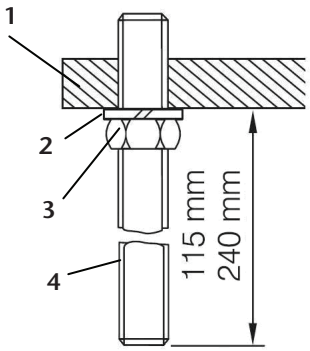


Installation of the M16 threaded rod when the intermediate plate is fastened directly the structural ceiling



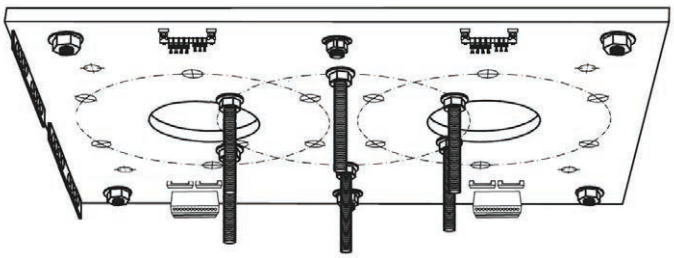
1.	Intermediate plate
2.	M16 Spring washer
3.	M16 nut
4.	M16 threaded rod

Installation of the M16 threaded rod when the intermediate plate is fastened to the ceiling plate via drop tubes.

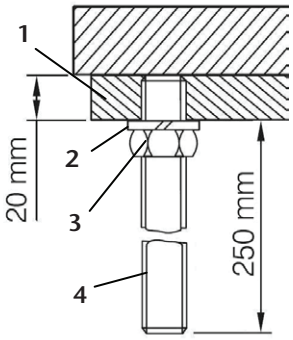


1.	Intermediate plate
2.	M16 Spring washer
3.	M16 nut
4.	M16 threaded rod

Figure 14 – Atlas system flange mounting rod installation

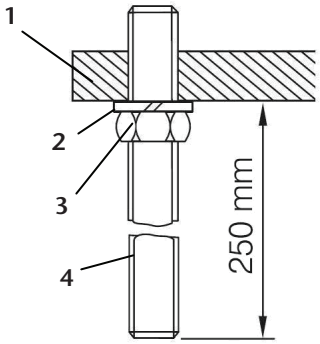


Installation of the M16 threaded rod when the intermediate plate is fastened directly the structural ceiling



1.	Intermediate plate
2.	M16 Spring washer
3.	M16 nut
4.	M16 threaded rod

Installation of the M16 threaded rod when the intermediate plate is fastened to the ceiling plate via drop tubes.



1.	Intermediate plate
2.	M16 Spring washer
3.	M16 nut
4.	M16 threaded rod

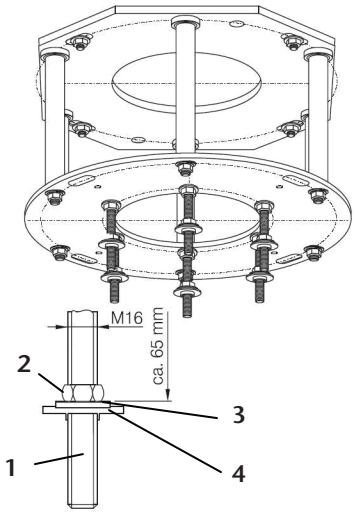
NOTE...

For Atlas Tandem arm systems there will be 12 M16 threaded rods fitted to the outer 2 circular configurations.

- Install the M16 nuts, washers and plastic insulating discs as shown in figure 15 and 16.

Figure 15 – Coronus system flange mounting fastenings

Coronus solo arm system



Coronus tandem arm system

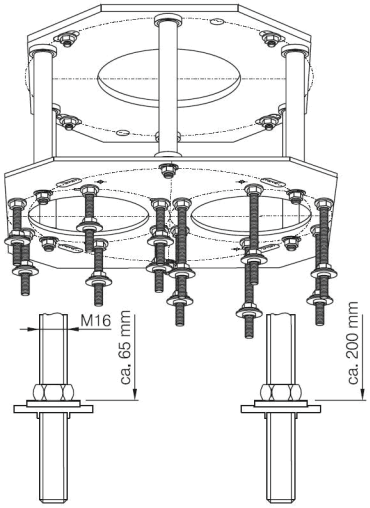
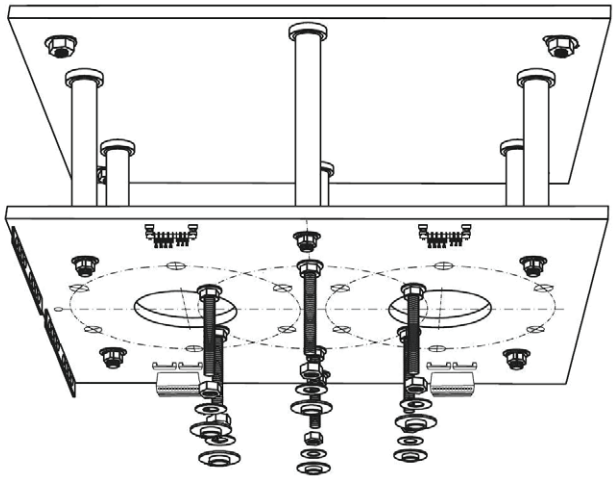
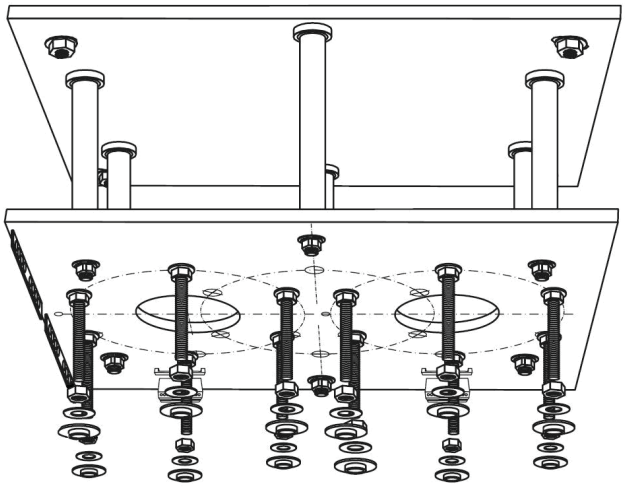


Figure 16 – Atlas system flange mounting fastenings

Atlas solo arm system



Atlas tandem arm system



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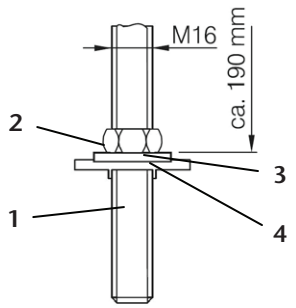


1.	M16 threaded rod
2.	M16 nut
3.	M16washer
4.	Insulation disc

• Slide the flange plate assembly onto the 6 threaded rods and secure using the insulation washers.

• washers and M16 nuts as shown in figures 17 and 18. Tighten the M16 nuts to a torque of 100Nm.

WARNING…

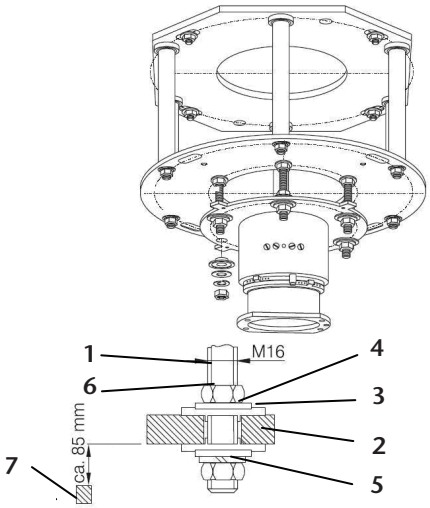
ENSURE EXACT HORIZONTAL ALIGNMENT OF THE FLANGE ASSEMBLY FOR SAFE OPERATION OF THE PENDANT SYSTEM.

NOTE…

For the Atlas range the flange plate assembly is built into the first pendent arm.

Figure 17 – Coronus system flange mounting

Coronus solo arm system



1.	M16 threaded rod
2.	Flange plate assembly
3.	Insulation washer
4.	M16 washer
5.	M16 spring washer
6.	M16 nut
7.	Intermediate ceiling

Coronus tandem arm system

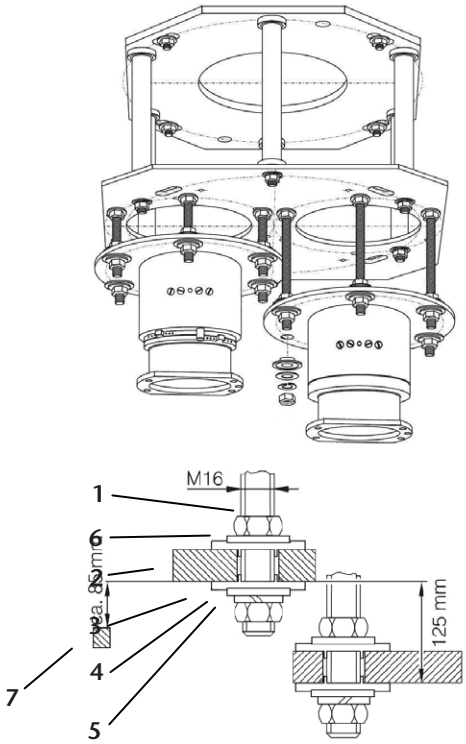
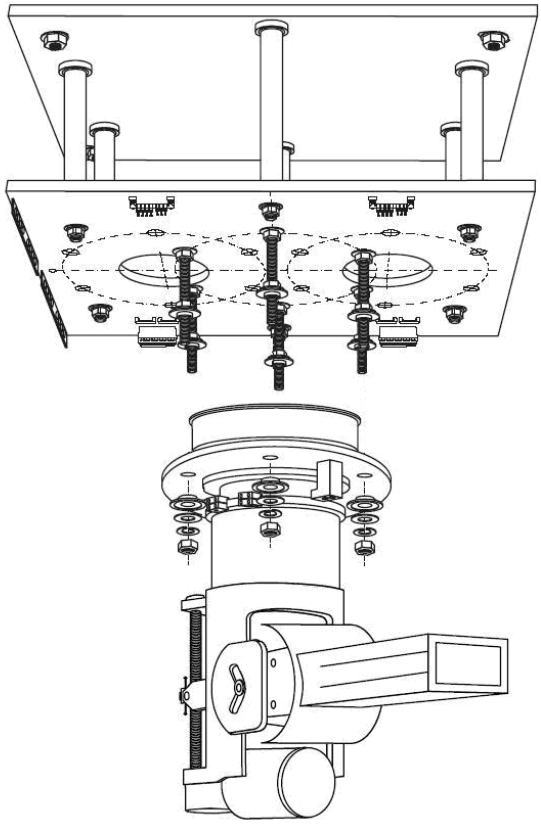
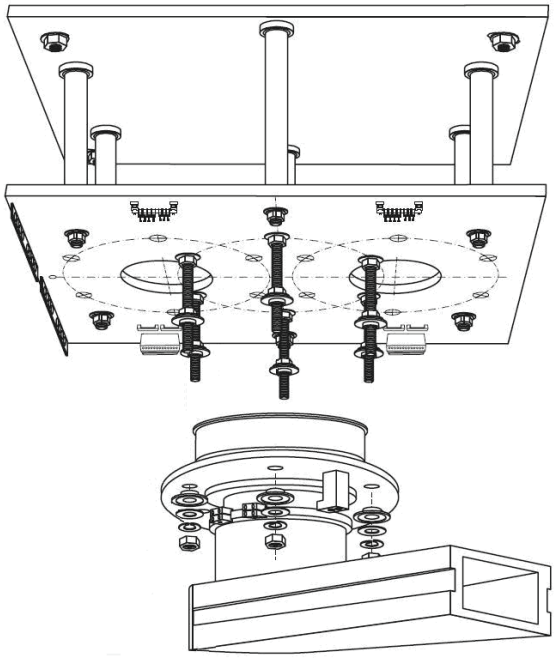


Figure 18 – Atlas system flange mounting

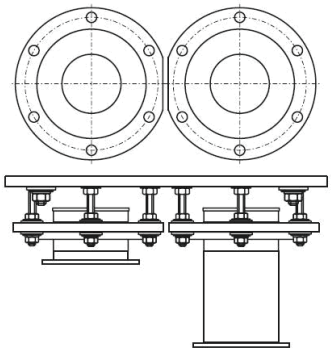
Atlas motor arm system



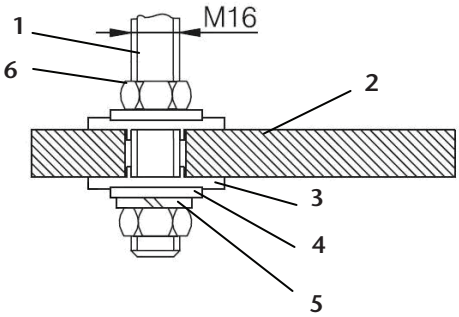
Atlas extension arm system



Tandem Flange Mounting



Fixing detail



1.	M16 threaded rod
2.	Flange plate assembly
3.	Insulation washer
4.	M16 washer
5.	M16 spring washer

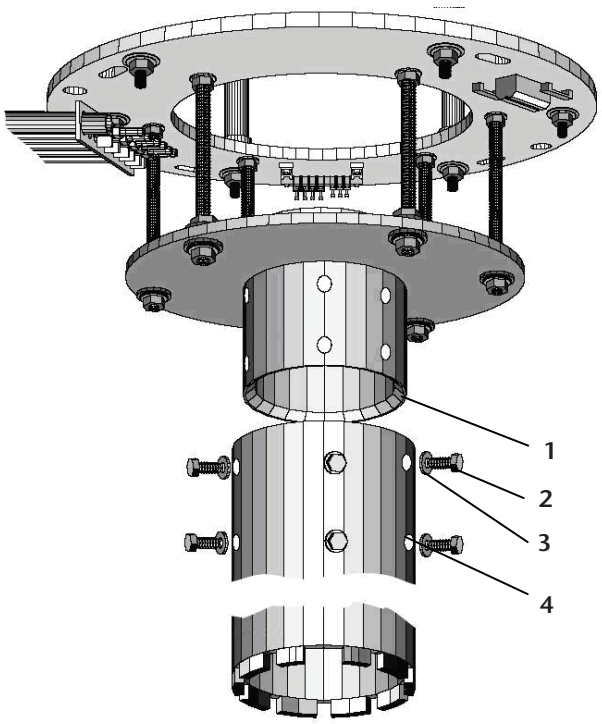
6.	M16 nut

NOTE…

For Coronus single motor arms only an extension collar needs to be installed between the flange assembly and first arm.

Slide the collar onto the flange assembly and secure using the 12 M8 bolts and washers (See Figure 19). Tighten the M8 bolts to a torque of 23Nm.

Figure 19 – Coronus system motor arm collar mounting



1.	Flange Assembly
2.	M8 Bolt
3.	Washer
4.	Collar

See diagram overleaf.

2.4.2 Extension/motor arm.

The pendant extension and motor arms can be made up of a number of combinations depending on the specification supplied (See section 1.3 of the operating and maintenance manual ref.-2004135). For Atlas pendant system the initial arm is built up as part of the flange plate assembly, which can be seen in the previous section.

WARNING…

1. IMPROPER TIGHTENING OF THE M8 SOCKET HEAD CAP SCREWS MAY CAUSE THE PENDANT STRUCTURE TO FALL. UNDER TIGHTENING MAY RESULT IN THE FASTENINGS WORKING LOOSE, WHILE OVER TIGHTENING WILL OVER STRESS THE COMPONENTS. ENSURE THAT THE M8 SOCKET HEAD CAP SCREWS ARE TIGHTENED TO 23NM.

2. TO PREVENT INJURY FROM FALLING OBJECTS, ENSURE NOBODY IS DIRECTLY BELOW THE PENDANT SYSTEM WHILE INSTALLING.

NOTE…

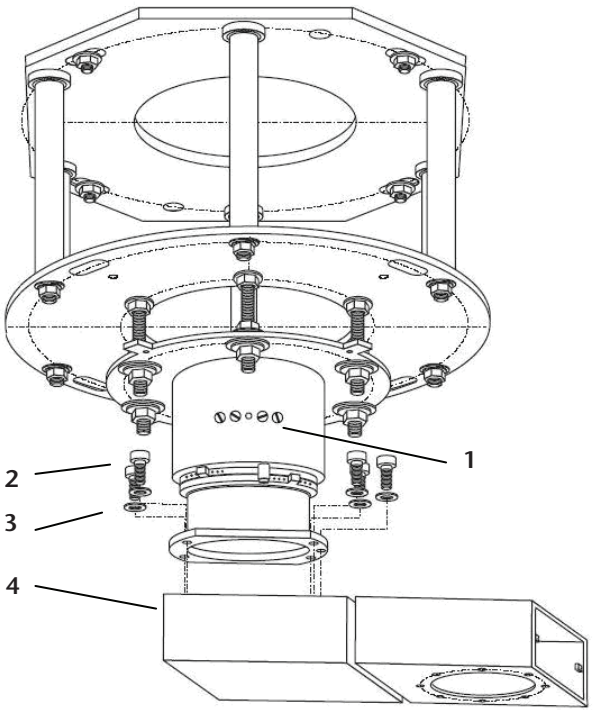
1. For Coronus motor arms only, ensure the pneumatic brake line is connected prior to connecting the arm to the
extension collar, as once fitted this connection point is inaccessible (See Figure 21).

2. For instructions on setting the rotational limiting stops see the commissioning section

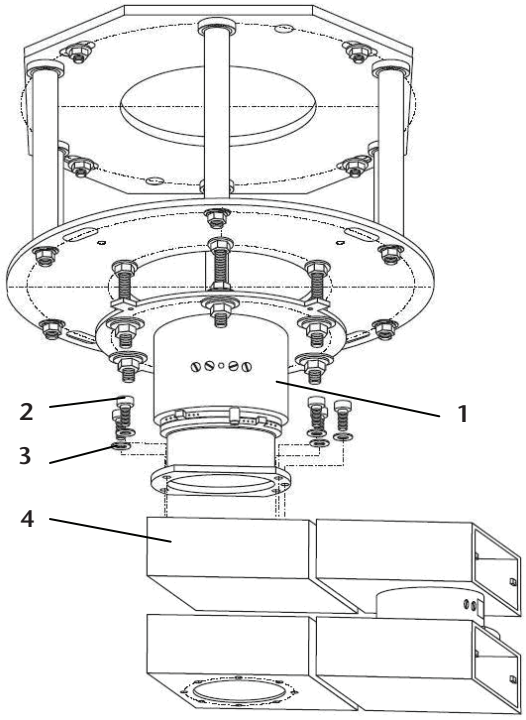
• Position extension/motor arm inline with the flange assembly or extension arm fixing location. Secure using the supplied M6 counter sunk screw to a torque of 10Nm for Coronus motor arm only, for all other pendant arms use M8 socket cap head screws to a torque of 23Nm (See figure 20, 21 or 22 for the various pendant arm installation examples).

Figure 20 – Coronus extension arm connection

Coronus single extension arm



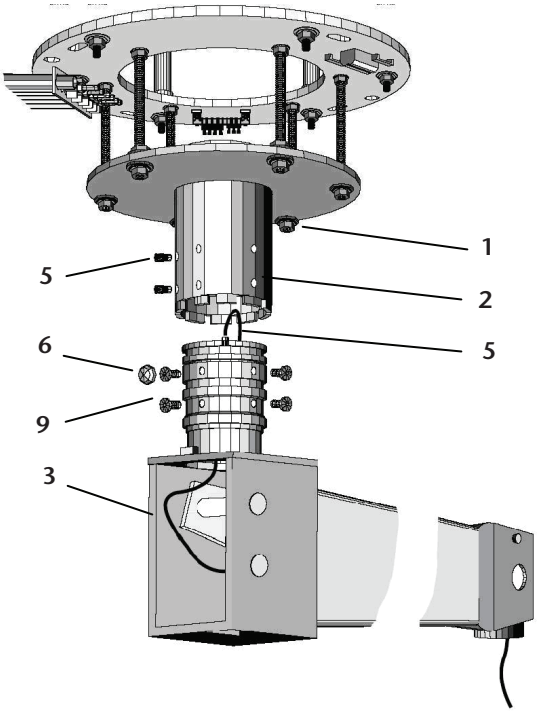
Coronus double extension arm



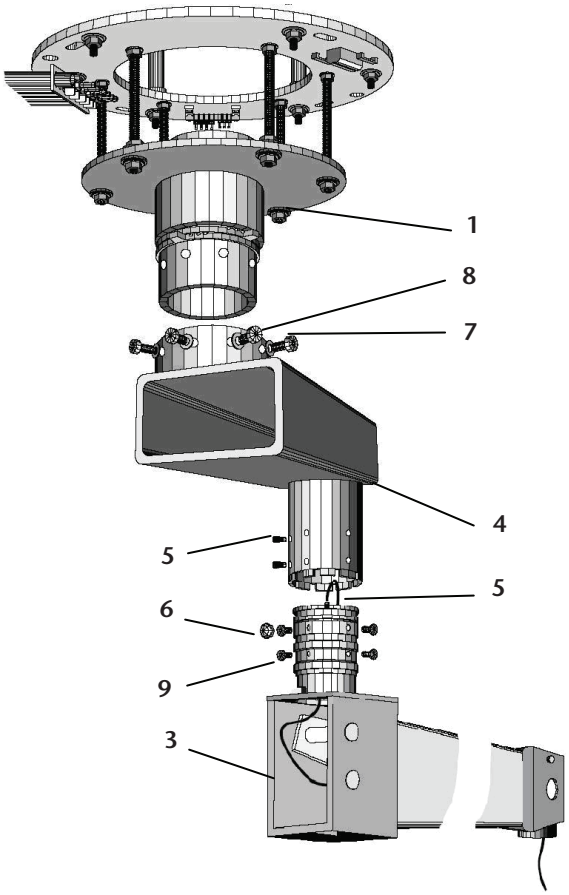
1.	Flange Assembly
2.	M8 Socket Cap head screw
3.	Washer
4.	Extension arm

Figure 21 – Coronus motor arm connection

Coronus single motor arm



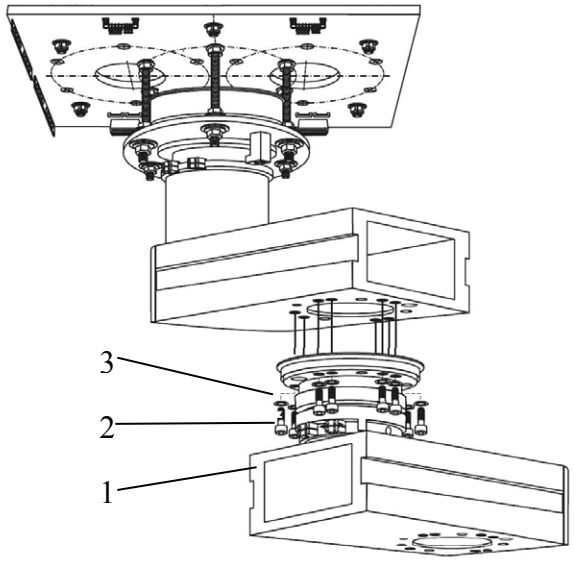
Coronus double motor arm



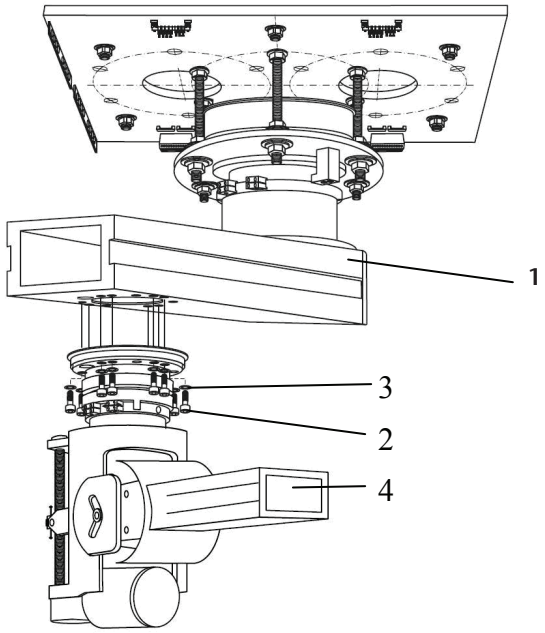
1.	Flange assembly
2.	Extension collar
3.	Motor arm
4.	Extension arm
5.	Pneumatic brake line
6.	Brake screw
7.	M8 socket cap head screw
8.	M8 washer
9.	M6 counter sunk screws

Figure 22 – Atlas double arm connection

Atlas extension arm



Atlas motor arm



1.	Extension Arm
2.	M8 Socket Cap head screw
3.	Washer
4.	Motor Arm

NOTE…

- For tandem pendant systems the arms mount to the flange assembly in exactly the same manor, see figures 17 and 18 for the flange configuration.
- Service Head Drop Tube (Extension arms only).
- The drop tube length will be sized to match the installation ensuring the corrected finishing height for the service head. The drop tube assembly consists of the service head pivoting mechanism and limiting stops (For instructions on how to set the limiting stops go to commissioning section).

WARNING…

1. IMPROPER TIGHTENING OF THE SOCKET HEAD CAP SREWS MAY CAUSE THE PENDANT STRUCTURE TO FALL. UNDER TIGHTENING MAY RESULT IN THE FASTENINGS WORKING LOOSE, WHILE OVER TIGHTENING WILL OVER STRESS THE COMPONENTS. ENSURE THAT THE M8 SOCKET CAP HEAD SCREWS ARE TIGHTENED TO 23NM AND THE M6 SOCKET HEAD CAP SCREWS ARE TIGHTENED TO 9.6NM.

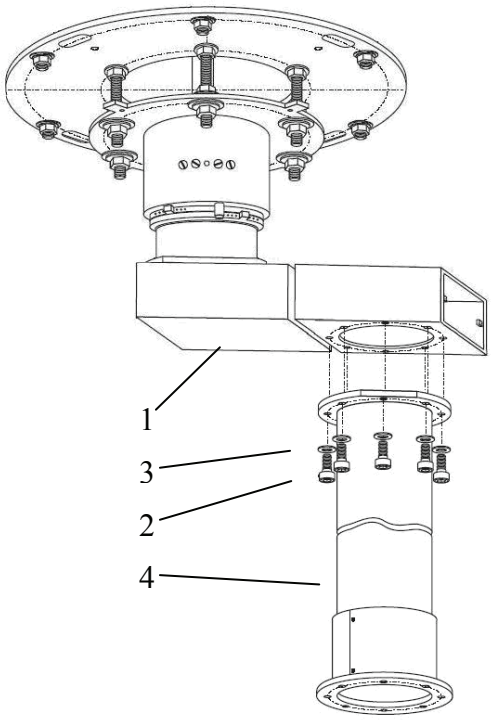
2. TO PREVENT INJURY FROM FALLING OBJECTS, ENSURE NOBODY IS DIRECTLY BELOW THE PENDANT SYSTEM WHILE INSTALLING.

- Position the drop tube inline with the mounting holes on the extension arm and secure with the M8 socket head cap screws for the Atlas system, or M6 socket head cap screws for the Coronus system.
- Ensure that the m8 socket cap head screws are tightened to 23nm and the m6 socket head cap screws are tightened to 9.6nm (See figure 23).

Figure 23 – Extension arm drop tube mounting

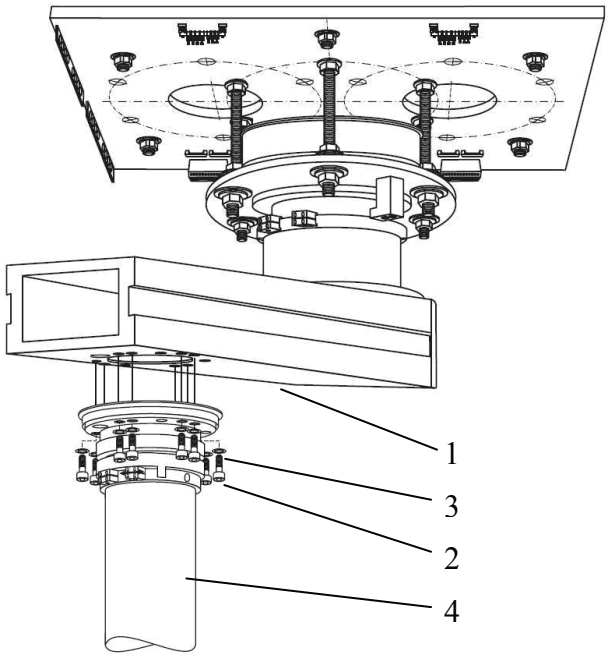
Coronus single extension arm

1.	Extension arm
2.	M6 socket head cap screw
3.	M6 washer
4.	Drop tube



Atlas extension arm

1.	Extension arm
2.	M6 socket head cap screw
3.	M6 washer
4.	Drop tube



2.4.3 Service Head

The service head houses the end user outlet connections for the electric, data and gas services.

WARNING…

1. ENSURE NON OF THE ELECTRICAL SUPPLY CABLES ARE DAMAGED, AS THIS MAY RESULT IN LEAKAGE CURRENT OR LOW SUPPLY VOLTAGE.

2. ENSURE NON OF THE GAS SUPPLY HOSES ARE DAMAGED, AS THIS MAY RESULT IN RELEASE OF THE SUPPLY GAS.

3. DO NOT BEND THE BRAKE HOSE, AS THIS MAY RESULT IN FAILURE OF THE BRAKE FUNCTION.

4. ENSURE THAT THE SUPPLY CABLES AND HOSES ARE CARFULLY INSTALLED AVOIDING ANY TRISTING.

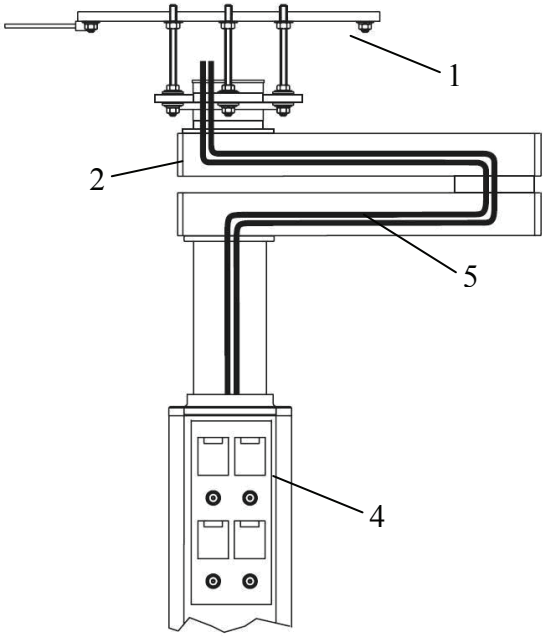
5. IMPROPER TIGHTENING OF THE M8 SOCKET HEAD CAP SCREWS MAY CAUSE THE PENDANT STRUCTURE TO FALL. UNDER TIGHTENING MAY RESULT IN THE FASTENINGS WORKING LOOSE, WHILE OVER TIGHTENING WILL OVER STRESS THE COMPONENTS. NSURE THAT THE M8 SOCKET HEAD CAP SCREWS ARE TIGHTENED TO 23NM.

6. TO PREVENT INJURY FROM FALLING OBJECTS, ENSURE NOBODY IS DIRECTLY BELOW THE PENDANT SYSTEM WHILE INSTALLING.

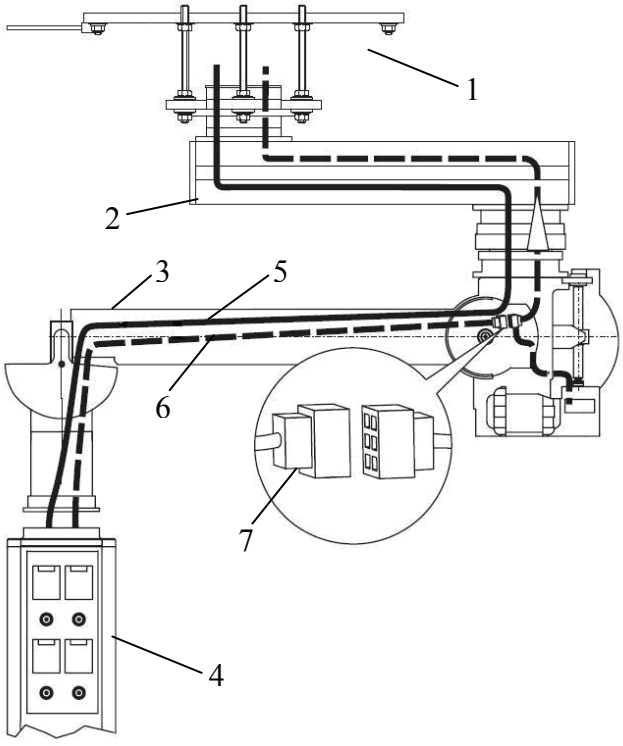
- Before installing the service head route the on site data cables through from the intermediate plate to the service head, as shown in figure 24.

Figure 24 – Cable and hose routing

Extension arms



Motor arms



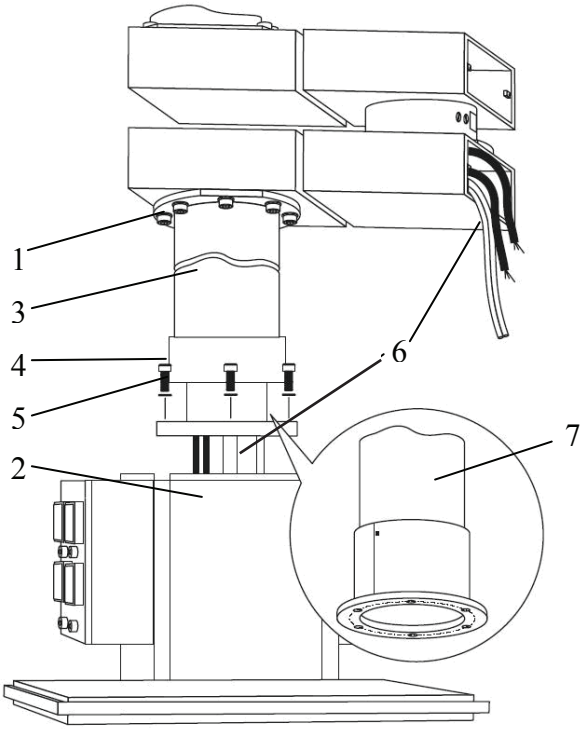
1.	Intermediate plate
2.	Extension arm
3.	Motor arm
4.	Service head
5.	Cable and hose routing
6.	Motor switching and power supply
7.	Motor 6 way connector

- Lift the service head and route the electric cables and hose through the extension/motor arm in accordance with regional regulations (see figure 25).

Figure 25 – Cable and hose routing

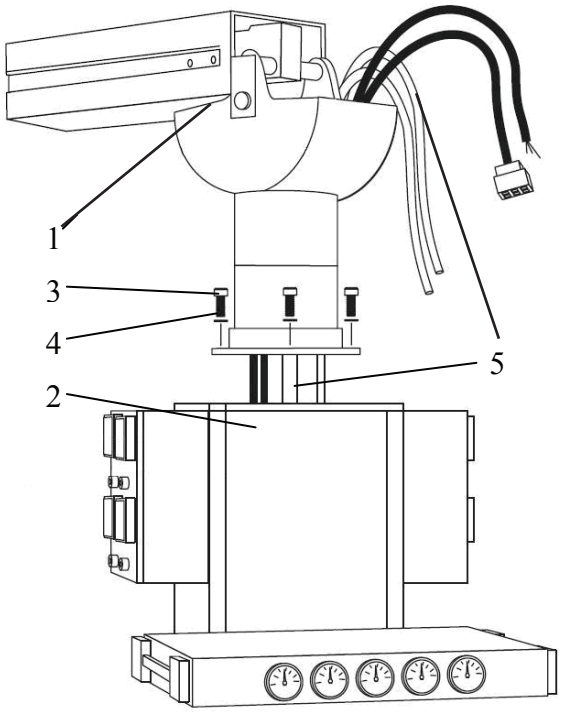
Extension arms

1.	Extension arm
2.	Service head
3.	Drop tube
4.	M8 socket head cap screw
5.	M8 washer
6.	Cable and hose supply lines
7.	Bearing cover



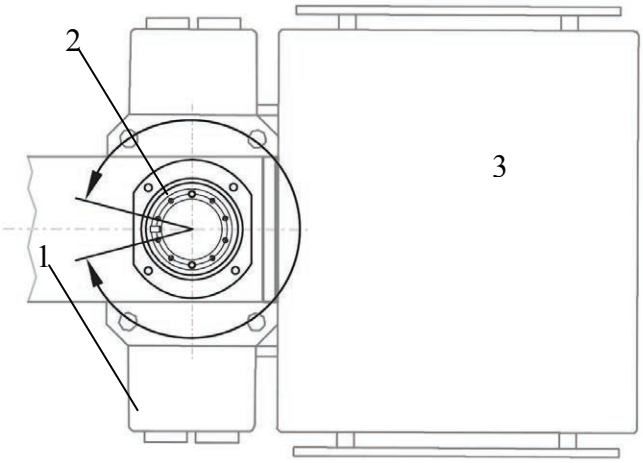
Motor arms

1.	Motor arm
2.	Service head
3.	M8 socket head cap screw
4.	M8 washer
5.	Cable and hose supply lines



• Position the service head so the fixed rotational stop is to the back of the service head (See figure 26)

Figure 26 – Service Head Alignment



1.	Service Head
2.	Fixed Stop
3.	Equipment shelf (if fitted)

• Secure the service head in place using M8 socket head cap screws to a torque of 23Nm (See figure 25).

• Route the cables conduits, earth bonding cables (Preinstalled at service head and motor arm) and hoses through the pendant arms as shown in figure 24 in accordance with regional regulations.

• Ensure that none of the cables or hoses are in tension or pinched throughout the pendants range of movement (See commissioning section)

2.4.4 Earthing Bonding of Pendant System.

In the event of an electrical fault result in a voltage passing through the pendant system the earth bonding must be correctly installed to prevent electric shock hazards.

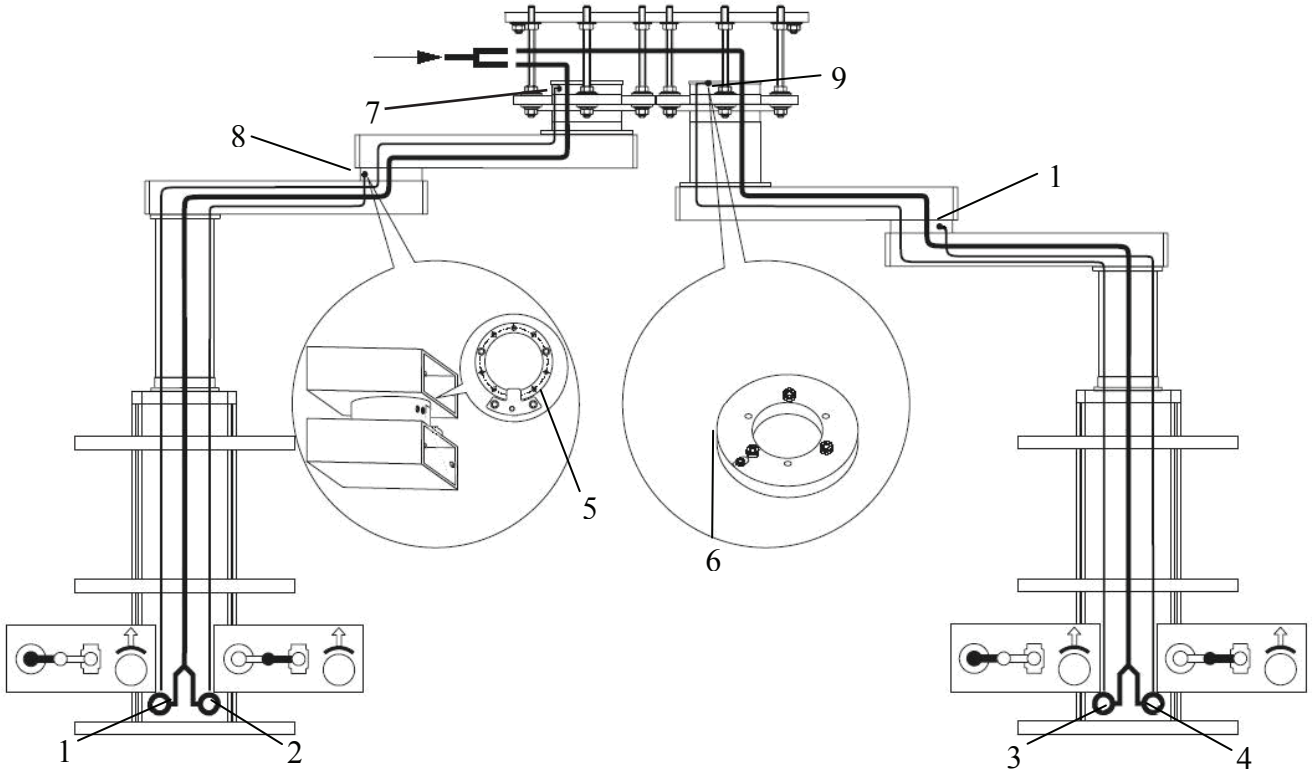
WARNING…

ENSURE THAT THE POWER IS ISOLATED AND REMAINS ISOLATED USING THE PROCEDURE LAID DOWN BY THE PARTICULAR HOSPITAL. THE POWER SHOULD NOT BE TURNED ON UNTIL FINAL COMMISSIONING OF THE PENDANT ELECTRICAL SYSTEM.

• Cut the preinstalled earth cable to length from the service head and motor arm if pendant system has a vertically powered arm. Prepare end of cable, thread through the traction relief and connect to one of the 10mm2 connections of the earth terminal block on the intermediate plate (See figure 27). For tandem arm pendant systems repeat this again for from the second service head.

• For the earth connection between the flange plate and intermediate plate. Prepare the cable (not supplied) and connect to the flange earth connector (See figure 27). Thread cable through the traction relief, prepare and connect to the 4mm-earth terminal at the intermediate plate. For tandem arm pendant systems repeat for the second flange plate assembly.

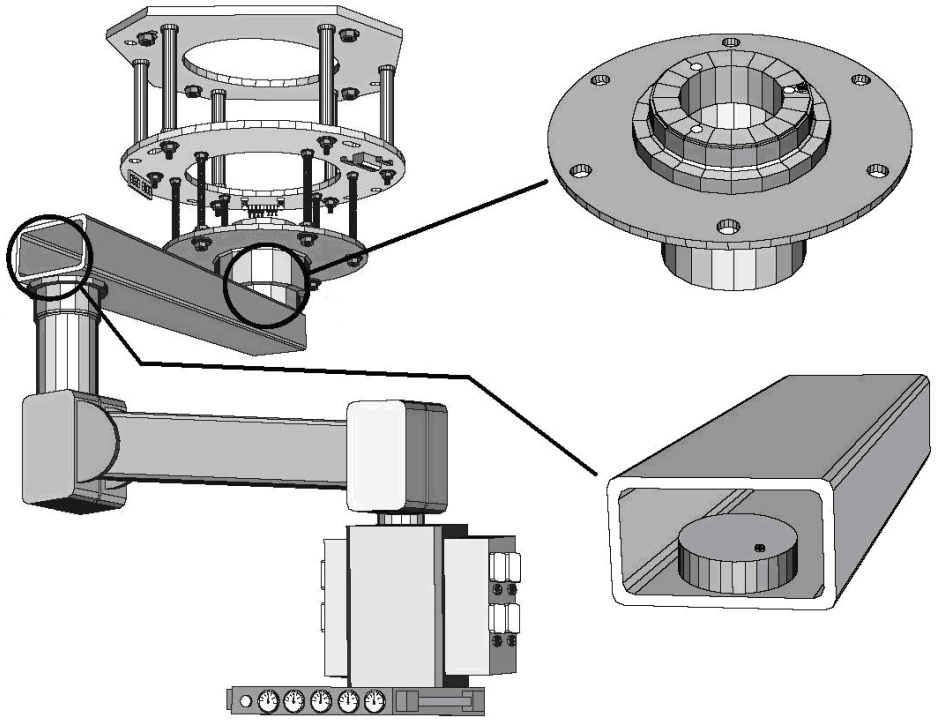
Figure 28 – Coronus extension arm pneumatic brake connections



1.	Brake button 1 (Controls pivot point 1)
2.	Brake button 2 (Controls pivot point 2)
3.	Brake button 3 (Controls pivot point 3)
4.	Brake button 4 (Controls pivot point 4)
5.	Arm brake tube connection point
6.	Flange brake tube connection point

7.	Pivot point 1
8.	Pivot point 2
9.	Pivot point 3
10.	Pivot point 4

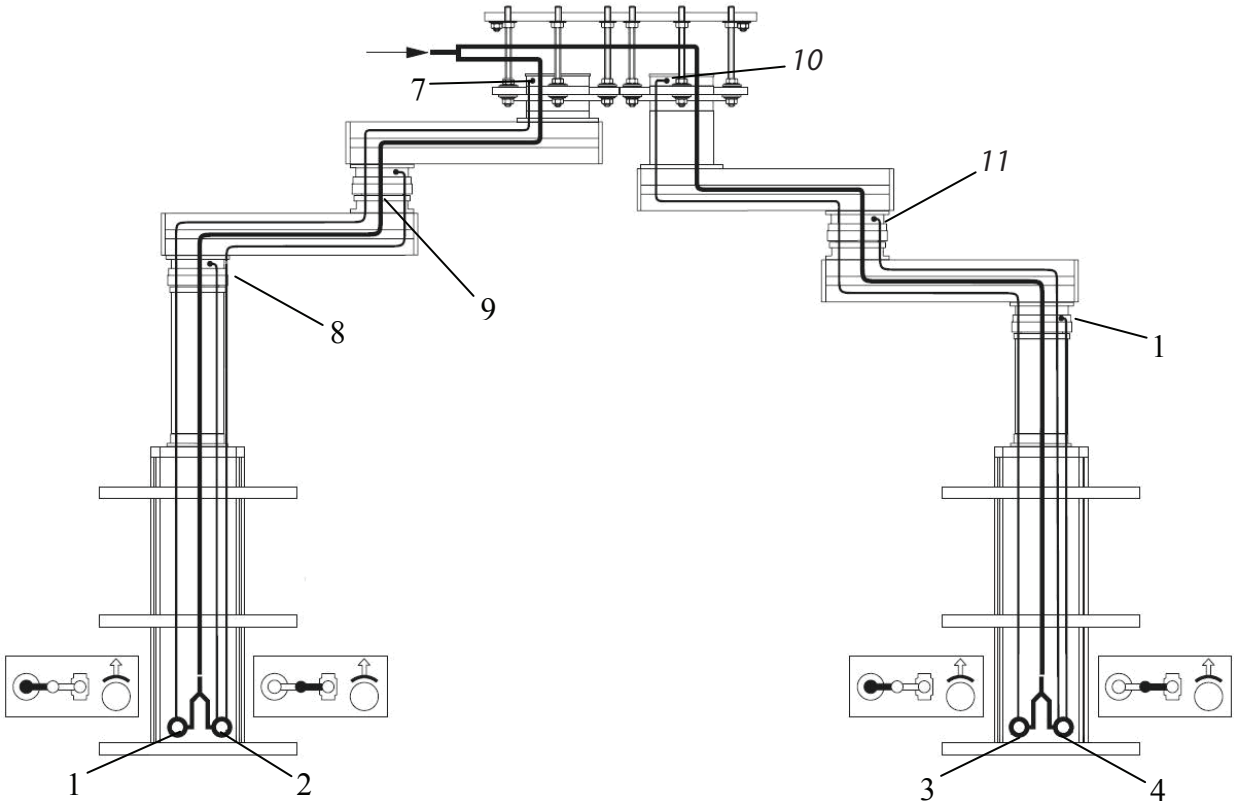
Figure 29 – Coronus motor arm pneumatic brake connections



1.	Brake button 1 (Controls pivot point 1 and 2)
2.	Pivot point 1
3.	Pivot point 2

4.	Arm tube connection point
5.	Flange brake tube connection point

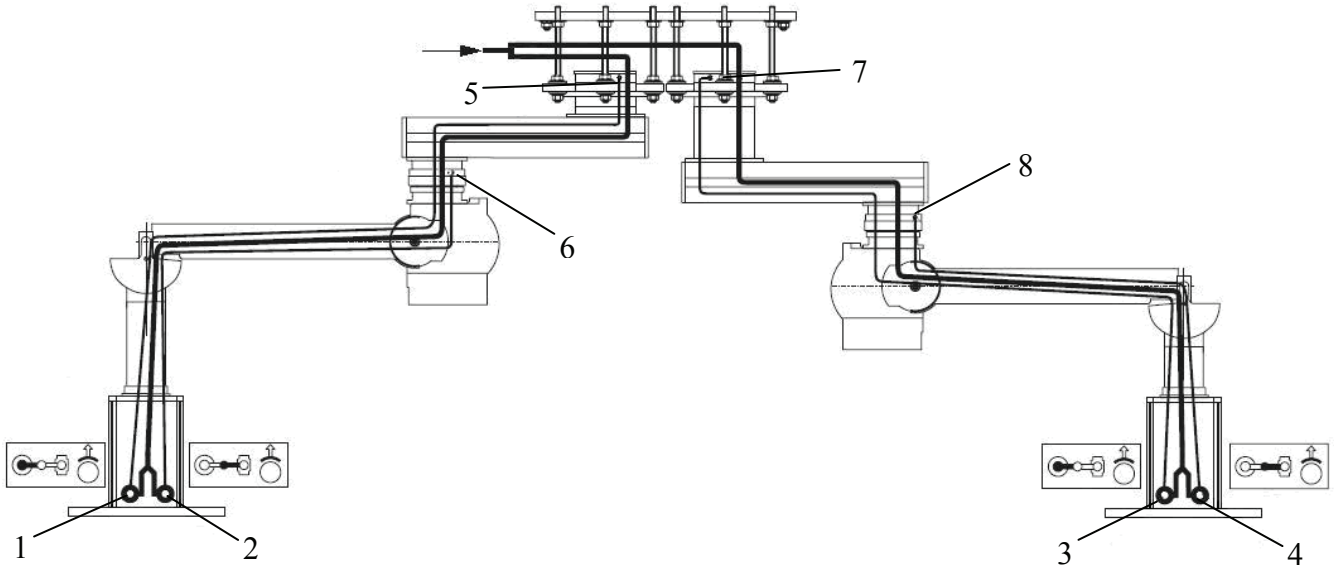
Figure 30 – Atlas extension arm pneumatic brake connections



1.	Brake button 1 (Controls pivot point 1)
2.	Brake button 2 (Controls pivot point 2 and 3)
3.	Brake button 3 (Controls pivot point 4)
4.	Brake button 4 (Controls pivot point 5 and 6)
5.	Arm brake tube connection point
6.	Flange brake tube connection point

7.	Pivot point 1
8.	Pivot point 2
9.	Pivot point 3
10.	Pivot point 4
11.	Pivot point 5
12.	Pivot point 6

Figure 31 – Atlas motor arm pneumatic brake connections

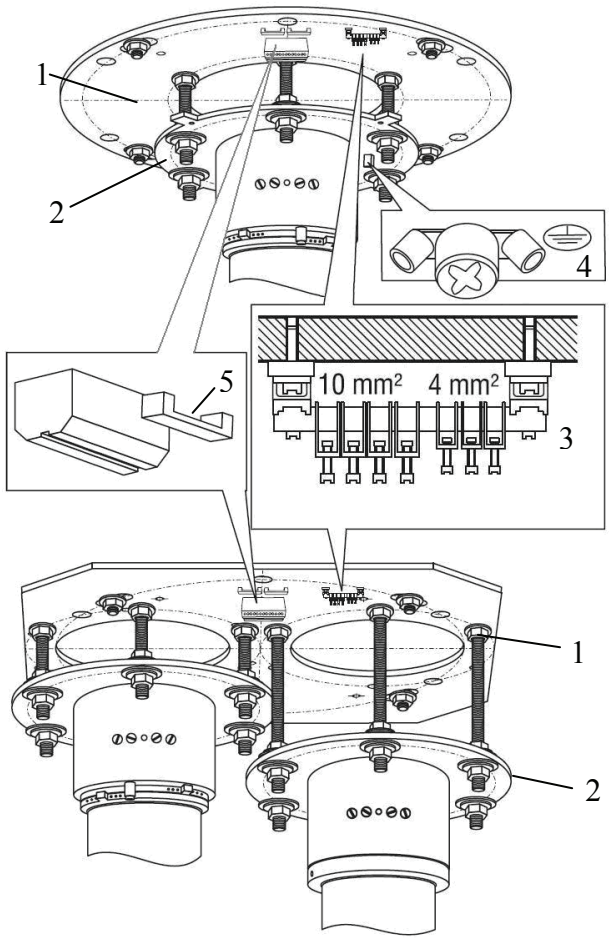


1.	Brake button 1 (Controls pivot point 1)
2.	Brake button 2 (Controls pivot point 2)
3.	Brake button 3 (Controls pivot point 3)
4.	Brake button 4 (Controls pivot point 4)

5.	Pivot point 1
6.	Pivot point 2
7.	Pivot point 3
8.	Pivot point 4

Figure 27 – Service and flange assembly earth bonding

Coronus pendant system



1.	Intermediate plate
2.	Flange plate assembly
3.	Intermediate plate earth terminals
4.	Flange plate earth terminals
5.	Traction relief

2.4.5 Electrical Connection.

The supply for feeding the service head electrical sockets will be connected to the terminal blocks installed during previously described section. If instructions have been followed an electrical diagrams can be found inside the terminal box and on the cover.

WARNING…

ENSURE THAT THE POWER IS ISOLATED AND REMAINS ISOLATED USING THE PROCEDURE LAID DOWN BY THE PARTICULAR HOSPITAL. THE POWER SHOULD NOT BE TURNED ON UNTIL FINAL COMMISSIONING OF THE PENDANT ELECTRICAL SYSTEM.

NOTE…

Ensure that all electrical work is carried out in conformance with any regional standards.

- Route conduit with the mains supply cables to the location of the terminal box described previously.

- Thread cables into the terminal box via the gland holes and connect the conduit to the terminal box using a conduit gland.

- Prepare the cable ends and connect to the terminals as shown in the wiring diagram.

2.4.6 Pneumatic Brake Connection.

Each horizontal rotation joint of the pendant arms is fitted with a pneumatic brake except when the service head is fitted to a motor arm or Coronus extension arm. In this case a friction brake restricts the service head rotation. See
previous section for details of the pneumatic supply line.

WARNING…

1. SUPPLY LINES ABOVE 8 BAR WILL NEED TO BE REGULATED DOWN TO PREVENT DAMAGE OR FAILURE OF THE BRAKE SYSTEM.

2. ENSURE THAT NONE OF THE BRAKE SUPPLY HOSES ARE DAMAGED, AS THIS MAY RESULT IN FAILURE OF THE BRAKE FUNCTION.

3. DO NOT BEND THE BRAKE HOSE, AS THIS MAY RESULT IN FAILURE OF THE BRAKE FUNCTION.

4. ENSURE THAT THE BRAKE HOSES ARE CARFULLY INSTALLED AVOIDING ANY TRISTING.

5. ENSURE THAT THE BRAKE HOSES AND VALVES ARE CLEAN FROM PARTICULATES PRIOR TO FINAL CONNECTION.

NOTE…

- For details on how to adjust the braking force for the pneumatic braking system see commissioning section.
- The rotational of the service head is restricted by a friction brake, so has no connection to the air supply. For details on how to adjust the braking force for the friction braking system see commissioning section.
- Connect the ø12mm brake supply hose to the installed supply.
- Depending on the specification of the pendant system see figure 28-31 for connection of the ø4mm tube to the brakes and controls

•

2.4.7 Connect Medical Gas Hoses.

The gas service connections can be found attached to the intermediate plate. All connection is gas specific and non-interchangeable. The gas service kits are positioned in the correct order as specified in HTM02-01 and HTM2022, which is O2, N2O, O2/N2O 50%/50%, Medical Air, Surgical Air, Vacuum and AGS.

• Connect each hose to the correct gas service kit, tighten using a spanner, but be careful not to over torque.

2.4.8 Ceiling Shroud.

The shroud is fitted in two parts to enclose the ceiling cavity from either side. Threaded drop rods should be fitted as shown in figure 32 and 33. Plastic capped screws are supplied to neatly finish off the shroud installation.

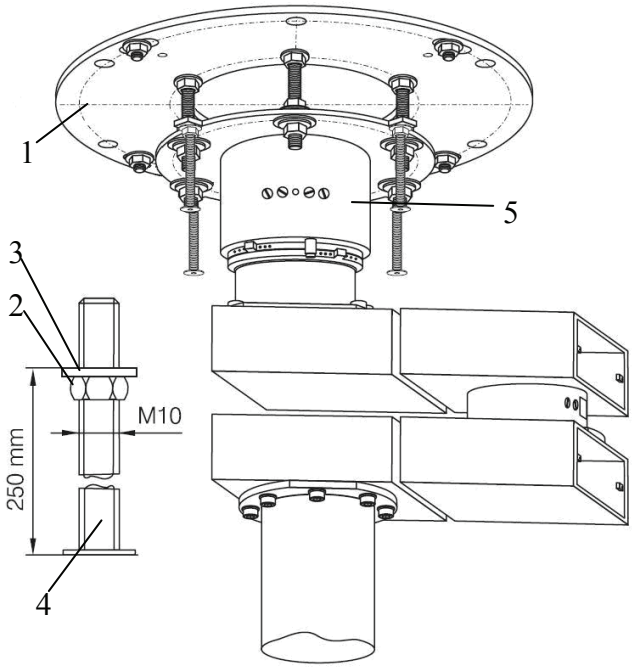
NOTE…

If commissioning is to be carried out immediately after the installation the shrouds can be left until the end of the next section.

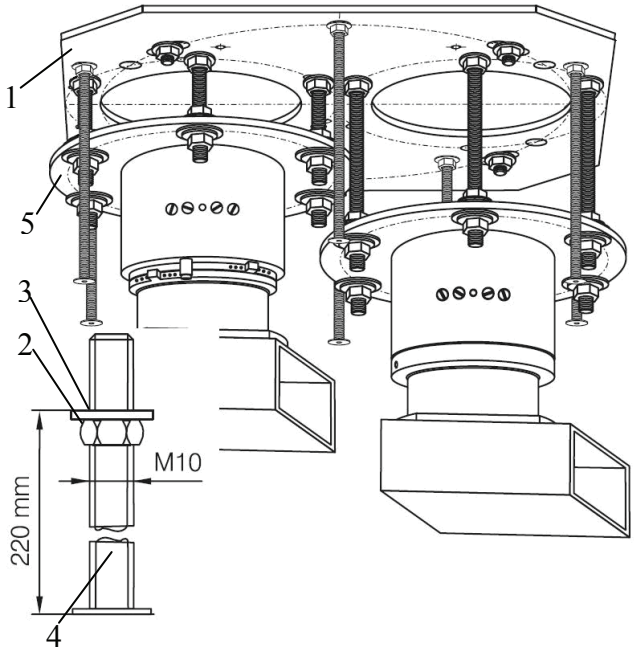
• Figure 32 and 33 shows threaded rods that are fitted to the intermediate plate and have internally threaded ends on the lower side. These will accept the plastic capped screws passing through the holes in the shroud. For fitting the ceiling shrouds see commissioning section.

• Silicone based sealant may be used to give a dust tight seal between the ceiling and the top of the shroud. This should not normally be done until the 2nd fix is installed and commissioned. Figure 32 – Coronus ceiling shroud mountings

Single Arm System



Tandem Arm System



1.	Intermediate plate
2.	M10 nut
3.	M10 washer
4.	M10 shroud support column
5.	Flange Plate Assembly

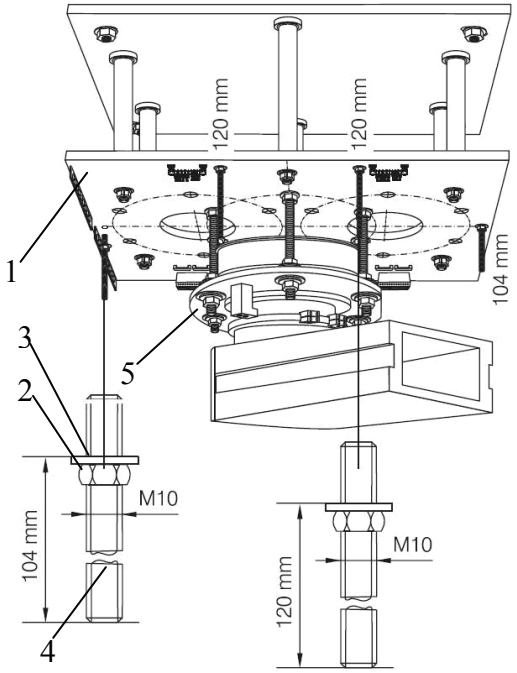
2.4.9 Pendant Covers.

For fitting the various pendant covers see commissioning section.

NOTE...

If commissioning is to be carried out immediately after the installation the covers can be left until the end of the next section

Figure 33 – Atlas ceiling shroud mountings



1.	Intermediate plate
2.	M10 nut
3.	M10 washer
4.	M10 shroud support column
5.	Flange Plate Assembly

3. COMMISSIONING

3.1 Introduction

Commissioning of the Pneumatech MGS Pendant system with Gem 10 terminal units fitted is normally carried out in two parts.

Part 1 consists of pipeline carcass pressure testing on completion of the first fix installation.

Part 2 is carried out on completion of the second fix installation and ensures that the correct flow rate/pressure is achieved at each terminal unit.

Full anti-confusion, identification and mechanical compatibility checks are carried out. Nitrogen may be used to complete the pipeline pressure test only. Medical quality air is used throughout the remaining procedures and the correct type of Medical gas introduced to complete the gas identification, quality and purity checks. Commissioning is carried out after initial installation. Personnel carrying out the commissioning procedure must be qualified,
competent and conversant with the information contained in this manual.

3.1.1 Part 1.

Following installation of all first fix assemblies, the Medical gas pipelines must be purged to remove all particulate matter and the following checks/test carried out :-

Ensure that the correct gas specific service kits are installed and located in accordance with the installation specification.

Check that each gas service kit incorporates the correct NIST fitting.

Ensure that a sealing washer and blank NIST nut is fitted to each gas service kit.

Carry out the pipeline carcass pressure testing in accordance with the installation contract, HTM02-01, HTM 2022 or International Standard as applicable.

On completion, the distribution system must be purged with Medical quality air to remove all traces of Nitrogen.

NIST blanking nuts should remain fitted to prevent ingress of foreign matter until the second fix assembly is installed.

3.1.2 Part 2.

Following installation of the pendant and all other associated components which complete the distribution system pipe work, each Medical gas service must be commissioned in accordance with the installation con-

tract, HTM02-01, HTM 2022 or International Standard as applicable. Whilst the above standards are mandatory and provide specific details of each test, the following paragraphs are Pneumatech MGS recommendations designed to ensure that each terminal unit is fully tested before it is brought into use. The AGS disposal system and electrical installation (if fitted) must be functionally checked. The mechanical
operation and adjustment of the pendant operating mechanisms must be checked and proven.

3.2 Tests for leakage on each Medical Gas pipeline system.

Each Medical gas pipeline system should be pressure tested separately and links between systems shall not be fitted. Pipeline systems shall normally be complete and isolated from the normal supply system. Parts of pipelines may, if convenient, be pressure tested separately, but care must be taken to ensure that the entire distribution system is fully tested. The following procedure shall be carried out on each pressure gas distribution system :-

Pressurise each distribution system with Medical quality air at normal distribution system pressure. Disconnect pressure source.

Leave pressurised for the period stated in the installation contract or appropriate standard and note the pressure at the end of test.

The pressure drop shall not exceed 0.02 litres per hour per terminal unit (subject to temperature corrections).

Any leakage outside the limits must be investigated, rectified and the test repeated.

Tests for leakage on each Medical Vacuum pipeline system.

Operate vacuum plant and establish normal operating vacuum.

Isolate distribution system from plant.

Leave for 1 hour and note vacuum at end of test.

The pressure increase should not exceed 10 mm Hg.

Any leakage outside the limits must be investigated, rectified and the test repeated.

3.3 Tests for cross-connection.

Each Medical gas pipeline system shall be complete and links between systems shall not be fitted. All Zone Service Units shall be selected open. Only one system at a time shall be checked with the remaining systems at atmospheric
pressure. The following procedure shall be carried out on each Medical gas distribution system: -

Pressurise distribution system under test with Medical quality air at normal operating pressure or induce the normal vacuum.

Using the correct Medical gas probes, ensure that gas flows only from the correct terminal units for the system under test.
Ensure that all other terminal units on systems not under test do not have a gas flow.

Flow and pressure drop tests - individual terminal units.

To prove the flow and pressure drop through each individual terminal unit, carry out the following procedure :-

Pressurise distribution system under test with Medical quality air at normal operating pressure or induce the normal vacuum.

Fit correct size FRDP into one terminal unit at a time.

Ensure that at the correct flow rate, the correct minimum pressure is achieved.

NOTE...

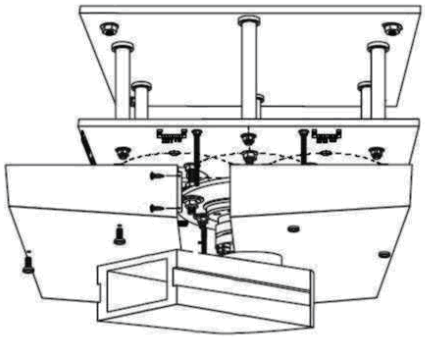
Performance figures detailed at Table 5 are for use with installations designed to operate in accordance with BS EN ISO 9170-1 and EN 739. Performance figures detailed at Table 6 are for use with installations designed to operate in
accordance with BS5682: 1984.

Table 5: Acceptable Pressure And Flow Rates For Terminal Units And Hose Assemblies In Accordance With BS EN ISO 9170-1 And EN 739.

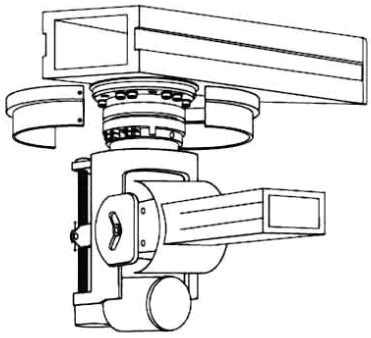
Terminal Unit Nominal distribution Pressure BS EN ISO 9170-1 kPa	Test Pressure kPa	Test Flow BS EN ISO 9170-1 L/min	Terminal Unit Pressure Drop kPa	Hose Pressure Drop BS EN ISO 9170-1 kPa	Combined Terminal Unit and Hose Pressure Drop BS EN ISO 9170-1 EN739
400 to 500	320	60	15	25	40
400 to 500	320	200	70	80	150
800 to 1000	640	300	70	80	150
Vacuum	40 (Absolute)	40	15	20	35
AGS	See AGS system documentation				

Figure 34 – Atlas ceiling and joint covers

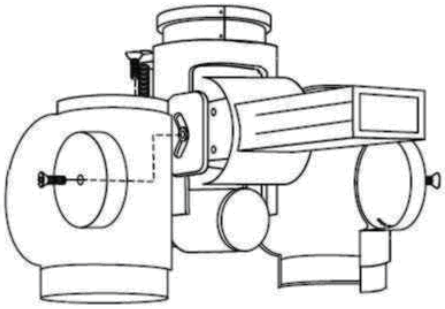
Ceiling covers



Bearing and stop covers



Motor and vertical limit covers



Arm to service head link covers

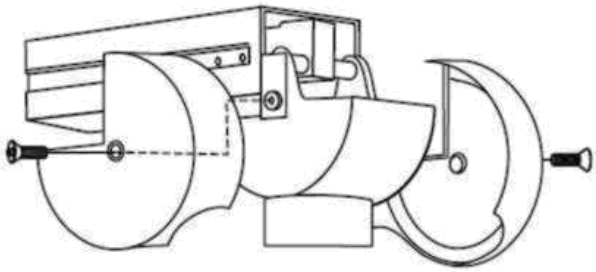
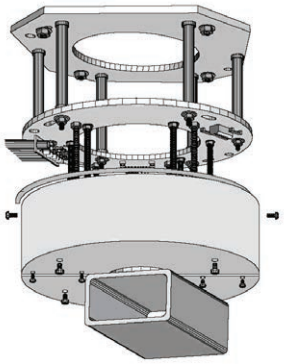
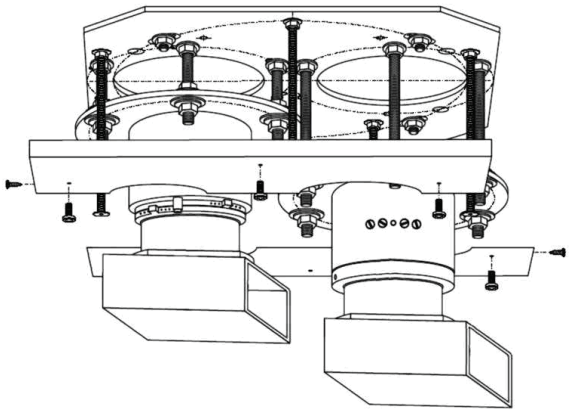


Figure 35 – Coronus ceiling and joint covers

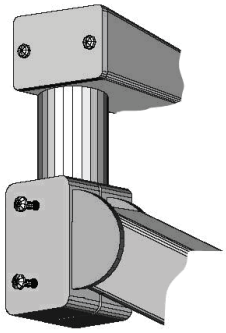
Solo arm Ceiling covers



Tandem Ceiling covers



Motor Cover



Arm end cap and Bearing cover

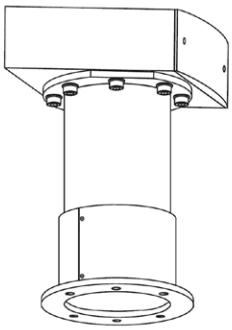


Table 6: Acceptable Pressure And Flow Rates For Terminal Units And Hose Assemblies In Accordance With BS5682: 1984

Service and design pressure	Flow rate at STP (litres/minute)	Pipeline Pressure (kPa)	Pressure Drop (kPa)
O2 and N2O - 400kPa	40	400	3.4
O2/N2O (50%/50%) 400kPa	275	400	55
Medical Air - 400kPa	50	400	3.4
Surgical Air - 700kPa	350	800	100
Medical Vacuum	40	53.3kPa (400mm Hg) Below Atmospheric (101.3 kPa)	13.3 (100mm Hg)
AGS	See AGS system documentation		

NOTE...

The flowrate of 350 L/min for surgical air is now a requirement of HTM02-01 and HTM2022 and does not conform to BS 5682: 1984.

3.4 Mechanical function and gas specificity - terminal units.

Each terminal unit shall be checked to ensure that it will only accept the correct Medical gas test probe and that its mechanical function is correct. This check shall be carried out with the system pressurised in accordance with the following procedure and shall be carried out on every terminal unit installed.

Ensure that the correct Medical gas test probe can be inserted into the terminal unit, captured (cannot rotate for horizontally mounting units only) and released.

NOTE...

Ensure that probe movement is free, that the probe fully engages and is locked firmly in position. Ensure that the terminal unit does not leak past the probe. Withdraw probe and ensure terminal unit seals the gas flow.

Attempt to connect all other Medical gas test probes and ensure that no other probe will engage.

3.5 Performance tests on the pipeline system.

If required by the contract, apply the HTM02-01 or HTM 2022 diversity factor for each type of installation and fit the FRDP's into the correct number of terminal units to provide full design flow rates. Check the flow rate and pressure at each terminal unit. Ensure that the pipeline performance standards are correct in accordance with the installation contract, HTM02-01, HTM 2022 or International Standard as applicable.

3.6 Other test requirements.

Other tests will be required to prove other aspects of the installation, but are not directly related to the terminal units. These tests should be detailed in the installation contract and shall be carried out before introduction of the working gas.

Purging and filling with specific working gas.

The procedure to purge and fill the distribution system with the specific working gas is as follows: -

NOTE...

Medical compressed air and oxygen from a PSA plant should be tested for quality before the pipeline is filled with gas from the plant.

- Disconnect all sources of test gas.
- Remove all "Special connectors" from site.
- Ensure that all Zone Service Units are selected open.
- Depressurise the distribution system.
- Fill each system with specific working gas.
- Purge each terminal unit to remove all traces of the test gas (Medical quality air).

NOTE...

Purging of vacuum systems is not required.

3.7 Gas identification, quality and purity checks.

Witness the following checks, which are normally carried out by the "Suitably Qualified Person" designated by the customer.

- Particulate matter tests.
- Oil tests.
- Water tests.
- Carbon Monoxide and Carbon Dioxide tests.
- Gas identification tests.

When totally satisfied that the "Suitably Qualified Person" has completed their checks and certified the systems as serviceable, and only when authorised by the "Authorised Person", remove the "DANGER" label from each terminal unit.

3.8 AGS Disposal System terminal unit.

If the pendant installation is carried out simultaneously with a complete AGS Disposal System installation, the complete AGS commissioning procedure must be carried out. If the pendant is installed and connected to an exist-

ing AGS
system, the following checks must be carried out:-

Ensure that the AGS terminal unit is correctly identified and labelled.

Insert an AGS probe into the terminal unit and check for smooth operation and effective action.

Fit a flow meter calibrated to simulate the pressure drop of the transfer/receiver system and with the AGS system selected ON, check that the flow rate is correct.

Note...With a resistance to flow of 1 kPa, the flow rate should not exceed 130 litres/min and, with a resistance to flow of 4 kPa, the flow rate should exceed 80 litres/min.

3.9 Electrical installation

Every installation shall be inspected and tested during erection of the electrical system, and after completion.

During inspection and testing precaution should be make to prevent danger or damage to persons, property or equipment.

The electrical system will be inspected to ensure that the system has been correctly selected and erected in accordance with BS 7671, and that there is no visible damage that may impair safety.

The appropriate tests should be carried out in line with BS 7671 or International Standard as applicable, and compared against the relevant criteria.

If any test shows a failure, the installation must be rectified. The test must then be repeated along with any other tests that may be effected.

The following list of tests is required where applicable.

- Continuity of protective conductors.
- Continuity of the mains supply final conductors.
- Insulation resistance.
- Site applied insulation.
- Protection by separation of circuits.
- Protection against direct contact.
- Insulation of non-conducting floors and walls.
- Polarity.
- Earth electrode resistance.
- Earth fault loop impedance.
- Prospective fault current.
- Functional testing.

3.10 Mechanical installation

A number of checks must be carried out to prove the correct mechanical installation and adjustment of the ceiling pendant.

Covers and shrouds.

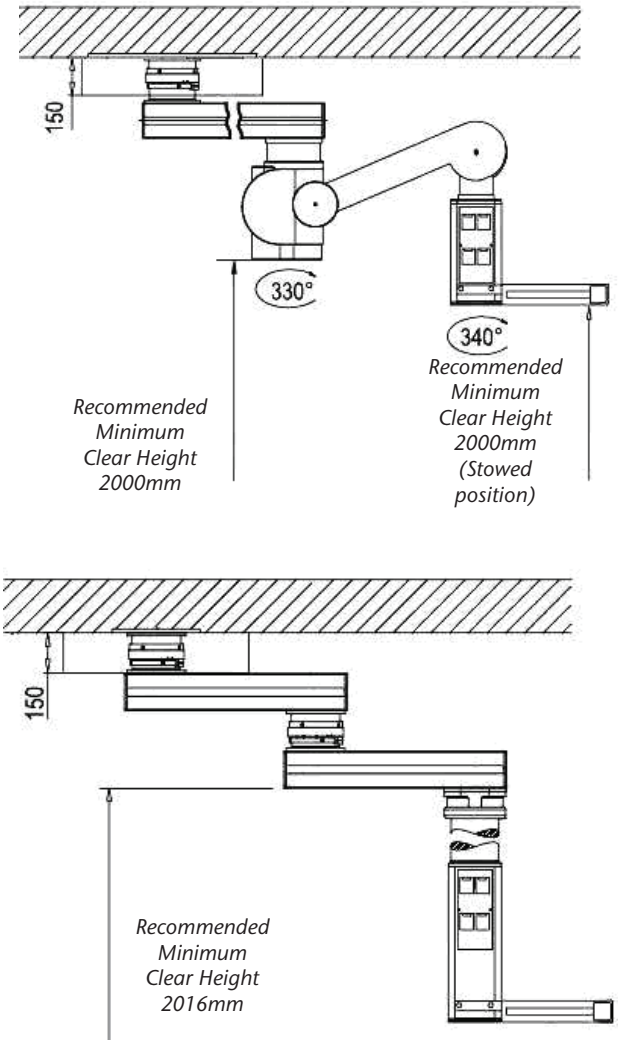
Remove covers at pendant joints and ceiling shroud (See Figure 34 and 35).

WARNING…SOME OF THE PENDANT COVERS CONCEAL POWER SUPPLY COMPONENTS, ALWAYS ISOLATE THE POWER SUPPLY BEFORE ENTERING THESE LOCATIONS•

Check Clear height.

With the service head in the stowed (highest) position, check that the free passage height is within the limits of the installation specification (See Figure 36).

Figure 36 – Clearance height dimensions



Check range of vertical movement.

The vertical motion allows a maximum of + or – 23° for the Atlas System (715mm or 515 total movement for the

different arms available) and + 24° – 21° from horizontal for the Coronus (690mm total adjustment).

WARNING…

1. WHEN ADJUSTING THE PENDANT POSITIONS, AVOID AGGRESSIVELY STRIKING THE END STOPS, AND TAKE CARE NOT TO CAUSE ANY COLLISIONS WITH SURROUNDING EQUIPMENT.

2. THE LIFTING DEVICE IS NOT SUITABLE FOR CONTINUOS OPERATION LONGER THAN 3 MINUTES.

3. THE MOTOR COVERS CONCEAL POWER SUPPLY COMPONENTS, ALWAYS ISOLATE THE POWER SUPPLY BEFORE ENTERING THIS LOCATION.

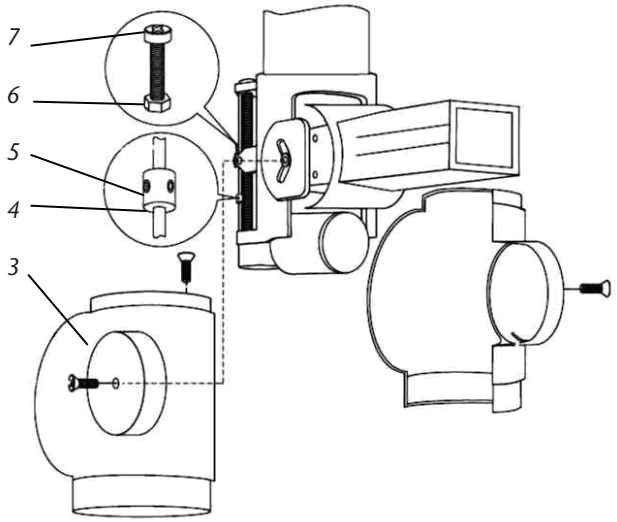
The next steps are for the Atlas systems only. Ensure the power supply is isolated whenever the covers shown in figure 8 are accessed, as this will expose live parts. Ensure that non-of the surrounding environment can be damaged by or cause damage to the pendant during vertical
operation.

Move the pendant arm to its desired upper position, and move the control ring to contact the stop. Apply thread retention fluid to the locking bolts.

Move the pendant arm to its desired lower position, loosen the hexagon nut and rotate the adjustment nut to desired position, and tighten the hexagon nut to lock in position.

Replace all covers, the motor joint cover must lay within the groove in the motor cover (see figure 37). Power up the pendant, check the full range of movement and re-adjust if required.

Figure 37 – Vertical movement limiting setup.



1.	Motor joint cover
2.	Groove in motor cover
3.	Motor cover
4.	Control ring locking bolts
5.	Control ring
6.	Hexagonal nut
7.	Adjustment screw

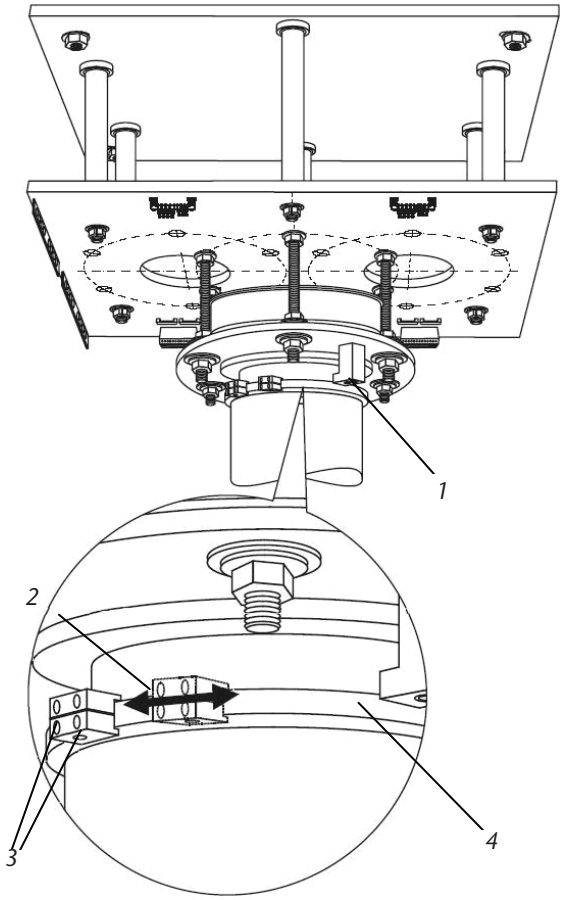
Check rotational movement of pendant arms and service heads.

Operate pendant through its full range of movement at each joint. For Atlas system ensure that maximum range of 330° for pendant arms and 340° for service head is not exceeded. For Coronus system ensure that maximum range of 320° for pendant arms and 340° for service head is not exceeded.
Ensure that the pendant does not foul on any adjacent equipment. If necessary adjust stop to restrict range of movement after consultation with the end user. Ensure that contact is made with the stops at the limit of the pendants movement (See Figure 38 or 39).

WARNING…WHEN ADJUSTING THE PENDANT POSITIONS, AVOID AGGRESSIVELY STRIKING THE END STOPS, AND TAKE CARE NOT TO CAUSE ANY COLLISIONS WITH SURROUNDING EQUIPMENT.

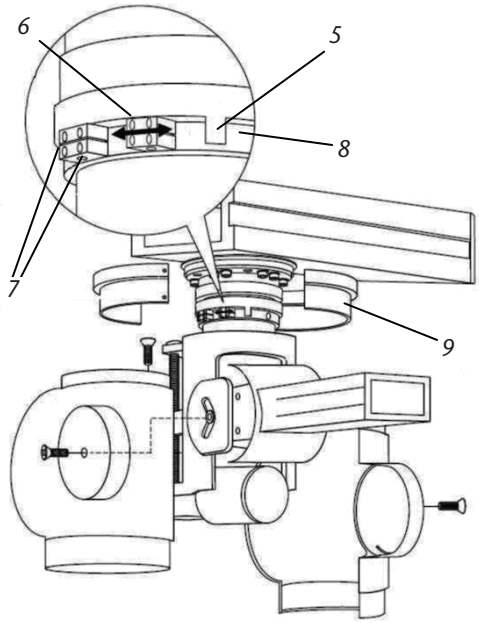
Figure 38 – Atlas Pendant arms and service head horizontal limiting stops.

Flange Plate Adjustment



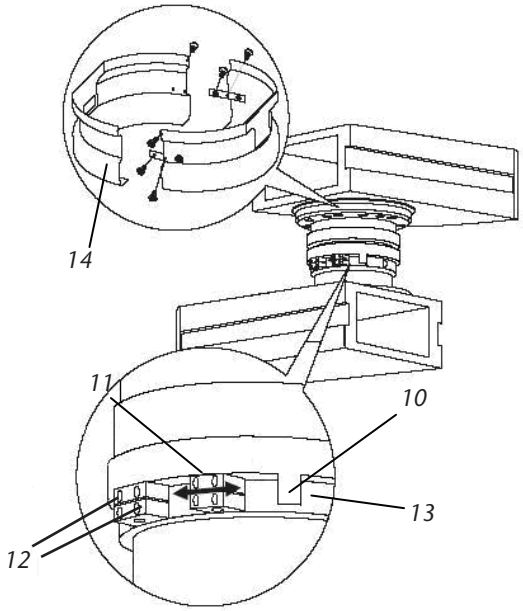
1.	Fixed Stop
2.	Adjustable Stop
3.	Adjustable Stop Screws
4.	Adjustable Stop Ring

Vertical movement Arm Adjustment



5.	Fixed Stop
6.	Adjustable Stop
7.	Adjustable Stop Screws
8.	Adjustable Stop Ring
9.	Bearing Cover

Arm Adjustment



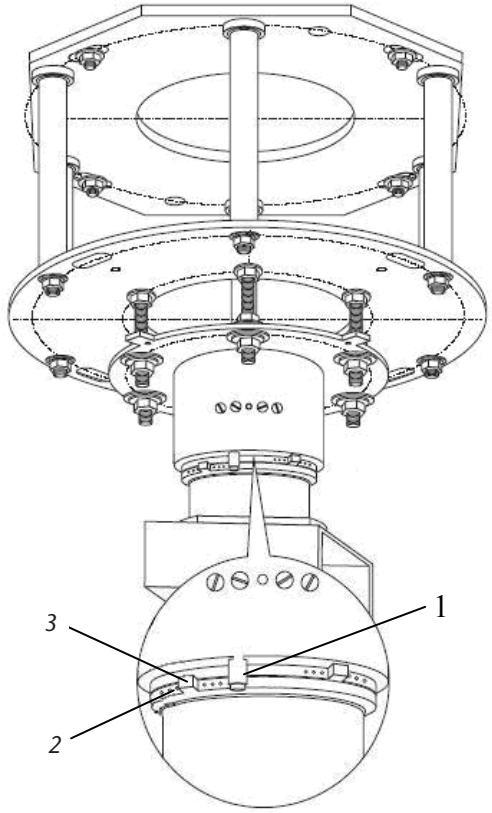
10.	Fixed Stop
11.	Adjustable Stop
12.	Adjustable Stop Screws
13.	Adjustable Stop Ring

14.	Bearing Cover

To adjust the stop positions, loosen the adjustable stop screws, reposition the adjustable stops where desired and secure in place.

Figure 39 – Coronus Pendant arms and service head horizontal limiting stops.

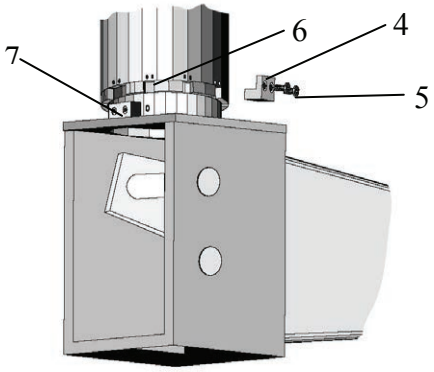
Flange Plate and Horizontal Arm Adjustment



1.	Fixed Stop
2.	Adjustable Ring Screws
3.	Adjustable Stop Ring

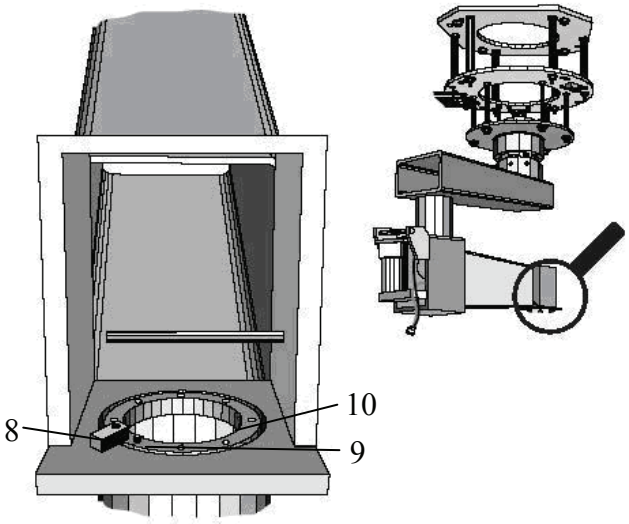
To adjust the stop positions, loosen the adjustable stop screws, reposition the adjustable stops where desired and secure in place.

Motor Arm Top Pivot Adjustment



4.	Angled Stop
5.	Angle Stop Screws
6.	Angle Stop Mount Positions
7.	Stop Block

Motor Arm Bottom Pivot Adjustment



8.	Stop Block
9.	Stop Bolt
10.	Stop Bolt Mounting Positions

To adjust the stop positions, loosen the stop bolts, reposition where desired and secure in place.

3.11 Mechanical Brake System.

Check the braking force at the service head and pendant arm pivot locations, so that they can be easily re-located, yet will not drift once positioned where desired. If necessary adjust the braking force after consultation with the end user (See Figure 40).

NOTE…

Adjustment of the pneumatic braking force is only available for the Atlas pendant systems.

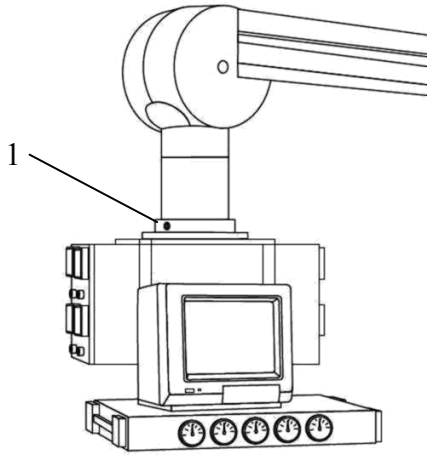
WARNING…

1. WHEN ADJUSTING THE PENDANT POSITIONS, AVOID AGGRESSIVELY STRIKING THE END STOPS, AND TAKE CARE NOT TO CAUSE ANY COLLISIONS WITH SURROUNDING EQUIPMENT.

2. SOME OF THE PENDANT COVERS CONCEAL POWER SUPPLY COMPONENTS, ALWAYS ISOLATE THE POWER SUPPLY BEFORE ENTERING THESE LOCATIONS.

Figure 40 – Brake Adjustment

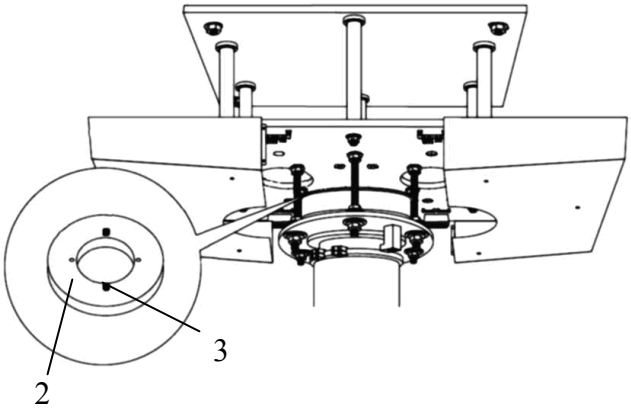
Friction Brake System (Service Head)



1.	Brake Adjustment Screw.

To increase the brake force evenly turn the 2 brake adjustment screws positioned at 180° from each other in a clockwise direction, until the desired effect is experienced. To decrease the braking force, turn in the opposite direction.

3.12 Pneumatic Brake System (Flange Plate)

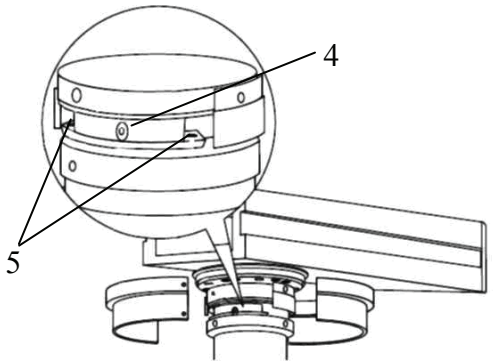


2.	Brake Flange
3.	Brake Adjustment Screw

To increase the brake force, evenly turn the 2 brake adjustment screws in a clockwise direction until the desired effect is experienced. To decrease the braking force turn the screws in the opposite direction

WARNING…FOR REDUCING THE PNEUMATIC BRAKING FORCE AT THE FLANGE PLATE DO NOT TURN THE BRAKING SCREWS MORE THAN 1 TURN, AS THIS MAY RESULT IN DAMAGE TO THE BRAKE SYSTEM.

Pneumatic Brake System (Arm Joints and service head when connected to an extension arm)



4.	Brake securing Screw
5.	Brake adjustment Pin

Loosen the securing screw at each brake shoe. To increase the brake force, evenly turn both adjustment pins in a clockwise direction until the desired effect is experienced. To decrease the braking force, turn the pins in the opposite direction. When satisfied with the result, tighten the securing screw.

3.13 Inspect flexible hoses and conduit.

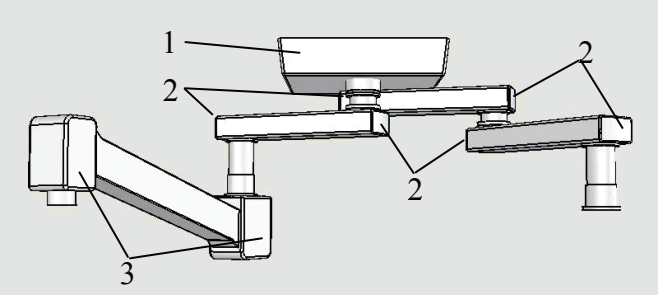
Examine as far as possible all flexible hoses and electrical conduit. Ensure no chafing, stress or damage occurs whilst moving the pendant throughout both its vertical and rotational range of movement (See section 2 of the operating and maintenance manual).

NOTE...

If any stiffness is experienced it may be due to chafing flexible hoses/electrical conduits. To examine these areas remove the covers shown in figure 41 (See previous section for how to remove the covers).

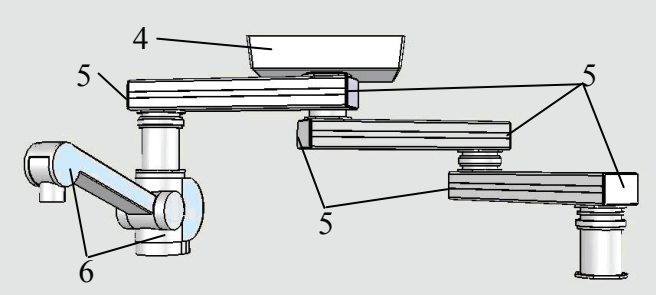
Figure 41 – Access points for inspecting hoses and conduit

Coronus Pendant System



1.	Ceiling Shroud (Gas and Electrical Connection)
2.	Arm End Caps
3.	Motor Arm Covers

System



4.	Ceiling Shroud (Gas and Electrical Connection)
5.	Arm End Caps
6.	Motor Arm Covers

3.14 Fit ceiling shroud and covers

See previous section for details of shroud and cover fittings. Silicone based sealant may be used to give a dust tight seal between the ceiling and the top of the shroud.

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