

Rigid and Retractable Pendants

Installation, Operation and Maintenance Manual



Published by Pneumatech Medical Gas Solutions

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Important

Personnel must make themselves familiar with the contents of this manual and the function of the unit before installing, operating or maintaining any Rigid or Retractable 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.

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- Lot/ Batch Number
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- Apparent fault.

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Issue Record

Issue No.	Reason for Change	Pages affected	Date
Ed1	Rebranding	All	12/10/2015

Introduction

This manual contains information needed to install, operate and maintain the Pneumatech Medical Gas Solutions (Pneumatech MGS) Rigid or Retractable Pendant.

The contents of this manual are intended to be read and used by suitably qualified personnel.

WARNINGS, CAUTIONS and NOTES

The following Warnings, Cautions, and Notes must be read and understood before using the Rigid or Retractable Pendant.

Warnings!

Warnings tell you about dangerous conditions that could lead to death or serious injury to the user that can occur if you do not obey all of the instructions in this manual.

1. **WARNING! Read through this entire instruction manual before using or showing others how to use this equipment. As with all medical equipment, attempting to use this device without a thorough understanding of its operation may result in patient or user injury.**
2. **WARNING! Do not attempt to modify this device in any way not strictly described within this manual.**
3. **WARNING! Pendants must be protected from access by unauthorised personnel.**
4. **WARNING! No attempt should be made to use this product with a gas service or at a pressure other than as identified.**
5. **WARNING! Do not use this product if it appears damaged in any way.**
6. **WARNING! Do not use this product if there is evidence of contamination internally or on any of gas wetted connections (e.g. debris, particles, oil, lubricants or grease).**
7. **WARNING! This equipment should only be installed, commissioned, operated and maintained by technicians who are suitably trained with medical gas systems, such as Competent or Authorised Persons as defined in UK Department of Health Technical Memorandum No. 02-01 (HTM 02-01).**
8. **WARNING! Before loosening any pneumatic connection, ensure that the pressure has been isolated.**
9. **WARNING! Dangerous voltage - risk of electrocution: Disconnect the pendant from the electrical mains supply before commencing work on any electrical components. The mains supply must be isolated, locked in the off position and proved dead before attempting to access any mains parts.**
10. **WARNING! Risk of fire or explosion: Do not lubricate this product with oil or grease. Use only safe and compatible lubricants available from Pneumatech Medical Gas Solutions.**
11. **WARNING! Keep all components dry and clean during installation.**

Cautions!

Cautions tell you about dangerous conditions that can occur and cause damage to the equipment if you do not obey all of the instructions in this manual.

1. **CAUTION!** Use of sub-standard or inappropriate parts and materials may damage the Rigid or Retractable Pendant System and invalidate the warranty. Only use genuine Pneumatech Medical Gas Solutions spare parts.
12. **CAUTION!** Any work involving alteration, extension or maintenance work to an existing system should be subject to the *Permit to Work* procedure detailed in HTM 02-01.
13. **CAUTION!** Be careful not to over-torque face seal fittings.
14. **CAUTION!** Only use leak detection fluids that are compatible with the materials being tested.
15. **CAUTION!** Always wash leak detection fluids off with clean water immediately after use.

Notes:

1. All information, specifications and illustrations within this manual are those in effect at the time of printing.
2. The manufacturer reserves the right to change or make improvements without notice and without incurring any obligation to make changes or add improvements to products previously provided.
3. A blown fuse or tripped circuit breaker is often a symptom of a problem rather than a root cause.
4. All information, specifications and illustrations within this manual are those in effect at the time of printing.

Abbreviations used

The following abbreviations are used in this manual:

Abbreviation	Full name
MGS	Medical Gas Solutions
IPS	Isolated Power Supply
ERB	Earth Reference Busbar
BS EN	British Standard European Standard
NHS	National Health Service
HTM	Health Technical Memorandum
mm	millimetre
kg	kilogram
v	volts
A	amperes
ac	alternating current
AGSS	Anaesthetic Gas Scavenging System
kPa	kilopascal
R.H.	Relative Humidity
IPX	Ingress Protection Rating
GMDN	Global Medical Device Nomenclature
EC MDD	European Medical Devices Directive

MEIGaN	Medical Electrical Installation Guidance Notes
GHTF	Global Harmonization Task Force
NIST	Non-Interchangeable Screw Thread
ELV	Extra Low Voltage

Scope of this manual

This manual describes the Operation Service, Repair and Testing of the Pneumatech MGS Rigid or Retractable Pendant.

Pneumatech Medical Gas Solutions service contact

In the event of any queries or problems that cannot be resolved using information in this manual, please call:

+44 (0) 1235 463051

Quote if possible, the:

- Product part number
- Lot/ Batch number
- Approximate date of purchase
- Apparent fault

Contents

Issue Record.....	iv
Introduction	iv
WARNINGS, CAUTIONS and NOTES	iv
Warnings!.....	iv
Cautions!.....	iv
Notes:	v
Abbreviations used.....	v
Scope of this manual.....	vi
Pneumatech Medical Gas Solutions service contact	vi
Safety.....	ix
Storage and Handling	ix
Identification.....	ix
Other Essential Features.....	ix
1 Description	1
1.1 Services	1
2 Technical Specification	3
2.1 Electrical Specification.....	4
2.2 Mains Socket Outlets	4
2.3 Mains Circuits Wiring.....	4
2.4 Equipotential Receptacles	4
2.5 Earth Bonding	5
2.6 ELV and Data Provisions.....	5
2.7 Retractable models	5
3 User Responsibility	6
4 Description of Symbols	6
5 Installation	7
5.1 Components.....	7
5.2 First Fix Installation	7
5.3 Second Fix Installation	8
5.4 Installation Procedure.....	10
5.5 Terminal Units	11
6 Commissioning	12
Introduction	12
6.1 Installation Testing	12
7 Operating Instructions	14
7.1 Terminal Units	14
8 Maintenance	15
8.1 Monthly	15
8.2 Annually	15
8.3 Tools and Equipment	15
8.4 Routine Inspection, Checks and Maintenance.....	15
8.5 Annual inspection	15
8.6 Component Replacement and Adjustment	16
8.7 Cleaning.....	16
9 Fault Diagnosis	17
9.1 Introduction	17

10	Wiring Diagrams	19
11	Spares	21
12	Declaration of Conformity	22

Safety

Hose assemblies are connected to the first fix ceiling NIST via flexible hoses with NIST fittings to ensure that it is NOT possible to interchange the gas services.

Storage and Handling

All products are separately packaged and stored in under controlled conditions. Adverse environmental conditions and harsh abrasives or chemicals may cause damage.

Identification

The identification label is affixed to the side of the pendant (ref. *Figure i*).



Figure i Rigid Pendant - Label

Other Essential Features

Pneumatech MGS Rigid and Retractable Pendants are ideal where space is at a premium as in operating theatres and recovery rooms. The use of overhead services to the patient eliminates the majority of trailing hoses and cables.

The Pendants provide a cost effective solution to avoid dangerous trailing hoses in the workplace.

1 Description

The Rigid and Retractable pendant head houses up to nine BS EN 9170 Terminal Units and twelve twin electrical sockets. The Terminal Units are constructed and operate in the same way as a wall mounted unit except they do not contain an anti-rotation pin.

A hand held remote control unit controls 300 mm of vertical movement of the Retractable Pendant, allowing services to move clear of the operating area. The control operates pneumatically and is attached to the side of the unit.

The Terminal Units fitted in Retractable Pendants are connected to the first fix Ceiling NISTs via flexible hoses with NIST fittings to ensure that it is impossible to interchange the services. All gas hoses are colour coded and have the appropriate NIST fittings permanently attached. First fix Ceiling NISTs incorporate a self-closing gas shut-off valve.

Terminal units fitted in Rigid Pendants are connected via an internal copper tube which passes through the pendant and protrudes 150 mm above the first fix plate for brazing to the medical gas pipeline supply, eliminating the need for the first fix ceiling NIST.

Pneumatech MGS Rigid and Retractable Pendants are of monocoque construction to maximise rigidity and minimise weight.

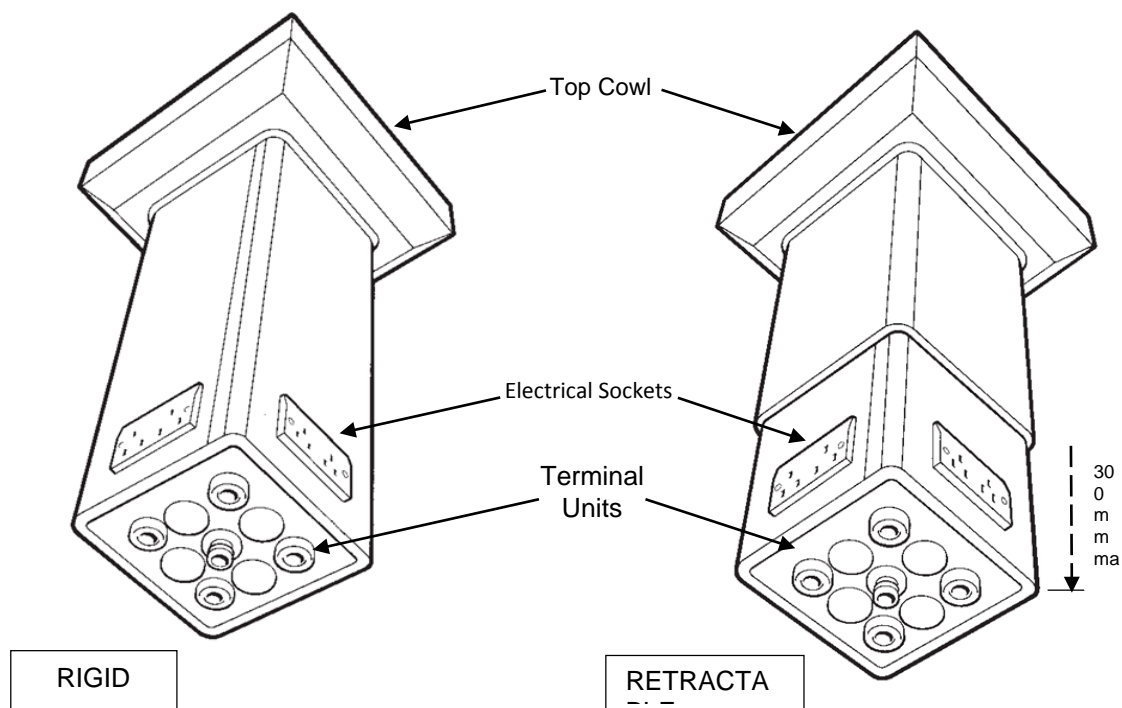


Figure 1-1 Rigid and Retractable Pendants

1.1 Services

A maximum of nine gas / vacuum services are positioned in a 3x3 square array in the following sequence, when viewed from below, left to right (in accordance with HTM 02-01):

- Oxygen,
- Nitrous Oxide,
- 50% Oxygen 50% Nitrous Oxide,

- Medical air,
- Surgical air,
- Nitrogen,
- Carbon Dioxide,
- Vacuum and
- AGSS.

Plastic blanking plugs fill redundant holes.

Retractable Pendants

The Terminal Units fitted in Retractable Pendants are connected to the first fix Ceiling NISTs via flexible hoses with NIST fittings to ensure that it is impossible to interchange the services. Each medical gas/vacuum service is transmitted via a PureHose Pf – Phthalate free medical gas hose assembly. The assemblies terminate with gas specific NIST fittings and are colour coded appropriate to the medical gas service (ref. *Table 2-2*).

First fix Ceiling NISTs incorporate a self-closing gas shut-off valve. The upper end of the flexible hose connection is via a NIST connection to the SP first fix ceiling NIST assembly which holds the non-return valve fully open. The lower end of the flexible hose is connected by a NIST connection to the mating gas specific Pneumatech Medical Gas Solutions Terminal Unit.

Rigid Pendants

The Terminal Units fitted in Rigid Pendants are connected to a 15 mm rear entry copper tube, cleaned and degreased to medical standards.

2 Technical Specification

Table 2-1 Technical Specifications

Rigid or Retractable Pendant	
Physical Characteristics:	
Height	To customer specification
Width (Rigid or Retractable)	300 mm
Depth (Rigid or Retractable)	300 mm
Weights:	
Rigid Pendant	45 kg (complete unit with five gases, AGSS, and 4 x twin electrical sockets)
Retractable Pendant	65 kg (complete unit with five gases, AGSS, and 4 x twin electrical sockets)
Environmental Transport, Storage and Operating Conditions:	
Temperature	10 to 40 °C
Humidity	10 to 95 % R.H. Non-condensing
Air Pressure	70 to 110 kPa
Electrical Specification:	
Electrical supply	220-240 v ac. 50/60 Hz 3.0 A
Protection against electric shock	Class 1 (requires protective earth)
Mode of operation	Continuous (may be left on indefinitely)
Ingress Protection Class	IPX0 (not protected)
Degree of mobility	Permanently installed
Degree of protection against flammable anaesthetic mixtures	Not protected (not suitable for use with flammable gases)
Performance:	
Working Pressure	4 to 7 bar
Regulatory Classification:	
GMDN Code (Term)	36271 (Medical gas and vacuum supply systems)
EC MDD Classification	Class IIb
GHTF Classification	Class C

Table 2-2 Gas Service, Operating pressure Range and Colour Coding of internal hose assemblies

Gas Service	Operating Pressure Range	Colour Coding of Hoses
Oxygen	0-400 kPa	White
Nitrous Oxide	0-400 kPa	Blue
O ₂ /N ₂ O 50%/50%	0-400 kPa	White / Blue
Medical Air	0-400 kPa	Black / White
Surgical Air	0-800 kPa	Black / White
Carbon Dioxide	0-400 kPa	Grey

Nitrogen	0-800 kPa	Black
Medical Vacuum	40 kPa (absolute pressure)	Yellow
AGSS	20 kPa (absolute pressure)	Yellow with a Yellow/ Blue band

2.1 Electrical Specification

General

Rigid and Retractable Pendants are supplied pre-wired for installation in Group 2 medical locations according to the Medical Electrical Installation Guidance Notes (MEIGaN). The wiring arrangement is suitable for connection to an isolated power supply (IPS) and associated earth reference busbar (ERB).

Where the installation is not intended to be installed in a Group 2 medical location or where an isolated power supply is not provided, the pendant body and electrical socket earths can be easily connected by fitting an earth conductor between the potential equalisation busbar and the earth of a mains circuit.

2.2 Mains Socket Outlets

If required, up to 12 double-gang electric sockets, extra low voltage or data service provisions can be supplied, to a maximum of six outlets on each pendant face.

The standard range of electric sockets is shown in the *Table 2-3 Electrical Sockets*.

Table 2-3 Electrical Sockets

Make Model:	Description
Legrand Synergy ref. 8204 53	Twin, clean earth, unswitched, blue
Wandsworth ref. MSR115963/BL	Twin, clean earth, unswitched, blue
MK ref. WDSS 15496	Twin, clean earth, unswitched, blue
MK ref. K781	Twin, unswitched, white

2.3 Mains Circuits Wiring

Mains electrical sockets are **provided in ring or radial configurations as defined by the customer specification (see Figures 10.1 and 10.2)**. Where no specification exists, ring main circuits are provided.

Ring and radial main circuits are wired with 4.0 sq.mm blue (neutral) and brown (phase) H07ZK/6701B (low smoke, zero halogen) flexible stranded conductors.

If specified, (MEIGaN) 'clean earth' sockets with metallic fascias have an additional protective earth bonded to the pendant chassis with 4.0sq.mm green/ yellow H07Z-K/6701B (low smoke, zero halogen) flexible stranded conductors. The 'clean earth' socket fascia plates are engraved MEDICAL EQUIPMENT ONLY.

For non UK electrical sockets 2.5sq.mm cables will be used for all ring main circuits.

All electrical circuits are routed through flexible conduit and terminate in junction boxes at the pendant top plate.

2.4 Equipotential Receptacles

Where fitted, equipotential receptacles are normally Multi-Contact type POAG-ID6, bonded in 4.0sq.mm green/ yellow H07Z-K/6701B (low smoke, zero halogen) flexible stranded conductors.

A maximum of four equipotential sockets are connected in series per connection to the potential equalisation busbar. Other types of equipotential receptacles can be provided if specified.

2.5 Earth Bonding

The Pendant body, linear actuator and potential equalisation sockets are bonded to a potential equalisation busbar at the pendant top plate. The potential equalisation busbar accepts a maximum of 16 sq.mm incoming cable for bonding to the earth reference bar.

2.6 ELV and Data Provisions

RJ45 sockets can be provided and are normally installed with a draw wire to simplify cable installation. A 20 mm diameter conduit and draw wire is provided for every two RJ45 sockets fitted. Blank provisions can also be provided to enable installation of other devices.

2.7 Retractable models

Quiet operation from the pneumatically powered, hand held remote control unit provides 300 mm of height adjustment. The remote control has a magnetic back.

If specified, electrical sockets can be wired as a single radial circuit or either dual or ring circuits (**see Figures 10.1 and 10.2**).

Retractable pendant units require a 230 v, 5 A single phase power supply for the movement motors. The pendant has electrical safety devices provided to ensure that the specified amount of movement is not exceeded.

3 User Responsibility

This device has been built to conform to the specification and operating procedures stated in this manual and/ or accompanying labels and notices when checked, operated, maintained and serviced in accordance with these instructions.

To ensure the safety of this device it must be checked and serviced to at least the minimum standards laid out in this manual. A defective or suspected defective product must not be used under any circumstances.



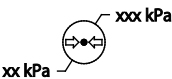
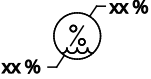




The user must accept responsibility for any malfunction which results from non-compliance with the servicing requirements detailed in this manual. Additionally, the user must accept responsibility for any malfunction which may result from misuse of any kind, or non-compliance with other requirements detailed in this manual.

Worn, broken, distorted, contaminated or missing components must be replaced immediately. Should such a repair be necessary, it is recommended that a request for service advice be made to the nearest Pneumatech Medical Gas Solutions Service Centre.

This device and any of its constituent parts must be repaired only in accordance with written instructions issued by Pneumatech Medical Gas Solutions and must not be altered or modified in any way without the written approval of Pneumatech Medical Gas Solutions.

The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, maintenance, repair, damage or alteration by anyone other than Pneumatech Medical Gas Solutions or their appointed agents.

4 Description of Symbols

	Warning! Dangerous voltage
	Protective earth connection
	Ambient pressure range (kPa)
	Ambient humidity range (%)
	Ambient temperature range (°C)
	Service due date
	Type B applied part
	Consult accompanying documents
L	Connection for the live conductor on permanently installed equipment
N	Connection for the neutral conductor on permanently installed equipment
E	Connection for the earth conductor on permanently installed equipment

5 Installation

5.1 Components

The Pneumatech MGS Rigid / Retractable Pendants consist of:

- First fix plate
- Ceiling NIST assemblies for Retractable Pendants only
- Second fix Pendant assembly
- A cowl is included in the kits to provide a neat appearance at ceiling level

WARNING! The pendants should be installed by competent persons as defined in HTM 02-01. Particular care should be taken when installing pendants with more than one gas, to ensure that each gas NIST is connected to the correct gas supply pipeline.

WARNING! Checks should be carried out using gas flow and identity tests to ensure the above Warning is correct.

WARNING! Care should be taken to ensure electrical earth connections are not disturbed and the pendant is correctly bonded to the gas and electricity supply.

WARNING! Caution is advised whilst cleaning the units to prevent ingress of liquid into electrical points.

Note: Keep all components dry and clean during installation.

Pneumatech MGS Pendants are normally supplied with a first and second fix, with all components installed and tested in the factory. Ceiling pendants should be installed to provide a clearance of between 2000 mm above the finished floor level. For retractable pendants this means 2000mm retracted / 1700mm fully extended as recommended by HTM 02-01.

The Pendant first fix plate, which is common to both the rigid and retractable pendants, must be securely fixed to the soffit. This provides suitable support for the weight of the pendant, which will vary according to the length of the body, and the forces incurred during service.

The first fix is usually bolted to steelwork or the concrete slab of the floor above. A steel sub frame can be provided upon request. Medical gas and electrical services can then be terminated at the first fix gas service kit within the ceiling void, before the pendant body, complete with gas and electrical sockets, is installed as a second fix item.

5.2 First Fix Installation

Note: Refer to *Figure 5-1* for first fix plate dimensions.

1. Secure the first fix plate to a support structure, using the 4 x 14 mm holes 50 mm in from each corner. This plate houses the NIST fittings which must be on the underside of the plate (Retractable Pendant only).

Note: Gas services **MUST** be terminated with NIST connectors at the first fix plate.

2. Ensure that the securing bolts are adequate for the load of the pendant and any framework which must be designed for rigidity.

Note: Even small loads such as those imposed by inserting gas probes can cause large deflections.

3. Remove the NIST blank nut, seal and lock nut from each SP first fix ceiling NIST assembly. The first fix mounting bracket houses the first fix ceiling NIST assemblies which must be fed through the underside of the bracket.

For Retractable Pendants ensure the first fix ceiling NIST assemblies are positioned directly in line with the corresponding terminal unit (as per positions A to J, reference; figure 5.1) in conjunction with the Pneumatech MGS Retractable Pendant customer specification sheet.

A maximum of nine gas / vacuum services are available:

Oxygen, Nitrous Oxide, 50% Oxygen 50% Nitrous Oxide, Medical air, Surgical air, Nitrogen, Carbon Dioxide, Vacuum and AGSS.

4. Secure the first fix ceiling NIST assemblies using the lock nut.
5. Braze the Retractable Pendant stub pipe to the distribution pipeline.
6. Route the electrical services through the holes in the plate.
7. If the pendant is installed as a first fix item early in the construction of the theatre/ recovery room, care should be taken to protect the external finish from damage by subsequent work.

5.3 Second Fix Installation

With the first fix plate securely in place and the Ceiling NIST connectors installed (Retractable Pendant only) connect the pendant using the second fix kit:

Table 5-1 Second Fix Kit

Second Fix Kit	
Part	Number off
M12 studs	4
M12 nuts	12
M12 washers:	12
White screw caps	4
Remote Control Handset (Retractable Pendant only)	1
Top Cowl	1

1. Screw the M12 studs (4 off) into the first fix plate to the full depth of the plate.
2. Lock the studs in position with a nut and washer against the first fix plate.
3. Run another nut onto each stud, approximately 80 mm down.
4. Unpack the flange end of the pendant and remove the top cowl.
5. Lift the second fix plate and using a nut and washer, secure the plate up against the nuts previously set at 80 mm. The distance between the plates should be 100 to 150 mm. If the dimension is outside these limits, it will prove impossible to finally assemble. The overall length of the pendant is specified with the distance between the plate at 125mm.
6. Using a spirit level make final adjustments at the studs, ensuring the second fix plate is level in both axis.
7. Make the gas connections to the NIST fittings (Retractable Pendants only):
 - Ensuring the first fix plate is securely in place and the NIST connectors are installed feed the second fix flexible pendant hoses through the ceiling plate. Check that each gas service is correctly mated with the reciprocating gas service.
 - Ensure that an 'o' ring seal is correctly located within each flexible hose assembly NIST fitting as illustrated in figure 5.2.
 - Connect all flexible hose assemblies to their reciprocating gas specific first fix assembly. Tighten all NIST connections, but do not over-torque.
8. Braze the Rigid Pendant stub pipe to the distribution pipeline; Applies to Ceiling NIST stub pipe for Retractable Pendants.
9. Make the electrical connections. Make a separate earth bond to the first fix plate.
10. After gas tests, refit the cowl against the ceiling, cover the screw heads with the plastic plugs provided and unpack the rest of the pendant.

11. Retractable pendants only:

Fit the remote control handset to the rubber bulkhead fitting on the pendant.

5.4 Installation Procedure

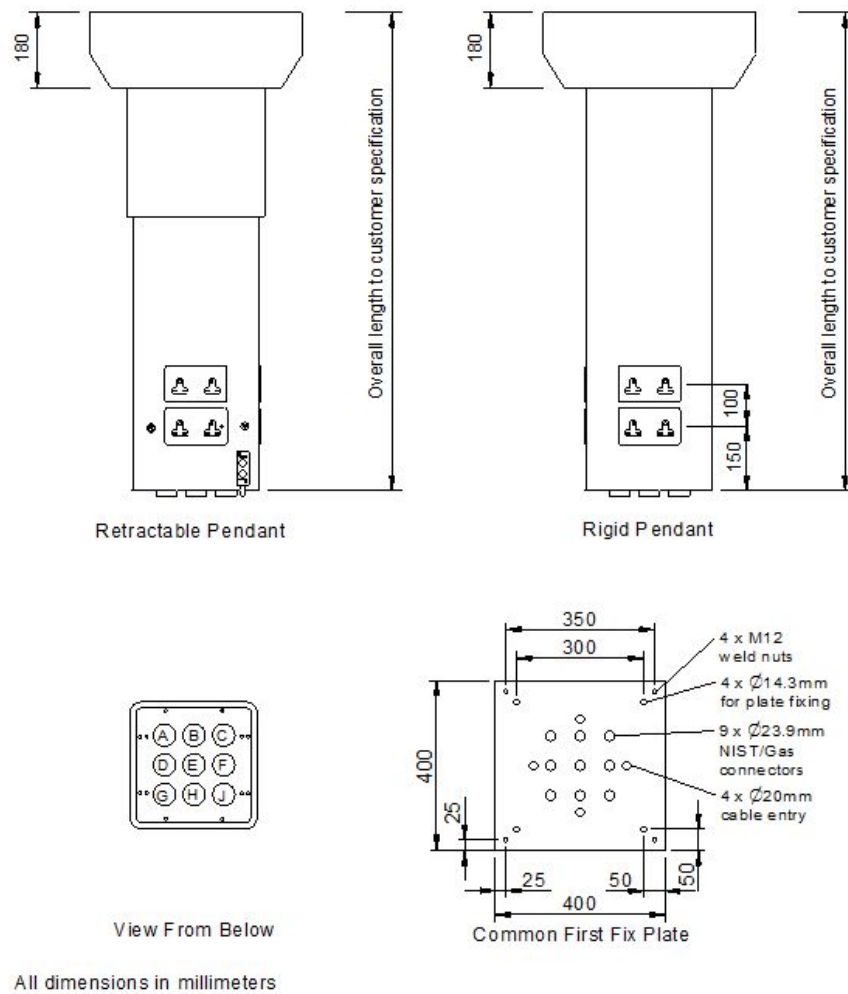
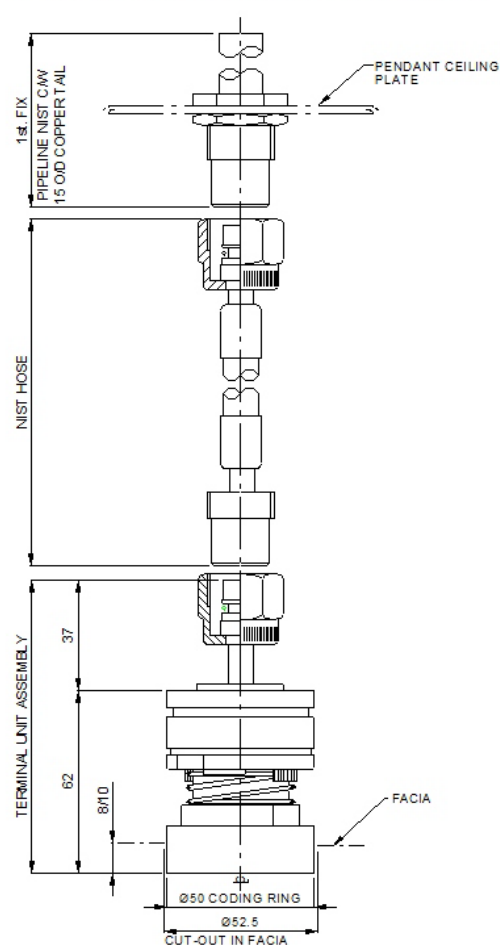


Figure 5-1 Rigid and Retractable Pendant Installation Overall Dimensions

5.5 Terminal Units

ZEUS TERMINAL UNIT PENDANT ASSEMBLY
(BRITISH STANDARD RANGE)



ZEUS TERMINAL UNIT PENDANT ASSEMBLY
(REAR ENTRY COPPER PIPE)
(BRITISH STANDARD RANGE)

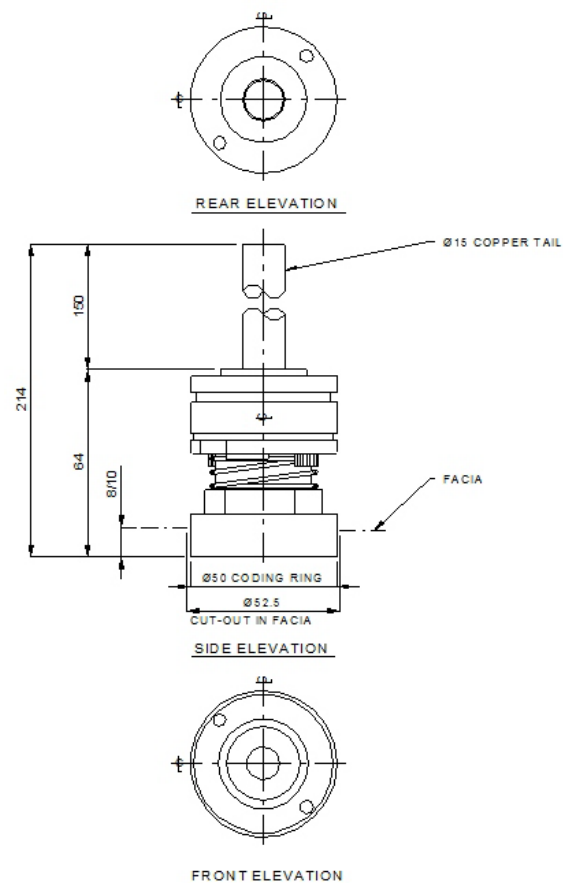


Figure 5-2 Rigid and Retractable Pendant Installation – Zeus Terminal

6 Commissioning

Introduction

Commissioning in full must be carried out after initial installation, after a major component change, and as part of a planned preventative maintenance programme. The objective of testing and commissioning is to ensure that all the necessary safety and performance requirements of the medical gas pipeline system shall be met in accordance with HTM 2022 and HTM 02-01.

Commissioning is typically carried out in two parts;

Part 1 is performed after installation of the pipeline carcass but before concealment and consists of; visual check of pipeline labelling, marking, sleeving and support; leakage test and tests for cross-connection.

Part 2 is carried out after complete installation of the pipeline system and consists of; test for leakage; tests for cross-connection, flow, pressure drop, mechanical function and correct identity of the terminal units; tests for mechanical function and identity of NIST connectors; performance tests of the pipeline system, tests for particulate contamination/odour/taste.

Purging and testing the medical gas pipeline system must be carried out with clean, oil-free, dry air or nitrogen, except for those tests where medical air or the specific working gas is prescribed e.g. gas identification, quality and purity checks.

Personnel carrying out the commissioning procedure must be qualified and fully conversant with the full test procedures detailed in HTM 2022 and HTM 02-01.

6.1 Installation Testing

Following installation of all Pneumatech Medical Gas Solutions Rigid and Retractable Pendant first fix assemblies the medical gas pipeline must be purged to remove all particulate matter and subjected to a series of checks and tests in accordance with British Standards and CE regulations, which includes the following;

Part 1

1. Ensure the correct first fix ceiling NIST assemblies are installed and located in accordance with the installation specification.
2. Check that each first fix ceiling NIST assembly incorporates the correct gas specific NIST fitting.
3. Ensure that a blank NIST nut and sealing washer is fitted to each first fix ceiling NIST assembly.
4. NIST blanking nuts shall remain fitted to prevent ingress of foreign matter until the second fix is assembled.
5. Perform pipeline carcass pressure testing in accordance with the installation contract and HTM 2022 and HTM 02-01 as applicable.

Following installation of all second fix assemblies each medical gas service must be commissioned in accordance with the installation contract and HTM 2022 and HTM 02-01

Part 2

1. Test for leakage on each medical gas pipeline system.
2. Test for cross-connection.
3. Test the mechanical function and gas specificity of terminal units.
4. Test for flow and pressure drop across terminal units and hose assemblies.
5. Test for correct gas identification, quality and purity checks.
6. Check hose NIST fitting for correct gas specification
7. Check hose fittings are stamped with gas identification and BS number
8. Check the second fix with the gas specific probe
9. Check the position of terminal units is in accordance with the customer specification, hose /pipe lengths and overall length of the rigid / retractable pendant assembly is correct.
10. Inspect the general finish of the pendants

Note! New terminal units are supplied with “Do not use” labels (Figure 6-1). These labels should remain in place until the final identity and quality tests have been completed. They shall then be removed by the Authorised Person.



Figure 6-1 Do Not use Label

7 Operating Instructions

7.1 Terminal Units

The terminal units are constructed and operate in the same way as a wall mounted unit, except they do not contain an anti-rotation pin. Pneumatech Medical Gas Solutions East and Zeus Terminal Units will only accept the correct BS 5682 Medical Gas Probe.

Refer to the *Installation, Operation and Maintenance Manual* for Zeus and East terminal units for further details.

To obtain a gas flow - insert the correct medical gas probe into the terminal unit. A slight push on the probe inwards completes engagement; the probe is locked into position via two roller pins. Fully engaging the probe opens the check valve to permit the specified gas flow. A gas seal is made between the probe and check valve assembly (housed in the second fix socket), through the plunger retaining

o-ring. The probe makes contact with the valve plunger, compressing the plunger spring. The check valve fully opens displacing the maintenance valve allowing the flow of gas to pass through the probe.

To remove the probe - hold the probe between the middle finger and palm, ease the probe inwards to reduce the load on the roller pins and press the terminal unit fascia ring firmly with your thumb and index finger. The probe shall eject from the terminal unit and the check valve seals to close the gas flow.

Pneumatech MGS AGSS Terminal Units are gas specific and shall only accept BS 8532:2011 probes. Inserting the AGSS receiver unit probe and engaging the retaining nut opens the valve adjuster by compressing the spring allowing full gas flow through the probe and terminal unit. Removal of the probe enables the spring loaded plunger adjuster to seal against the terminal unit barrel forming a seal.

Note: Carbon Dioxide and Nitrogen terminal units operate using the same method as AGSS but only accept BS EN 15908:2010 NIST connectors

Retractable Pendant Unit

The height adjustment is controlled by a pneumatically powered, hand held remote control unit.

8 Maintenance

Warnings! Use of sub-standard or inappropriate parts and materials may damage the pendant and invalidate the warranty. Only use genuine Pneumatech Medical Gas Solutions spare parts.

Warnings! Isolate the electrical supply before commencing work on any electrical components. Obtain a work permit before commencing any work on medical gas equipment.

Pneumatech MGS Pendant systems are designed to operate with the minimum of maintenance, however regular routine minor maintenance operations are recommended to prove the system integrity.

Maintenance operations must be carried out in accordance with the planned preventative maintenance contract purchased by the customer. Maintenance engineers must fully understand the Pendant system and must be conversant with the information contained in this manual.

Terminal units within the Pendants require regular checks to ensure they are not leaking or have become damaged during use.

8.1 Monthly

1. Visually inspect the Terminal Unit for damage.
2. Check the release mechanism operates freely (when the retaining ring is pressed the pins can be seen to retract from the barrel).
3. Check the unit seals on removal of the probe.
4. Any reluctance of the mechanism to operate freely should result in removal of the unit for closer inspection, repair or replacement as necessary.

8.2 Annually

1. Remove second fix and clean all components.
2. Replace O-ring seal (on AGSS units only).
3. Re-assemble.
4. Re-fit second fix and test for correct action using a blank probe.
5. Reset flow as required.

8.3 Tools and Equipment

No special tools are required, however all common hand tools used must be clean, completely free of oil and grease and checked for serviceability before commencing maintenance procedures. All necessary spare parts must be obtained before commencing work.

8.4 Routine Inspection, Checks and Maintenance

Minimum requirements for routine inspections, checks and maintenance are given in *Table 8.1 Inspection and Maintenance Schedule* and must be observed in full to ensure continued safe operation of the system.

8.5 Annual inspection

The commissioning procedure detailed in *Section 6* should be completed after replacement of any functional component and at least annually to prove the system is operating as normal and there are no faults present.

Table 8-1 Inspection and Maintenance Schedule

Actions	5 Yearly					
	3 Yearly					
Commissioning	Annually					
	Quarterly					
Daily	Weekly					
	Daily					
Inspection, Checks and Tests:	Suitability of location					
	Adequate access for maintenance					
Planned Preventative Maintenance:	Complete Commissioning Procedure					
	Electrical connection and supply integrity					
Check terminal units are complete and inspect for damage	Check correct gas identification label ling and colour coding					
	Check gas specificity using test probes					
Check for retention of the test probe	Check for smooth release of test probe					
	Check the release mechanism operates freely					
Check terminal units are leak free	Check all NIST connections are tight					
	Check security of fixings/mountings					
Check flow and pressure drop performance	Check for correct non anti-swivel specification					
	Check for freedom of rotation					
Inspect the hose assembly for any defects	Check all 'o' ring seals					
	Component t Replacement					
Hose assembly replacement	All gas seal kits & Check valve assembly					
	Hose assembly replacement					

8.6 Component Replacement and Adjustment

WARNINGS! If access to mains electrical parts is necessary, ensure that the mains electrical power supply is off and remains isolated during work on the pendant.

WARNINGS! Do not use oil, grease or jointing compound on any components.

8.7 Cleaning

The use of abrasive or solvent based cleaning solutions is not recommended. Should the external surface of the unit require cleaning we recommend the use of a damp cloth or mild soap solution, for the stainless steel plates use Alco-wipes **ONLY**.

Do not use any phenol or halogen based disinfectants or agents that release chlorine or oxygen.

9 Fault Diagnosis

9.1 Introduction

The pendant and terminal unit mechanisms are extremely robust and if they fail to operate smoothly, it is probably mechanically damaged and should be replaced.

The following tables detail possible defects/symptoms which may occur with the flexible pendant assemblies with the necessary rectification action.

Table 9.1: Leaking Terminal Unit

Possible Cause	Remarks/rectification action
Worn o-rings	Replace check valve assembly and/or seal plate o-ring
O-ring cut	Check probes for damage and replace as required

Table 9.2: Low Pressure & Flow at Terminal Unit

Possible cause	Remarks/rectification action
Regulator settings have drifted	Check regulators and make any necessary adjustments to correct settings
Isolation valves not fully open	Check isolation valves are fully open
Foreign object in terminal unit restricting gas flow	Remove socket and check valve assembly, inspect the terminal unit to ensure it is clean, serviceable and free from foreign objects. Replace check valve assembly and or seal plate o-ring.
Damage/leaking medical gas pipeline system	If the pressure and flow rate remains low with serviceable terminal units fitted, the fault could be directed at the medical gas pipeline system. Inspect the distribution system for damage/leakage. Repair the pipeline and perform commissioning procedures on the system affected.

Table 9.3: Terminal Unit Stiff or Difficult to Operate

Possible cause	Remarks/rectification action
Damaged probe	Check probes for damage and replace as required
Foreign objects causing interference with locking mechanism	Inspect parts for foreign objects and remove. Check for damage and replace the 2 nd fix assembly if necessary. Test the terminal unit for correct functionality using a serviceable test probe.
Mechanical damage inside the terminal unit	Replace the 2 nd fix & check valve assemblies and functionally test using a serviceable test probe.

Table 9.4: Leaking Hose Assembly

Possible Cause	Remarks/rectification action
Worn o-rings/damaged o-ring	Replace o-ring seal
Leaking NIST connection	Disconnect flexible hose and replace o-ring seal. Do not attempt to cure leak by over tightening

Table 9.5: Low Pressure/Flow Rate

Possible Cause	Remarks/rectification action
Flexible hose NIST connections leaking	Check all NIST connections. Replace o-ring seals if necessary. Do not attempt to cure a leak by over tightening.
Leaking NIST connection	Disconnect flexible hose and replace o-ring seal. Do not attempt to cure leak by over tightening
Damaged or blocked flexible hose	Inspect hose assembly for damage or blockage and remove foreign object. Replace hose assembly as necessary
Damaged or leaking pipeline system	If the pressure and flow rate remains low with serviceable hose assemblies, the fault could be directed at the medical gas pipeline system.
	Check other terminal units within the system and attempt to isolate the area.
	Ensure the appropriate AVSU or Line Valves are fully open.
	Ensure the source equipment is serviceable and delivering the correct design pressure and flow.
	Inspect the distribution system for damage/leakage. Repair the pipeline and perform commissioning procedures on the system affected.

Note! Failure through misuse or abuse is usually not repairable, and is not covered by the manufacturer's warranty.

10 Wiring Diagrams

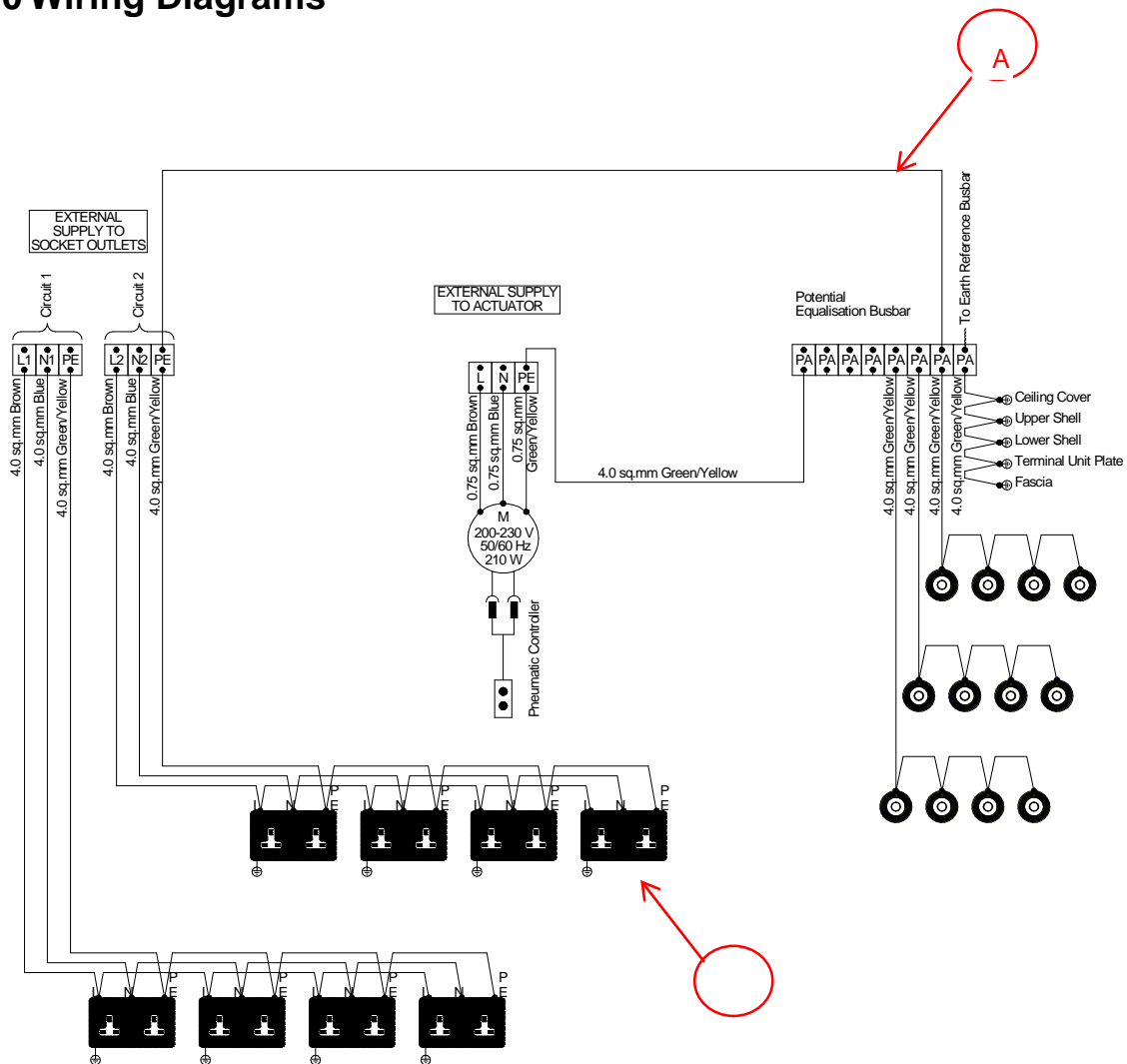


Figure 10-1 Retractable/ Rigid Pendant Wiring Diagram – Radial Circuit

Notes:

- Actuator circuit omitted for Rigid Pendants
- Only blue MEIGaN sockets have earth connection, **B**

Note for Installer:

- Earth link wire should be removed for MEIGaN installation, **A**

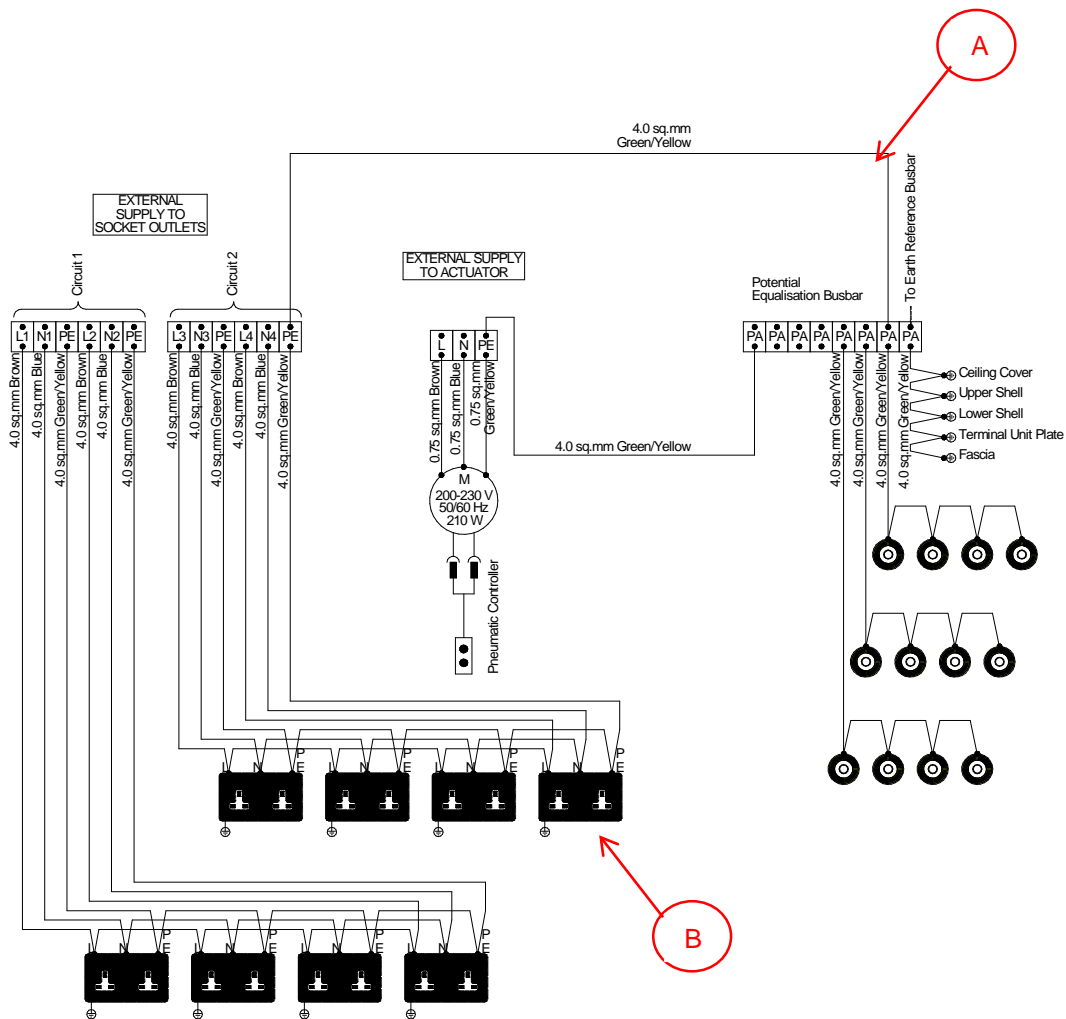


Figure 10-2 Retractable/ Rigid Pendant Wiring – Ring Main Circuit

Notes:

- Actuator circuit omitted for Rigid Pendants
- Only blue MEIGaN sockets have earth connection, **B**

Note for Installer:

- Earth link wire should be removed for MEIGaN installation, **A**

For non UK electrical sockets 2.5sq.mm cables will be used for all ring main circuits.

11 Spares

There is a limited number of routine maintenance parts required to prolong service life:

Table 12-1 Minimum Recommended Spares Scheduling

Description	Part Number
SP Terminal Unit Seal Kit	360204
Replacement Terminal Unit Operating Valve	5005607
AGSS Terminal Unit Seal Kit	3260197
Hose Assemblies – Pendant Specific	Contact Spares Department

For all Service Spares enquiries, contact the Pneumatech Medical Gas Solutions Spares Department, giving as much of the following information as possible (see *Figure i*):

Product Part Number:

Lot / Batch Number:

Approximate date of purchase:

Spares Department:

T: +44 (0) 1235 463053

F: +44 (0) 1235 463011

spares@p-mgs.com

12 Declaration of Conformity



Quality and Assurance

Declaration of Conformity

Manufacturer	Atlas Copco Ltd. trading as Atlas Copco Medical 18 Nuffield Centrum, Nuffield Way, Abingdon, OX14 1RL, UK
Product	Rigid and Retractable Medical Pendants
Classification	Ila
Conformity Route	Annex II
Quality Management System	EN ISO 13485:2012
GMDN Code	36271
GMDN Term	Medical gas and vacuum supply systems
Standards Applied	BS 1041, BS 5682, BS 8532, EN ISO 15223-1, EN ISO 5359, EN 15908, EN ISO 9170-1, EN ISO 9170-2, EN ISO 15001, EN ISO 14971, EN 13348
Notified Body	Lloyd's Register Quality Assurance Limited, 71 Fenchurch Street, London EC3M 4BS United Kingdom (LRQA Notified Body Number 0088)
MDD Certificate(s)	LRQ 4007749/C
Start of CE Marking	3 rd April 2013
Place and Date of Issue	Abingdon, 3 rd September 2015

We hereby declare that the above mentioned products meet the provisions of the Council Directive 93/42/EEC concerning Medical Devices, as amended by Directive 2007/47/EC. All supporting documentation is retained under the premises of the manufacturer.

Endorsing Signature
Turgay Ozan (General Manager)



Document ref.: RDOC0018v6.docx

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Document Ref. 8102341053 Issue D
Revision issue date: 09 2015

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