Installation, Operation and Maintenance Manual

Medical Gas Terminal Units
East SP and Zeus SP

Part Number 4233500245
Revision 03

BeaconMedæs®

All possible care has been taken in the preparation of this publication, but BeaconMedaes accepts no liability for any inaccuracies that may be found.
BeaconMedaes reserves the right to make changes without notice both to this publication and to the product which it describes.

Important
Personnel must make themselves familiar with the contents of this manual and the function of the unit before installing, operating or maintaining any Medical Gas Terminal Units.

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

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

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BeaconMedaes reserves the right to make changes and improvements to update products sold previously without notice or obligation.

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

Any complaints about the products or services provided by BeaconMedaes, please give as much of the following information as possible:
Product Part Number
Lot/ Batch Number
Approximate date of purchase
Apparent fault.

Issue Record

Document No.	Revision No	Details of changes	Date
4233500245	03	IAR 10788: Audit findings update	25-July-2025

Introduction

This manual contains information needed to install, operate, and maintain the BeaconMedaes East SP and Zeus SP Terminal Units.

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

0. WARNINGS, CAUTIONS, and NOTES

The following Warnings, Cautions, and Notes must be read and understood before using the East SP and Zeus SP Terminal Units.

0.1 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 the instructions in this manual.

1. **Read through these entire instructions before using or showing others how to use this equipment. As with al all-medical equipment, attempting to use this device without a thorough understanding of its operation may result in patient or user injury.**
2. **Do not attempt to modify this device in any way not strictly described within this manual.**
3. **Obtain a work permit before commencing any work on a medical gas installation.**
4. **No attempt should be made to use this product with a gas service or at a pressure other than as identified.**
5. **Do not use this product, if it appears damaged in any way.**
6. **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. **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. **Keep all components dry and clean during installation. BeaconMedaes terminal units can be safely handled and stored under normal working and environmental conditions. Adverse environmental conditions, harsh abrasives or chemicals may damage to the unit.**
9. **Incompatible oil and greases can auto ignite in pressurised oxygen. Do not lubricate this product with oil or grease. Safe and compatible lubricants can be obtained from BeaconMedaes, if necessary.**
10. **Do not use this product if there is evidence of contamination internally or on any of gas wetted connections (e.g. debris, particles, oil, lubricant or grease).**
11. **Terminal units that are not rigidly fixed should not be installed in MRI locations.**
12. **Vacuum terminal units should be treated as a bio-hazard and handled and de- contaminated accordingly, if microbially contaminated.**
13. **The installation of some conversion kits must NOT be car-ried out with terminal unit under pressure. Check the kit user manual for advice.**

0.2 CAUTIONS:

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

1. **Use of sub-standard or inappropriate parts and materials may damage the product and invalidate the warranty. Only use genuine BeaconMedaes spare parts.**
2. **Pressurised gas from the medical gas pipeline system may cause personnel injury or property damage if the unit is incorrectly operated or maintained.**

3. **Leak detection fluids contain surface active agents (surfactants) that can damage plastic components under stress. Only use leak detection fluids that are compatible with the materials being tested.**
4. **Always wash leak detection fluids off with clean water immediately after use.**
5. **Nickel plating may cause mild localised allergic skin reaction in some people.**

0.3 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.**

Abbreviations used

The following abbreviations are used in this manual:

Abbreviation	Full name
MGS	Medical Gas Solutions
kPa	Kilopascal
NRV	Non return Valve
IPX0	Not protected against water ingress
HTM	Health Technical Memorandum
RH	Relative Humidity
EN	European Standard
PTFE	Polytetrafluoroethylene tape
NIST	Non-Interchangeable Screw Thread
BS	British Standard
L/min	Litres per minute
AGSS	Anaesthetic Gas Scavenging Systems
AGS	Anaesthetic Gas Scavenging
mbar	millibar
MRI	Magnetic Resonance Imaging

Scope of this manual

This manual describes the Operation Service, Repair and Testing of the BeaconMedaes East SP and Zeus SP Terminal Units.

BeaconMedaes service contact

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

+44 (0) 1246 474242

Quote, if possible, the:

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

Contents

Storage and Handling

All products are separately packaged and stored in under controlled conditions.

Identification

The BeaconMedaes East SP and Zeus SP Terminal Units is identified by the product number, printed onto a batch label.

Environmental Conditions

Terminal units can be safely handled and stored under normal working and environmental conditions. Adverse environmental conditions and harsh abrasives or chemicals may cause damage to the unit.

Environmental Transport and Storage Conditions

All products are separately packaged and stored in controlled conditions.

Minimum storage temperature: -20°C

Maximum storage temperature: +60°C

Environmental Operating Conditions

Adverse environmental conditions and harsh abrasives or chemicals may cause damage to the unit.

Minimum working temperature: -20°C

Maximum working temperature: +60°C

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

Symbols	Title	Symbols	Title
	Manufacturer		Protect from heat and radioactive sources
	Date of manufacture		Keep dry
	Authorized representative in the European Union		Temperature limit
	Batch code		Humidity limitation
	Catalogue Number		Atmospheric pressure limitation
	Serial number		Caution
	Unique Device Identifier		Upper limit of temperature

	Do not use if package is damaged and consult instructions for use		Biological risks
	Keep away from sunlight		Consult instructions for use or consult electronic instructions for use
	Lower limit of temperature		Medical device
	Do not dispose of in general waste		

1 General Information

1.1 Device description

The device shall operate in a manner that complies to both HTM 02-01 and ISO 7396-1 requirements. This device is defined within ISO 7396-1 as a connector with dimensional characteristics which prevent connections between different gas services.

1.2 Intended use of the device

The device is intended to work in conjunction with other devices within the medical gas pipeline system (MGPS) to assist with maintaining continuity of the medical gas and vacuum supply throughout the hospital to local connection points for eventual introduction or removal of gas and fluids to or from the human body.

The device assists with the continuity of supply by preventing confusion of cross connection ensuring the correct gas type is supplied.

1.3 Intended patient population

The device is intended to be used in conjunction with other medical gas and vacuum pipeline equipment in hospitals and have no direct contact with patients. MGPS supply to medical equipment which can be used across any populations & all age groups.

1.4 Intended user profile

Medical Gas Terminal Units- East SP and Zeus SP are intended for use by appropriately qualified and trained clinical staff and technical personnel who have undergone relevant 'HTM 02-01 Authorised Person' (AP) training regarding the safe use of medical gas supply systems.
The device 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 Part B: Operational Management). The device is intended for use by appropriately qualified technical personnel only. This condition is emphasised in the IFUs.
Reference: HTM 02-01 Medical gas pipeline systems – Part B: Operational Management

Authorised Person (MGPS)

4.21 The Authorised Person (MGPS) is defined as that person designated by the Executive Manager to be responsible for the day-to-day management of the MGPS at a particular site or sites. This includes the issue of permits in accordance with the permit-to work procedure. The principal responsibilities of the Authorised Person (MGPS) in respect of the permit-to-work procedure are set out in paragraph 6.91. The Authorised Person (MGPS) also has specific duties with regard to VIE installations (see Appendix E).

Competent Person (MGPS)

4.40 The Competent Person (MGPS) is the person who carries out the installation and/or maintenance work on the MGPS. A list of his/her responsibilities and duties is set out in paragraph 6.92. The Competent Person (MGPS) should have received appropriate training and should be on a list of Competent Persons (MGPS). In the case of directly employed labour, this list should be held by the Authorised Person (MGPS); in the case of contracted labour, it should be held by the contractor's Authorised Person (MGPS) or project manager.

1.5 Indications

Medical Gas Terminal Units- East SP and Zeus SP are used as part of MGPS where an uninterrupted supply of medical gas and vacuum is required. The medical device works in conjunction with other medical devices for the immediate and reliable delivery of medical gas and vacuum to terminal units used for introduction or removal of gas and body liquids in healthcare facilities. In all cases there are medical devices installed between this device and the patient that controls the pressure and flow of gas and vacuum to safe levels to and from the patient.

1.6 Contraindications

If the device sustains any damage or malfunctioning, the assembly or faulty part should be replaced completely. This ensures all damaged components are replaced.
Contraindications for use, warnings and precautions related to the safe use of the devices are detailed in the IFU supplied with the devices. These sections shall be read by the intended user before installing the device and starting to use it.

1.7 Device Limitation

This Medical Gas Terminal Unit is designed exclusively for fixed indoor installation within healthcare facilities compliant with HTM 02-01 and ISO 7396-1 and intended only for connection to approved medical gas pipeline systems. It must be used solely with the specified medical gases and pressures and is not suitable for use with non-medical or industrial gases. Installation, operation, and maintenance must be performed only by trained and authorized personnel following manufacturer instructions and applicable standards. Unauthorized modifications, use of non-approved accessories, or connection to incompatible gas sources or pressures are strictly prohibited. The terminal unit is not intended for portable use or environments outside the specified healthcare settings.

1.8 Anticipated lifetime

The anticipated lifetime of terminal unit **is** 15 years from the date of installation**,** assuming proper maintenance, service and environmental conditions are met. This estimate is based on product design, historical performance, and internal technical assessments.

1.9 Safe disposal for terminal unit

Disposal and Environmental Considerations

At the end of its service life, the Medical Gas Terminal Unit must be disposed of in accordance with applicable national and local regulations regarding medical and technical equipment disposal.
While the responsibility for final disposal typically lies with the hospital or healthcare facility, the following manufacturer guidance is provided to support safe and environmentally responsible handling:

- The terminal unit consists primarily of non-hazardous materials such as brass, stainless steel, copper, and other mechanical components. These materials can usually be disposed of through standard industrial metal recycling streams.
- Where possible, the unit should be disassembled, and materials such as metals and rubber gaskets should be sorted to enable environmentally sound disposal or recycling.
- The medical gas terminal unit does not contain electrical or electronic components.
- Packaging should be separated and recycled in accordance with local waste segregation policies (e.g., cardboard, plastic, protective foam).

If specific assistance is required for safe disposal, users may contact the manufacturer’s technical support team.

2 Description

2.1 General

Terminal units provide a safe supply of medical gas, vacuum, and AGSS (anaesthetic gas scavenging system) from a central supply system and are designed to accept gas specific probes to prevent interchangeability between services. Various formats allow flexibility of installation.

The East and Zeus SP gas-specific Terminal Units are attached permanently via copper tube or semi- permanently via medical gas hose assemblies to the facility gas distribution pipeline system and allow mechanical connection to- and gas flow through a suitable connector.

East and Zeus SP Terminal Unit services include Oxygen, Nitrous Oxide, 50%Oxygen 50% Nitrous Oxide, Medical air, Surgical air, Nitrogen, Carbon Dioxide, Vacuum and AGSS.

2.2 Features

1. Positive action of rolling pin latch mechanism, which holds the probe securely.
2. Integral check valve (flutter disc) and retaining ring to allow removal of the socket assembly without depressurising the system.
3. Gas tight shut-off after probe removal, and gas tight seal to probe when inserted.
4. Gas specific indexing - eliminates the risk of connecting a socket assembly of one service to a terminal block of another, either during installation or maintenance.
5. Integral NIST connector fitted when installed via a flexible hose assembly.
6. Quick and simple installation.

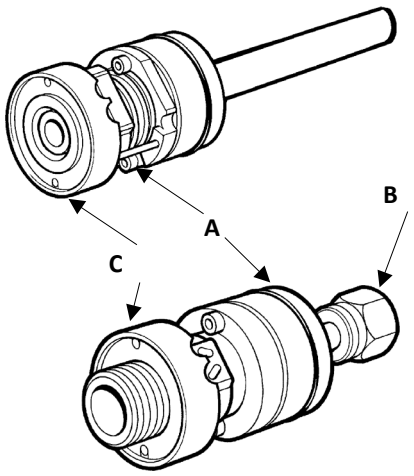


Figure 1-2 Terminal Block

2.3 Major Components

1. The Terminal Block Assembly (A):
   This is the part of the terminal unit that is fixed either permanently to the Medical Gas Pipeline System or, in the case of pendants, by means of a NIST connector (B).
2. The terminal block is machined from brass bar and incorporates an automatic shut-off valve which operates if the socket assembly is removed while the pipeline is still pressurised. The terminal block is indexed for each service

3. The Socket and Check Valve Assembly (C)
   a. This part of the Terminal Unit is designed to accept and retain a gas specific probe.

b. Anti-swivel units are available (see Section 4.3).

4. The socket assembly consists of a spring-loaded plastic (Zeus) or die-cast (East) interlock ring which slides over a PTFE coated die-cast (East) or plastic (Zeus) terminal body, and incorporates two retaining pins which latch the probe into position.
5. The rear flange of the terminal body is indexed to match the terminal block and the front of the socket assembly only accepts the correct gas specific probe.
6. The check valve assembly fitted between the terminal block and the socket assembly incorporates a spring-loaded check valve. This seals off the gas flow when the probe is disengaged, and opens the gas flow when the probe is engaged.

3 Technical Specification

Table 2-1 Technical Specification

Product name	
Physical Characteristics:	
Height	Varies with model (Refer to Installation Section)
Width	Varies with model (Refer to Installation Section)
Depth	Varies with model (Refer to Installation Section)
Weight	Varies with model (Refer to Installation Section)
Environmental Transport, Storage and Operating Conditions:	
Temperature transport/ storage	-20 to 60°C
Operating Temperature	-20 to 60°C
Humidity	10 to 95% R.H. Non-condensing
Air Pressure	70 to 110 kPa
Mode of operation	Continuous (may be left on indefinitely)
Ingress Protection Class	IP4x (for indoor installation only)
Degree of mobility	Permanently installed

The operating pressure ranges of the terminal units are as shown in *Table 2-2*.

Table 2-2 Gas Operating pressure

Gas service	**Operating pressure range**
Oxygen	0-400 kPa
Nitrous Oxide	0-400 kPa
O_2/ N_2O 50% /50%	0-400 kPa
Medical Air	0-400 kPa
Surgical Air	0-800 kPa
Carbon Dioxide	0-400 kPa
Nitrogen	0-800 kPa
Medical Vacuum	40 kPa (absolute pressure)
AGSS	20 kPa (absolute pressure)

4 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 replacement repair be necessary, it is recommended that a request for service advice be made to the nearest BeaconMedaes Service Centre.
This device and any of its constituent parts must be repaired only in accordance with written instructions issued by BeaconMedaes and must not be altered or modified in any way without the written approval or BeaconMedaes.
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 BeaconMedaes or their appointed agents.

5 Installation

5.1 Second Fix Assembly

BeaconMedaes terminal units should only be installed, commissioned, and maintained by technicians who are suitably trained with piped medical gas systems, and who are fully conversant with the contract specifications and safety procedures.

5.2 Mounting the Terminal Unit

BeaconMedaes SP terminal units can be wall-mounted, installed in pendant, or mounted in a bedhead trunking system.
Wall and trunking mounted terminal units should be installed between 900 mm and 1400 mm above the finished floor level, with not less than 200 mm to any obstruction.
Where terminal units are to be installed in banks of several units at any one space, they should be mounted to the following criteria:

2 units in tandem: 150 mm +/- 2.5 mm centers
3 or more units in tandem: 135 mm +/- 2.5 mm centers

The horizontal or vertical sequence should be:

Oxygen
Nitrous Oxide
Oxygen/ Nitrous Oxide 50/ 50
Medical Air 400 kPa
Surgical Air 700k Pa
Vacuum
Anaesthetic Gas Scavenging
Carbon Dioxide
Nitrogen

Inspect all components as they are unpacked.

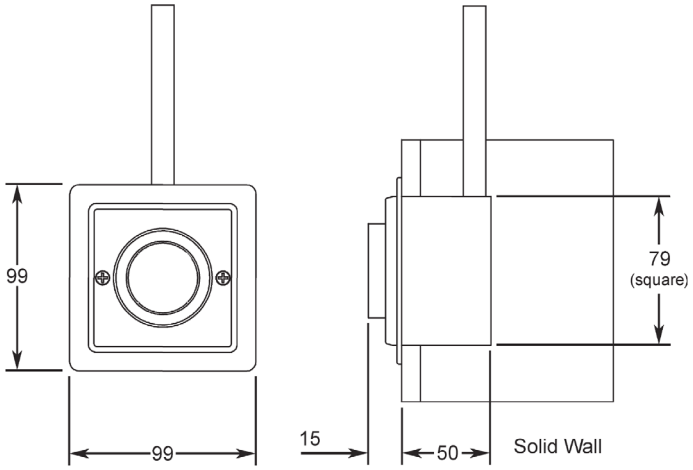
5.3 First Fix Installation

5.3.1 Flush mounted terminal unit for solid wall (*Figure 5-1*)

1. Mark the position of the terminal unit on the wall.
2. Chase out the wall to a depth that will leave the base of the terminal unit, including an allowance for final plastering, 50 mm below the wall surface.
3. Carry out any additional chasing that may be required for the pipework.
4. Fit the installation kit back box over the terminal block. Secure the back box to the wall using suitable fixings.
5. Braze the stub pipe to the distribution pipeline.

Note: If it is necessary to shorten the stub pipe, remove the installation back box and terminal unit seal plate, with O-ring, to prevent heat damage.

Jig plates are available to ensure correct alignment and spacing



Installed Height
Recommended installation height for all wall outlets is 900 to 1400 mm above floor level.

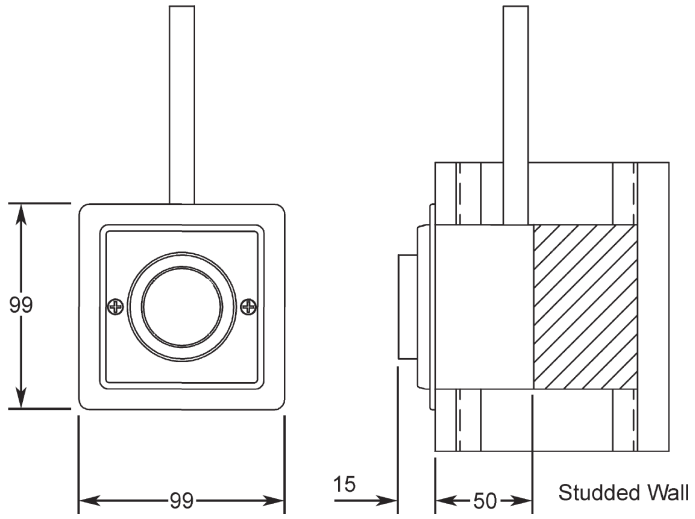
Installed Size	
Height	99 mm
Width	99 mm
Protrusion (from wall)	
Flush	15 mm
Surface	65 mm
Depth into wall	
Flush	50 mm
Surface	Nil

Figure 5-1 Flush mounted terminal unit - for solid wall

6. Fit a blanking plug and retaining strip using the screws provided. Pressure test the pipeline
7. Upon satisfactory completion of the pressure test, fit the cover box and plaster cover to protect the unit from building debris.
8. When the wall is finished, remove and discard the plaster cover.
9. Remove the blanking plug. Install the second fix assembly, with the anti-swivel pin in the 12 o'clock position. Secure with the screws provided. Do not over-tighten the screws.
10. Pressure test and purge the pipeline.
11. Locate the flush surround over the location lip on the rear of the fascia and secure to the cover box using the screws provided. Do not over-tighten the screws.

5.3.2 Flush mounted terminal unit for studded wall (*Figure 5-2*)

1. Install a member of suitable material between the adjacent struts, ensuring that it is firmly secured and of sufficient strength to take the weight of the terminal unit(s).
2. The section of the member should be such that the base of the terminal unit is 50 mm below the surface of the finished wall.



Flush fitting with tailpipe
(125 mm or 3 m)

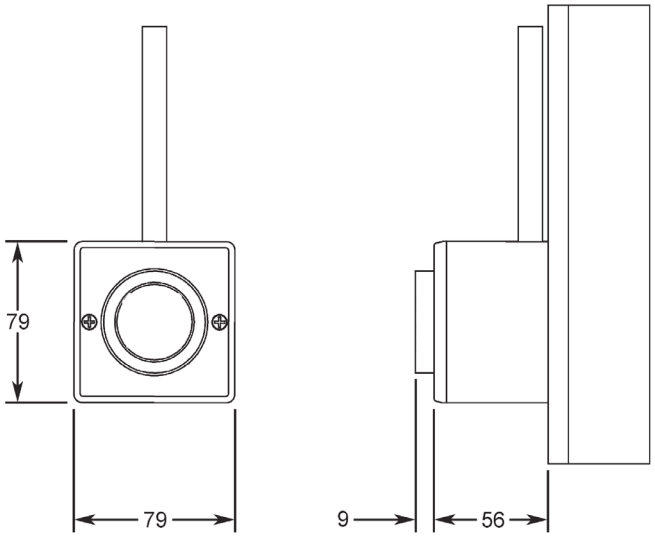
Installed Height
Recommended installation height for all wall outlets is 900 to 1400 mm above floor level.
Installed Size
Height 99 mm
Width 99 mm
Protrusion (from wall) 15 mm
Depth into wall
50 mm

Figure 5-2 Flush mounted terminal unit for studded wall

3. Mark the position of the terminal unit on the member.
4. Fit the installation kit back box over the terminal block. Secure the back box to the member using suitable fixings.
5. Braze the stub pipe to the distribution pipeline.
   Note: If it is necessary to shorten the stub pipe, remove the installation back box and terminal unit seal plate, with O-ring, to prevent heat damage.
6. Fit a blanking plug and retaining strip using the screws provided and pressure test the pipeline.
7. Upon satisfactory completion of the pressure test, fit the cover box and plaster cover to protect the unit from building debris.
8. When the wall is finished, remove and discard the plaster cover.
9. Remove the blanking plug. Install the second fix assembly, with the anti-swivel pin in the 12 o'clock position. Secure with the screws provided. Do not over-tighten the screws.
10. Pressure test and purge the pipeline.
11. Locate the flush surround over the location lip on the rear of the fascia and secure to the cover box using the screws provided. Do not over-tighten the screws.

5.3.3 Surface Mounting Terminal Unit (*Figure 5-3*)

BeaconMedaes SP wall mounted terminal units are supplied suitable for flush or surface installation. In surface mounted installations the plaster cover and flush surround are not required and may be discarded



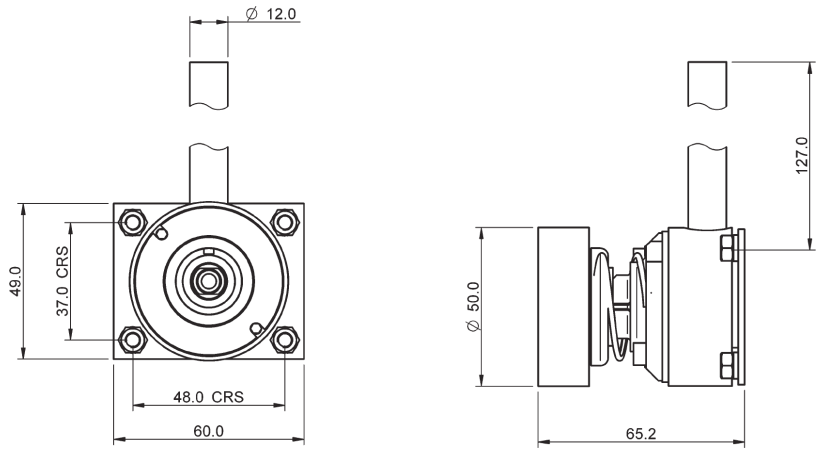
Surface fitting with tailpipe (125 mm or 3 m)
Installed Height
Recommended installation height for all wall outlets is 900 to 1400 mm above floor level.
Installed Size
Height 79 mm
Width 79 mm
Protrusion (from wall)
65 mm
Depth into wall
Nil

Figure 5-3 Surface mounting terminal units

1. When the wall has been plastered and decorated, mark the position of the terminal unit(s) on the wall.
2. Fit the installation kit back box over the terminal block. Secure the back box to the wall using suitable fixings.
3. Braze the stub pipe to the distribution pipeline.
   Note: If it necessary to shorten the stub pipe, remove the installation back box and terminal unit sealplate, with O-ring, to prevent heat damage.
4. Fit a blanking plug and retaining strip using the screws provided and pressure test the pipeline.
5. Upon satisfactory completion of the pressure test remove the blanking plug. Install the second fix assembly, with the anti-swivel pin in the 12 o'clock position. Secure with the screws provided.
6. Pressure test and purge the pipeline.
7. Secure the fascia to the cover box with the screws provided. Do not over-tighten the screws.

5.3.4 Bedhead trunking Mounted Terminal Units *(Figures 5-4* and *5-5)*

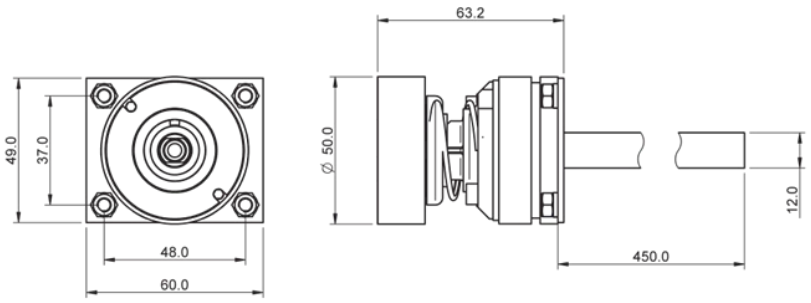
Bedhead trunking mounted terminal units can be installed to top, bottom, left or right side entry configurations. Mounting plates and/or studs should be provided in the trunking.



Top, Bottom, Side Entry with Tailpipe (125 mm)

Installed Height
Recommended installation height for all wall outlets is 900 to 1400 mm above floor level.
Installed Size: N/A
NOTE: 4 off M5 x 35 mm studs to be provided in the bedhead unit.

Figure 5-4 Bedhead Trunking - Top, Bottom, Side Entry



Back Entry with Tailpipe (450 mm)
Installed Height
Recommended installation height for all wall outlets is 900 to 1400 mm above floor level.
Installed Size: N/A
NOTE: 4 off M5 x 35 mm studs to be provided in the bedhead unit.

Figure 5-5 Bedhead Trunking - Back Entry

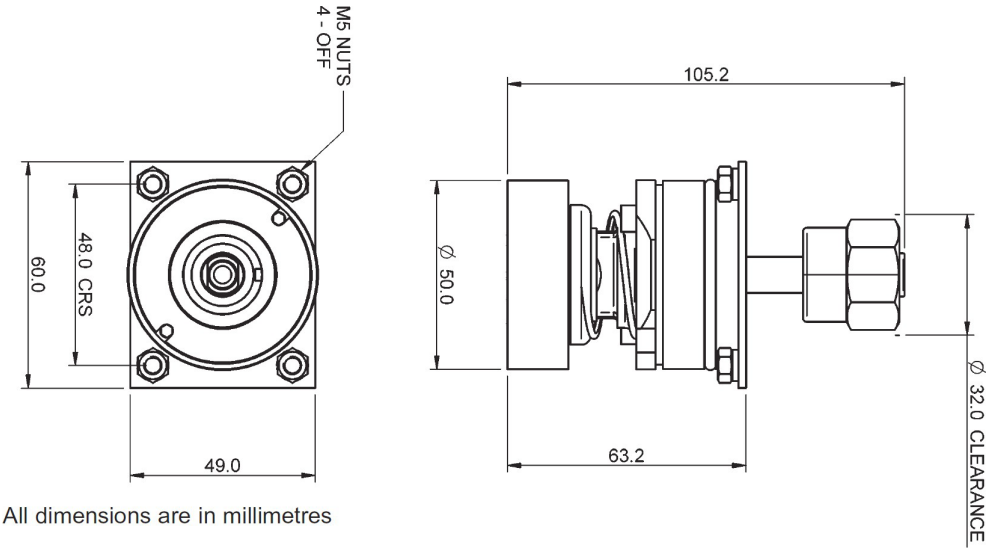
1. Assemble the installation plate to the back of the terminal block using the screws provided, with the stub pipe in the required position.
2. Locate the terminal block assembly over the studs in the trunking, and secure with the nuts and spring washers provided.
3. Braze the stub pipe to the distribution pipeline.

Note: If the stub pipe is to be shortened, remove the terminal unit seal plate, with O-ring, to prevent heat damage.

1. Fit a blanking plug and retaining strip using the screws provided and pressure test the pipeline.
2. After completion of the pressure test, remove the blanking plug. Install the second fix assembly, with the anti-swivel pin in the 12 o'clock position. Secure with the screws provided.
3. Pressure test and purge the pipeline.

5.3.5 Pendant mounted terminal units *(Figures 5-6* and *5-7)*

Pendant mounted terminal units are normally supplied fully assembled and pressure tested.
A separate installation plate can be provided for use where required.
Connection to the distribution pipeline is by means of a flexible hose connected to the integral NIST connector (See *Figures 5-6* and *5-7*).
NOTE: Tighten all NIST connections, but do not over-torque. Ensure that NIST connections are tightened before use.



All dimensions are in millimetres

Figure 5-6 Pendant or Boom with NIST connector

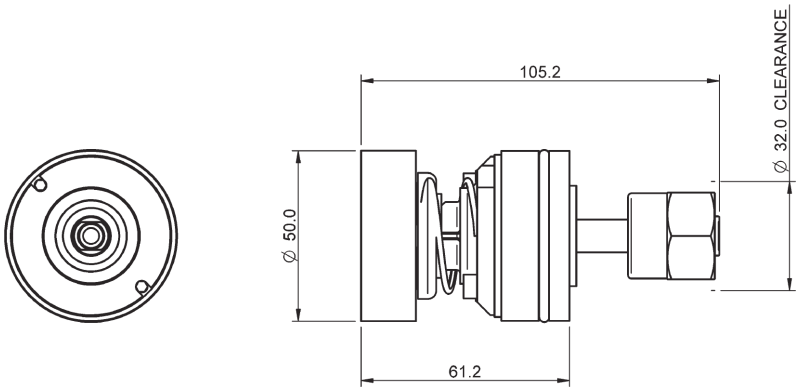
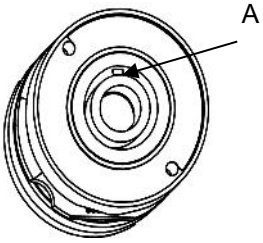


Figure 5-7 Flexible Pendant Head with NIST connector



5.4 Second Fix Installation

1. Inspect all components as they are unpacked.
2. Install the second fix assembly with the anti-swivel pin (A - if fitted) in the 12 o'clock position.
3. Locate the flush surround (if fitted) over the location lip on the rear of the fascia and secure to the cover box (screws in kit). Do not over-tighten the screws.

6 Commissioning

Commissioning ensures that all components are serviceable and takes place in full after initial installation, after a major component change, and as part of planned preventative maintenance. Personnel must be qualified and understand the information in these Instructions.

6.1 Introduction

Testing and Commissioning ensures 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.
Additional commissioning is also carried out after a major component change and as part of a planned preventative maintenance programme.

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.

6.2 Pre-use Test – Part 1

Before use, ensure that the correct gas service terminal units are installed and located in accordance with the installation specification. Check each terminal unit for correct gas identification, leakage and cross-connection.

Upon completion of all first fix installations, each terminal unit must be fitted with the test blank supplied. Pipeline carcass testing shall be carried out in accordance with the installation contract, HTM 2022, HTM 02-01, British Standard or International Standard as applicable. On completion the medical gas pipeline system must be purged with medical quality air to remove all traces of Nitrogen.

6.3 Pre-use Test – Part 2

Upon complete installation of the pipeline system, including all terminal unit second fix assemblies, each medical gas service must be commissioned in accordance with the installation contract, HTM 2022, HTM 02-01, British Standard or International Standard as applicable.

The following tests are typically performed; 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. Full test procedures are defined in HTM 2022 and HTM 02-01.

> **Note!** New terminal units are supplied with **DO NOT USE** labels. 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.

Do Not Use Label

6.4 AGSS System Pre-use Checks

6.4.1 System Performance

The AGS disposal system, of which the terminal unit is a part, is required to have a flow performance as defined in BS6834.

6.4.2 Performance requirements

1. The flow at any terminal shall not exceed 130 L/min. when a resistance of 1 kPa is applied.
2. The flow at any terminal shall not be less than 80 L/min, when a resistance of 4 kPa is applied.
3. Each terminal on a system shall remain within those limits, irrespective of the number of terminal units in use on the system.
4. It is possible that, between maintenance operations, the performance of the disposal system may vary and require adjustment.
5. Adjust also, whenever the flow adjusters have been disturbed during maintenance.

6.4.3 Setting Procedure

To vary the flow rate through each terminal unit the integral flow adjuster is screwed in to increase flow, or screwed out to decrease flow.
The flow adjuster, which is accessed through the front of the terminal unit, is very sensitive. Make adjustments in small increments, checking the performance of the system after each adjustment.

> **Note**: adjustments should only be made as part of the installation or setting of the complete system. BS6834 defines the performance of the system as a whole, and adjustments to individual Terminal Unit s will affect the balance of the whole system.

A suitable test unit for measuring the performance at a Terminal Unit is the BeaconMedaes AGSS Test Unit, part number 068193.

A test unit is required for each Terminal Unit connected to a single power source.

1. Place a test unit in one Terminal Unit, ensuring that all other Terminal Units are closed.
2. Adjust the restrictor on the test unit to give a resistance of 1 kPa (-10 mbar).
3. Using a 5 mm Allen key adjust the flow through the Terminal Unit until the flow on the test unit

measures 130 L/min.

4. Remove the test unit and move to the next Terminal Unit.
5. Repeat steps 1 to 3 on each Terminal Unit that is connected to the same power unit.
6. Return to the first Terminal Unit and insert the test unit. Set the restrictor on the test unit to give a resistance of 4 kPa (-40 mbar).
7. Record the flow.
8. Remove the test unit and repeat steps 6 and 7 on each Terminal Unit connected to the same power unit.
9. Place a test unit in each Terminal Unit and adjust the test unit restrictor to give 1 kPa (-10 mbar) on each unit at the same time.
10. Record the flow on each test unit. Flow must not be greater than 130 L/min.
11. Readjust the test units to give a resistance of 4 kPa (-40 mbar) on each unit at the same time.
12. Record the flow on each test unit. It must not be less than 80 L/min.
13. If the reading on any of the test units is less than 80 L/min, it may be possible to increase the vacuum setting of the relief valve at the power unit.

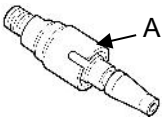
14. This adjustment is described in the appropriate Installation, Operation and Maintenance Instructions for the power unit.

Note: The vacuum setting must not exceed -200 mbar, or that given in the Power Unit Specification. If the vacuum setting is altered in any way it will be necessary to repeat the setting procedure, steps 1 to 12, in full.

7 Operating Instructions

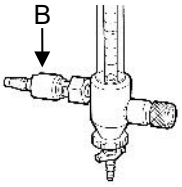
7.1 Probes

Medical Gas and Vacuum



The probe for each medical gas or vacuum service has its own specific guard ring (A). The terminal unit socket assembly incorporates a recess, which matches the guard ring on the probe for its own service. This ensures that the probe for one service cannot be inserted into the socket assembly for any other service. It is important to use only probes that conform to BS5682:1984.

Anti-swivel Function

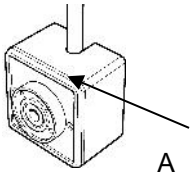


Insert the probe so that the cut-out slot (B) in the guard ring is uppermost. When the probe is fully inserted in this position, the cut-out engages the anti-swivel pin (see Section 6.3), preventing rotation.

Note: When fixed equipment (such as a flowmeter or vacuum controller) is connected directly to the probe, it should be assembled to the probe so that the cut-out (B) in the guard ring is in the top position when the equipment is in its working position.

7.2 Probe Engagement

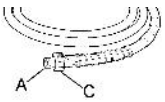
Medical Gas and Vacuum



Insert the appropriate probe in the centre hole (A) of the socket assembly and push fully home.

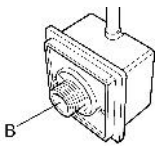
The action of pushing the probe home lifts the check valve in the socket assembly from its seat allowing gas to flow. When the probe is fully home retaining pins latch into the groove in the probe to ensure that it is held securely in position. At the same time the nose of the probe is held against an internal seal to provide a gas-tight path.

Anaesthetic Gas Scavenging



Insert the AGSS probe (A) in the centre hole of the socket assembly (B), and push fully home.

Screw the knurled retaining nut (C) fully onto the socket assembly. The action of pushing the probe home lifts the check valve in the socket assembly from its seat allowing the gas to flow.

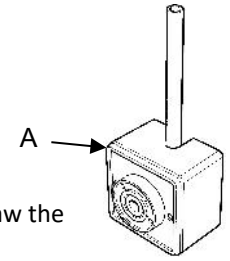


Note: If the probe is not fully inserted in the socket assembly, the flow through the system may be inadequate.

7.3 Probe Disengagement

Medical Gas and Vacuum

To disengage, the probe should be gripped firmly and pushed in slightly.
At the same time the sliding interlock ring (A) on the front of the socket assembly should be pressed in forward to release the probe latching mechanism. When the probe is removed the unit seals against gas flow.



Anaesthetic Gas Scavenging

Refer to the diagrams in Section 8: Grip the AGSS probe and unscrew the knurled nut (C). Withdraw the probe (A) from the socket assembly (B).

8 Maintenance

BeaconMedaes East SP and Zeus SP Terminal Units are designed to operate with the minimum of maintenance, however regular routine minor maintenance operations are recommended to prove the system integrity.
Maintenance operations are carried out in accordance with the planned preventative maintenance contract purchased by the customer.
Maintenance engineers must fully understand the East SP and Zeus SP Terminal Units and must be conversant with the information contained in this manual.

8.1 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.

8.2 Cleaning

The use of abrasive or solvent based cleaning solutions is not recommended.
Cleaning external surfaces - use a damp cloth only. Mild soap solution may be used but detergent/ surfactant solutions are not recommended.

8.2.1 Minimum Requirements

Minimum requirements for routine inspections, checks and maintenance are given in *Table 8-1* and must be observed in full to ensure continued safe operation of the terminal units system.

Table 8-1 Inspection and Maintenance Schedule

Actions	Commissioning	Daily	Weekly	Quarterly	Annually	5 Yearly
Inspection, Checks and Tests:						
Ambient temperature	■			■		
Suitability of location	■					
Adequate room ventilation	■					
Adequate access for maintenance	■			■	■	■
Planned Preventative Maintenance:						
Complete Commissioning Procedure	■				■	■
Check terminal units are complete	■			■		
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 terminal units are leak free	■			■		
Check NIST connections are tight (Pendants)	■			■		
Check security of fixings/mountings	■			■		
Check flow and pressure drop performance	■			■		
Check for correct anti-swivel/non anti-swivel specification	■			■		
Component Replacement						
All gas seal kits and Check valve assembly						■

8.3 Repair

8.3.1 Terminal Block

The terminal block is permanently secured to the fixed gas pipe work. In the event of damage to the terminal block itself, an approved installer should be consulted. To replace the O-ring on the seal plate it is necessary to de-pressurise the section of the distribution pipeline in which the terminal unit is situated. See *section 8.3.2*.

Note: There is no seal plate fitted in vacuum or AGS terminal blocks.

8.3.2 Seal Plate O-ring Replacement

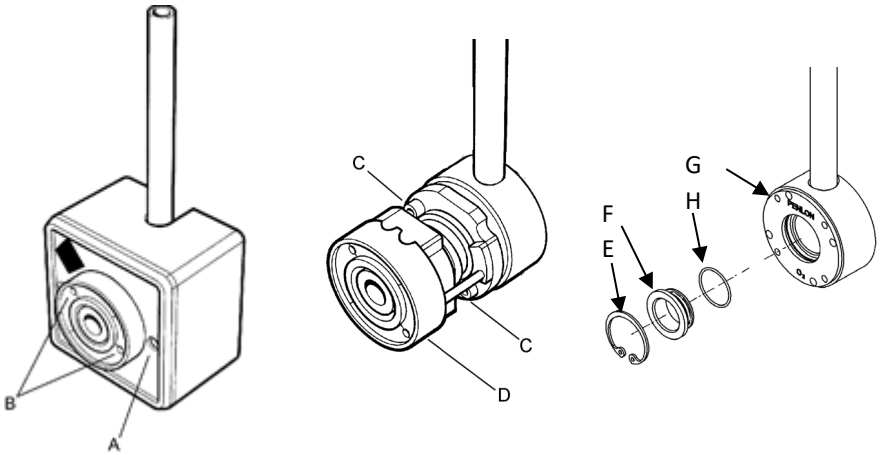


Figure 8-1 O-ring replacement

De-pressurise the section of the distribution pipeline in which the terminal unit is situated.

1. Undo the two screws (A) and remove the terminal unit fascia and flush surround (where applicable).
2. Using a 3 mm Allen key, inserted through the holes (B) in the identity label, locate and undo the two cap screws (C) retaining the socket assembly (D). Remove the socket assembly and place to one side.
3. Pull the check valve assembly out of the seal plate and place aside with the socket assembly.
4. Using internal circlip pliers, remove the circlip (E) retaining the seal plate (F) and extract the seal plate assembly from the terminal block (G).
5. Remove the O-ring (H) from the seal plate, taking care not to damage the groove, and fit the new seal.
6. Replace the seal plate in the terminal block after ensuring that the check valve is in place. Refit the circlip (E).
7. Refit the check valve assembly into the seal plate.
8. Locate the socket assembly (D) over the check valve assembly. Using the Allen key tighten the two retaining screws (C), taking care to keep the socket assembly square to the terminal block. Do not over-tighten the screws.
9. Re-pressurise the section of pipeline and check the terminal unit for leaks.
10. Replace the fascia and flush surround (where applicable).

8.3.3 Check valve assembly seal replacement - medical gas and vacuum

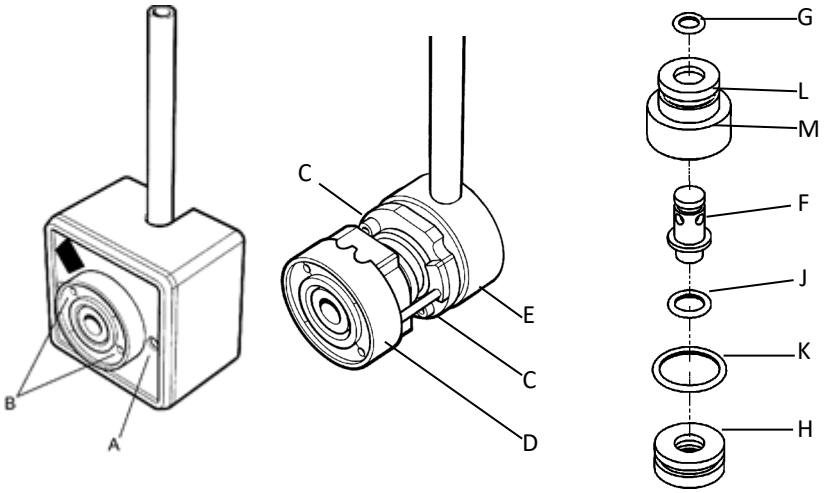


Figure 8-2 Valve seal replacement – gas and vacuum

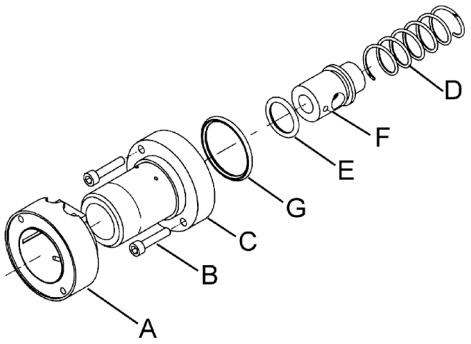
1. Undo the two screws (A) and remove the terminal unit fascia and flush surround (where applicable).
2. Using a 3-mm Allen key, inserted through the holes (B) in the identity label, locate and undo the two cap screws (C) retaining the socket assembly (D) to the terminal block (E). Remove the socket assembly and place to one side.
3. Pressurized units - as the socket assembly is released from the terminal block, the check valve assembly will be pushed from the terminal block until the integral valve behind the seal plate operates.

   Note: This integral valve is intended to check the gas flow for short periods for maintenance of the terminal unit without closing the pipeline. The valve is not intended to be gas tight. If the terminal unit is to be left for a length of time under pressure with the socket assembly removed, arrangements should be made for a more secure seal.

4. Vacuum and AGS terminal blocks do not contain integral valves. If the socket assembly for either of these services is removed while the pipeline is under vacuum, the terminal block should be sealed by placing a blank disc such as a coin over it.
5. Take the check valve assembly and, using the tip of a probe, push the valve plunger (F) back so that the O-ring (G) at the rear of the valve body is fully exposed.
6. Remove the O-ring, taking care not to damage the groove.
7. When the O-ring has been removed, push the plunger (F) forward to remove the retaining ring (H).
8. Remove and renew the internal and external O-rings (J and K) in the retaining ring (H), taking care not to damage the grooves.
9. Refit the valve plunger (F) and retaining ring (H) pushing the plunger back to install the O-ring (G) at the rear of the valve.
10. Remove and replace the O-ring (L) on the outside of the valve body (M).
11. Remove any temporary blanking units from the terminal block.
12. Locate the check valve assembly into the recess in the base of the socket assembly and position the assembly over the terminal block (E). Using the Allen key, tighten the two retaining screws, taking care to keep the socket assembly square to the terminal block. Do not over-tighten the screws.
13. Check for leaks.

8.3.4 Check Valve Assembly Seal Replacement - AGS (East and Zeus)

Note: If the socket assembly is removed while the pipeline is under vacuum, the terminal block should be sealed by placing a blank disc such as a coin over it.



2.

Figure 8-3 Valve seal replacement – AGS (East and Zeus)

1. Using a 3-mm Allen key, inserted through the holes (A) in the identity label, locate and undo the two cap screws (B) retaining the socket assembly (C). Remove the socket assembly.
2. As the socket assembly is removed, the check valve operating spring (D) will push the socket assembly away from the terminal block.
3. Remove and replace the O-ring (E) on the outside of the check valve (F), taking care not to damage the groove.
4. Remove and replace the O-ring (G) on the flange of the socket assembly (C), taking care not to damage the groove.
5. Locate the check valve assembly into the recess in the base of the socket assembly and position the assembly over the terminal block. Using the Allen key tighten the two retaining screws (B), taking care to keep the socket assembly square to the terminal block.
6. Do not over-tighten the screws.
7. Check for leaks.

8.4 AGS System Maintenance

8.4.1 System Performance

The AGS disposal system, of which the terminal unit is a part, is required to have a flow performance as defined in BS6834 (clause 3.4.1.)
Performance requirements:

1. The flow at any terminal shall not exceed 130 L/min. when a resistance of 1 kPa is applied.
2. The flow at any terminal shall not be less than 80 L/min, when a resistance of 4 kPa is applied.
3. Each terminal on a system shall remain within those limits, irrespective of the number of terminal units in use on the system.

It is possible that, between maintenance operations, the performance of the disposal system may vary and require adjustment.

Adjustment will also be required whenever the flow adjusters have been disturbed during maintenance.

8.4.2 Setting Procedure

To vary the flow rate through each terminal unit the integral flow adjuster is screwed in to increase flow, or screwed out to decrease flow. The flow adjuster, which is accessed through the front of the terminal unit, is very sensitive and adjustments should be made in small increments, checking the performance of the system after each adjustment.

Note: Adjustments should only be made as part of the installation or setting of the complete system. BS6834 defines the performance of the system as a whole, and adjustments to individual terminal units will affect the balance of the whole system.

A suitable test unit for measuring the performance at a terminal unit is the BeaconMedaes AGSS Test Unit, *part number. 068193*.

A test unit is required for each terminal unit that is connected to a single power source.

1. Place a test unit in one terminal unit, ensuring that all other terminal units are closed.
2. Adjust the restrictor on the test unit to give a resistance of 1 kPa (-10 mbar).
3. Using a 5-mm Allen key adjust the flow through the terminal unit until the flow on the test unit measures 130 L/min.
4. Remove the test unit and move to the next terminal unit.
5. Repeat steps 1 to 3 on each terminal unit that is connected to the same power unit.
6. Return to the first terminal unit and insert the test unit.
7. Set the restrictor on the test unit to give a resistance of 4 kPa (-40 mbar).
8. Record the flow.
9. Remove the test unit and repeat steps 6 and 7 on each terminal unit that is connected to the same power unit.
10. Place a test unit in each terminal unit and adjust the test unit restrictor to give 1 kPa (-10 mbar) on each unit at the same time.
11. Record the flow on each test unit. Flow must not be greater than 130 L/min.
12. Readjust the test units to give a resistance of 4 kPa (-40 mbar) on each unit at the same time.
13. Record the flow on each test unit. It must not be less than 80 L/min.
    If the reading on any of the test units is less than 80 L/min, it may be possible to increase the vacuum setting of the relief valve at the power unit.
    This adjustment is described in the appropriate Installation, Operation and Maintenance Instructions for the power unit. The vacuum setting must not exceed -200 mbar, or that given in the power unit specification.
    If the vacuum setting is altered in any way it will be necessary to repeat the setting procedure, *steps 1* to *12*, in full.

9 Fault Diagnosis

9.1 Introduction

The following Tables detail possible defects/ symptoms which may cause failure:

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 and 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 2nd fix assembly if necessary. Test the terminal unit for correct functionality using a serviceable test probe.
Mechanical damage inside the terminal unit.	Replace the 2nd fix and check valve assemblies and functionally test using a serviceable test probe.

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

10 Recommended Spares

For all Service Spares enquiries, contact the BeaconMedaes Spares Department, providing as much of the following information as possible:

Product Part Number:
Lot / Batch Number:
Approximate date of purchase:

BeaconMedaes Terminal Units are expected to provide trouble-free service without the need for a large holding of spare parts.

The only recommended holding of spares is detailed *Table 10-1.*
Overseas customers should take into account extended delivery times.

Table 10-1 Minimum Recommended Spares Schedule

Description	Part Number
All gas seal kit – SP Terminal Units	360204
AGSS seal kit	3268197
Carbon Dioxide and Nitrogen seal kit	6000447
Terminal Unit check valve assembly – Service Replacement Kit	5005607

Spares Department:
spares@beaconmedaes.com

11 Reporting Serious Incidents

In accordance with Regulation (EU) 2017/745 (MDR), a notice to the user and/or patient that any serious incident that has occurred in relation to the device should be reported to the manufacturer and the competent authority of the Member State in which the user and/or patient is established.

A serious incident is defined as any incident that directly or indirectly led, might have led, or might lead to:

- The death of a patient, user, or other person,
- The temporary or permanent serious deterioration of a patient's, users, or other person's state of health,
- A serious public health threat.

These events may occur during device use, due to device failure, malfunction, labelling error, or IFU omission.

User Responsibilities
The user or healthcare professional should report any suspected serious incident without delay. (Immediately, but no later than 2 calendar days after the manufacturer becomes aware of the threat.)

If a serious incident is suspected, users must:

- Immediately discontinue use of the device, if safe to do so
- Retain the device (if possible) for investigation
- Notify the manufacturer without delay using the contact information below
- Report the event to the local competent authority of their country as required

Contact Information for Reporting Serious Incidents

- **Manufacturer**: www.beaconmedaes.com
- **Support Email**: BMCS@beaconmedaes.com
- **Phone**: 01246 474242
- **Authorized Representative (EU)**: Atlas Copco Airpower n.v. Boomsesteenweg 957 2610 Wilrijk-Belgium
- **Competent Authority**: https://health.ec.europa.eu/md_authorities

12 Online access

IFUs are available in digital format on the BeaconMedaes BeaconMedaes official website HTM/ISO products (beaconmedaes.com), where the latest versions can be accessed and downloaded. For previous versions, end users may contact us via the "Request Information" section on the website.

BeaconMedaes

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