

Operation and Maintenance Instructions



Rigid and Retractable Pendants Series 9a

Part number 2001617

Revision 07

Feb 01, 2017

Operation and Maintenance Manual

Series 9a Rigid & Retractable Pendant

This unit is purchased from:

Date purchased:

Model number:

Serial number:

Option(s) included:

Any information, service or spare parts requests should include the serial number and be directed to:

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Telford Crescent, Staveley
Derbyshire S43 3PF

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Atlas Copco Ltd. trading as Atlas Copco Medical
Unit 18 Nuffield Way, Abingdon, Oxfordshire, UK OX14 1RL



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

Abbreviations			
Abbreviation	Full Description	Abbreviation	Full Description
BS	British Standard	kPa	Kilo pascals
BSP	British Standard Pipe	Max	Maximum
CO2	Carbon dioxide	Med	Medical
°C	Degree Celsius	m	Meter
∅	Diameter	mm	Millimetres
ERM	Emergency reserve manifold	Min	Minimum
EN	European Standards	N2	Nitrogen
1st	First	N2O	Nitrous oxide
HTM	Health Technical Memorandum	NRV	Non-return valve
ID	Identification	OD	Outside Diameter
"	Inch	O2	Oxygen
ISO	International Standard Organisation	%	Percentage
Kg	Kilograms	2nd	Second

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Rigid and Retractable Pendants housing Diamond 3 or DISS 3 Terminal Units.








Series 9a Rigid & Retractable Pendants

0. SAFETY, STORAGE AND HANDLING DATA

This section gives safety, storage and handling information for BEACONMEDÆS Ltd. Rigid/Retractable Pendants only. Circuit diagrams, component parts lists and descriptions are available on request.

0.1 Identification of symbols

The following symbols apply to this product and are used in this section and on the product in question. The meaning of these symbols are as specified below :-

	Read instructions
	Temperature range
	Date of manufacture (Year/Month)
	Alternating current
	Protected earth connection
	Type B applied part, as per BSEN60601-1
	Dangerous voltage

0.2 Environmental Transport and Storage Conditions

Minimum ambient temperature - 0 degrees Celsius
Maximum ambient temperature - 40 degrees Celsius
Minimum relative humidity (non-condensing) - 10%
Maximum relative humidity (non-condensing) - 95%
Atmospheric pressure range - 700 to 1100 hPa

Environmental Operating Conditions

Minimum ambient temperature - 0 degrees Celsius
Maximum ambient temperature - 40 degrees Celsius
Minimum relative humidity (non-condensing) - 10%
Maximum relative humidity (non-condensing) - 95%

0.3 Environmental Protection

The unit and any components can be discarded in any standard refuse facility. The unit contains no hazardous substances.

0.4 Electromagnetic Interference

The pendant has been tested to BSEN60601-1-2 : 1993 - Medical electrical equipment Electromagnetic compatibility - Requirements and tests. Ensure that all data cables are physically separated from other mains and data cables.

0.5 Cleaning

The pendant should be wiped over with a damp cloth frequently to remove any dust or foreign substances.

0.6 Electrical details

WARNINGIt is necessary to check the integrity of the power source for safety at regular intervals.

Power source

Mains operated, please see specific labelling fixed to junction box, concealed by pendant shroud.

Current requirements

Please see the specific labelling fixed to junction box.

Type of protection against electric shock

Class 1 (Mains supplied equipment using a protected earth).

Mode of operation

Mains Sockets - Continuous (equipment may be left switched on indefinitely).

Actuator (Retractable Pendant only) - Continuous with intermittent operation i.e. no more than five cycles per hour.

Degree of protection against ingress of liquids

IPX0 (Not protected).

Degree of mobility

Permanently installed (This unit is electrically connected by permanent means).

Degree of protection

Type B (no Applied Part or with an Applied Part not designed to meet F type {floating} requirements).

Degree of protection against flammable anaesthetic mixtures
Not protected (not suitable for use with flammable gases).

Hose Assemblies

The flexible PVC high-pressure hose used within the assemblies included with this product contain phthalates. Phthalates are added to increase the flexibility of the hose allowing it to be handled with a low risk of rupturing, and to increase the durability of the hose assembly.

If the intended use of these devices includes the treatment of children, or the treatment of pregnant or nursing women, care should be taken to reduce the length of possible exposure to phthalates.

Alternatives to phthalates are being sought, however to date no solution has been found.

Series 9a Rigid & Retractable Pendants

1. DESCRIPTION AND OPERATION

1.1 Introduction.

The BEACONMEDÆS Rigid and Retractable Pendants are principally designed for use in operating theatres and anaesthetic rooms and connect :

- (a) fixed Medical gas pipeline installations from ceiling level to BEACONMEDÆS Gem 10 terminal units and
- (b) fixed electrical installations from ceiling level to electrical sockets.

both of which are located within an octagonal pendant assembly at a specific height with the Retractable Pendant having adjustable height control.

The Pendants are designed to be a self contained unit and it should be noted that modifications should not be made to them to facilitate the carrying of additional loads.

A maximum of eight Medical gas/vacuum terminal units, plus one BEACONMEDÆS anaesthetic gas scavenging (AGS) terminal unit may be fitted to each Pendant, located radially on the lower fascia plate and any combination of services may be specified. The Pendants are designed so that four of the octagonal faces are larger than the other four. The four larger faces may be fitted with standard twin unswitched 13 Amp. electrical sockets and the four smaller faces either standard single unswitched 13 Amp. sockets or extra low voltage components, e.g. patient monitoring. Facilities may be incorporated to provide special electrical installations to be in accordance with the customers specification. Extra electrical components can be fitted in situ, by the easy removal of single or twin blanking plates. The Pendants are manufactured to customer specifications to suit the particular location and purpose, for either surface or concealed pipeline installations. The installation ensures that all Terminal Units and electrical sockets are located above the anaesthetic machine or surgeon thereby removing congestion and hazards of trailing hoses and cables across the operating room floor. All Pendants have a soft bumper strip around the bottom edge. The Rigid and Retractable Pendants are designed to fully comply with BS EN ISO 11197 and the installation fully satisfies the United Kingdom Health Technical Memorandum, HTM02-01, HTM2022 and the National Health Service - Model Engineering Specification - C11. The AGS disposal system conforms fully with BS6834:1987 and the electrical installation conforms to the current IEE regulations.

1.2 Rigid Pendant Structure.

The Rigid Pendant consists of a 1st Fix Mounting Plate and a 2nd Fix Assembly which includes the octagonal Pendant Shell and Terminal Unit Mounting Plate. A square section ceiling Shroud with an octagonal section cutout fits neatly around the Pendant Shell and is secured by button head setscrews to adjustable spacing pillars located on the 1st fix mounting plate. The Pendants are manufactured to a

customer specified length and when installed should provide a clearance from the finished floor level to the underside of the Pendant of metres. The pendants can be manufactured with a minimum length of 450mm and a maximum length of 1500mm. Individual flexible conduits are provided for physical segregation of Low and Extra Low voltage services from the Medical gas services and is routed to avoid chafing.

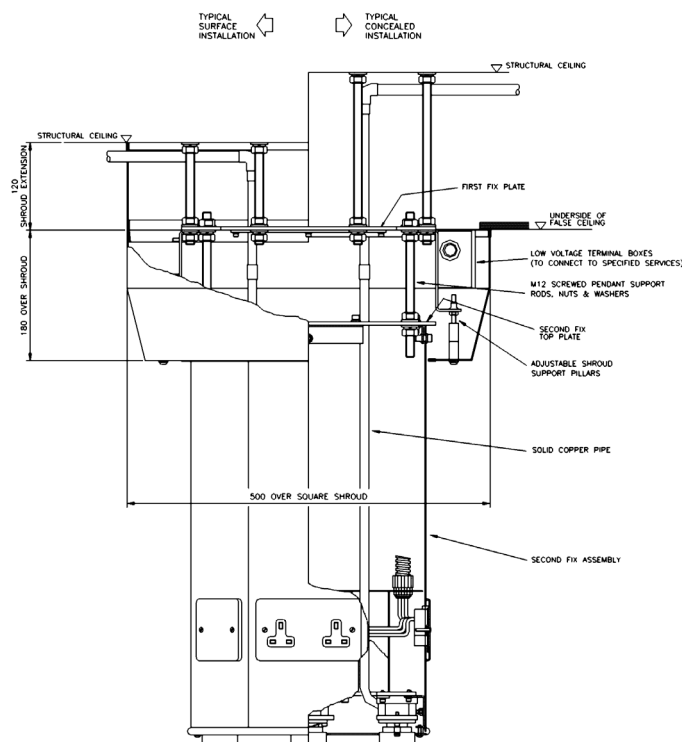


FIG.1
MEDÆS Rigid Pendant with Gem 10 Terminal Units

1.3 Retractable Pendant Structure.

The Retractable Pendant consists of a 1st Fix Mounting Plate and a 2nd Fix Assembly which includes the Pendant Shell, comprising of two telescopic octagonal sections. The Linear Actuator and electrical junction boxes are attached to the top static half. The lower (moveable) portion of the Linear Actuator is secured to the Terminal Unit Mounting Plate by means of a Spacer Extension. A square section ceiling Shroud with an octagonal section cutout fits neatly around the Pendant Shell and is secured by button head set screws to adjustable spacing pillars located on the 1st fix mounting plate. The Pendants are manufactured to a customer specified length and when installed should provide a clearance from the finished floor level to the underside of the Pendant of 2 metres (Pendant fully retracted). The pendants can be manufactured with a minimum length of 680mm and a maximum length of 1500mm. An electrically operated controlled Linear Actuator is mounted within the Retractable Pendant and provides the motive force to extend and retract the lower assembly. The electronic hand controller which

Series 9a Rigid & Retractable Pendants

is magnetically retained onto the Pendant body controls the extension and retraction of the moveable part of the pendant by the operation of the push buttons, the actuator can be operated a maximum of 5 cycles per hour (1-cycle = 1 up and 1 down movement) as indicated by arrows on the hand controller. Operation of the Linear Actuator extends and retracts the Pendant throughout a vertical range of movement of 300mm at an approximate rate of 20mm per second. The mechanical drive arrangement enables the unit to be stopped/locked in any position and internal micro switches control the range and prevent over travel. A thermal trip circuit, with automatic reset facility is incorporated to safeguard against the unit overheating. Individual flexible conduits are provided for physical segregation of Low and Extra Low voltage services from the Medical gas services and is routed to allow for extension and retraction of the Pendant without chafing.

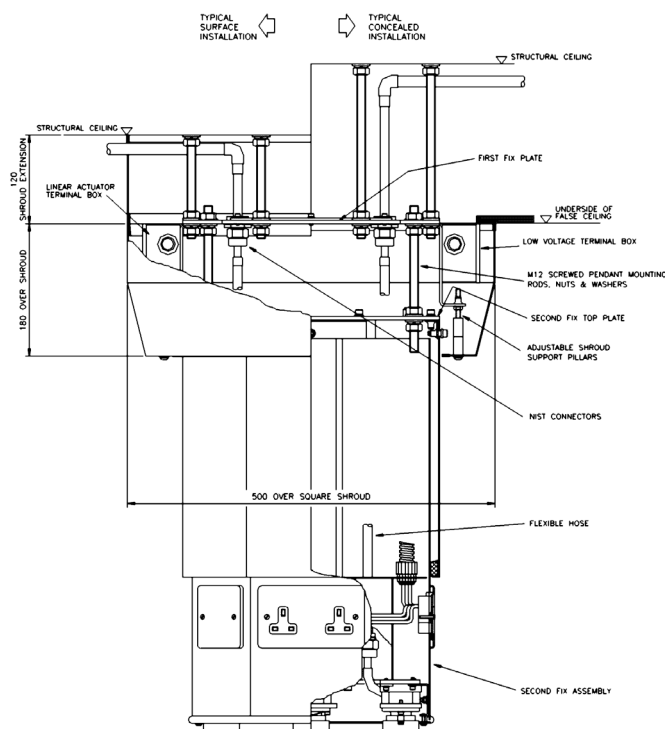


FIG. 2
MEDÆS Retractable Pendant with Gem 10 Terminal Units

1.4 Rigid and Retractable Pendant Installation.

A first fix Mounting Plate is attached to the structural roof by M12 screwed rods/rawbolts (not supplied), the Mounting Plate incorporates drop rods to secure the 2nd Fix Pendant Assembly. The Mounting Plate incorporates electrical conduit entry holes.

1.4.1 Rigid Pendant gas services.

The gas services incorporated into Rigid Pendants are solid copper piped, joints are to be made using the approved

jointing technique as detailed in the contract specification. With HTM 02-01 and HTM 2022 installations the copper pipe is joined using the flux less brazing technique with Oxygen-free Nitrogen purge. Joints are made below the first fix Mounting Plate.

1.4.2 Retractable Pendant gas services.

Gas Services Kit first fix assemblies are supplied for all installations and terminate in a NIST connection particular to each Medical gas service. A Pressure Test Kit is available to seal the distribution system and enable pipeline carcass pressure testing to be carried out prior to fitting the second fix assembly.

1.5 Medical gas/vacuum services.

A maximum of eight specified Medical gas and vacuum Terminal Units can be located radially in the following clockwise sequence when viewed from below :-

Oxygen, Nitrous Oxide, Oxygen/Nitrous Oxide Mixture (50/50% V/V), Medical Air 400kPa, Surgical Air 700kPa and Medical Vacuum. An AGS disposal system Terminal Unit can also be provided in the centre of the Terminal Unit array. In the case of the Rigid Pendant each gas service is transmitted through the centre of the Pendant assembly within identified copper pipe. In the case of the Retractable Pendant each gas service is transmitted through the centre of the Pendant assembly by reinforced anti-static plastic flexible hoses complying with BS EN 739. Both ends of the hose are fitted with gas specific non-interchangeable screw threaded (NIST) connections and each flexible hose is colour coded appropriate to the Medical gas service in accordance with Table 1. Each of the hoses is coiled and routed through the Pendant in such a way as to enable the full range of Pendant movement without chafing. The lower end of the flexible hose is fitted via a NIST connector to the appropriate BEACONMEDÆS Gem 10 Terminal Unit which is secured to the Terminal Unit Mounting Plate. The upper end of the flexible hose connects by its respective NIST fittings to the first fix Gas Service Kits located on the 1st Fix Mounting Plate.

1.6 Anaesthetic Gas Scavenging.

The BEACONMEDÆS AGS Terminal Unit is mounted centrally and in the case of the Rigid Pendant is connected using copper pipe. In the case of the Retractable Pendant the same type of flexible hose is utilised (Table 1). The hose is routed and fits to the AGS Terminal Unit and first fix Gas Service Kit with NIST type connections in exactly the same manner as the gas and vacuum services. It may be necessary to remove the AGS installation in order to gain access to other Medical services within the Pendant. The AGS Terminal Unit is fully described in the appropriate Technical Manual chapter.

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TABLE 1 : COLOUR CODING OF HOSES

Service (except Vacuum)	Colour Coding to BSEN 739
Oxygen	White
Nitrous Oxide	Blue
Oxygen/Nitrous Oxide Mixture (50/50% V/V)	Black with a White/French Blue band at each end
Medical/Surgical Air	Black with a White/Black band at each end
Medical Vacuum	Yellow
AGS	Orange

1.7 Electrical Installation.

On each of the four larger octagonal faces a stainless steel unswitched twin electrical socket may be fitted and on the four smaller faces a unswitched single socket. The sockets can be wired for either 230 volt A.C. or other specified voltage to suit the customers requirements. The Pendants may also have provisions for patient monitoring and other special applications in place of the standard electrical sockets. A Terminal Box(es) is provided for the connection to the Low Voltage electrical supply and access to the Terminal Box

requires the removal of the ceiling Shroud. Entry holes in both the 1st Fix mounting Plate and Pendant Top Mounting Plate are provided to accommodate flexible cable conduits as required. The Pendant should be connected to an essential mains electrical power supply. Six cores of 2.5sq. mm multi-stranded cable are routed through coiled flexible conduit which ensures maximum segregation from Medical gas hoses and in the case of the Retractable Pendant allows for the full range of movement without chafing. An internal electrical shroud forms a physical barrier between the electrical and gas installations. U.K. type electrical sockets shall be connected via a 30 Amp ring main. In the case of the Retractable Pendant the rated power consumption of the linear actuator is 210 Watts and should be connected via a F5A HRC fuse.

1.8 Gem 10 Terminal Unit operation.

Gem 10 Terminal Units will only accept the correct BS 5682 Medical gas probe. During insertion the conical surface of the probe displaces both roller pins which enables the probe to engage with the capsule assembly. The probe 'O' ring seal forms a gas seal between the probe and capsule insert. The probe face contacts the check valve, compressing the check valve spring and fully opening the check valve. When the probe is fully engaged the roller locking pins snap back into the probe groove, locking the probe in position. Gas flows through the open maintenance and check valves then passes through the probe. Unlocking and probe removal can only occur as the fascia ring is operated.

1.8.1 To release the probe, hold the probe between the middle finger and palm of the hand, ease the probe inwards

to reduce the load on the roller pins and press the fascia ring with thumb and index finger. Movement of the fascia ring and probe release ring, releases the roller pins from the probe locking ring. The probe is automatically ejected and the check valve is closed forming a gas seal within the capsule assembly.

1.9 BEACONMEDÆS AGS Terminal Unit Operation

BEACONMEDÆS AGS Terminal Units are gas specific and will only accept BS6834 probes. Inserting the receiver unit probe and fully engaging the retaining screw thread, fully opens the nylon valve plug compressing the spring. Full and free gas flow is achieved through the probe and Terminal Unit. Removing the probe enables the spring loaded nylon valve plug to seat against the front body forming an effective seal.

2. COMMISSIONING

2.1 Introduction

Commissioning of the BEACONMEDÆS Rigid and Retractable Pendants is normally carried out in two parts.

Part 1 consists of pipeline 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 document.

2.2 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 :-

Rigid Pendants

2.2.1 Ensure that the correct gas pipelines are installed and located in accordance with the installation specification.

2.2.2 Carry out the pipeline carcass testing in accordance with the installation contract, BS EN ISO 7396-1, HTM 02-01 or HTM 2022 as applicable.

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

2.2.4 Pipeline blanking caps should remain fitted to prevent ingress of foreign matter until the second fix

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assembly is installed.

Retractable Pendants

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

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

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

2.2.8 Carry out the pipeline carcass pressure testing in accordance with the installation contract, BS EN ISO 7396-1, HTM 02-01 or HTM 2022 as applicable.

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

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

2.3 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 contract, BS EN ISO 7396-1, HTM 02-01 or HTM 2022 as applicable. Whilst the above standards are mandatory and provide specific details of each test, the following paragraphs are BEACONMEDÆS 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) and Linear Actuator must be functionally checked.

2.4 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 :-

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

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

2.4.3 The pressure drop shall not exceed 0.02 litres per hour per Terminal Unit (subject to temperature corrections).

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

2.4.5 The following procedure shall be carried out on each Medical Vacuum distribution system :-

2.4.5.1 Operate Vacuum Plant and establish normal operating vacuum.

2.4.5.2 Isolate distribution system from Plant.

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

2.4.5.4 The pressure increase should not exceed 75mm Hg.

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

2.5 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 :-

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

2.5.2 Using the correct Medical gas Probes, ensure that gas flows only from the correct Terminal Units for the system under test.

2.5.3 Ensure that all other terminal units on systems not under test do not have a gas flow.

2.6 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 :-

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

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

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

Note:- Performance figures detailed at Tables 2 and 3 are for use with installations designed to operate in accordance with BS 5682:1984. The 1998 version of BS 5682 only covers the dimensions of probes, flow and pressure drops are in accordance with BSEN 737-1 and BSEN 739.

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TABLE 2 : FLOW RATE & PRESSURE DROP ACROSS TERMINAL UNIT BS 5682 : 1984

Service Distribution Pressure	Flow Rate (lit./min) at S.T.P.	Maximum pressure drop across Terminal Unit Assy. kPa (bar)
Oxygen or Nitrous Oxide 400 kPa. (4 bar)	40	3.4 (0,034)
Oxygen/Nitrous Oxide Mixture (50/50% V/V) 400 kPa. (4 bar)	275	55 (0.55)
Medical Air 400 kPa. (4 bar)	50	3.4 (0.034)
Surgical Air 700 kPa. (7 bar)	250	34 (0.34)
Medical Vacuum 53.3 kPa. (400 mm Hg) below standard atmospheric pressure at 101.3 kPa. (760 mm Hg)	40	13.3 (100 mm Hg)

Note ! The pressure drop across Surgical Air terminal units for systems that provide a flow of 350 lit./min at 700kPa will be approximately twice the pressure drop of a system with a flow rate of 250 lit./min. Applicable to TABLE 2 and TABLE 3.

TABLE 3: FLOW RATE & PRESSURE DROP ACROSS TERMINAL UNIT AND HOSE ASSEMBLY. BS 5682:1984

Service Distribution Pressure	Flow Rate (lit./min) at S.T.P.	Maximum pressure drop across Terminal Unit Assy. kPa (bar)
Oxygen or Nitrous Oxide 400 kPa. (4 bar)	40	10 (0,10)
Oxygen/Nitrous Oxide Mixture (50/50% V/V) 400 kPa. (4 bar)	275	150 (1.50)
Medical Air 400 kPa. (4 bar)	50	11 (0.11)
Surgical Air 700 kPa. (7 bar)	250	75 (0.75)

Medical Vacuum 53.3 kPa. (400 mm Hg) below standard atmospheric pressure at 101.3 kPa. (760 mm Hg)	40	20 (150 mm Hg)
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TABLE 4 : FLOW RATE & PRESSURE DROP ACROSS TERMINAL UNITS AND HOSE ASSEMBLIES. BS EN 9170-1 - TERMINAL UNITS AND BS EN 739 - HOSE ASSEMBLIES.

Terminal unit nominal operating pressure (kPa)	Test flow (litres/min.)	Test Pressure (kPa)	Max. pressure drop across a terminal unit (kPa)	Max. pressure drop across a hose assembly (kPa)
400 to 500	60	320	15	25
400 to 500	200	320	70	80
800 to 1000	300	640	70	80
Vacuum	40	40*	15	20

* Absolute pressure

2.7 Mechanical function and gas specificity test - 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.

2.7.1 Ensure that the fascia plate is fitted.

2.7.2 Ensure that correct Medical gas Test probe can be inserted into the terminal unit captured and released.

Note :-

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

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

2.8 Performance tests on the pipeline system.

If required by the contract, apply the HTM 02-01 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

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contract, BS EN ISO 7396-1, HTM 02-01 or HTM 2022 as applicable.

2.9 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.

2.10 Purging and filling with specific working gas.

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

Note :- Purging of vacuum and AGS systems is not required.

2.11 Gas identification, quality and purity checks.

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

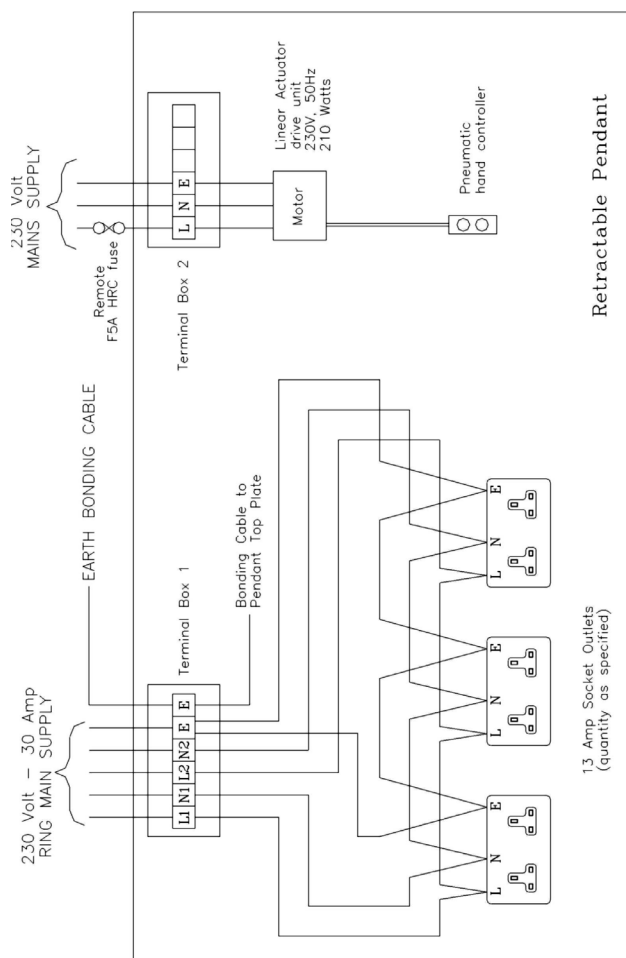
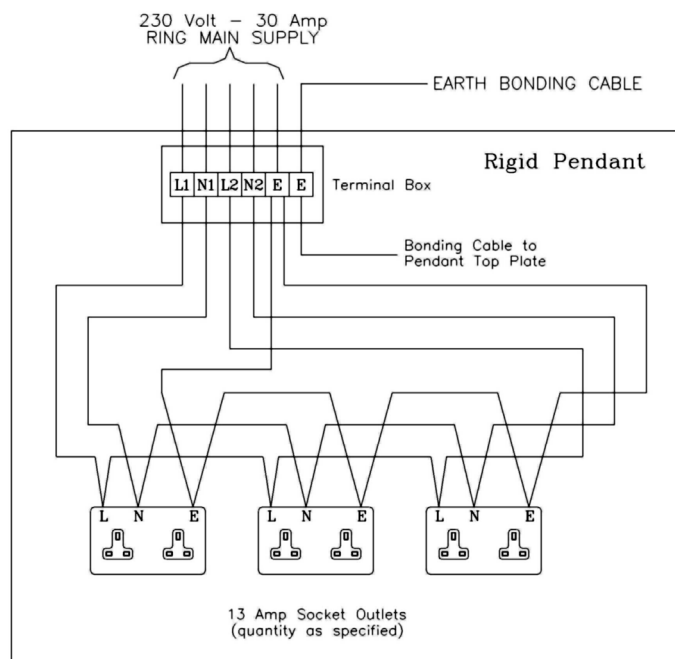
- 2.11.1 Particulate matter tests.
- 2.11.2 Oil tests.
- 2.11.3 Water tests.
- 2.11.4 Carbon monoxide and carbon dioxide tests.
- 2.11.5 Gas identification tests.
- 2.11.6 When totally satisfied that the "Suitably Qualified Person" has completed his/her checks and certified the systems as serviceable, and only when authorised by the "Authorised Person", remove "DANGER" label from each terminal unit.

2.12 AGS disposal system terminal unit.

If the pendant is to be used in conjunction with a new AGS disposal system installation, the complete AGS commissioning procedure must be carried out. If the pendant is installed and connected to an existing AGS system, the following checks must be carried out :-

- 2.12.1 Ensure that the AGS terminal unit is correctly

identified and labelled.



2.13 Electrical installation.

It is recommended that comprehensive checks are conducted on the installation in accordance with IEE or other applicable regulations. As a minimum these should include :-

- 2.13.1 Earth continuity (connections to casing).
- 2.13.2 Insulation (Megger supplies to earth).
- 2.13.3 Correct connection of Live and Neutral.
- 2.13.4 Connection and insulation between low voltage circuits.
- 2.13.5 Any special installation, e.g. patient monitoring must be functionally tested using the customers equipment.

2.14 Pendant linear actuator functional test.

Ensure that the electrical supply to the linear actuator is on. Operate the hand controller and fully retract the pendant assembly. Ensure that the internal micro-switch controls the range of movement and that further retract selections on the hand controller are ineffective. Using a suitable datum, measure and record the length of the pendant in the fully retracted position. Operate the hand controller to fully extend the pendant assembly and time the movement from the fully retracted to the fully extended position. Ensure that the internal micro-switch controls the range of movement and that further extend selections on the hand controller are ineffective. Using the same datum, measure the length of the pendant in the fully extended position and ensure that the total range of movement is approximately 300mm. Compare distance and time and check that the pendant has a minimum mean rate of movement of 20mm/sec. Repeat this check from the fully extended to fully retracted position. Operate the pendant without any undue vibration or noise, and periodically stop the pendant in any interim position.

2.15 Commissioning certificate.

When all terminal units and all gas and electrical services have been fully proven by the above procedures, certify the system and issue the appropriate commissioning certificates to the customer.

3. MAINTENANCE

3.1 Introduction.

BEACONMEDÆS Rigid and Retractable Pendants with Gem 10 Terminal Units are designed to operate with the minimum amount of maintenance and contain few moving parts. Regular routine maintenance operations are recommended to prove the Terminal Unit and Medical gas service performance. Maintenance operations are carried out in accordance with the planned preventative maintenance contract purchased by the customer. All maintenance work

must be carried out by a competent person who must be fully conversant with the procedures and standards required when working on Medical gas systems.

WARNING :-

3.1.1 OBTAIN A WORK PERMIT BEFORE COMMENCING ANY WORK ON A MEDICAL GAS INSTALLATION.

3.1.2 IT IS ESSENTIAL THAT ONLY GENUINE BEACONMEDÆS SPARE PARTS ARE FITTED DURING MAINTENANCE.

3.2 Tools and equipment.

Common hand tools are required and they must be clean and serviceable. A Gem 'O' ring extraction tool is also necessary, and FRDP's are required to check pressure and flow rates. All necessary spare parts must be obtained before commencing work.

3.3 Customer recommended maintenance.

3.4 Quarterly inspection.

The quarterly inspection proves the integrity and performance of each Terminal Unit and the Retractable Pendant Linear Actuator. The quarterly inspection must be carried out on all Terminal Units and consists of the following procedure :

3.4.1 Check that the Terminal Unit is complete and has the correct gas identification label firmly attached.

3.4.2 Using the Test Probes, ensure that only the correct Medical gas Probe will enter the Terminal Unit. Fully engage the correct Test Probe and check the Terminal Unit for freedom from leaks, remove the Test Probe and ensure that the Terminal Unit seals the gas flow.

3.4.3 Retractable Pendant only. Using the hand controller, select the Pendant to operate throughout its full range of movement. Ensure that the operation is smooth and free from any unusual noise or vibration.

3.5 Annual inspection.

The annual inspection proves the mechanical and electrical operation of the Pendant and proves the integrity and performance of each Medical gas service and Terminal Unit. The annual inspection must be carried out in accordance with the following procedure :-

3.5.1 Medical gas services/vacuum.

Fit an FRDP to the Terminal Unit and check for correct flow rate and pressure (Tables 2, 3 or 4). Remove FRDP and ensure that the Terminal Unit seals the gas flow.

3.5.2 Retractable Pendant. Preparation.

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Remove ceiling Shroud and split outer covers for access.
3.5.3 Flexible hoses and conduits.

Operate the Retractable Pendant throughout its full range of movement. Ensure that all flexible hoses and electrical conduits do not chafe or restrict movement of the Pendant. Examine as far as possible each flexible hose throughout its length for damage, replace as necessary in accordance with Clause 3.9.

Note! It is recommended that hoses assemblies should be replaced after 5 years service even if no sign of damage can be detected.

Note ! Replacement flexible hoses are manufactured to a specified length relative to the Pendant length, tested and supplied with NIST fittings attached.

WARNING :-
BEFORE COMMENCING ANY WORK ON A CONTAMINATED VACUUM SYSTEM, PERSONNEL MUST BE AWARE OF THE POTENTIAL HEALTH HAZARDS AND NECESSARY SAFETY PRECAUTIONS WHICH MUST BE OBSERVED.

Notes :-

1. With Medical Vacuum Terminal Units, where experience has proven that contamination may occur, engineers are advised to strip and clean that affected Terminal Units and replace the Capsule Assembly at periods dictated by experience of the particular system.
2. BS EN ISO 9170-1 allows for a probe 'O' ring seal replacement every 1000 cycles in order to maintain the leakage rate. Tests have proven that the Gem 10 Terminal Unit will normally operate within BS EN ISO 9170-1 limits for 3000 cycles, at which point that Capsule Assembly should be replaced. Given U.K. hospital procedures and maintenance philosophy, BEACONMEDÆS do not recommend a periodic Capsule change. Hospitals requesting such periodic routine maintenance may require the Capsule to be replaced at 12 month intervals. In these circumstances, the Capsule assembly is replaced in accordance with Clause 3.6, but replacement of the Capsule 'O' ring seal is unnecessary.

AGS disposal system.

Fit test equipment designed to simulate the pressure drop through the receiver system. Select the AGS disposal system ON and check the flow rate is in accordance with the specification.

3.5.4 Retractable Pendant Split outer covers and ceiling shroud. Replace.

3.6 Hose Assembly Replacement

It is recommended that hose assemblies be replaced after a service life of 5 years even if no sign of damage can be detected (replace in accordance with Clause 3.9.).

Note ! Replacement flexible hoses are manufactured to a specified length relative to the Pendant length, tested and supplied with NIST fittings attached.

WARNING :-
BEFORE COMMENCING ANY WORK ON A CONTAMINATED VACUUM SYSTEM, PERSONNEL MUST BE AWARE OF THE POTENTIAL HEALTH HAZARDS AND NECESSARY SAFETY PRECAUTIONS WHICH MUST BE OBSERVED.

3.7 Damaged or leaking Gem 10 Terminal Unit.

A leaking Terminal Unit is normally caused by an internal seal failure/wear within the Capsule Assembly. The Capsule Assembly is a sealed unit and should be replaced. It is also recommended that the capsule 'O' ring seal is replaced. The procedure to repair a leaking Terminal Unit is as follows :-

WARNING :-
IF THE TERMINAL UNIT SUSTAINS ANY DAMAGE OR PROBE MALFUNCTION, THE SOCKET ASSEMBLY SHOULD BE REPLACED COMPLETELY (CLAUSE 4.7). THIS ENSURES THAT ALL DAMAGED COMPONENTS ARE REPLACED. IT IS NOT RECOMMENDED TO ONLY REPLACE ROLLER PINS AS IT IS EXPECTED THAT DAMAGED ROLLER PINS CAN DAMAGE THE SOCKET ASSEMBLY.

Note ! It is not necessary to depressurise the distribution system to carry out this procedure.

3.7.1 Pendant Fascia Plate. Remove.

Remove screws and washers securing Fascia Plate and remove.

3.7.2 Gem 10 Fascia Ring. Remove.

Carefully unlock the spring fingers located in the holes on the diameter of the fascia ring by using a small screwdriver. Gently pull the fascia ring to remove.

Note ! The Probe Release Ring will remain in the forward position influenced by the Locking Springs and will retain both Roller Pins. Care should be taken not to displace Probe Release Ring as the Roller Pins may fall out of the assembly.

3.7.3 Socket Assembly. Remove.

Unscrew both capscrews securing Socket Assembly and remove. Withdraw Socket Assembly.

3.7.4 Capsule Assembly. Remove.

Withdraw Capsule Assembly.

Note ! The Maintenance Valve arrangement will close off the supply, but is expected to leak slightly. In the case of Vacuum Terminal Units, a serviceable Test Plug should be temporarily fitted to maintain the system integrity.

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CAUTION :-

When removing an 'O' ring seal, a specifically designed soft 'O' Ring Extraction Tool 1826977 should be used. The use of a dental probe or similar sharp instrument can damage the 'O' ring groove and may cause leakage.

3.7.5 Capsule 'O' Ring Seal. Remove

Using an 'O' ring extraction tool, remove capsule 'O' ring from inside pipeline termination block.

3.7.6 Capsule 'O' ring seal. Fit.

Fit new capsule 'O' ring seal, ensuring that the seal is correctly seated in locating groove.

3.7.7 Capsule assembly. Fit.

Insert new capsule assembly inside pipeline termination block.

3.7.8 Socket assembly. Fit.

Gently align socket assembly to gas specific plate with pin engaging with gas specific hole. Centralise on capsule assembly and fit both cap screws. Tighten cap screws to secure assembly.

Note ! If after replacing the capsule assembly and capsule 'O' ring seal, the terminal it is still found to be leaking, replace bush 'O' ring seal in first fix assembly in accordance with Clause 3.8

3.7.9 Fascia ring. Fit.

Align fascia ring key way with socket assembly. Gently push fascia ring until spring fingers engage and lock.

Note ! The fascia ring and probe release ring should now form one component and should be retained in place.

3.7.10 Pendant Fascia. Refit.

Locate fascia plate over Terminal Units and retain by fitting securing screws.

3.7.11 Probe operation. Check.

Carry out quarterly inspection procedure in accordance with Clause 3.4.

3.8 Gem 10 Terminal Unit - Socket replacement.

In the event of a damaged Gem 10 Terminal Unit, the Socket Assembly must be replaced using the following procedure :-

3.8.1 Pendant Fascia. Remove.

Remove retaining screws securing Fascia Plate and remove.

3.8.2 Gem 10 Fascia Ring. Remove.

Carefully unlock the spring fingers located in the holes on the diameter of the fascia ring by using a small screwdriver. Gently pull the fascia ring to remove.

Note ! The Probe Release Ring will remain in the forward position influenced by the Locking Springs and will retain both Roller Pins. Care should be taken not to displace Probe Release Ring as the Roller Pins may fall out of the assembly.

3.8.3 Socket assembly. Remove.

Unscrew both cap screws securing socket assembly to gas specific plate and remove. Withdraw socket assembly.

3.8.4 Capsule assembly. Remove.

Withdraw capsule assembly.

Note ! The Maintenance Valve arrangement will close off the supply, but it is expected to leak slightly. In the case of Vacuum Terminal Units, a serviceable Test Plug should be temporarily fitted to maintain the system integrity.

3.8.5 Replacement socket assembly. Remove fascia ring.

Remove Fascia Ring from replacement Socket Assembly in accordance with Clause 3.7.2.

3.8.6 Capsule Assembly. Fit.

Insert new capsule assembly inside pipeline termination block.

3.8.7 Socket assembly. Fit.

Gently align socket assembly to gas specific plate with pin engaging with gas specific hole. Centralise on capsule assembly and fit both cap screws. Tighten cap screws to secure assembly.

Note ! If after replacing the capsule assembly and capsule 'O' ring seal, the terminal it is still found to be leaking, replace bush 'O' ring seal in first fix assembly in accordance with Clause 3.8

3.8.8 Gem 10 Fascia Ring. Fit.

Align fascia ring key way with socket assembly. Gently push Fascia Ring until spring fingers engage and lock.

3.8.9 Pendant Fascia. Refit.

Locate Fascia Plate over Terminal Units and retain by fitting securing screws.

3.8.10 Probe operation. Check.

Carry out quarterly inspection procedure in accordance with

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Clause 3.4.

3.9 Replacing the Terminal Unit Bush 'O' ring seal.

The procedure to replace the termination assembly 'O' ring seal is as follows :-

3.9.1 Pendant Fascia Plate. Remove.

Remove retaining screws securing fascia plate and remove.

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WARNING :-
BEFORE PROCEEDING THE PIPELINE DISTRIBUTION SYSTEM MUST BE ISOLATED AND DEPRESSURISED.

3.9.2 Terminal Unit. Strip.

Remove Fascia Ring, Socket Assembly and Capsule Assembly in accordance with Clauses 3.7.2 to 3.7.4 inclusive.

3.9.3 Internal bush. Remove.

Using suitable circlip pliers, remove internal retaining circlip. Carefully withdraw internal Bush with capsule 'O' ring Seal using a Test Plug as an extractor.

CAUTION :-
When removing an 'O' ring seal, a specifically designed soft 'O' ring extraction tool (1826977) should be used. The use of a dental probe or similar sharp instrument can damage the 'O' ring locating groove and may cause leakage.

3.9.4 'O' ring seal. Replace.

Using an 'O' ring extraction tool, carefully withdraw 'O' Ring Seal from inside of pipeline Termination Block and discard. Carefully insert new 'O' Ring Seal and ensure it locates correctly within groove in pipeline Termination Block.

3.9.5 Maintenance valve. Check.

With the exception of Vacuum Terminal Units, check that Maintenance Valve and spring remain correctly assembled. Insert into Terminal Unit if displaced and ensure that both items are correctly located.

3.9.6 Internal Bush. Refit.

Carefully insert Bush complete with Capsule 'O' Ring Seal, until Bush locates with internal shoulder of pipeline Termination Block. Using suitable internal circlip pliers, refit retaining circlip to secure Bush. Ensure that circlip locates correctly within retaining groove.

3.9.7 Terminal Unit. Rebuild.

Rebuild Terminal Unit, Capsule Assembly, Socket Assembly

and Fascia Ring in accordance with Clauses 3.7.6 to 3.7.9 inclusive.

3.9.8 Probe operation. Check.

Carry out quarterly inspection procedure in accordance with Clause 3.4.

Retractable Pendant

3.9.9 Ceiling Shroud. Remove.

Remove ceiling Shroud securing screws and remove ceiling Shroud for access to upper NIST connections.

3.9.10 Split outer covers. Remove.

Remove split outer cover securing screws and remove both outer covers with felt sealing strip. Note routing of flexible hoses.

CAUTION :-
The Shuttle Valve relies on a metal to metal seal and therefore is expected to leak slightly when the hose is removed.

3.9.11 Terminal Unit and Hose Assembly. Disconnect.

Disconnect flexible hose upper NIST connection.

3.9.12 Terminal Unit. Strip.

Remove Fascia Ring, Socket Assembly and Capsule Assembly in accordance with Clauses 3.7.2 to 3.7.4 inclusive.

3.9.13 Internal bush. Remove.

Using suitable circlip pliers, remove internal retaining circlip. Carefully withdraw internal Bush with capsule 'O' ring Seal using a Test Plug as an extractor.

CAUTION :-
When removing an 'O' ring seal, a specifically designed soft 'O' ring extraction tool (1826977) should be used. The use of a dental probe or similar sharp instrument can damage the 'O' ring locating groove and may cause leakage.

3.9.14 'O' ring seal. Replace.

Using an 'O' ring extraction tool, carefully withdraw 'O' Ring Seal from inside of pipeline Termination Block and discard. Carefully insert new 'O' Ring Seal and ensure it locates correctly within groove in pipeline Termination Block.

3.9.15 Maintenance valve. Check.

With the exception of Vacuum Terminal Units, check that Maintenance Valve and spring remain correctly assembled. Insert into Terminal Unit if displaced and ensure that both items are correctly located.

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3.9.16 Internal Bush. Refit.

Carefully insert Bush complete with Capsule 'O' Ring Seal, until Bush locates with internal shoulder of pipeline Termination Block. Using suitable internal circlip pliers, refit retaining circlip to secure Bush. Ensure that circlip locates correctly within retaining groove.

3.9.17 Terminal Unit. Rebuild.

Rebuild Terminal Unit, Capsule Assembly, Socket Assembly and Fascia Ring in accordance with Clauses 3.7.6 to 3.7.9 inclusive.

3.9.18 Terminal Unit and Hose Assembly. Reconnect.

Reconnect upper NIST fitting and tighten, but do not over torque.

3.9.19 Flexible Hose. Leak check.

With the Medical gas service operating at normal system pressure/vacuum, check all disturbed connections for leaks.

3.9.20 Retractable Pendant Split outer covers. Replace.

Ensure that felt sealing strip and both split outer covers are correctly located. Refit securing screws and tighten.

3.9.21 Ceiling Shroud. Refit.

Refit ceiling Shroud and securing screws.

3.9.22 Probe operation. Check.

Carry out quarterly inspection procedure in accordance with Clause 3.4.

3.10 Replacing a Flexible Hose Assembly.

**WARNING :-
FLEXIBLE HOSE ASSEMBLIES ARE MANUFACTURED AND TESTED TO BS EN 739 USING SPECIAL TOOLS. ON-SITE REPAIRS OTHER THAN BY REPLACEMENT ARE NOT AUTHORISED.**

Before attempting to replace a Medical gas service/vacuum Flexible Hose assembly, a replacement Hose manufactured to the correct length, colour coded in accordance with

Table 1, and with the correct NIST fittings permanently attached must be obtained. If practicable the Medical gas service must be isolated by closing the appropriate ZSU and the pipeline depressurised. The procedure to replace a Flexible Hose is as follows :-

3.10.1 Pendant Fascia Plate. Remove.

Remove Fascia Plate by removing securing screws.

3.10.2 Ceiling Shroud. Remove.

Remove ceiling Shroud securing screws and remove ceiling Shroud for access to upper NIST connections.

3.10.3 Split outer covers. Remove.

Remove split outer cover securing screws and remove both outer covers with felt sealing strip. Note routing of flexible hoses.

**CAUTION :-
The shuttle valve relies on a metal to metal seal and therefore is expected to leak slightly when the hose is removed.**

3.10.4 Terminal Unit. Remove from Terminal Unit Mounting Plate.

Remove Terminal Unit from Terminal Unit Mounting Plate by removing securing screws.

3.10.5 Flexible Hose Assembly. Remove.

Disconnect the upper NIST connection and remove the Hose and Terminal Unit assembly by withdrawing through the Terminal Unit Mounting Plate.

3.10.6 Terminal Unit. Disconnect.

Disconnect Flexible Hose from Terminal Unit at lower NIST connection.

3.10.7 Replacement Hose. Inspect.

Ensure that replacement hose assembly is manufactured to the correct length, colour coded in accordance with Table 1. and incorporates correct NIST fittings.

3.10.8 Terminal unit NIST. Inspect 'O' ring seal.

Inspect 'O' ring seal fitted to terminal unit NIST connection and replace as necessary.

3.10.9 Terminal Unit. Connect.

Connect replacement flexible Hose to Terminal Unit at lower NIST fitting, tighten, but do not over torque.

3.10.10 Flexible Hose assembly. Refit.

Carefully feed flexible Hose assembly through the Terminal Unit Mounting Plate and the Pendant body in the same manner as the original Hose was withdrawn. Connect the upper NIST fitting to the first fix assembly Gas Service Kit and tighten but do not over torque.

3.10.11 Terminal Unit. Refit to Terminal Mounting Plate.

Locate Terminal Unit to the Terminal Unit Mounting Plate and fit securing screws.

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3.10.12 Flexible Hose. Leak check.

Check all disturbed connections for leaks.

3.10.13 Flexible Hose. BS EN ISO 7396-1 checks.

Carry out the tests for obstruction, particulate contamination and gas identity as specified in BS EN ISO 7396-1.

3.10.14 Terminal unit. Functional check.

Reapply gas pressure and purge the installation. Carry out the annual inspection in accordance with Clause 3.5. and check all disturbed NIST fittings for leaks.

3.10.15 AGS Terminal unit. Functional test.

If AGS terminal unit has been disturbed carry out a functional test in accordance with Clause 3.10.6.

3.10.16 Fascia Plate. Refit.

Ensure Fascia Plate is correctly positioned to the Pendant and fit securing screws.

3.10.17 Retractable Pendant Split outer covers. Replace.

Ensure that felt sealing strip and both split outer covers are correctly located. Refit securing screws and tighten.

3.10.18 Ceiling Shroud. Refit.

Refit ceiling Shroud and securing screws.

3.11 AGS - disposal system Terminal unit.

The procedure to remove, inspect and functionally test the AGS - disposal system Terminal Unit is as follows :-

CAUTION :-

The Terminal Unit valve Front Body screws into the Rear body by a left hand thread. The identification disc, and Front Body are removed as one component.

3.11.1 Front Body. Remove.

Unscrew valve Front Body from first fix assembly. If the screw thread appears stiff, use a test Probe to provide sufficient purchase. The Terminal Unit should dismantle by hand pressure, but previously applied Loctite may cause an initial stiction (left hand thread).

3.11.2 Valve Plug and Spring. Remove.

Remove Valve Plug and Spring from Terminal Unit.

3.11.3 Rear Body. Blank.

Blank Rear Body by fitting a dust plug.

3.11.4 Terminal Unit. Inspect.

Inspect and clean Valve Plug and Spring. Ensure that orifice is free from obstruction and Valve Plug seats are serviceable, clean all components and replace as necessary. Ensure that the identification label remains firmly affixed to the Front Body.

3.11.5 Terminal Unit. Assemble.

Remove dust plug from Rear Body. Apply Loctite "Screwlock 222" sparingly to screw threads. Assemble Spring, Valve Plug and Front Body to Rear Body. Tighten using only hand pressure and do not over torque (left hand thread).

3.11.6 Terminal Unit. Check operation.

Check for freedom of operation by inserting a test Probe. Using the test equipment, and with the disposal system activated, check the flow rates according to the specification.

3.12 Replacing a Retractable Pendant Linear Actuator

WARNING :-

ELECTRICAL POWER SUPPLIES TO THE PENDANT ASSEMBLY MUST BE SELECTED OFF AND ISOLATED THROUGHOUT THIS PROCEDURE.

3.12.1 Electrical power supplies. Select 'OFF' and isolate.

Identify each electrical power supply to Pendant assembly. Select 'OFF' and isolate each electrical power supply.

3.12.2 Ceiling Shroud. Remove.

Remove ceiling Shroud securing screws and remove ceiling Shroud for access.

3.12.3 Split outer covers. Remove.

Remove split outer cover securing screws and remove both outer covers with felt sealing strip.

3.12.4 Fascia Plate. Remove.

Remove Fascia Plate securing screws and remove Fascia Plate.

3.12.5 AGS Terminal Unit (if fitted). Remove.

If an AGS Terminal Unit is fitted to the Pendant remove from Terminal Unit Mounting Plate.

3.12.6 Actuator lower mounting. Disconnect.

Ensure that the lower Pendant Assembly does not fall during this operation and that no undue stress is placed on the flexible hoses/conduits. Support the lower Pendant assembly and remove the 4 socket head countersunk screws

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and washers securing the Spacer Extension to the Terminal Unit Mounting Plate.

3.12.7 Actuator. Electrically disconnect.

Disconnect Actuator electrical plug from socket on upper body.

3.12.8 Actuator. Disconnect.

Disconnect electronic signal line from socket on upper body.

3.12.9 Actuator and Spacer Extension. Remove.

Ensure that Actuator is firmly supported and remove 4 cap head screws and washers securing Actuator upper section to Top Mounting Plate. Carefully remove Actuator and Spacer Extension taking care to avoid damage to flexible hoses/conduits.

3.12.10 Spacer Extension. Remove.

Remove the Spacer Extension from the Actuator by removal of the 4 cap head screws and washers.

3.12.11 Actuator. Compare replacement.

Check specification plate on both Actuators and confirm that replacement Actuator is of the same type as the one removed.

3.12.12 Spacer Extension. Fit.

Refit the Spacer Extension to the new Actuator using the 4 cap head screws and washers. Ensure fixings are tight.

3.12.13 Replacement Actuator. Fit.

Check Actuator specification plate to ensure that operating voltage is correct. Carefully position Actuator inside Pendant assembly taking care to avoid damage to flexible hoses/conduits.

3.12.14 Actuator. Fit.

Align Actuator with Pendant Top Mounting Plate and lower Spacer Extension, fit securing bolts and washers. Fully tighten assembly.

3.12.15 Actuator. Reconnect.

Reconnect signal line at Actuator upper body socket.

3.12.16 Actuator. Electrically reconnect.

Reconnect electrical plug to socket on Actuator upper body.

3.12.17 AGS Terminal Unit (if fitted). Refit.

Refit the AGS Terminal Unit to the Terminal Unit Mounting Plate.

3.12.18 Electrical power supply. Restore.

Restore electrical power supply to Pendant assembly.

3.12.19 Actuator. Functionally test.

Remove temporary supports from Pendant Assembly and ensure that area is clear from obstructions. Select Hand Controller to fully extend and retract Pendant whilst ensuring that flexible hoses/conduits follow direction of travel without chafing. Check rate of travel to ensure that a minimum of 20mm/sec. is obtained in both direction over a full range of movement of 300mm.

3.12.20 Fascia Plate. Refit.

Ensure Fascia Plate is correctly positioned to the Pendant and fit securing screws.

3.12.21 Split outer covers. Replace.

Ensure that felt sealing strip and both split outer covers are correctly located. Refit securing screws and tighten.

3.12.22 Ceiling Shroud. Refit.

Refit ceiling Shroud and securing screws.

4. FAULT DIAGNOSIS

4.1 Introduction

The following Tables detail possible defects/symptoms which may occur with the BEACONMEDÆS Rigid or Retractable Pendant, with the necessary rectification action.

TABLE 5 : LEAKING TERMINAL UNIT

Possible cause	Remarks/rectification action
Worn 'O' Rings or components inside Capsule Assembly	Replace Capsule Assembly and 'O' Ring Seal. (Clause 3.6)
Leaking NIST connection at either Terminal Unit or first fix assembly	Disconnect flexible Hose and replace 'O' ring seal. Do not attempt to cure leak by over tightening.

TABLE 6 : TERMINAL UNIT STIFF OR DIFFICULT TO OPERATE

Possible cause	Remarks/rectification action
Damaged Medical gas Probe	Inspect probe for damage, replace as necessary.

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Mechanical damage inside Terminal Unit	Replace Terminal Unit Socket Assembly and functionally check using a serviceable Medical gas test Probe. (Clause 3.7)
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TABLE 7 : PRESSURE/FLOW RATE AT TERMINAL UNIT LOW

WARNING :-

BEFORE COMMENCING ANY WORK ON A CONTAMINATED VACUUM SYSTEM, PERSONNEL MUST BE AWARE OF THE POTENTIAL HEALTH HAZARDS AND NECESSARY SAFETY PRECAUTIONS WHICH MUST BE OBSERVED. CONTAMINATED VACUUM TERMINAL UNIT SECOND FIX ASSEMBLIES SHOULD BE REPLACED.

Possible cause	Remarks/rectification action
Damaged Medical gas Probe	Inspect Probe for damage, replace.
Dirty Terminal Unit or foreign objects restricting gas flow	Remove Socket and Capsule Assemblies, ensure that Terminal Unit is clean, serviceable and free from foreign objects. Replace Capsule Assembly and 'O' Ring Seal. (Clause 3.6)
Flexible Hose NIST connections leaking	Check both upper and lower NIST connections. Replace 'O' Ring Seals as necessary. Do not attempt to cure a leak by over tightening.
Damaged or blocked Flexible Hose	Inspect flexible hose for damage. Disconnect Flexible Hose at first fix gas service kit NIST fitting. Using a suitable tool open gas service kit Shuttle Valve and ensure that there is a substantial flow of gas. Replace Hose Assembly as necessary. (Clause 3.9)

Damaged or leaking Medical gas distribution system	If the pressure/flow rate remains low with a serviceable Terminal Unit fitted, the Medical gas distribution system is suspect.
	Check other Terminal Units within the system and attempt to isolate the defective area.
	Ensure that the appropriate ZSU or Line Valves are fully open.
	Ensure that the source equipment is serviceable and delivering the correct design pressure/flow. Inspect distribution system for damage or leaks. Repair pipeline as necessary and carry out commissioning procedure on system affected.

TABLE 8 : PENDANT WILL NOT EXTEND OR RETRACT

Possible cause	Remarks/rectification action
Electrical power supply faulty	Check fuse on incoming electrical power supply to Linear Actuator. Replace as necessary.
	If Linear Actuator was being operated immediately prior to failure, the thermal trip may have operated, wait several minutes for the unit to cool and the thermal trip will automatically reset.
	Gain access to Linear Actuator terminal box and check all connections are correctly made. Check plug/socket connection of Linear Motor upper casing. Using a Multimeter, check that mains voltage is available at Linear Actuator plug. Repair wiring defects as necessary.
Electronic signals to Linear Actuator lost	Visually examine Hand Controller and interconnecting cable for damage. Replace as necessary.
Linear Actuator faulty	Replace Linear Actuator (Clause 3.11).

TABLE 9 : PENDANT OPERATION NOISY OR PRODUCES VIBRATION

Possible cause	Remarks/rectification action
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Series 9a Rigid & Retractable Pendants

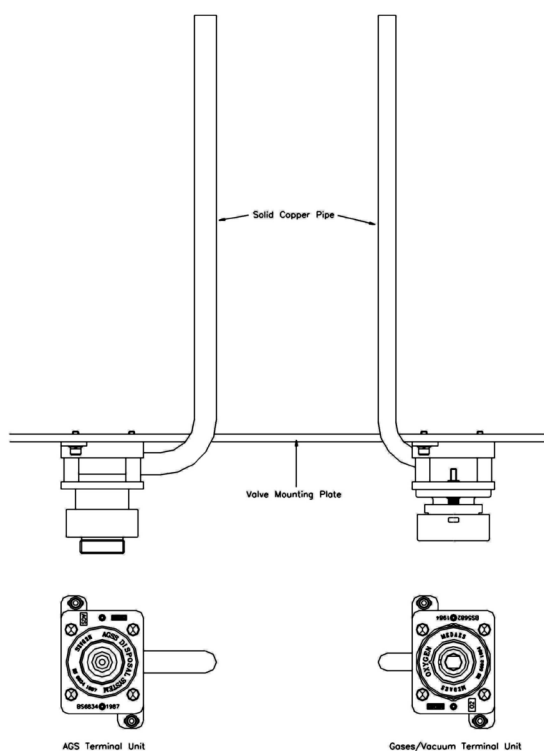


FIG.5
Rigid Pendant Gem 10 Terminal Units

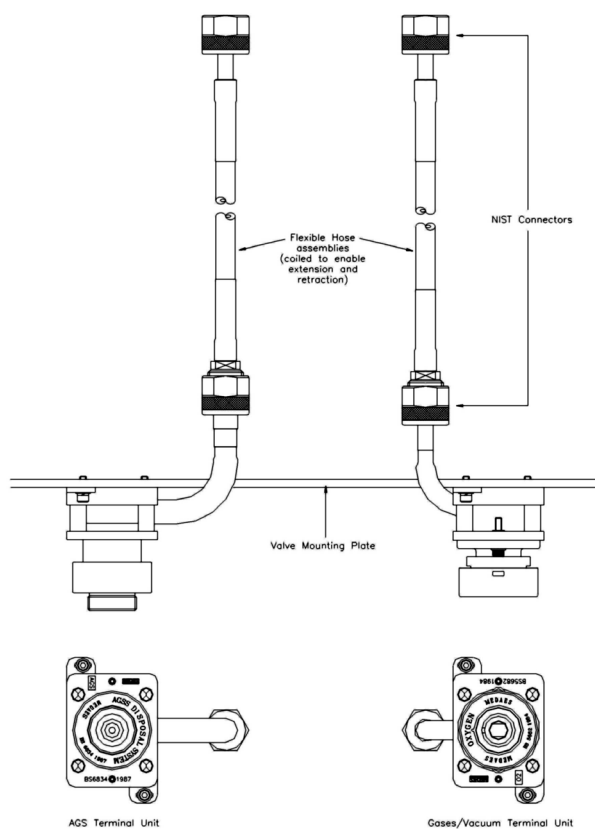


FIG.6
Retractable Pendant Gem 10 Terminal Units

Flexible hoses/ electrical conduit chafing	Gain access to the flexible hoses/ electrical conduits and check for chafing during Pendant operation. Replace any damaged hose or conduit (Clause 3.9). Reroute as necessary.
Linear Actuator faulty	Replace Linear Actuator (Clause 3.11).

5. SPARES LIST

5.1 Spares.

Note ! When ordering either Hose and Terminal Unit Assemblies or Hose Assemblies only, the Retractable Pendant Length (when retracted) is required to be supplied.

5.1.1 Hose and Terminal Unit Assemblies. (Retractable Pendant only)

	Part Number
Oxygen	2001217
Nitrous Oxide	2001218
Oxygen/Nitrous Oxide Mixture (50/50% V/V)	2001219
Medical Air 400kPa	2001220
Surgical Air 700kPa	2001221
Medical Vacuum	2001222
Anaesthetic Gas Scavenging	2001223

5.1.2 Hose Assemblies with NIST fittings. (Retractable Pendant only)

	Part Number
Oxygen	1823440
Nitrous Oxide	1823441
Oxygen/Nitrous Oxide Mixture (50/50% V/V)	1823442
Medical Air 400kPa	1823443
Surgical Air 700kPa	1823444
Medical Vacuum	1823445
Anaesthetic Gas Scavenging	1828776

5.1.3 Terminal Units c/w NIST fitting and Gem 10

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- 2nd Fix Assembly.
(Retractable Pendant only)

	Part Number
Oxygen	2001224
Nitrous Oxide	2001225
Oxygen/Nitrous Oxide Mixture (50/50% V/V)	2001226
Medical Air 400kPa	2001227
Surgical Air 700kPa	2001228
Medical Vacuum	2001229
Anaesthetic Gas Scavenging	2001230

5.1.4 Gem 10 - 2nd Fix Assemblies c/w Capsule Assembly.

	Part Number
Oxygen	1826850
Nitrous Oxide	1826851
Oxygen/Nitrous Oxide Mixture (50/50% V/V)	1826852
Medical Air 400kPa	1826853
Surgical Air 700kPa	1826854
Medical Vacuum	1826855

5.1.5 NIST 'O' Ring Seal.
(Retractable Pendant only)

	Part Number
For upper and lower connections on all services except AGS.	1820697
AGS	1822236

5.1.6 Capsule Assembly **Part Number**
1826848

5.1.7 Capsule 'O' Ring Seal 1826809

5.1.8 Bush 'O' Ring Seal 1826808

5.1.9 AGS Terminal Unit

Spares Valve Plug 2004148
Spring 1824581

5.1.10 Linear Actuator

	Part Number
230 Volt A.C. 50 Hz (Type TES2 23L)	1828379

5.2 Spares scheduling

The recommended holding of spares depends on the number of Rigid or Retractable Pendants installed and is detailed at Table 10. The number recommended for overseas customers is expressed in brackets and takes into account expected transport delay.

TABLE 10 : MINIMUM RECOMMENDED SPARES

HOLDING

Part Number and Description	Number of Pendants Installed		
	1-2	2-3	3-5
1826850 to 1826855 Gem 10 - 2nd Fix assemblies (each gas)	1 (2)	1 (2)	1 (3)
1820697 - NIST 'O' Ring Seal	4 (8)	4 (8)	8 (16)
1822236 - NIST 'O' Ring Seal – AGS	1 (2)	1 (2)	1 (3)
1826848 - Capsule Assembly	2 (4)	2 (4)	2 (6)
1826809 - Capsule 'O' Ring Seal	2 (4)	2 (4)	2 (6)
1826808 - Bush 'O' Ring Seal	2 (4)	2 (4)	2 (6)
2004148 - AGS Valve Plug	1 (2)	1 (2)	1 (2)
1824581 - AGS Valve Spring	1 (2)	1 (2)	1 (2)

APPENDIX A

RIGID/RETRACTABLE PENDANTS FITTED WITH DIAMONDCARE® TERMINAL UNITS AND U.S. ELECTRICAL POWER SOCKETS

A.1 Introduction

This Appendix deals with the operation and maintenance of DiamondCare® Geometric Quick-Connect key style or DISS key style terminal units and U.S. electrical power sockets. All other operation and maintenance instructions are contained within the main body of the manual.

The BEACONMEDÆS Rigid and Retractable Pendants can accommodate up to eight Medical gas/vacuum terminal units, located radially on the lower fascia plate, any combination of services may be specified. Each of the four larger octagonal faces may be fitted with two twin U.S. power sockets and each of the four smaller octagonal faces may be fitted with either one twin U.S. power socket or extra low voltage component as required.

Standard gas terminal units are DiamondCare® Geometric Quick Connect or DISS (threaded) and are available for Oxygen, Nitrous Oxide, Vacuum, Air, Nitrogen (DISS only), Carbon Dioxide and Evacuation. Standard U.S. power sockets are 20Amp Duplex type.

A.2 Operation

A.2.1 Gas Terminal Units

Geometric Quick Connect

When gas service is needed, attach the appropriate hose assembly with a Geometric male adapter to the outlet by pushing the nose of the adapter into the terminal unit. Push the adapter into the terminal unit until the locking spring or latching plate holds the adapter in place. The adapter will lock in place.

To remove, press down on the adapter release button and pull the adapter out.

DISS

When gas service is needed, attach the appropriate hose assembly with a DISS nut and gland to the outlet and tighten the nut finger tight. It may be necessary to tighten slightly with a wrench if finger tight does not prevent leakage. However, tighten only enough to prevent leakage. Excessive tightening will eventually cause damage to the terminal unit.

A.3 Maintenance

Inspect the gas terminal units for leaks when inserting an adapter. Repair when necessary. See repair procedure for Geometric Quick Connect or DISS terminal units.

Note: At least twice per year or during a self determined maintenance schedule, perform a Leak Test of each terminal unit.

A.4 Repair Policy

Do not use an improperly functioning unit until all necessary repairs are made and the unit is tested to

ascertain that it is functioning in accordance with the manufacturer's published specifications.

To ensure full reliability, it is recommended that all repairs be performed by an Authorised BEACONMEDÆS Medical Service Representative. However, if this cannot be done, replacement of those parts designated in this manual may be undertaken by a competent person having experience in the repair of devices of this nature.

CAUTION: No repair should ever be attempted by anyone not having experience in the repair of devices of this nature.

Such repairs should be accomplished by replacing the damaged part with a replacement part manufactured or sold by BEACONMEDÆS. The unit should then be tested to ascertain that it is functioning in accordance with the manufacturer's published specifications.

A.5 Repair Procedure - Gas Terminal Units

A.5.1 Rigid Pendants

The terminal units were originally connected to the hospital gas service pipeline by a qualified medical gas pipeline installer because this procedure requires brazing. If a complete terminal unit is to be replaced, the brazing should be carried out by qualified Medical gas pipeline installer. Repairs to the terminal unit can be performed without disconnecting it from the hospital pipeline. Refer to the clauses listed in the procedures.

WARNING... Be certain that the gas supply to the terminal unit is shut off before disassembling.

CAUTION : Do not use oil or grease on or around the terminal units.

Shut off gas supply to the Rigid Pendant.

Remove Pendant Fascia Plate.

NOTE : To repair the terminal unit, refer to the listed clauses.

Geometric Quick Connect

Oxygen, Nitrous Oxide, Air and Carbon Dioxide

Clause A.5.6 Vacuum and Evacuation

Clause A.5.6

DISS - Oxygen, Nitrous Oxide, Air, Nitrogen and Carbon Dioxide

Clause A.5.5 Vacuum and Evacuation

Clause A.5.5

To replace the terminal units as an assembly, continue with the procedure.

NOTE: This procedure requires brazing, which should be carried out by a qualified medical gas pipeline installer.

To avoid cross connection if more than one check unit

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requires replacement, remove and replace one unit before replacing the second unit. Be certain that each gas line is connected to a properly identified check unit.

1. Unbrazed the pipeline connection.
2. Remove the two screws that hold the terminal unit to the mounting plate and remove the terminal unit.
3. Mount the new terminal unit, braze the pipeline connection, and perform leak test according to NFPA 99.
4. Reassemble the Pendant Fascia Plate.
5. Check for crossed connections. See NFPA 99.

A.5.2 DiamondCare® Frontbody Assembly

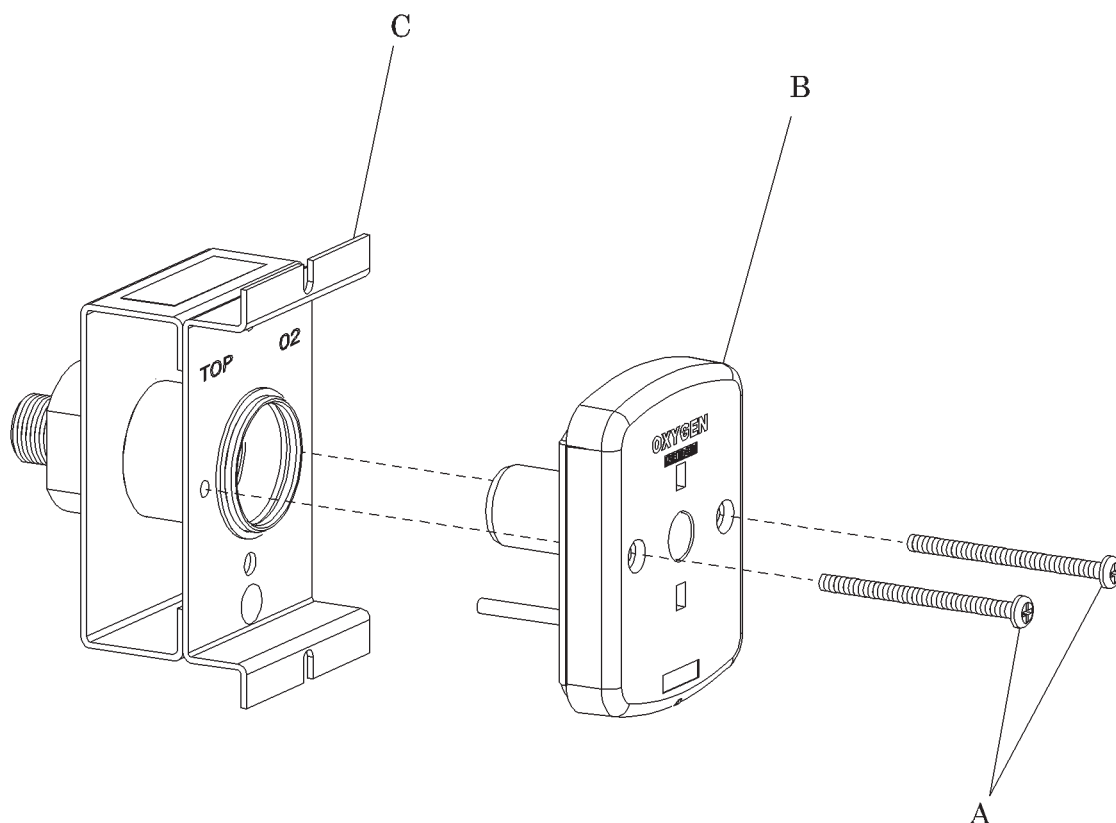
Tools Required: #2 phillips head screwdriver

Removal

NOTE: You do not have to turn off an outlet's pressurized gas service supply before removing and servicing the frontbody assembly. The secondary check valve in the rough-in assembly prevents gas flow from the gas service supply line. (Since medical vacuum, WAGD, and AGSS inlets do not have secondary checks, temporarily turn off the outlet's vacuum supply or install the pressure test cap.)

1. Using a #2 phillips head screwdriver, loosen the two screws (A) that secure the frontbody assembly (B) to the rough-in assembly (C) (see figure A.5.2-1 on page A.4).
2. Carefully remove the frontbody assembly (B) from the rough-in assembly (C).

Figure A.5.2-1 Frontbody Assembly Removal



NOTE: You may attach an adapter to the frontbody assembly to assist in the removal process.

Replacement

1. To install the replacement frontbody assembly, reverse the removal procedure.
2. To ensure proper operation, attach a secondary piece of equipment to the outlet.
3. Make sure the outlet does not leak and is properly sealed.

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A.5.3 DiamondCare® Twist-Lock, Replaceable, Barrel Assembly

Tools required: None

Parts required: (1) Repair kit

To select the proper twist-lock, replaceable, barrel assembly, refer to the section titled "Repair Kits" on page A.24.

Removal

NOTE: You do not have to turn off an outlet's pressurized gas service supply before removing and servicing the twist-lock, replaceable, barrel assembly. The secondary check valve in the rough-in assembly prevents gas flow from the gas service supply line. (Since medical vacuum, WAGD, and AGSS inlets do not have secondary checks, temporarily turn off the outlet's vacuum supply or install the pressure test cap.)

1. Remove the frontbody assembly (refer to procedure A.5.2).
2. Rotate the twist-lock, replaceable, barrel assembly (A) counterclockwise 180° until the flat portion of the barrel assembly is oriented in the 12:00 position (see figure A.5.3-1).

3. Tilt the twist-lock, replaceable, barrel assembly (A) downward and remove it from the keying disc assembly (B).

NOTE: Hold the frontbody assembly with the twist out barrel pointing upwards to avoid losing the washer and O-ring.

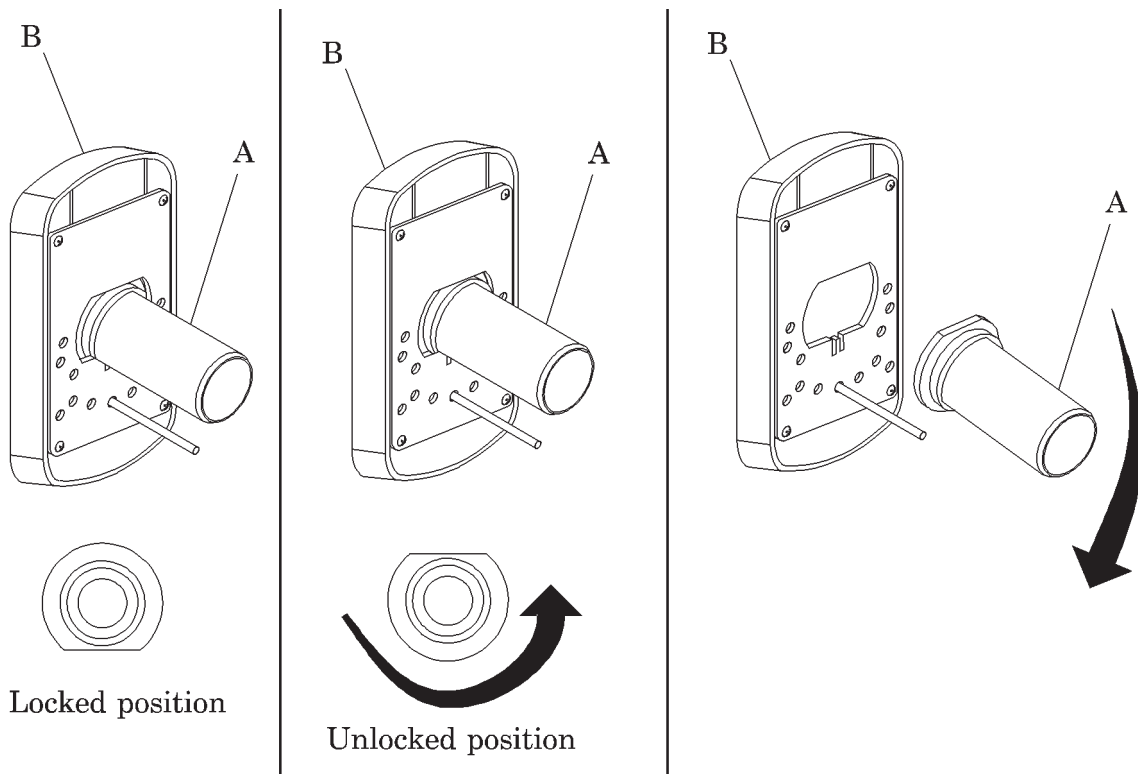
Replacement

1. Inspect the parts of the frontbody assembly for excessive wear or damage.
2. Replace worn or damaged parts as necessary.
3. To install a twist-lock, replaceable, barrel assembly (B), reverse the removal procedure.
4. Ensure that the retaining ring and/or the washer is in place on the frontbody assembly before installing the twist-lock, replaceable, barrel assembly.

NOTE: Once the twist-lock, replaceable, barrel assembly is installed, the flat portion of the barrel assembly should be located in the bottom, 6:00 position.

5. To ensure proper operation, attach a secondary piece of equipment to the outlet. Make sure the outlet does not leak and is properly sealed.

Figure A.5.3-1 Frontbody Barrel Assembly



A.5.4 DiamondCare® Rough-in Secondary Check Unit Assembly

(Pressurized Outlets Only)

Tools required: Small screwdriver

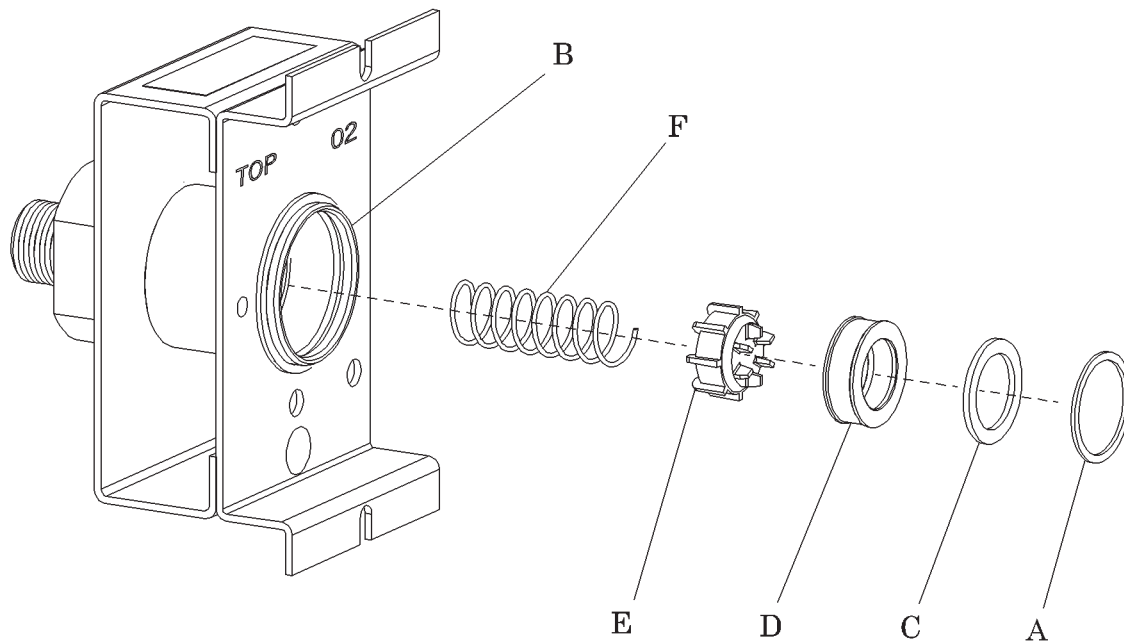
Removal

WARNING... Shut off the gas supply to the outlet before servicing the rough-in secondary check unit assembly. Failure to do so could result in personal injury or equipment damage.

Series 9a Rigid & Retractable Pendants

1. Shut off the gas supply to the outlet.
2. Remove the frontbody assembly (refer to procedure A.5.2).
3. Note the removal sequence of the internal parts in the rough-in secondary check unit assembly to ensure proper replacement during the installation procedure.
4. Using a small screwdriver, remove the retaining ring (A) from the rough-in assembly (B) (see figure A.5.4-1 on page A.8).
5. Remove the washer (C).
6. Using the small screwdriver, carefully remove the rubber bushing (D) from the rough-in assembly (B).
7. Remove the rough-in secondary check (E).
8. Remove the rough-in spring (F).

Figure A.5.4-1. Rough-in Secondary Check Unit Assembly (Pressure Gas)



Replacement

1. Inspect the parts of the internal secondary check unit assembly for excessive wear or damage.
2. Replace all the parts included in the replacement kit.
3. To install the replacement secondary check unit assembly, reverse the removal procedure.
4. To ensure proper operation, make sure the rough-in assembly seals properly and does not leak.

A.5.5 DiamondCare® Rough-in Assembly (Vacuum Outlets Only)

Tools required: Small screwdriver

Removal



WARNING

Shut off the gas supply to the outlet before servicing the rough-in secondary check unit assembly. Failure to do so could result in personal injury or equipment damage.

1. Shut off the service supply to the outlet.
2. Remove the frontbody assembly (refer to procedure A5.2).
3. Note the removal sequence of the internal parts in the rough-in secondary check unit assembly to ensure proper replacement during the installation procedure.
4. Using a small screwdriver, remove the retaining ring (A) from the rough-in assembly (B) (see figure A.5.5-1 on page A.10).
5. Remove the washer (C).
6. Using the small screwdriver, carefully remove the rubber bushing (D) from the rough-in assembly (B).

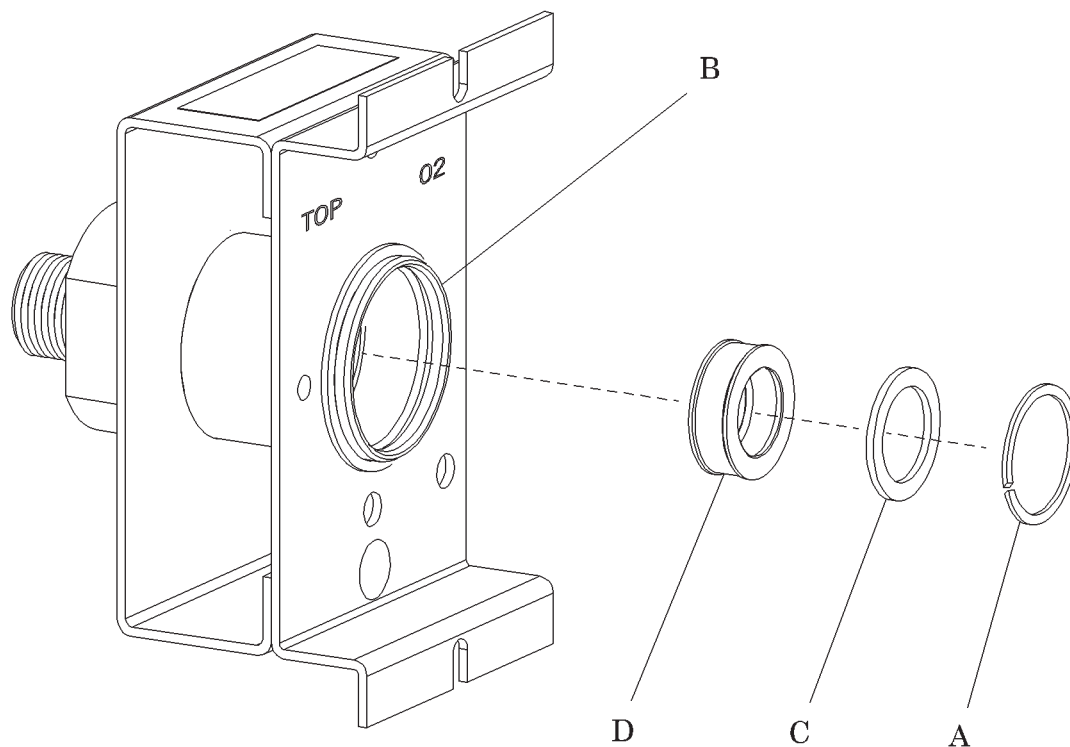
Replacement

1. Inspect the internal parts of the vacuum rough-in assembly for excessive wear or damage.
2. Replace all the parts included in the replacement kit.
3. To install the replacement vacuum outlet bushing, reverse the removal procedure.
4. To ensure proper operation, attach the frontbody

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assembly (see A.5.2). Make sure the rough-in assembly does not leak and is properly sealed when the finish assembly is installed.

Figure A.5.5-1. Rough-in Assembly (Vacuum Only)



A.5.6 DiamondCare DISS Frontbody Assembly

Tools Required: Retaining ring removal/installation tool (appropriate size/type)
Small screwdriver

Removal

Note: You do not have to turn off the outlet's pressurized gas service supply before removing and servicing the DISS, key style, frontbody assembly. The secondary check valve in the rough-in assembly prevents gas flow from the pressure gas service supply line, except in vacuum outlets.

Note: Medical vacuum, WAGD, AGSS do not have secondary checks. The service supply must be turned off, or the pressure test cap should be installed in order to service their rough-in assemblies. Otherwise, the line will continue to maintain a draw (suction).

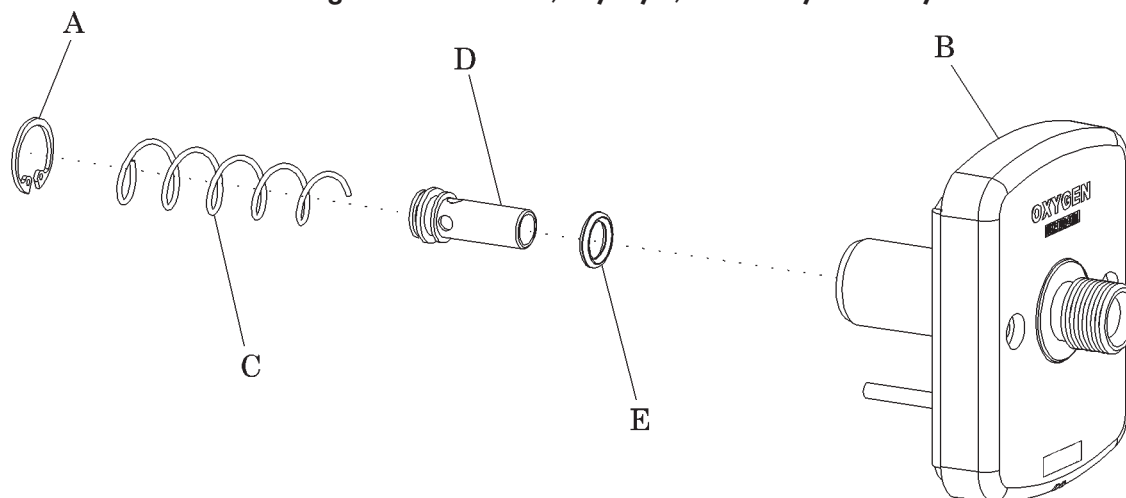
1. Remove the frontbody assembly (refer to procedure A.5.2).
2. Note the removal sequence of the internal parts of the frontbody assembly to ensure proper replacement during the installation procedure.
3. Using the retaining ring removal/installation tool or a small screwdriver, remove the retaining ring (A) from the rear of the DISS frontbody assembly (B) (see figure A.5.6-1 on page A.12).
4. Remove all of the internal parts from the DISS frontbody assembly (B) by performing the following steps:

- a. Carefully remove the DISS frontbody spring (C).
- b. Remove the DISS piston (D).
- c. Remove the frontbody piston O-ring (E) from the DISS piston (D).

Replacement

1. To install the replacement DISS frontbody assembly, reverse the removal procedure.
2. To ensure proper operation, attach a secondary piece of equipment to the outlet. Make sure the outlet does not leak and is properly sealed.

Figure A.5.6-1. DISS, Key Style, Frontbody Assembly



A.5.7 DiamondCare Geometric Quick Connect, Key Style, Frontbody Assembly

Tools required: Retaining ring removal/installation tool

Removal

NOTE: You do not have to turn off the outlet's pressurized gas service supply before removing and servicing the Geometric Quick Connect, key style, frontbody assembly for pressure gas services. The secondary check valve in the rough-in assembly prevents gas flow from the pressure gas service supply line, except in vacuum outlets.

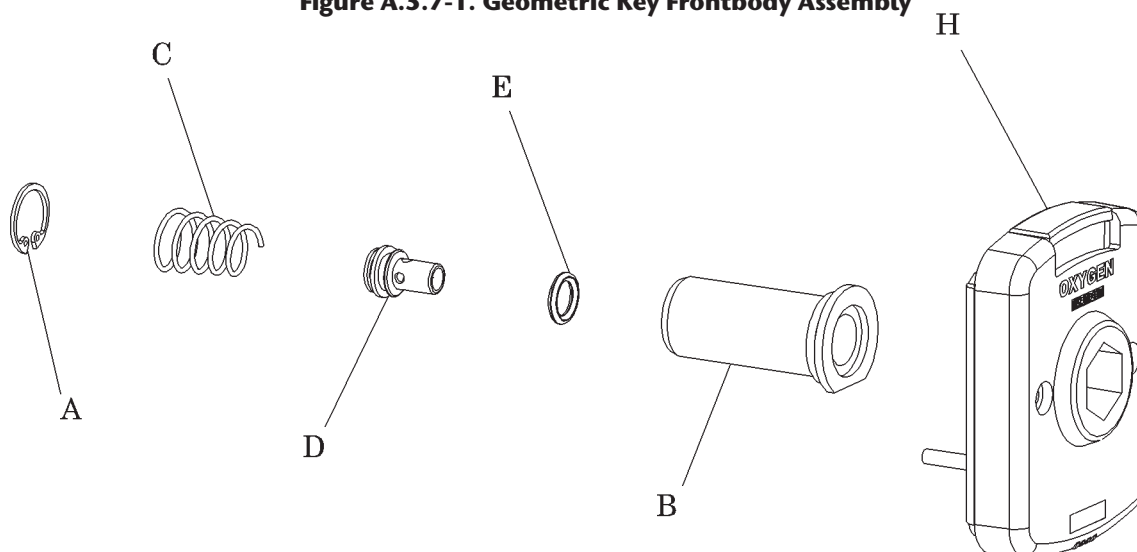
NOTE: Medical vacuum, WAGD, AGSS do not have secondary checks. The service supply must be turned off, or the pressure test cap should be installed in order to service their rough-in assemblies. Otherwise, the line will continue to maintain a draw (suction).

1. Remove the twist-lock, replaceable, barrel assembly (refer to procedure A.5.2).

NOTE: When replacing the frontbody assembly on a Waste Anesthetic Gas Disposal (WAGD) outlet, you cannot remove the barrel assembly because it is permanently attached to the frontbody keying disc assembly.

1. Note the removal sequence of the internal parts in the Geometric Key frontbody assembly to ensure proper replacement during the installation procedure.
2. Using the retaining ring removal/installation tool, remove the retaining ring (A) from the rear of the twist-lock, replaceable, barrel assembly (B) (see figure A.5.7-1 on page A.14).
4. Remove all of the internal parts from the twist-lock replaceable assembly (B) by performing the following steps:
 - a. Carefully remove the frontbody secondary piston spring (C).
 - b. Remove the frontbody piston (D).
 - c. Remove the frontbody piston O-ring (E) from the frontbody piston (D).

Figure A.5.7-1. Geometric Key Frontbody Assembly



Series 9a Rigid & Retractable Pendants

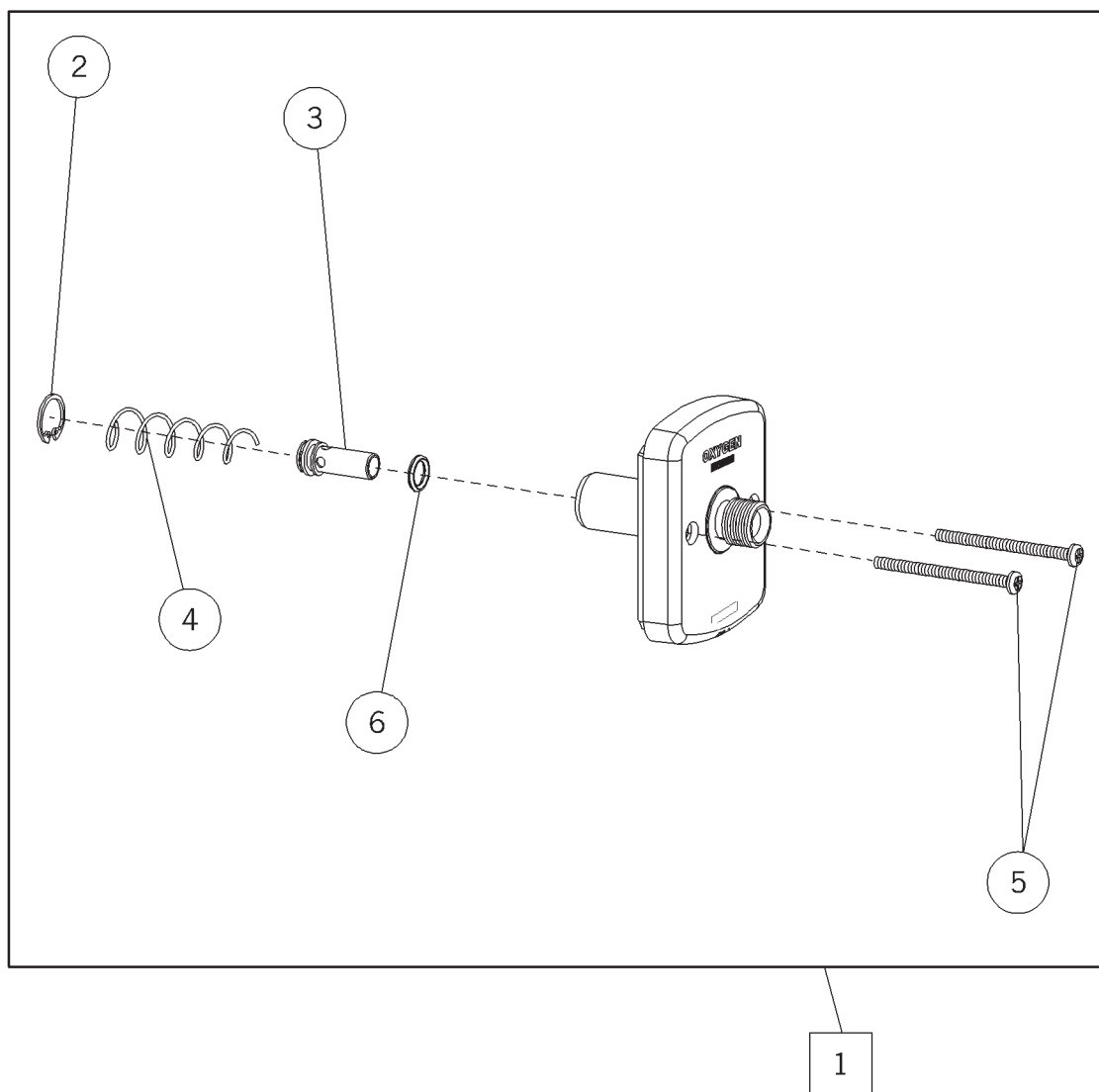
Replacement

1. To install the replacement Geometric Key frontbody assembly, reverse the removal procedure.
2. To ensure proper operation, attach a secondary piece of equipment to the outlet. Make sure the outlet does not leak and is properly sealed.

A.6 Parts List

A.6.1 DISS, Key Style, Frontbody

Figure A.6.1-1. DISS, Key Style, Frontbody



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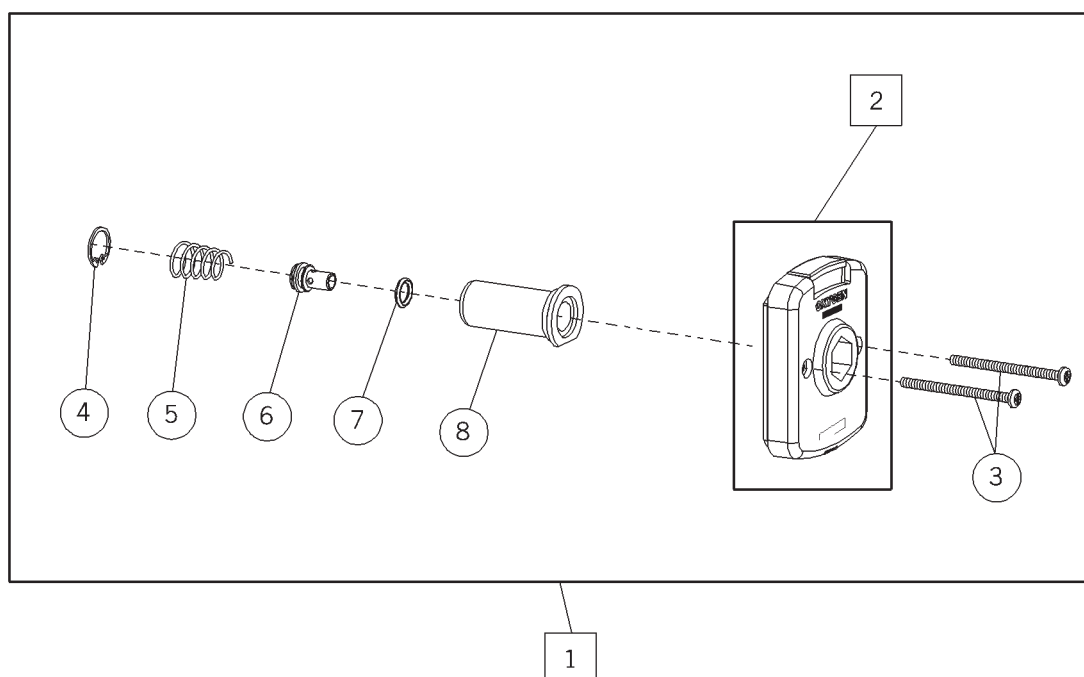
Table A.6.1-1. DISS, Key Style, Frontbody

Item Number	Quantity	Part Number	Description
1	1	6803-8110-800	O2 finish assembly - green/white
		6803-8110-801	N2O finish assembly - blue/white
		6803-8110-802	VAC finish assembly - white/black
		6803-8110-803	Air finish assembly - yellow/black
		6803-8110-804	CO2 finish assembly - grey/black
		6803-8110-805	N2 finish assembly - black/white
		6803-8110-806	WAGD finish assembly - violet/white
		6803-8110-807	O2/CO2 finish assembly - green/grey
		6803-8110-808	O2-ISO finish assembly - white/green
		6803-8110-809	Air-ISO finish assembly - white/black
		6803-8110-810	VAC-ISO finish assembly - yellow/black
		6803-8110-811	AGSS finish assembly - violet/white
2	1	6812-2001-007 ⁽¹⁾	Retaining ring
3	1	6803-2000-188	Piston - for O2, Vac, WAGD, O2-ISO, Vac-ISO
		6803-200-187	AGSS Piston - for N2O, Air, CO2, N2, O2/CO2, and Air-ISO
4	1	6812-2001-008 ⁽¹⁾	Spring
5	2	6812-2001-003	Screw - Pan PH SST 6-32 x 1-7/8
6	1	0210-0601-300 ⁽¹⁾	O-ring

⁽¹⁾ Included within the frontbody repair kit. See "Repair Kits" on page A.24 for details.

A.6.2 Geometric, Quick Connect, Key Style, Frontbody

Figure A.6.2-1. Geometric, Quick Connect, Key Style, Frontbody



Series 9a Rigid & Retractable Pendants

Table A.6.2-1. Geometric, Quick Connect, Key Style, Frontbody

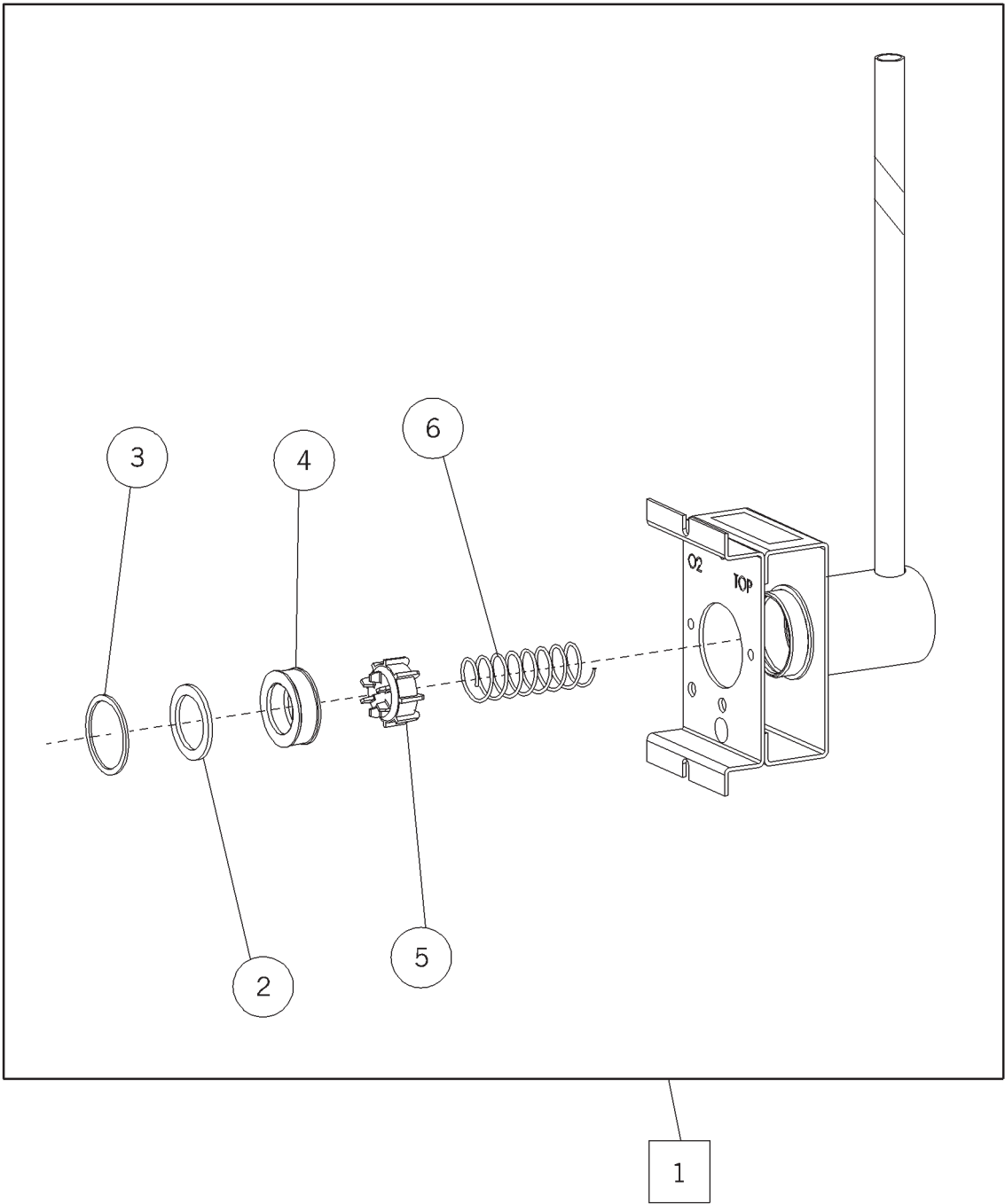
Item Number	Quantity	Part Number	Description
1	1	6803-8112-800	O2 finish assembly - green/white
		6803-8112-801	N2O finish assembly - blue/white
		6803-8112-802	VAC finish assembly - white/black
		6803-8112-803	Air finish assembly - yellow/black
		6803-8112-806	WAGD finish assembly - violet/white
		6803-8112-808	O2-ISO finish assembly - white/green
		6803-8112-809	Air-ISO finish assembly - white/black
		6803-8112-810	VAC-ISO finish assembly - yellow/black
		6803-8112-811	AGSS finish assembly - violet/white
2	1	6803-8112-900	Frontbody, keying disc assembly - O2
		6803-8112-901	Frontbody, keying disc assembly - N2O
		6803-8112-902	Frontbody, keying disc assembly - VAC
		6803-8112-903	Frontbody, keying disc assembly - Air
		6803-8112-908	Frontbody, keying disc assembly - O2-ISO
		6803-8112-909	Frontbody, keying disc assembly - Air-ISO
		6803-8112-910	Frontbody, keying disc assembly - Vac-ISO
Item Number	Quantity	Part Number	Description
3	2	6812-2001-003	Screw - Pan PH SST 6-32 x 1-7/8
4	1	6812-2001-007 ⁽¹⁾ ⁽²⁾	Retaining ring Truarc
5	1	6812-2001-009 ⁽¹⁾ ⁽²⁾	Spring - Frontbody secondary piston
6	1	6803-2000-194 ⁽²⁾	Piston - Frontbody Geometric
7	1	0210-0601-300 ⁽¹⁾ ⁽²⁾	O-Ring - Frontbody piston
8	1	Non-orderable ⁽²⁾	Barrel - Frontbody Geometric

(1) Included within the frontbody repair kit. See "Repair Kits" on page A.24 for details.

(2) Included within the replacement twist-lock barrel assembly (not available for WAGD/AGSS). See "Repair Kits" on page A.24 for details.

A.6.3 Copper-Piped Backbody

Figure A.6.3-1. Copper-Piped Backbody



Series 9a Rigid & Retractable Pendants

Table A.6.3-1. Copper-Piped Backbody

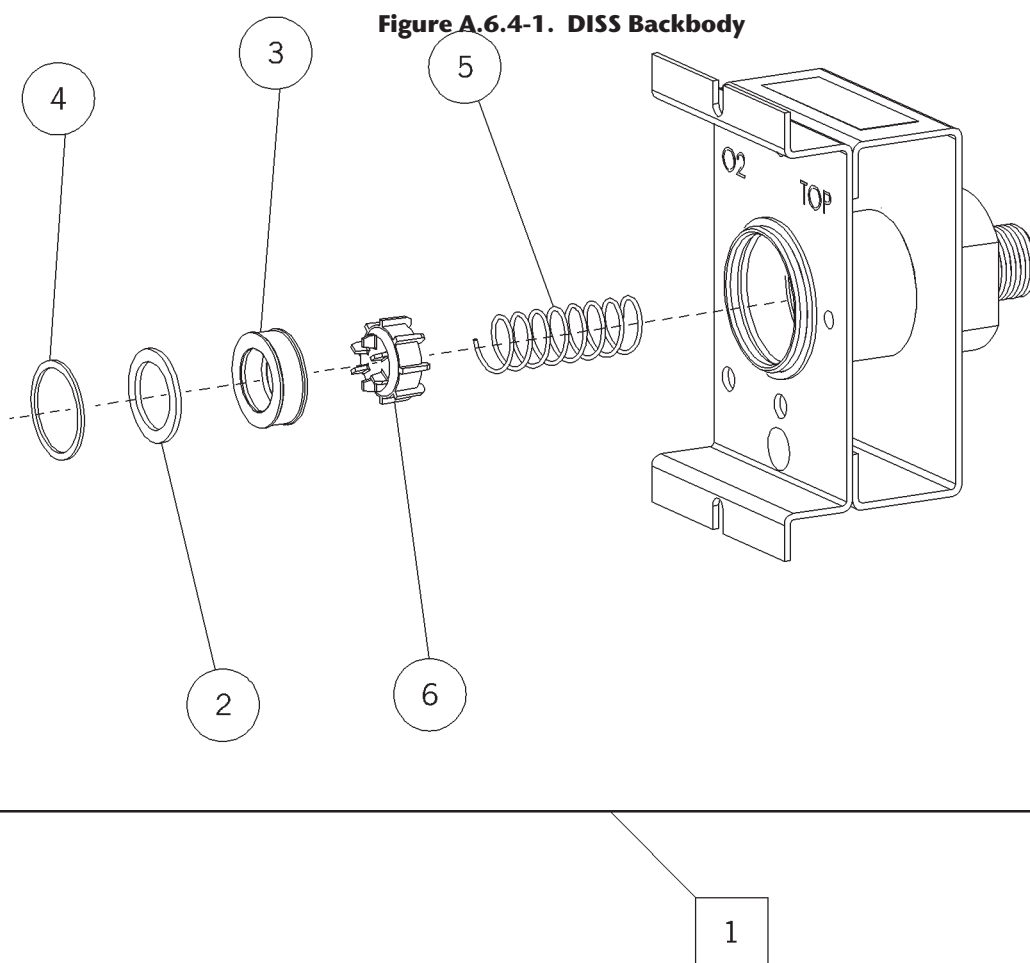
Item Number	Quantity	Part Number	Description
1	1	6803-8138-800	O2 outlet assembly
		6803-8138-801	N2O outlet assembly
		6803-8138-802	VAC outlet assembly
		6803-8138-803	Air outlet assembly
		6803-8138-804	CO2 outlet assembly
		6803-8138-805	N2 outlet assembly
		6803-8138-806	WAGD outlet assembly
		6803-8138-807	O2-CO2 outlet assembly
2	1	6812-2000-851 ⁽¹⁾	Washer
3	1	6812-2001-004 ⁽¹⁾	Retaining ring
4	1	6812-2001-037 ⁽¹⁾	Bushing
5	1	6803-2000-199 ⁽¹⁾ ⁽²⁾	Secondary check
6	1	0203-3508-300 ⁽¹⁾ ⁽²⁾	Spring
7	As required	6812-2160-008 ⁽³⁾	Lubricant, Krytox®

(1) Included within the rough-in repair kit. See "Repair Kits" on page A.24 for details.

(2) Not used in VAC and WAGD.

(3) Item 7 is not shown in figure A.6.3-1 on page A.20.

A.6.4 DISS Backbody



Series 9a Rigid & Retractable Pendants

Table A.6.4-1. DISS Backbody

Item Number	Quantity	Part Number	Description
1	1	6803-8130-800	O2 outlet assembly
		6803-8130-801	N2O outlet assembly
		6803-8130-802	VAC outlet assembly
		6803-8130-803	Air outlet assembly
		6803-8130-804	CO2 outlet assembly
		6803-8130-805	N2 outlet assembly
		6803-8130-806	WAGD outlet assembly
		6803-8130-807	O2-CO2 outlet assembly
2	1	6812-2001-851 ⁽¹⁾	Washer
3	1	6812-2001-037 ⁽¹⁾	Busing
4	1	6812-2001-004 ⁽¹⁾	Retaining ring
5	1	0203-3508-300 ⁽¹⁾ (2)	Spring
6	1	6803-2000-199 ⁽¹⁾ (2)	Secondary check
7	As required	6812-2160-008 ⁽³⁾	Lubricant, Krytox®

(1) Included within the rough-in repair kit. See "Repair Kits" on page A.24 for details.

(2) Not used in VAC and WAGD.

(3) Item 7 is not shown in figure A.6.4-1 on page A.22.

A.6.5 Repair Kits

Table A.6.5-1. Replacement Twist-Lock Barrel Assembly

Quantity	Part Number	Description
1	6803-7030-123	Geometric key style (excluding WAGD)

Table A.6.5-2. Frontbody Repair Parts Kits

Quantity	Part Number	Description
1 pkg. for 10 outlets	6803-7030-116	DISS key style
1 pkg. for 10 outlets	6803-7030-119	Geometric key style

Table A.6.5-3. Rough-in Repair Parts Kits

Quantity	Part Number	Description
1 pkg. for 10 outlets	6803-7030-124	Pressure gases (all key styles)
1 pkg. for 10 outlets	6803-7030-125	VAC/WAGD/AGSS (all key styles)



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