

## Instructions For Use



## Gem Terminal Unit

Part number 4233400289  
Revision 1  
18/MAR/2021



**BEACONMEDAES<sup>®</sup>**

# Operation and Maintenance Manual

## Gem Medical Gas Terminal Units

This unit is purchased from:

Date purchased:

Model number:

Serial number:

Option(s) included:

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

BeaconMedæs  
Telford Crescent, Staveley  
Derbyshire S43 3PF

Telephone: +44 (0) 1246 474242  
Email: [gbn.info@beaconmedaes.com](mailto:gbn.info@beaconmedaes.com)  
Website Contacts: [www.beaconmedaes.com](http://www.beaconmedaes.com)

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



Atlas Copco Ltd. trading as Atlas Copco Medical  
Telford Crescent, Staveley, Derbyshire S43 3PF UK



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

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

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## Safety Precautions

**⚠ DO NOT USE OIL OR GREASE** on any Gem terminal unit for any reason. This could lead to a FIRE or an EXPLOSION. Only use approved OXYGEN COMPATIBLE lubricants, which can be purchased from BEACONMEDÆS if necessary.

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

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

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

Component descriptions and parts lists are available on request.

## Environmental Transport and Storage Conditions

All products are separately packaged and stored in controlled conditions.

## Environmental Operating Conditions

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

**⚠ WARNING!** Only use approved leak detection fluids with this product. Other leak detection fluids may contain surfactants that can impair the structural integrity of the terminal unit.

## Cleaning

Care should be taken when cleaning terminal units to ensure that alcohol based cleaning fluids do not enter the terminal unit. It should also be noted that gas specific probes used with terminal units should not be cleaned with alcohol based cleaning fluids.

## General Information

### 1.1 Introduction

BEACONMEDÆS Gem medical gas terminal units are designed to fully comply with BS EN ISO 9170-1 (accepting probes to BS 5682 and DIN 13260-2), and their installation fully satisfies the United Kingdom Health Technical Memorandum No. 2022 (HTM2022) and Health Technical Memorandum No. 02-01 (HTM02-01).

BEACONMEDÆS Gem Anaesthetic Gas Scavenging terminal units are designed to comply with BS 6834:1987 and in order to achieve the correct performance specified should be used with a Transfer and Receiving System manufactured to the same British Standard. Gem terminal units are used as outlets to fixed pipeline installations supplying any of the following medical gas services:

- Oxygen
- Nitrous Oxide
- O<sub>2</sub>/N<sub>2</sub>O (50%/50% V/V)
- Medical Air
- Surgical Air
- Medical Vacuum
- Anaesthetic Gas Scavenging
- Carbon Dioxide
- Nitrogen

Gem terminal units may be wall mounted, for use with either surface or concealed pipeline installations or fitted inside a bedhead trunking assembly. Gem terminal units are also fitted to trunking and headwalls, flexible, rigid, retractable and multipurpose pendants. All terminal units and components should be handled with due care to ensure they do not become damaged during transit, unpacking and installation. The standard range of BEACONMEDÆS Gem Terminal Units are CE marked under the Medical Devices Directive 93/42/EEC with approval from notified body no. 0088 (LRQA). Under this directive, the specified products are classified as Class IIb Medical Devices.

## 1.2 Product Range

This manual is intended for use with the following products:

**Table 1a: Product Identification - 1st and 2nd fix units**

Description	Part Numbers
BS Gem B 2nd Fix	8102371350-8102371355
DIN Gem B 2nd Fix	8102371370-8102371375
BS Gem 10 2nd Fix	1826850-1826855
BS Gem NIST 2nd Fix	8102340206-8102340207
BS AGS 2nd Fix	8102340208
GEM Revolve Modular/ Wall 1st Fix	8102340210-8102340218

**Table 1b: Product Identification - BS Complete**

Description	Part Numbers
Multi-Purpose Pendant Type	8102340240-8102340248
Retractable Pendant Type	8102340250-8102340258
Rigid Pendant Type	8102340270-8102340278
Flexible Pendant Type	8102340280-8102340288
OEM Pendant Type	8102340360-8102340368

**Table 1c: Product Identification - DIN Complete**

Description	Part Numbers
Multi-Purpose Pendant Type	8102340420-8102340425
Retractable Pendant Type	8102340430-8102340435
Rigid Pendant Type	8102340440-8102340445
Flexible Pendant Type	8102340450-8102340455
MP Pendant Type Barb	8102340970-8102340975

Installation instructions are supplied with each assembly and they should be consulted prior to any work being carried out.

## 1.3 Installation Array

BEACONMEDÆS Gem terminal units may be installed either individually or as a group of medical services. When installed within a group, terminal units shall be mounted, when facing the units, in the following sequence, horizontally from left to right, vertically from top to bottom or clockwise if in a circular arrangement is required (looking upwards - pendant installation):

- Oxygen
- Nitrous Oxide
- O<sub>2</sub>/N<sub>2</sub>O (50%/50% V/V)
- Medical Air
- Surgical Air
- Medical Vacuum
- Anaesthetic Gas Scavenging
- Carbon Dioxide
- Nitrogen

With the exception of 2 gas services incorporating oxygen and vacuum terminal units, which are spaced at 150mm, wall mounted Gem terminal units are mounted in a multiple terminal unit array at 135mm between centres. Medical gas and vacuum wall mounted terminal units incorporate an anti-rotation pin to ensure correct orientation of connected downstream equipment. When the terminal unit is mounted within a pendant with the probe axis vertical, the anti-rotation pin is not fitted.

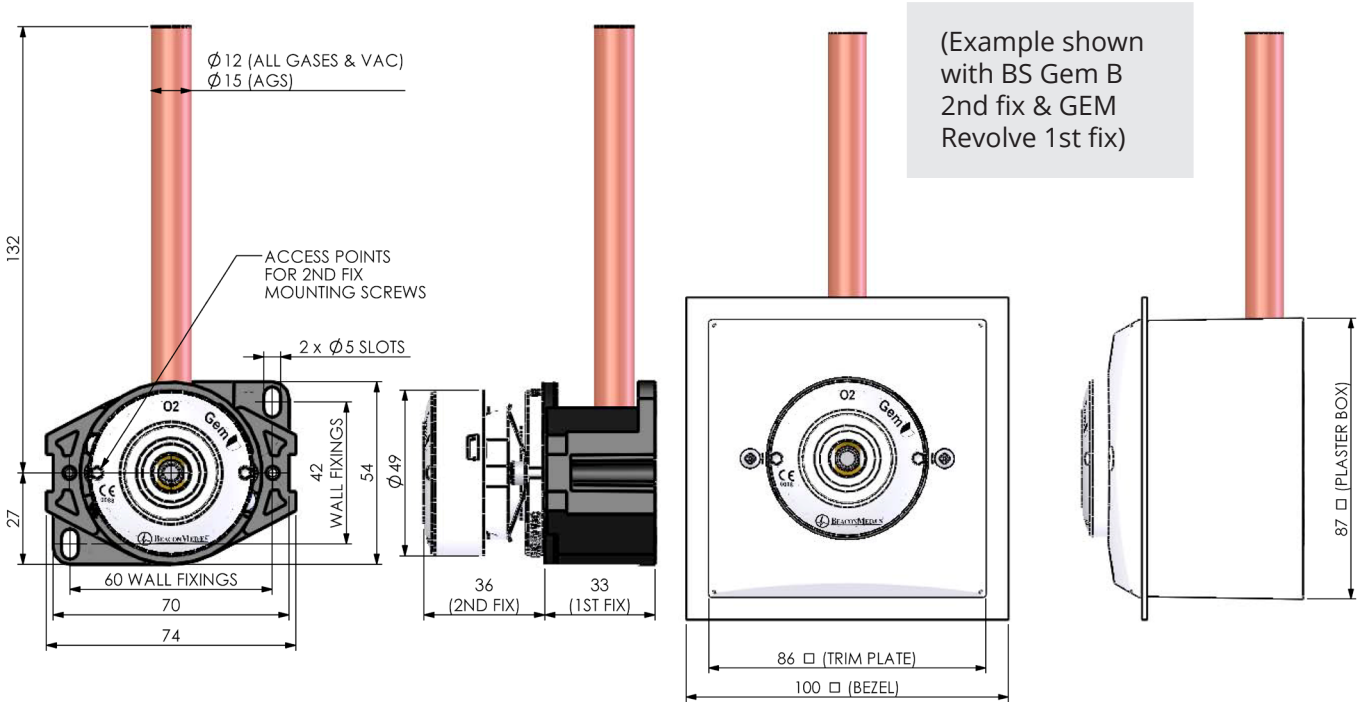
## 1.4 Gas Specificity

Each terminal unit is designed to be fully gas specific, medical gas and vacuum terminal units are complete with pin indexed gas specific sub-components to prevent inadvertent incorrect assembly between medical gas services, anaesthetic gas scavenging terminal units are gas specific through the use of a screw thread as specified BS 6834. The BEACONMEDÆS Gem terminal units will only accept the correct service probe complying with BS5682 or DIN 13260-2, thereby preventing inadvertent operator error. Gem terminal units are clearly identified in accordance with BS EN ISO 9170-1 and BS 6834 and are subject to comprehensive QA controls during manufacture with batch numbers allocated to the assemblies to provide traceability.

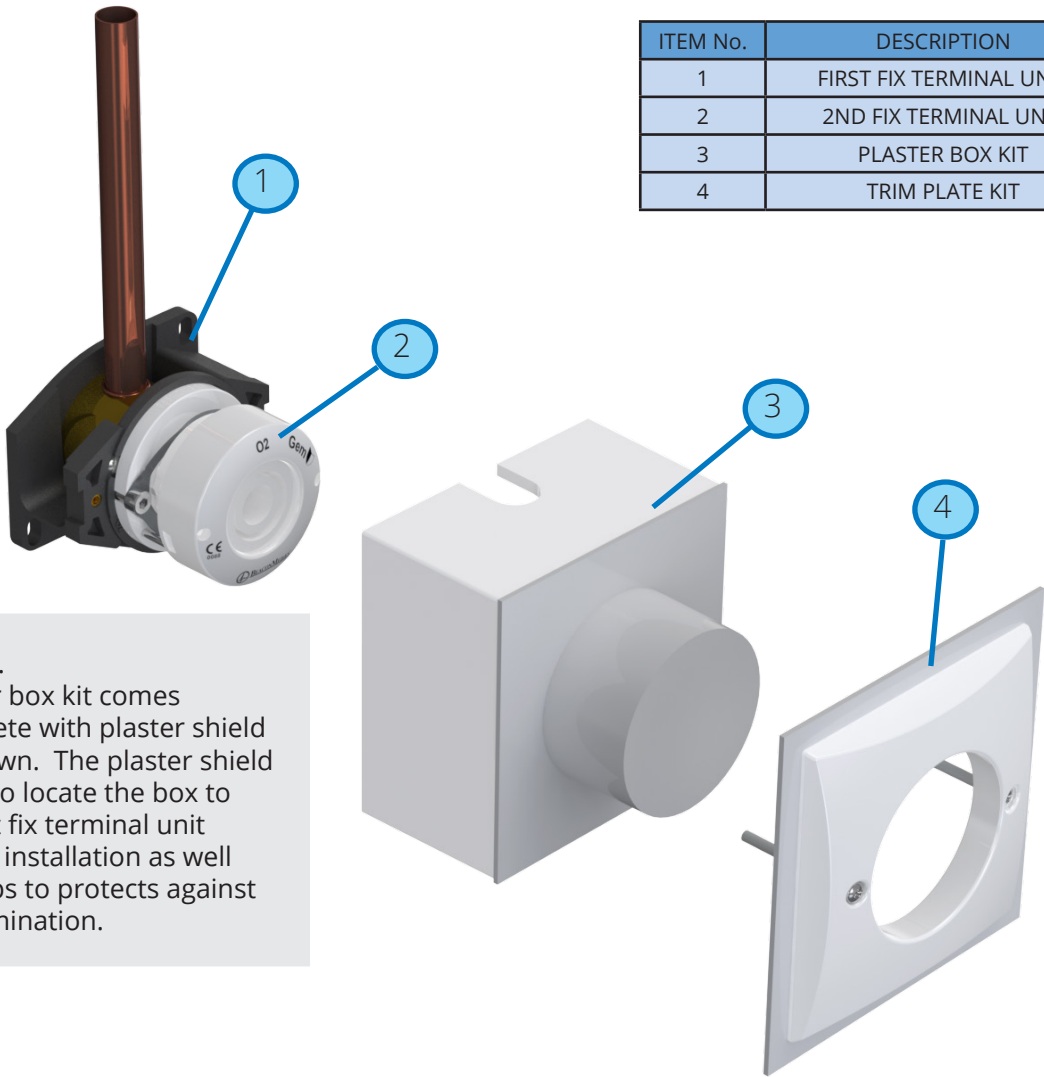
## 1.5 Multiple Gas Jig Plates

To ensure correct alignment and spacing of multiple terminal unit installations, multiple gas jig plates are used to mount the BEACONMEDÆS Gem terminal unit first fix assembly. Jig plates form the foundation for all concealed installations. The jig plate is manufactured from steel to form a channel section and is treated to prevent corrosion.

Typical Gem Terminal Unit Installation Dimensions



ITEM No.	DESCRIPTION
1	FIRST FIX TERMINAL UNIT
2	2ND FIX TERMINAL UNIT
3	PLASTER BOX KIT
4	TRIM PLATE KIT



Note....  
Plaster box kit comes complete with plaster shield as shown. The plaster shield helps to locate the box to the 1st fix terminal unit during installation as well as helps to protects against contamination.

Fixing - Modular/wall backplate to include two slotted fixing holes in order to provide adjustment of the terminal mounting position. Gem B 2nd fix does not require disassembling during installation due to the fastener access points.



## Gem Medical Gas Terminal Units

### Second Fix BS Gem B Terminal Unit, Quick Connection



### Second Fix DIN Gem B Terminal Unit, Quick Connection



### Second Fix Gem Stainless Steel Thread Connection



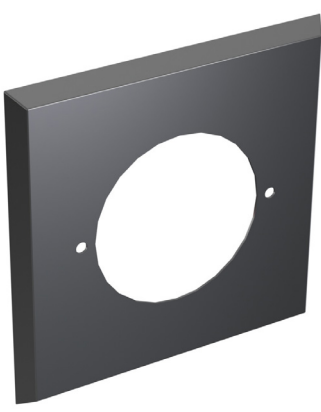
Accessories



Bezel and Trim Plate Kit 2006149  
(Includes Antimicrobial Additive)

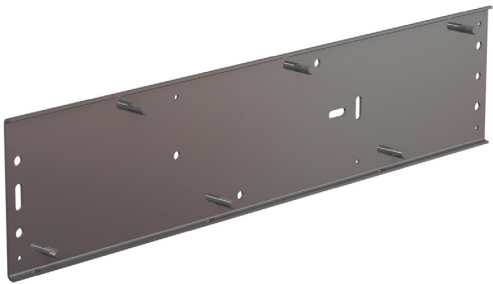


Bezel and Trim Plate Kit 1826849



Stainless Steel Trim Plate

Size	Jig plates	Stainless steel trim plate
1 Gas	N/A	1826978
2 Gas (150mm spacing)	8102340520	1826979
2 Gas (133mm spacing)	8102340521	T.B.C
3 Gas (133mm spacing)	8102340522	1826980
4 Gas (133mm spacing)	8102340523	1826981
5 Gas (133mm spacing)	8102340524	1827026
6 Gas (133mm spacing)	8102340525	1827027



Jig Plates - for accurate flush wall mounting  
of terminal units



Note.  
Terminal Unit Plug provided  
with all 1st fix assemblies in  
order to complete on site 1st  
fix pipeline carcass testing

Note - All terminal unit accessories are suitable for use with Gem B (BS & DIN) & Gem10® quick connect or Gem threaded terminal units.



## Commissioning

### 2.1 Introduction

Commissioning of medical gas services with Gem terminal units fitted is normally carried out in two parts. Part 1 consists of pipeline carcass pressure testing on completion of the first fix installation. Part 2 is carried out on completion of the second fix installation and ensures that the correct flow rate/pressure is achieved at each terminal unit. Full anti-confusion, identification and mechanical compatibility checks are carried out. Nitrogen may be used to complete the pipeline carcass pressure test only. Medical quality air is used throughout the remaining procedures and the correct type of medical gas introduced to complete the gas identification, quality and purity checks. Commissioning is carried out after initial installation and whenever the Medical gas distribution system has been disturbed and pipelines broken into e.g. an extension to an existing system. Personnel carrying out the commissioning procedure must be qualified, competent and conversant with the information contained in this manual.

Note... For information on commissioning AGS disposal systems and terminal units please refer to the AGS disposal system operating and maintenance manual.

### 2.2 Part 1

Ensure that the correct gas service terminal units are installed and located in accordance with the installation specification. Check each Gem gas specific plate for correct medical gas identification.

Following installation of all first fix assemblies, each terminal unit must have the test plug fitted and retained in the pressure blank position. Pipeline carcass pressure tests must be carried out in accordance with the installation contract, HTM 2022, HTM02-01, British Standard or International Standard as applicable. On completion the distribution system must be purged with Medical quality air to remove all traces of Nitrogen.

### 2.3 Part 2

Following installation of all terminal unit second fix assemblies and all other associated components that complete the distribution system pipework, each medical gas service must be commissioned in accordance with the installation contract, HTM2022, HTM02-01, British Standard or International Standard as applicable. The following tests are normally required as a minimum to ensure a safe installation and that all performance criteria are

met. Full test procedures are detailed in HTM 2022 and HTM02-01.

- Leakage
- Cross-Connection.
- Flow and Pressure Drop
- Function and Gas Specificity

Full test procedures are detailed in HTM 2022 and HTM02-01.

## 3. Operating Instructions

### 3.1 General Operation

Oxygen, Nitrous Oxide, Oxygen/Nitrous Oxide mixture, Medical Air, Surgical Air, Vacuum, N2 (DIN only), CO2 (DIN only):

To obtain a gas flow, the correct Medical gas probe is inserted into the terminal unit. For BS type a horizontally mounted (wall) terminal unit, the slot in the probe index collar must be uppermost to engage with the anti-rotation pin. For BS type vertically mounted terminal units (Pendant and Hose boom) orientation of the probe is unnecessary, as the anti-rotation pin is not fitted. A slight push on the probe inwards completes engagement and locks the probe into position.

Fully engaging the probe opens the check valve to permit the specified gas flow. To remove the probe, hold the probe between the middle finger and palm, ease the probe inwards to reduce the load on the roller pins and press the terminal unit fascia ring with thumb and index finger. The probe is ejected from the terminal unit and the check valve closes to seal the gas flow.

For German DIN type only the 2nd fix is fitted with 2 sets of probe locking pins. The first click engages the park position, which secure the probe without opening the check valve for when the terminal unit is not in use. The 2nd click secure the probe with the check valve open, allowing gas to flow when in use.

### 3.2 Operation of AGS Terminal Units

The transfer/receiving system probe is inserted into the terminal unit and the screw thread connection made hand tight. The terminal unit is opened and, with the exhaustor unit running, will provide the correct flow rate in accordance with BS 6834:1987. Removal of the probe closes the terminal unit and forms an effective seal.

## 3.3 Operation of CO2 (BS only) and N2 (BS only) Terminal Units

To obtain a gas flow, the correct Medical male NIST is inserted into the terminal unit. Fully engaging the male NIST and tightening the NIST nut onto the terminal unit opens the check valve to permit the specified gas flow.

## 4. Maintenance

### 4.1 Introduction

BEACONMEDÆS Gem terminal units are designed to operate with the minimum of maintenance and contain few moving parts. Regular routine maintenance operations are recommended to prove the terminal unit and medical gas service performance. A 'competent' person must carry out all maintenance work. They must be fully conversant with the procedures and standards required when working on medical gas systems.



#### WARNINGS...

1. OBTAIN A WORK PERMIT BEFORE COMMENCING ANY WORK ON A MEDICAL GAS INSTALLATION.
2. IT IS ESSENTIAL THAT ONLY GENUINE MEDÆS SPARE PARTS ARE FITTED DURING MAINTENANCE.
3. BEFORE COMMENCING ANY WORK ON A CONTAMINATED VACUUM SYSTEM, PERSONNEL MUST BE AWARE OF THE POTENTIAL HEALTH HAZARDS AND NECESSARY SAFETY PRECAUTIONS TO BE OBSERVED.
4. IF THE TERMINAL UNIT SUSTAINS ANY DAMAGE OR PROBE MALFUNCTION, THE SECOND FIX ASSEMBLY SHOULD BE REPLACED COMPLETELY. THIS ENSURES ALL DAMAGED COMPONENTS ARE REPLACED. IT IS NOT RECOMMENDED TO ONLY REPLACE ROLLER PINS AS IT IS EXPECTED THAT DAMAGED ROLLER PINS CAN DAMAGE THE SOCKET ASSEMBLY.

### 4.2 Tools and Equipment

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

### 4.3 Preventative Maintenance

BEACONMEDÆS can provide a planned preventative maintenance contract suitably adapted to meet customer requirements.

## 4.4 Routine Inspection

The routine inspection and maintenance programme proves the integrity and performance of each terminal unit, and must be carried out on all terminal units. The programme consists of the following procedure:

4.4.1 Check that the terminal unit is complete and has the correct gas identification label firmly attached. Ensure that correct gas specific colour coded insert (if required) is fitted to correct medical gas terminal unit.

4.4.2 Using test probes engage the correct test probe and check the terminal unit is free from leaks. Check that the terminal unit will retain the test probe and ensure that the terminal unit seals the gas flow. Check that the terminal unit will smoothly release the probe.

4.4.3 AGS terminal units should be dismantled and checked for cleanliness and freedom of movement of the nylon valve plug and spring. Clean and replace as necessary.

4.4.4 Medical gas and vacuum terminal units and Gem conversions should be checked for correct flow and pressure drop performance. Fit an FRDP to the terminal unit and check for correct flow rate and pressure (Table 3). Remove the FRDP and ensure that the terminal unit seals the gas flow. Ensure that the 2nd fix on all Mk.2 and Mk.3 to Gem conversions does not wobble between finger and thumb. If this is the case, the brass blocks which make up the conversion assembly will need to be tightened together, please see paragraph 4.4.6/7 for rectification procedure.

**Table 2: Pressure Drop Testing to BS EN ISO 9170-1 and BS EN 739**

Nominal Pressure (kPa)	Test Flow (l/Min)	Test Pressure (kPa)	Max. Delta P Terminal Unit (kPa)	Max. Delta P Hose Assembly (kPa)
400 to 500	60	320	15	25
400 to 500	200	320	70	80
800 to 1000	300	640	70	80
Vacuum	40	40*	15	20

\*Absolute pressure

# Gem Medical Gas Terminal Units

**Table 3: Terminal Unit Testing to BS 5682:1984**

Gas Service	Test Flow (l/min)	Min. Pressure Terminal Unit Only (kPa)	Min. Pressure Terminal Unit c/w Hose Assy. (kPa)
All 4 bar Gases	40	396	393
O2/N2O	275	345	250
Medical Air	50	396	392
Surgical Air**	350	700	700
Vacuum	40	40*	33.3*

\*Below atmospheric pressure

\*\*This requirement arises from HTM 2022

**Table 4: AGS Terminal Unit Flows to BS 6834:1987**

Resistance to Flow (kPa)	Flow (l/min)
1	130 maximum
4	80 minimum

**Table 5: AGS Terminal Unit Flows to BS EN ISO 9170-2**

Resistance to Flow (kPa)	Flow (l/min)
1	50 maximum
2	25 minimum

Notes...

1. With Medical vacuum terminal units, for which experience has proven that contamination may occur, engineers are advised to strip and clean the affected terminal units and replace the capsule assembly at a period dictated by experience of the particular system.

2. ISO 9170 allows for a probe 'O' ring seal replacement every 1000 cycles in order to maintain the leakage rate. Because of the wide variation of terminal unit usage and Medical gas probe physical condition, BEACONMEDÆS cannot recommend a period to cover all circumstances. Hospitals are advised to discuss with BEACONMEDÆS their specific maintenance requirements to establish realistic period for their application. Periodic capsule replacement is carried out in accordance with paragraph 4.5.1, but replacement of the capsule 'O' ring seal is unnecessary in these circumstances.

## 4.4.5 AGS Terminal Units

Irrespective of the installed location of terminal units, i.e. wall, bedhead or pendant, the design is similar and many common components are used throughout. The procedure to remove, inspect and functionally check a wall mounted terminal unit is as follows, and may be used in principle on all other installations.

4.4.5.1 Fascia Plate. Remove (if fitted). Unscrew both securing screws and remove the fascia plate.

Note...The terminal unit valve front body screws into the first fix assembly by a left-hand thread.

4.4.5.2 Front body. Remove. Unscrew valve front body from 1st fix assembly. If the screw thread appears stiff, use a test probe to provide sufficient purchase. The terminal unit should dismantle by hand pressure, but the previously applied Loctite may cause an initial 'stiction' (left hand thread).

4.4.5.3 Brass valve plug and spring. Remove. Remove brass valve plug and spring from terminal unit.

4.4.5.4 Rear body. Blank. Blank rear body by fitting a dust plug.

4.4.5.5 Terminal unit. Inspect. Inspect and clean brass valve plug and spring. Ensure that orifice is free from obstruction and valve plug seats are serviceable, clean all components and replace as necessary. Ensure that the identification label remains firmly affixed to the front body.

4.4.5.6 Terminal unit. Assemble. Remove dust plug from rear body. Apply Loctite 'Screwlock 222' sparingly to screw threads. Assemble spring, brass valve plug and front body to rear body. Tighten using only hand pressure and do not over-torque.

4.4.5.7 Terminal unit. Check operation. Check for freedom of operation by inserting a test probe. Using the test equipment, and with the disposal system activated, check that with a 1kPa pressure drop the flow rate does not exceed a maximum of 130 litres/min. Adjust the pressure drop to 4kPa and check that the flow rate exceeds a minimum of 80 litres/min.

4.4.5.8 Fascia plate. Re-fit (if required).

## 4.4.6 Mk.2 to Gem Conversions

With a Mk.2 to Gem conversion, the brass blocks making up the conversion assembly can be tightened together without disassembling the terminal unit. The following procedure is adopted.

4.4.6.1 Fascia plate. Remove (if fitted). Unscrew both securing screws and remove fascia plate.

4.4.6.2 Gas specific block. Tighten to interface block. Locate the 4 cap head screws securing the gas specific block to the conversion interface block. These are equally spaced around the terminal unit 2nd fix when viewed from the front of the terminal unit. Fully tighten the screws, and check that the 2nd fix is now stable in position.

4.4.6.3 Fascia plate. Refit (if required). Secure fascia plate back in position with both screws and check that operation of terminal unit is free.

### 4.4.7 Mk.3 to Gem Conversions

With a Mk.3 to Gem conversion, the brass blocks making up the conversion assembly can only be tightened together by first disassembling the terminal unit 2nd fix. The following procedure is adopted.

4.4.7.1 Fascia plate. Remove (if fitted). Unscrew both securing screws and remove fascia plate.

4.4.7.2 Fascia ring. Remove. Carefully ease the fingers of the probe release ring out of their position in the fascia ring and pull the fascia ring away from the terminal unit.

4.4.7.3 Release ring and roller pins. Remove. Ease forward the release ring to release the roller pins and then remove the release ring.

4.4.7.4 Socket and capsule assemblies. Remove. Unscrew both cap head screws securing socket assembly to gas specific plate and remove. Withdraw socket and capsule assembly.

4.4.7.5 Gas specific block. Tighten to interface block. Locate the 2 cap head screws securing the gas specific block to the conversion interface block. These are partially obscured from view while the capsule is in place. Fully tighten the screws.

4.4.7.6 Capsule assembly. Fit. If required, fit plaster depth spacer over new capsule assembly. Insert new capsule assembly inside pipeline termination block.

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

4.4.7.8 Release ring and roller pins. Fit. Align release ring keyways with socket assembly and fit. Gently move release ring forward depressing locking springs and insert roller pins.

4.4.7.9 Fascia ring. Fit. Align fascia ring keyway with socket assembly. Gently push fascia ring until spring fingers engage and lock.

4.4.7.10 Fascia plate. Re-fit (if required). Locate fascia plate in position. Fit both securing screws locating into gas specific plate and tighten.

4.4.7.11 Probe operation. Check. Carry out quarterly inspection in accordance with paragraph 4.4.

## 4.5 Medical Gas Terminal Units

### 4.5.1 Replacing a Damaged or Leaking Unit

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

**⚠ WARNING... IF THE TERMINAL UNIT SUSTAINS ANY DAMAGE OR PROBE MALFUNCTION, THE SECOND FIX ASSEMBLY SHOULD BE REPLACED COMPLETELY. THIS ENSURES ALL DAMAGED COMPONENTS ARE REPLACED. IT IS NOT RECOMMENDED TO ONLY REPLACE ROLLER PINS, BECAUSE DAMAGED ROLLER PINS MAY HAVE DAMAGED THE SOCKET ASSEMBLY.**

Note...It is not necessary to depressurise the distribution system to carry out this procedure, or to replace the 2nd fix assembly.

Note... Gem B 2nd fix comes complete with holes in the front face to access the mounting screws. Therefore, unlike the Gem10 the Gem B does not require disassembling during maintenance, other than unclipping the fascia ring to fit the anti-rotation pin (BS version only) if required (see page 5). For Gem B go straight to 4.5.1.4.

4.5.1.1 Fascia plate. Remove (if fitted). Unscrew both securing screws and remove the fascia plate.

4.5.1.2 Fascia ring. Remove. Carefully ease the fingers of the probe release ring out of their position in the fascia ring and pull the fascia ring away from the terminal unit.

4.5.1.3 Release ring and roller pins. Remove. Ease forward the release ring to release the roller pins and then remove the release ring.

4.5.1.4 Socket assembly. Remove. Unscrew both cap head screws securing socket assembly to gas specific plate and remove. Withdraw socket assembly.

4.5.1.5 Capsule assembly. Remove. Withdraw capsule assembly complete with plaster depth spacer if fitted.

Note...The maintenance valve arrangement will close off the supply, but is expected to leak slightly. In the case of vacuum terminal units, a serviceable test plug should be temporarily fitted to maintain the system integrity.



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

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

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

4.5.1.8 Capsule assembly. Fit. If required, fit plaster depth spacer over new capsule assembly. Insert new capsule assembly inside pipeline termination block.

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

Note...If after replacing the capsule assembly and capsule 'O' ring seal, the terminal unit is still found to be leaking, replace bush 'O' ring seal in first fix assembly in accordance with paragraph 4.5.2.

4.5.1.10 Release ring and roller pins. Fit. Align release ring keyways with socket assembly and fit. Gently move release ring forward depressing locking springs and insert roller pins.

4.5.1.11 Fascia ring. Fit. Align fascia ring keyway with socket assembly. Gently push fascia ring until spring fingers engage and lock.

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

4.5.1.12 Fascia plate. Re-fit (if fitted). Locate fascia plate in position. Fit both securing screws locating into gas specific plate and tighten.

4.5.1.13 Probe operation. Check. Carry out quarterly inspection in accordance with paragraph 4.4.

### 4.5.2 Terminal Unit - Decontamination

Should the terminal unit become biologically contaminated, it is necessary to remove both the second fix assembly and capsule assembly. The safest and most cost effective method of dealing with such an event is to dispose of the contaminated items and fit new replacement assemblies. It is

recommended that the entire second fix assembly and both 'O' ring seals are replaced.

4.5.2.1 Replacing the first fix bush 'O' ring seal. In order to replace the first fix bush 'O' ring within wall and bedhead mounted terminal units, the distribution system must be isolated and depressurised. With pendant type installations, the upper NIST fitting should be disconnected. The procedure to replace the 1st fix bush 'O' ring seal is as follows:

4.5.2.2 Wall and bedhead mounted terminal units. Isolate and depressurise distribution system.

4.5.2.3 Hose boom or Pendant mounted terminal unit. Disconnect upper NIST fitting.

4.5.2.4 Fascia/cover. Remove fascia/cover as necessary to gain access to the terminal unit.

4.5.2.5 Fascia ring. Remove. Carefully ease the fingers of the probe release ring out of their position in the fascia ring and pull the fascia ring away from the terminal unit.

4.5.2.6 Release ring and roller pins. Remove. Ease forward the release ring to release the roller pins and then remove the release ring.

4.5.2.7 Socket assembly. Remove. Unscrew both caps head crews securing socket assembly to gas specific plate and remove. Withdraw socket assembly.

4.5.2.8 Capsule assembly. Remove. Withdraw capsule assembly complete with plaster depth spacer if fitted.

4.5.2.9 First fix bush. Remove. Using suitable internal circlip pliers, remove internal retaining circlip. Carefully withdraw first fix bush

4.5.2.11 Maintenance valve. Check. With the exception of vacuum terminal units, check that the maintenance valve and spring remain correctly assembled and correctly located.

4.5.2.12 First fix bush. Re-fit. Carefully insert first fix bush, until bush locates with internal shoulder of pipeline termination block. Using suitable internal circlip pliers, re-fit retaining circlip to secure assembly. Ensure that circlip locates correctly within retaining groove.

4.5.2.13 Capsule assembly. Fit. If required, fit plaster depth spacer over new capsule assembly. Insert new capsule assembly inside pipeline termination block.

## Gem Medical Gas Terminal Units

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

Note... Gem B 2nd fix comes complete with holes in the front face to access the mounting screws. Therefore, unlike the Gem10 the Gem B does not require disassembling during maintenance, other than unclipping the fascia ring to fit the anti-rotation pin if required (see page 5). For Gem B go straight to 4.5.1.4.

4.5.2.15 Release ring and roller pins. Fit. Align release ring keyways with socket assembly and fit. Gently move release ring forward depressing locking springs and insert roller pins.

4.5.2.16 Fascia ring. Fit. Align fascia ring keyway with socket assembly. Gently push fascia ring until spring fingers engage and lock.

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

4.5.2.17 Fascia/cover. Re-fit.

4.5.2.18 Pendant mounted terminal units. Re-connect upper NIST fitting.

4.5.2.19 Wall or bedhead mounted terminal units. Re-pressurise distribution system.

4.5.2.20 Probe operation. Check. Carry out quarterly inspection in accordance with paragraph 4.4.

**Table 7: Pressure/Flow Rate at Terminal Unit Low**

Possible Cause	Remarks/Rectification action
Regulator settings have drifted	Check and adjust regulators to correct settings as necessary
Isolating valves closed or partially closed	Check and fully open all isolating valves as necessary
Dirty terminal unit or foreign objects restricting gas flow	Remove socket assembly and capsule assembly, ensure that the terminal unit is clean, serviceable and free from foreign objects. Replace capsule assembly and/or bush 'O' ring seal
Damaged or leaking medical gas distribution system	If the pressure/flow rate remains low with serviceable terminal unit fitted, the medical gas distribution system is suspect. Inspect distribution system for damage/leakage. Repair pipeline and carry out commissioning procedure on system affected

**Table 8: Terminal Unit Stiff or Difficult to Operate**

Possible Cause	Remarks/Rectification action
Damaged medical gas probe	Inspect probe for damage, replace as necessary.
Foreign objects interfering with locking mechanism	Inspect and remove foreign objects. Check for damage and replace 2nd fix if required. Functionally check using a serviceable medical gas test probe.
Mechanical damage inside terminal unit	Replace terminal unit second fix assembly and functionally check using a serviceable medical gas test probe.

## 5. Fault Diagnosis

### 5.1 Introduction

The following tables detail some possible defects/symptoms that may occur with the BEACONMEDÆS Gem terminal unit, with necessary rectification action.

**Table 6: Leaking Terminal Unit**

Possible Cause	Remarks/Rectification action
Worn 'O' rings	Replace capsule assembly and/or bush 'O' ring seal
'O' ring cut	Check probes for damage and replace as necessary



## 6. Recommended Spares

**6.1** BEACONMED/ES Gem terminal units are expected to give trouble-free service without the need for a large holding of spare parts. The only recommended spares required to held by the user are detailed below and are suitable for all Gem terminal units irrespective of their installation:

Second fix Assemblies	Ref.
Oxygen Gem B (BS)	8102371350
Nitrous Oxide Gem B (BS)	8102371351
O2/N2O (50%/50% V/V) Gem B (BS)	8102371352
Medical Air Gem B (BS)	8102371353
Surgical Air Gem B (BS)	8102371354
Medical Vacuum Gem B (BS)	8102371355
Nitrogen Gem B (NIST)	8102340206
Carbon Dioxide Gem B (NIST)	8102340207
AGS GEM (Threaded)	8102340208
Oxygen Gem B (DIN)	8102371370
Nitrous Oxide Gem B (DIN)	8102371371
Medical Air Gem B (DIN)	8102371372
Medical Vacuum Gem B (DIN)	8102371373
Nitrogen Gem B (DIN)	8102371374
Carbon Dioxide Gem B (DIN)	8102371375
Oxygen Gem10 (BS)	1826850
Nitrous Oxide Gem10 (BS)	1826851
O2/N2O (50%/50% V/V) Gem10 (BS)	1826852
Medical Air Gem10 (BS)	1826853
Surgical Air Gem10 (BS)	1826854
Medical Vacuum Gem10 (BS)	1826855

Spares	Ref.
Capsule assembly (BS)	1826848
Capsule assembly (DIN)	8102340198
Sealing Bush	2005929
NIST 'O' ring	1820697
DIN Insert 'O' ring	2006258
'O' ring extraction tool	1826977

## 6.2 Spares Scheduling

The recommended holding of spares depends upon the number of terminal units installed and is detailed at Table 9.

The number recommended for overseas customers is expressed in brackets and takes into account expected transport delays.

**Table 9: Recommended Spares Holding**

Part Number/ Description	Number of Gem's Installed		
	10-50	50-150	150-300
2nd fix	2 (4)	4 (8)	10 (20)
Capsule	4 (8)	8 (16)	20 (40)
Sealing Bush	4 (8)	8 (16)	20 (40)
NIST 'O' ring	2 (4)	4 (8)	10 (20)
DIN Insert 'O' ring	2 (4)	4 (8)	10 (20)



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