East SP and Zeus SP Terminal Units
Installation, Operation and Maintenance Manual
Published by Pneumatech Medical Gas Solutions

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

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

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

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Any complaints about the products or services provided by Pneumatech Medical Gas Solutions, please give as much of the following information as possible:

- Product Part Number
- Lot/ Batch Number
- Approximate date of purchase
- Apparent fault.

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complaints@p-mgs.com
Introduction
This manual contains information needed to install, operate and maintain the Pneumatech Medical Gas Solutions (Pneumatech MGS) East SP and Zeus SP Terminal Units.

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

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

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

- Read through this entire instruction manual before using or showing others how to use this equipment. Attempting to use this device without a thorough understanding of its operation may result in patient or user injury or death.
- Do not attempt to modify this device. Failure to observe this may result patient or user injury or death.
- No attempt should be made to use this product with a gas service or at a pressure other than as identified.
- Do not use this product if it appears damaged in any way.
- 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).
- 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).
- Before loosening any pneumatic connection, ensure that the pressure has been isolated.
- Inspect the manifold regularly to confirm the correct pressure is being delivered and that the pressure regulator set points have not drifted. These checks must be performed after each cylinder change and/or at regular intervals where the manifold is an emergency reserve/standby supply source.
- Before carrying out maintenance work on the Product name should be brought on line: refer to the Maintenance section of this manual.
- Risk of fire or explosion: Do not lubricate this product with oil or grease. Safe and compatible lubricants can be obtained from Pneumatech Medical Gas Solutions if required.
- Do not, under any circumstances, attempt to prove the safety relief valve in-situ by adjusting the regulators.
- Before loosening any pressurised connection, ensure that the pressure has been isolated.
- Risk of fire or explosion: Do not lubricate this product with oil or grease. Safe and compatible lubricants can be obtained from Pneumatech Medical Gas Solutions if necessary.
• 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).
• Terminal units that are not rigidly fixed should not be installed in MRI locations.
• Vacuum terminal units should be treated as a bio-hazard and handled and de-contaminated accordingly if microbially contaminated.

Cautions!
Cautions tell you about dangerous conditions that can occur and cause damage to the equipment if you do not obey all of the instructions in this manual.
• Use of sub-standard or inappropriate parts and materials may damage the Manifold System and invalidate the warranty. Only use genuine Pneumatech Medical Gas Solutions spare parts.
• Any work involving alteration, extension or maintenance work to an existing system should be subject to the 'Permit to Work' procedure detailed in HTM 02-01.
• System Capacity: HTM 02-01 recommends that each bank of the manifold should contain enough gas to supply the system for two days. Additional cylinders should be held in the gas store to facilitate one complete bank change. For O2/ N2O mixture, retain sufficient cylinders to change two banks.
• Pressurised air from the medical gas pipeline system may cause personnel injury or property damage if the unit is incorrectly operated or maintained.
• Terminal unit probes, particularly those attached to high pressure hoses can be ejected from the terminal unit with considerable force. Probes or other equipment should be restrained/ supported during removal from a terminal unit to prevent injury or damage.
• Be careful not to over-torque face seal fittings.
• 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.
• Always wash leak detection fluids off with clean water immediately after use.
• Nickel plating may cause mild localised allergic skin reaction in some people.
• Always open valves slowly.
• Be careful not to over-torque face seal fittings.
• Only use leak detection fluids that are compatible with the materials being tested.
• Always wash leak detection fluids off with clean water immediately after use.

Notes:
1. All information, specifications and illustrations within this manual are those in effect at the time of printing.
2. The manufacturer reserves the right to change or make improvements without notice and without incurring any obligation to make changes or add improvements to products previously provided.
### Abbreviations used

The following abbreviations are used in this manual:

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

### Scope of this manual

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

### Pneumatech Medical Gas Solutions service contact

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

+44 (0) 1235 463051

Quote if possible, the:

- Product part number
- Lot/ Batch number
- Approximate date of purchase
- Apparent fault
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Safety
Pneumatech MGS East and Zeus SP Terminal Units provide a safe means of supplying medical equipment with medical gases from the central gas supply system. They are manufactured to accept only the gas specific probes to prevent interchangeability between different types of services.

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

Identification
The Pneumatech MGS East SP and Zeus SP Terminal Units is identified by the product number, printed onto a label.

Environmental Conditions
Adverse environmental conditions and harsh abrasives or chemicals may cause damage to the unit.
1 Description

1.1 Intended Use

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.

1.2 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](image)

1.3 Major Components

1. The Terminal Block Assembly (A)
2. 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).
3. 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.
4. 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).
5. The socket assembly consists of a spring loaded plastic (Zeus) or diecast (East) interlock ring which slides over a PTFE coated diecast (East) or plastic (Zeus) terminal body, and incorporates two retaining pins which latch the probe into position.
6. 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.
7. 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.

2 Technical Specification

Table 2-1 Technical Specification

<table>
<thead>
<tr>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Transport, Storage and Operating Conditions:</td>
</tr>
<tr>
<td>Temperature transport/ storage</td>
</tr>
<tr>
<td>Operating Temperature</td>
</tr>
<tr>
<td>Humidity</td>
</tr>
<tr>
<td>Air Pressure</td>
</tr>
<tr>
<td>Mode of operation</td>
</tr>
<tr>
<td>Ingress Protection Class</td>
</tr>
<tr>
<td>Degree of mobility</td>
</tr>
<tr>
<td>Regulatory Classification:</td>
</tr>
<tr>
<td>GMDN Code (Term)</td>
</tr>
<tr>
<td>EC MDD Classification:</td>
</tr>
<tr>
<td>GHTF Classification:</td>
</tr>
</tbody>
</table>

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

Table 2-2 Gas Operating pressures

<table>
<thead>
<tr>
<th>Gas service</th>
<th>Operating pressure range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>0-400 kPa</td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>0-400 kPa</td>
</tr>
<tr>
<td>O\textsubscript{2}/ N\textsubscript{2}O 50% /50%</td>
<td>0-400 kPa</td>
</tr>
<tr>
<td>Medical Air</td>
<td>0-400 kPa</td>
</tr>
<tr>
<td>Surgical Air</td>
<td>0-800 kPa</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>0-400 kPa</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>0-800 kPa</td>
</tr>
</tbody>
</table>
3 User Responsibility

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

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

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

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

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

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

4 Description of Symbols

**WARNING!** Indicates a potentially hazardous situation which, if not avoided, could result in personal injury to the user or others.

**CAUTION!** Indicates a potentially hazardous situation which, if not avoided, could result in damage to the device or property.

**Note:** Emphasises points to achieve more convenient or efficient use of the device.

- Ambient pressure range
- Ambient humidity range
- Ambient temperature range
- Consult accompanying documents
- Service due date
- The number 0088 identifies the notifying body under which the Quality Systems operated within Pneumatech MGS.
5 Installation

5.1 Second Fix Assembly

Pneumatech Medical Gas Solutions 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 Environmental Conditions

Warning! Keep all components dry and clean during installation. Pneumatech Medical Gas Solutions 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.

5.3 Mounting the Terminal Unit

Penlon MGS 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 centres
- 3 or more units in tandem: 135 mm +/- 2.5 mm centres

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.

5.4 First Fix Installation

5.4.1 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.

5.4.2 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.

### 5.4.3 Surface Mounting Terminal Unit (Figure 5-3)

Penlon MGS 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](image)

**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.

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

5. Fit a blanking plug and retaining strip using the screws provided and pressure test the pipeline.

6. 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.

7. Pressure test and purge the pipeline.

4. Secure the fascia to the cover box with the screws provided. Do not over-tighten the screws.
5.4.4 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 4-5 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.

5.4.5 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.

![Figure 5-6 Pendant or Boom with NIST connector](image)

![Figure 5-7 Flexible Pendant Head with NIST connector](image)

5.5 Second Fix Installation

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.
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 BS6834:1987 (1992).

6.4.2 Performance requirements:

1. AGSS performance, including the terminal unit, must be as defined in BS6834:1987 (1992).

6.4.3 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.

6.4.4 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. BS6834:1987 (1992) 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 Penlon MGS 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**

Caution! The socket assembly does not incorporate a secondary lock. When the interlock ring on the front of the socket assembly is pressed to release the probe the residual gas pressure may cause the probe to be rapidly ejected from the terminal unit. Hold the device or hose attached to an engaged probe firmly, then operate the interlock ring.
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

Pneumatech MGS 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.

Sub-standard or inappropriate parts and materials may damage the terminal unit and invalidate the warranty. Only use genuine Pneumatech Medical Gas Solutions spare parts.

Obtain a work permit before commencing any work on medical gas equipment.

#### 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 B-1* and must be observed in full to ensure continued safe operation of the terminal units system.
Table 8-1  Inspection and Maintenance Schedule

<table>
<thead>
<tr>
<th>5 Yearly</th>
<th>Annually</th>
<th>Quarterly</th>
<th>Weekly</th>
<th>Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspection, Checks and Tests:</td>
<td>Ambient temperature</td>
<td>Suitability of location</td>
<td>Adequate room ventilation</td>
<td>Adequate access for maintenance</td>
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</table>

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 7.4.2.

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

8.3.2 Seal Plate 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

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.

4. 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.

5. 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.
7. 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.
8. Remove the O-ring, taking care not to damage the groove.
9. When the O-ring has been removed, push the plunger (F) forward to remove the retaining ring (H).
10. Remove and renew the internal and external O-rings (J and K) in the retaining ring (H), taking care not to damage the grooves.
11. 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.
12. Remove and replace the O-ring (L) on the outside of the valve body (M).
13. Remove any temporary blanking units from the terminal block.
14. 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.
15. 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.

![Figure 8-3 Valve seal replacement – AGS (East and Zeus)](image)

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 BS6834:1987 (1992) 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. BS6834:1987 (1992) 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 Penlon AGSS Test Unit, part No. 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

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Remarks/ rectification action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worn O-rings.</td>
<td>Replace check valve assembly and/or seal plate O-ring.</td>
</tr>
<tr>
<td>O-ring cut.</td>
<td>Check probes for damage and replace as required.</td>
</tr>
</tbody>
</table>

Table 8-.2  Low Pressure and Flow at Terminal Unit

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remarks/ rectification action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulator settings have drifted.</td>
<td>Check regulators and make any necessary adjustments to correct settings.</td>
</tr>
<tr>
<td>Isolation valves not fully open.</td>
<td>Check isolation valves are fully open.</td>
</tr>
<tr>
<td>Foreign object in Terminal Unit restricting gas flow.</td>
<td>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.</td>
</tr>
<tr>
<td>Damage/ leaking medical gas pipeline system.</td>
<td>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.</td>
</tr>
</tbody>
</table>

Table 8-3  Terminal Unit Stiff or Difficult to Operate

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remarks/ rectification action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damaged probe.</td>
<td>Check probes for damage and replace as required.</td>
</tr>
<tr>
<td>Foreign objects causing interference with locking mechanism.</td>
<td>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.</td>
</tr>
<tr>
<td>Mechanical damage inside the terminal unit.</td>
<td>Replace the 2nd fix and check valve assemblies and functionally test using a serviceable test probe.</td>
</tr>
</tbody>
</table>

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 Penlon Medical Gas Solutions Spares Department, giving as much of the following information as possible:

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

Penlon MGS 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 9-1. Overseas customers should take into account extended delivery times.

Table 10-1 Minimum Recommended Spares Schedule

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>All gas seal kit – SP Terminal Units</td>
<td>360204</td>
</tr>
<tr>
<td>AGSS seal kit</td>
<td>3268197</td>
</tr>
<tr>
<td>Carbon Dioxide and Nitrogen seal kit</td>
<td>6000447</td>
</tr>
<tr>
<td>Terminal Unit check valve assembly – Service</td>
<td>5005607</td>
</tr>
<tr>
<td>Replacement Kit</td>
<td></td>
</tr>
</tbody>
</table>

Spares Department:

- **T:** +44 (0) 1235 463053
- **F:** +44 (0) 1235 463011

spares@p-mgs.com
# Declaration of Conformity

| Manufacturer        | Atlas Copco Ltd. trading as Atlas Copco Medical  
|                     | 18 Nuffield Centrum, Nuffield Way, Abingdon, OX14 1RL, UK |
| Product             | East SP Medical Gas Terminal Units |
| Classification      | IIa |
| Conformity Route    | Annex II |
| Quality Management System | EN ISO 13485:2012 |
| GMDN Code           | 36124 |
| GMDN Term           | Terminal Units for Medical Gases and Vacuum |
| Standards Applied   | EN 5682, EN 980, EN 15908, EN ISO 9170-1, EN 13348, EN ISO 15001, EN ISO 14971, EN 1041, EN ISO 10993-1 |
| Notified Body       | Lloyd's Register Quality Assurance Limited, 71 Fenchurch Street, London EC3M 4BS United Kingdom (LRQA Notified Body Number 0068) |
| MDD Certificate(s)  | LRQ 4007749/C |
| Start of CE Marking | 3rd April 2013 |
| Place and Date of Issue | Abingdon, 3rd September 2015 |

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

Endorsing Signature
Turgay Ozcan (General Manager)

[Document ref.: RDO/004/04/doc]
# Declaration of Conformity

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Atlas Copco Ltd. trading as Atlas Copco Medical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18 Nufield Centrum, Nufield Way, Abingdon, OX14 1RL, UK</td>
</tr>
<tr>
<td>Product</td>
<td>Zeus SP Medical Gas Terminal Units</td>
</tr>
<tr>
<td>Classification</td>
<td>Ila</td>
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<tr>
<td>Conformity Route</td>
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<td>36124</td>
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<tr>
<td>GMDN Term</td>
<td>Terminal Units for Medical Gases and Vacuum</td>
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<td>Standards Applied</td>
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<tr>
<td>Notified Body</td>
<td>Lloyd’s Register Quality Assurance Limited, 71 Fenchurch Street, London EC3M 4BS United Kingdom (LRQA Notified Body Number 0088)</td>
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<tr>
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**Endorsing Signature**  
Turgay Özan (General Manager)