

A200SP Circle Absorber Service Manual



IMPORTANT

Includes component upgrade information :

- a) Inspiratory/expiratory valves
- b) Canister and Release/Lock System;
- c) APL Valve

IMPORTANT

Servicing and Repairs

In order to ensure the full operational life of this device, servicing by a Penlon-trained engineer should be undertaken periodically.

We recommend that the absorber should be serviced on the following schedule:

- (a) Six monthly inspection and function testing.
- (b) Annual service which includes routine replacement of seals etc, as preventive maintenance.

Details of these operations are in this A200SP Circle Absorber service manual. Servicing should be carried out by Penlon trained engineers.

For any enquiry regarding the servicing or repair of this device, contact the nearest accredited Penlon agent:

or communicate directly with:

Technical Support Department
Penlon Limited
Abingdon
OX14 3PH
UK

Tel: 44 (0) 1235 547076
Fax: 44 (0) 1235 547062
E-mail: technicalsupport@penlon.co.uk

Always give as much of the following information as possible:

1. Type of equipment
2. Product name
3. Serial number
4. Approximate date of purchase
5. Apparent fault

FOREWORD

This manual has been produced to provide authorised personnel with information on the function, routine, performance, servicing and maintenance checks applicable to the A200SP Absorber.

Information contained in this manual is correct at the date of publication. The policy of Penlon Limited is one of continued improvement to their products. Because of this policy Penlon Limited reserves the right to make any changes which may affect instructions in this manual, without giving prior notice.

Personnel must make themselves familiar with the contents of this manual and the machine function before using the apparatus.

IMPORTANCE OF PATIENT MONITORING

WARNING

Anaesthesia systems have the capability to deliver mixtures of gases and vapours to the patient which could cause injury or death unless controlled by a qualified anaesthetist.

There can be considerable variation in the effect of anaesthetic drugs on individual patients so that the setting and observation of control levels on the anaesthesia system does not in itself ensure total patient safety.

Anaesthesia system monitors and patient monitors are very desirable aids for the anaesthetist but are not true clinical monitors as the condition of the patient is also dependent on his respiration and the functioning of his cardio-vascular system.

IT IS ESSENTIAL THAT THESE ELEMENTS ARE MONITORED FREQUENTLY AND REGULARLY AND THAT ANY OBSERVATIONS ARE GIVEN PRECEDENCE OVER MACHINE CONTROL PARAMETERS IN JUDGING THE STATE OF A CLINICAL PROCEDURE.

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USER RESPONSIBILITY

This device has been built to conform with the specification and operating procedures stated in this manual and/or accompanying labels and notices when checked, assembled, 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 under any circumstances be used.

The user must accept responsibility for any malfunction which results from non-compliance with the servicing requirements detailed in this manual.

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

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

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

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 Penlon or their appointed agents.

USA and Canadian Federal Law restricts the sale and use of this device to, or on the order of, a licensed practitioner.

Statements in this manual preceded by the following words are of special significance:-

WARNING *means there is a possibility of injury to yourself or others.*

CAUTION *means there is a possibility of damage to the apparatus or other property*

NOTE *indicates points of particular interest for more efficient and convenient operation.*

The reader must take particular notice of the warnings, cautions and notes provided throughout this manual

1. WARNINGS AND CAUTIONS

The following **WARNINGS** and **CAUTIONS** must be read and understood before servicing or repairing this Anaesthetic Apparatus

WARNINGS

General Information

1. *Personnel must make themselves familiar with the contents of this manual and the function of the A200SP Absorber before servicing or use.*
2. *Trichloroethylene must not be used in association with soda lime.*
3. *This unit is restricted to use with non-flammable anaesthetic agents only.*
4. *The A200SP Circle System Absorber must only be used when securely mounted in an upright position.*
 - a) *The inspiratory and expiratory non-return valves (NRV) are gravity operated.*
 - b) *Spillage of absorbent may contaminate the breathing system. See 3.2/5.1*

Before using the absorber

5. *The use of patient Y-pieces containing non-return valves in connection with the Absorber is hazardous, because two sets of non-return valves may easily be connected in opposition, by error.*
6. *Breathing hoses and bags used with the absorber must comply to ISO 5367 (Hoses) and ISO5362 (Breathing Bags) respectively. The resistance and compliance of these hoses and bags provide essential factors for the satisfactory use of this system.*
7. *Do not connect a vacuum systems must not directly to the APL valve. A receiving system with positive and negative pressure control functions must be interposed. Systems must comply with ISO 8835 Part 2. See 5.2.3.*

8. *Underfilling of the canister can lead to inefficient CO₂ absorption. Overfilling may result in poor sealing of canister due to caking of granules and abrasion of the canister and seal. See 3.1 and 5.3.*

9. *Do not use the Absorber without ensuring that it passes all pre-use checks. See Section 6.*

10. *After servicing and cleaning procedures, verify positive action of the bag/ventilator selector switch before the unit is used clinically.*

Check that at all times that the switch is free to move from one end of its travel to the other.

Using the absorber

11. *Condensation, which may collect in the bottom of the absorber canister is caustic and care must be taken not to spill it on the skin when draining. See section 7.3.*

12. *Kinking of the fresh gas tube is a known cause of anaesthetic accident and the use of unsuitable tubing can contribute to this situation. See 3.5.*

13. *Any breathing system utilising the A200SP absorber must be fitted with:*
 - a) *An oxygen monitor complying with ISO7767.*
 - b) *A breathing system integrity alarm.*

14. *Refitting the canister - failure to rotate the canister to the fully closed position may cause a system leak and/or a reduction in CO₂ absorption (see 5.3).*

WARNINGS AND CAUTIONS

CAUTIONS

1. *Do not sterilise (autoclave) the manometer.*
2. *Do not immerse in liquid or autoclave the electrical interface unit, and the heater unit (if fitted) at the rear of the absorber.*
3. *Remove the absorbent canister before autoclaving.*
4. *If the absorber has to be lifted or carried by hand, always support the weight of the unit under the base. Do not lift the absorber by gripping any of the components attached to the top of the absorber - the manometer, APL valve, breathing circuit connectors, etc.*
5. *Do not use any ventilator with the A200SP absorber that does not comply with ISO 8835 part 2.*

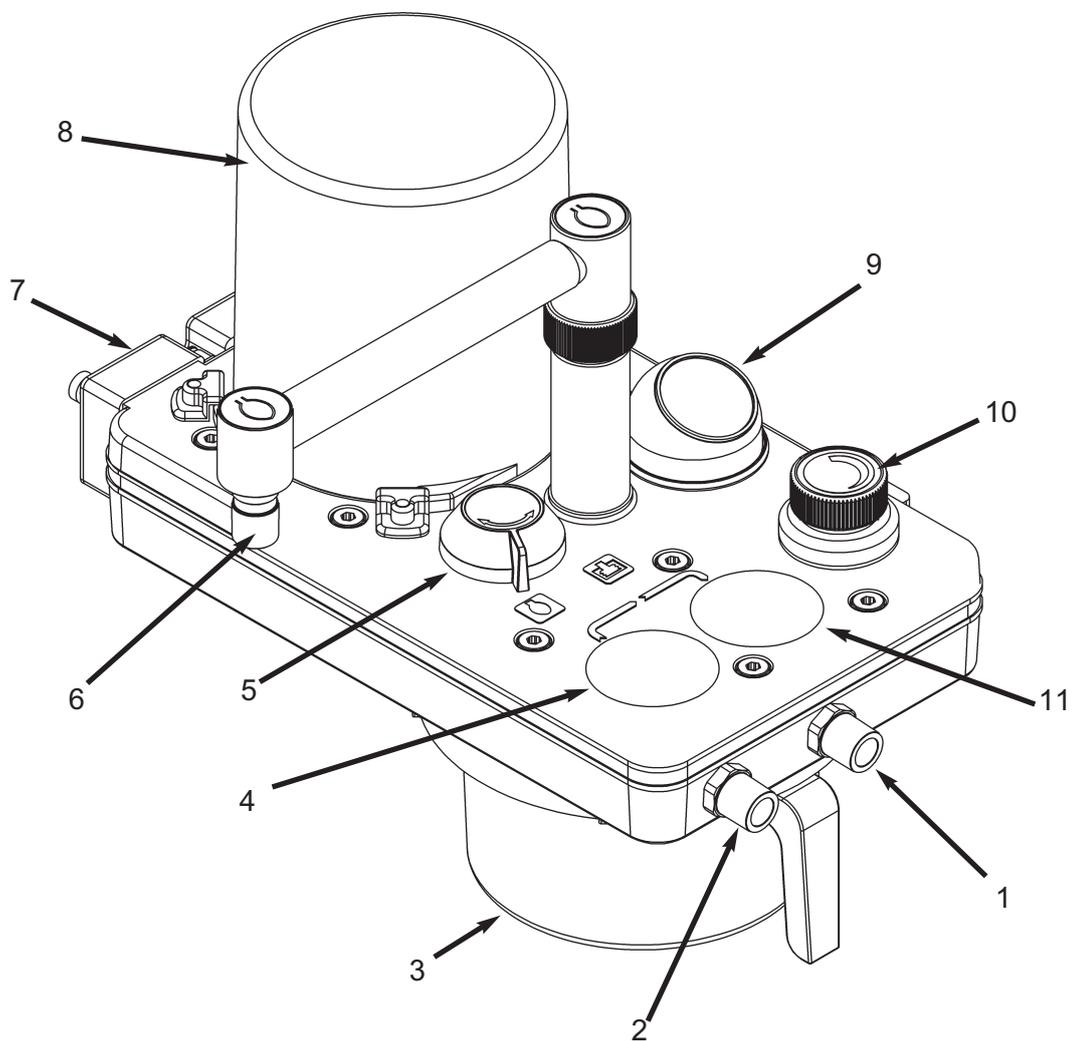
2. PURPOSE

The A200SP Absorber is designed for use as part of a closed breathing system for anaesthesia, providing CO₂ absorption in conjunction with the appropriate ventilator, breathing hoses, reservoir bags and patient connections.

Depending on the flow of fresh gas relative to patient minute volume, the patient may receive fresh gas or partial recirculated gas, as determined by the anaesthetist.

The system incorporates a Bag/Ventilator switch to enable:

- a) spontaneous breathing or manually assisted ventilation in 'Bag' mode.
- b) use with an anaesthesia ventilator when 'Ventilator' is selected.



A200SP Circle System Absorber

- | | | | |
|----|-----------------------------------|-----|--|
| 1. | Inspiratory hose connector | 7. | Electrical interface unit |
| 2. | Expiratory hose connector | 8. | Ventilator bellows housing |
| 3. | Canister | 9. | Manometer |
| 4. | Expiratory non-return valve (NRV) | 10. | Adjustable pressure limiting valve (APL valve) |
| 5. | Bag/ventilator switch | 11. | Inspiratory non-return valve (NRV) |
| 6. | Reservoir bag connector | | |

3. DESCRIPTION

3.1 Canister

Mounting

The absorber must only be used when securely mounted in an upright position – spillage of absorbent may contaminate the breathing system – see WARNING, in section 5.1.

Absorbent Capacity

The canister (1) is designed to take a prepacked unit, or hold 1.3 kg (equivalent to 1500 ml) of loose absorbent in its inner container.

NOTE

Remove the inner container from the canister if a pre-pack unit is to be used.

DO NOT OVERFILL the inner container - see section 5.3.

Refill During Use

The canister seals at the top face.

The canister can be removed and refilled during a clinical procedure.

Gas Flow

The gas flow through the canister is from top to bottom.

Note that the bag/ventilator connection is between the absorber and the patient. Bag squeezing or the use of mechanical ventilation does not result in the transport of dust toward the patient, but tends to drive dust back into the absorber.

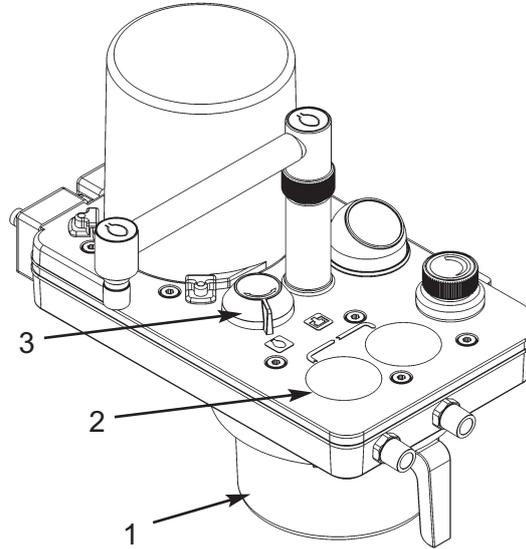
3.2 Inspiratory and Expiratory Non-return Valves (NRV)

The valves are positioned on the top of the manifold block and control the direction of the gas flow through the system.

Each valve consists of a rubber disc located over a valve seat. The discs operate by gravity and are retained by guides to prevent lateral movement.

The valves are visible through the top cover (2) and the operation of each valve can be visually checked as the patient breathes in and out.

IT IS IMPORTANT THAT THE ABSORBER IS MOUNTED UPRIGHT SO THAT THESE VALVES MOVE IN A TRULY VERTICAL PLANE, WITH THE VALVE SEATS HORIZONTAL.



3.3 Bag/Ventilator Switch (3)

Ventilator mode

In 'Ventilator' mode the reservoir bag is closed off from the breathing system and the ventilator connection port at the rear of the manifold block, is in circuit.

WARNING *The APL valve is out of circuit when the system is in 'Ventilator' mode. The ventilator must be equipped with a pressure relief valve.*

Bag mode

The breathing bag acts as an additional over-pressure protection device, preventing pressure exceeding 60 cmH₂O.

WARNING

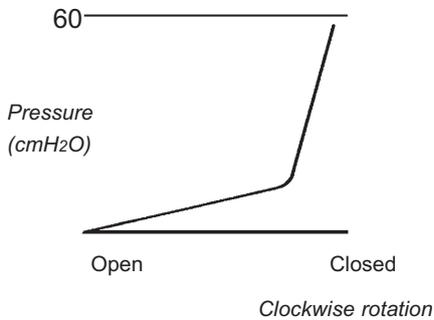
If no ventilator is connected to the absorber, care must be taken to ensure that the bag/ventilator switch is kept in the 'Bag' position, to avoid gross loss of gas from the breathing system and to maintain the reservoir bag in the system.

DESCRIPTION

3.4 Adjustable Pressure Limiting (APL) Valve

The APL valve is a spring loaded stainless steel disc valve, providing breathing system pressure control, and excess pressure relief.

The spring pressure can be varied by rotating the control knob on top of the valve. In the fully counterclockwise position the minimum pressure is 1.0 cmH₂O at 6 L/min. This can be increased by clockwise rotation to 60 cmH₂O.



As shown in the graph above, further clockwise rotation causes a rapid increase in opening pressure so that in the fully closed position, the valve functions as a 60 cmH₂O excess pressure relief valve.

AGSS connector

Taper connector (1) at rear of absorber assembly.

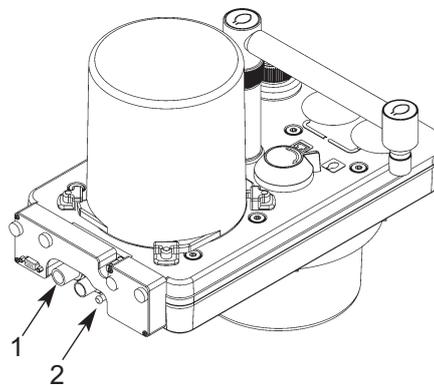
3.5 Fresh Gas Inlet and Tubing

The fresh gas inlet (2) is at the rear of the absorber.

The absorber is supplied with a fresh gas hose assembly with attached end fitting. Do not use any other type of hose

WARNING

Kinking of the fresh gas tube is a known cause of anaesthetic accident and the use of unsuitable tubing can contribute to this situation.



DESCRIPTION

3.6 Manometer

NOTE: *The use of a manometer is strongly recommended at all times.*

The manometer is located on the top of the manifold block to the rear of the expiratory valve .

Manometer scale: –10 to +100 cmH₂O
Manometer accuracy: ±5%
 (within range +10 to 80 cmH₂O)

CAUTION

Remove the manometer before autoclaving the absorber unit.

3.7 Heater Unit (option)

The heater unit (1) limits the build up of moisture in the gas paths through the absorber.

CAUTION

Do not autoclave the heater unit.

3.8 Bypass System

It is strongly recommended that a capnometer is used to prevent the risk of hypercapnia.

When the canister is removed, expiratory gas passes directly to the APL valve and bag, or ventilator, without passing through the absorbent.

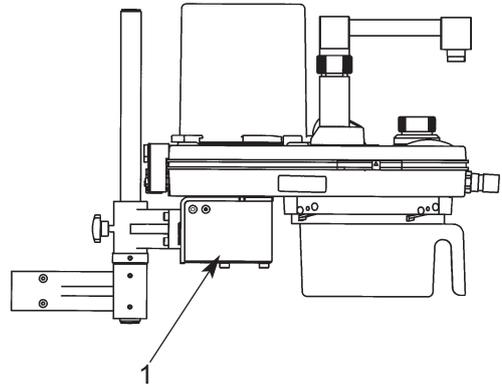
This allows the canister to be refilled during a clinical procedure

3.9 End Tidal Carbon Dioxide Monitoring

The use of end tidal carbon dioxide monitoring is strongly recommended.

Connection of a suitable analyser must be made between the patient's airway and the patient connection Y-piece.

Detailed instructions are provided by the manufacturers of the analyser.



DESCRIPTION

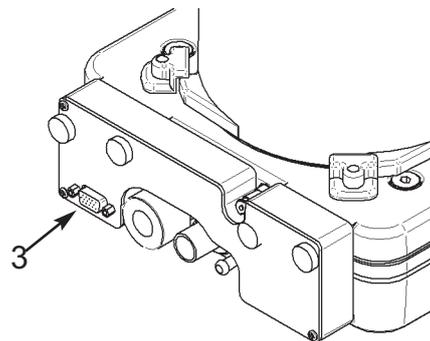
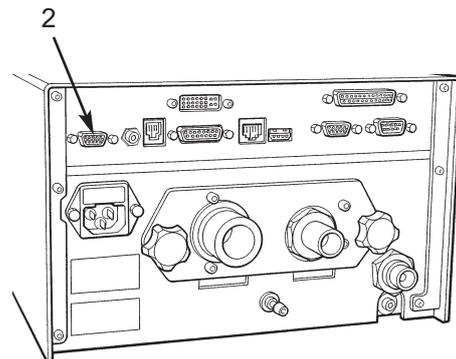
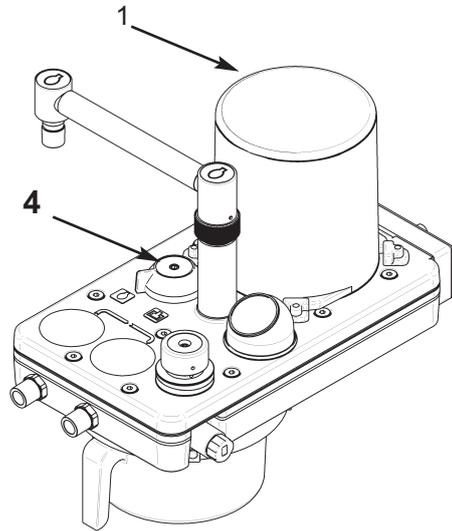
3.10 Interface to AV-S Ventilator

The absorber is designed to interface with the AV-S Ventilator and the ventilator bellows unit (1) is built into the absorber..

The interface cable links the connector (2) on the ventilator control panel to the multifunction connector (3) on the interface unit at the rear of the absorber.

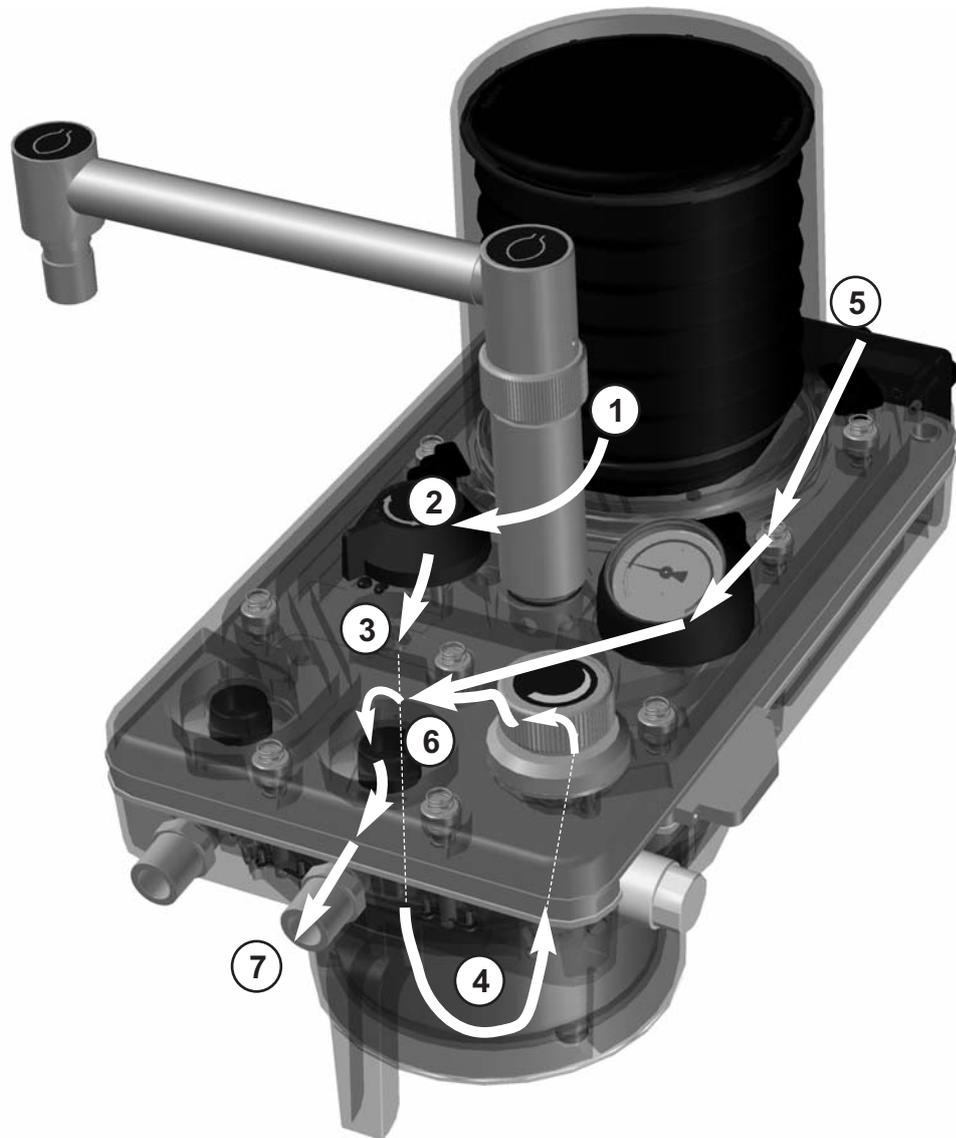
- a) The A200SP is fitted with a sensor that detects the position of the absorber bag/vent control (4). The sensor signal cabling is routed internally to connector (3)
- b) Operation of the Bag/Vent control will trigger automatic Mode switching on the AV-S ventilator, as follows:
 - i) If the Absorber Bag/Vent control is moved from Vent to Bag, the ventilator will change from Volume Mode, or Pressure Mode, into Spontaneous Mode.
 - ii) Switching the absorber Bag/Vent control from Bag to Vent:
The ventilator will reset from Spontaneous Mode to the previously set active mode.
 - iii) If the ventilator is in any mode other than those detailed above, operation of the absorber Bag/Vent control will not affect the ventilator.

NOTE This function can be enabled/disabled through the AV-S on-screen menus (refer to the AV-S user manual).



DESCRIPTION

3.11 Gas Flow Schematic



Inspiratory Gas Path

1. Patient Gas from bellows
2. Through the bag/vent switch
3. Down to absorbent canister
4. Through the absorbent
5. Fresh gas flow from anaesthetic machine
6. Into the inspiratory non-return valve
7. Through inspiratory connector to patient breathing circuit

4. SPECIFICATION

NOTE

Information in this section complies with the requirements of ISO 8835–2.

4.1 General Dimensions

All figures are approximate

Overall height	380 mm
Width	186 mm
Depth	240 mm
Weight (empty)	5.7 kg
Mounting system	Polemount assembly

4.2 Resistance of Breathing System

Resistances listed in 4.2.1 and 4.2.2 are measured with:

- (A) **An absorber fitted with 1060 mm (42 inch) breathing hoses complying with ISO 5367, and a Penlon Safelock Y-piece.**
- (B) **Absorber only.**

NOTE:

1. *The canister must be filled to the correct level with fresh absorbent (follow the instructions in section 5.3).*
2. *A bacterial filter must be used in the patient breathing system to protect the oxygen sensor.*
Use an appropriate filter that does not raise the resistance values of the whole system to above 0.6 kPa (6 cmH₂O).
3. *The APL valve must be fully open.*

4.2.1 Expiratory Resistance

Tested with a flow of 6 L/min of air through the fresh gas inlet and an induced flow of 60 L/min through the breathing system.

- (A) expiratory resistance: less than 0.6 kPa (6 cmH₂O)
- (B) expiratory resistance: less than 0.5 kPa (5 cmH₂O)

4.2.2 Inspiratory Resistance

Tested with a flow of 6 L/min of air through the fresh gas inlet and an induced flow of 60 L/min through the breathing system.

- (A) inspiratory resistance: less than 0.6 kPa (6 cmH₂O)
- (B) inspiratory resistance: less than 0.45 kPa (4.5 cmH₂O)

SPECIFICATION

4.3 Internal Compressible Volume

Note that the reservoir bag is not fitted and the bag mount blocked.

These figures are measured with:

- (A) **An absorber fitted with 1060 mm (42 inch) breathing hoses complying with ISO 5367, and a Penlon Safelock Y-piece.**

Volume required to raise the system pressure to 3 kPa (30 cmH₂O) = 180 ml

- (B) **Absorber only.**

Volume required to raise the system pressure to 3 kPa (30 cmH₂O) = 170 ml

Other disposable breathing hoses may give different figures; the supplier of the hose will provide compressible volume figures.

4.4 System Leakage Rate

The patient connection port is sealed and the APL valve fully closed.

These figures are measured with:

- (A) **An absorber fitted with 1060 mm (42 inch) breathing hoses complying with ISO 5367, and a Penlon Safelock Y-piece.**

Absorber 'ON'

Leakage rate: less than 50 ml/min at 3 kPa (30 cmH₂O)

- (B) **Absorber only.**

Absorber 'OFF', canister removed.

Leakage rate: less than 50 ml/min at 3 kPa (30 cmH₂O)

4.5 Canister Capacity and Resistance

4.5.1 Canister Capacity

When filled to the correct level (see section 5.3), the canister inner container holds 1.3 kg (2.87 lb) of absorbent (1500 ml).

Recommended absorbent:

Soda lime or barium lime, with a colour indicator, 4-8 mesh, supplied in bulk.

Alternatively, a pre-pack unit may be used.

Note

- i) The absorber canister is not electrically conductive.
- ii) Cleaning and sterilisation details are given in section 7.

4.5.2 Canister Resistance

The resistance of a freshly filled canister is less than 0.2 kPa (2 cmH₂O) at 60 L/min.

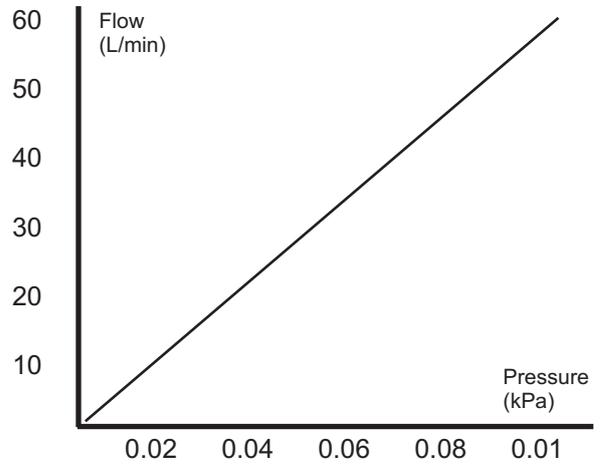
SPECIFICATION

4.6 Non-return Valves

Pressure drop across the inspiratory and expiratory non-return valves at an air flow of 60 L/min: 0.1 kPa (1 cmH₂O).

Note that flow characteristics are identical for valves in a dry or wet condition.

A 'wet' valve is defined as a valve in a flow of humidified gas, such that moisture is visible on the surface of the valve.



4.7 Heater (option)

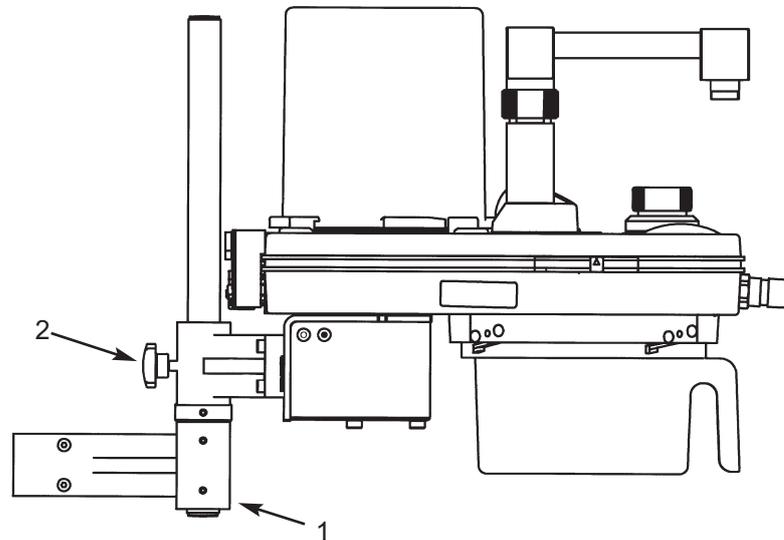
Voltage 110 - 240 VAC

Current 1.5 - 0.7 A

Frequency 50/60 Hz

Fuse T2 AH 250 V

5. INSTALLATION AND OPERATION



5.1 Mounting the Absorber

CAUTION

If the absorber has to be lifted or carried by hand, always support the weight of the unit under the base.

Do not lift the absorber by gripping any of the components attached to the manifold block at the top of the absorber.

WARNING

The absorber assembly must only be used when securely mounted in an upright position.

- a) *Non-return valves are gravity operated*
- b) *Spillage of absorbent may contaminate the breathing system.*

Polemount bracket assembly (1)

Secure the polemount assembly to the side of the anaesthetic machine.

Mount the absorber on the bracket assembly, and secure by tightening the knob (2)

Height Adjustment

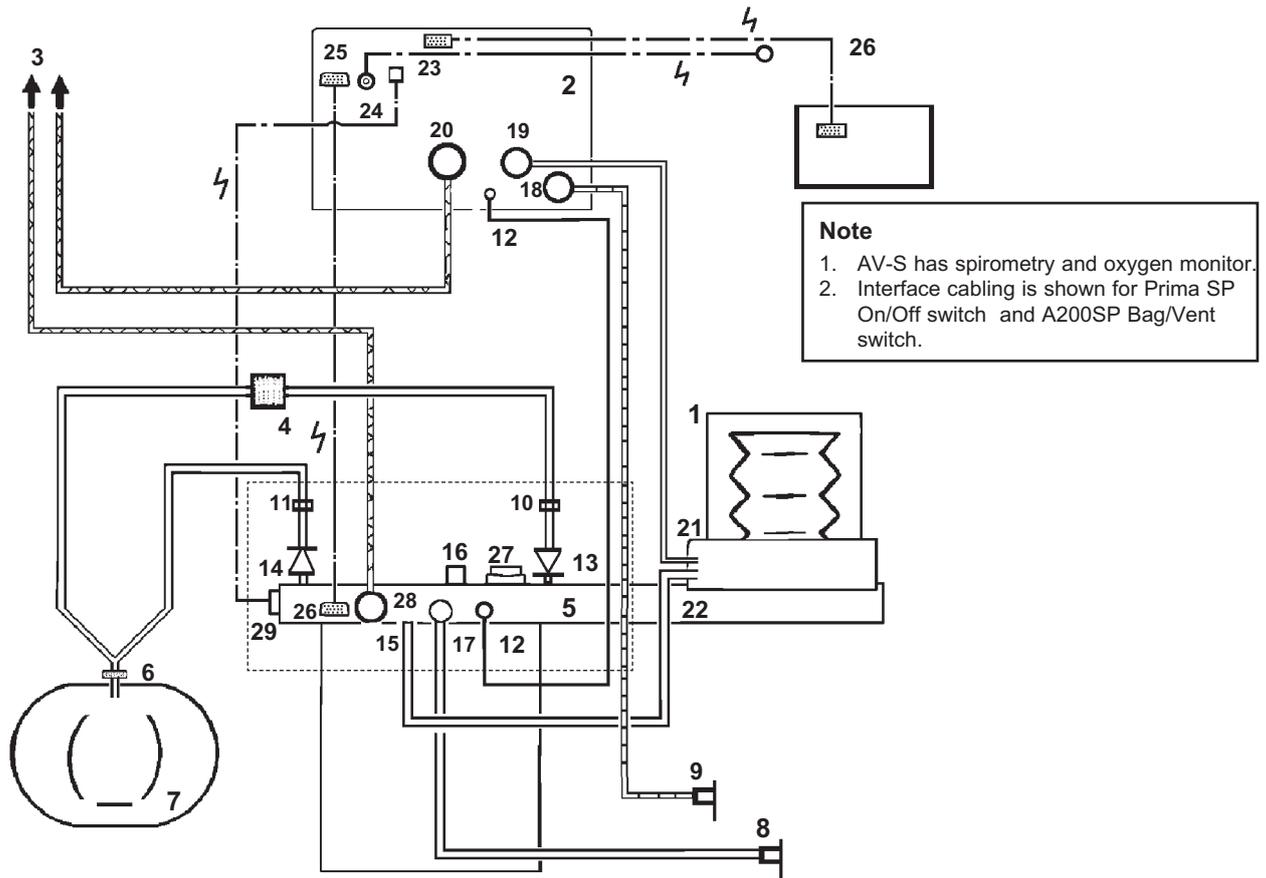
Slacken the knob (2) and position the assembly at the required height.

Tighten the knob.

INSTALLATION AND OPERATION

5.2 System Connection

Hoses and Cables Schematic: AV-S and A200SP Absorber



- | | |
|---|---|
| 1. Bellows | 18. Drive Gas Inlet - Ventilator |
| 2. Ventilator Control Unit | 19. Drive gas Outlet - ventilator control unit to bellows |
| 3. Outlets to Anaesthetic Gas Scavenging System (AGSS) | 20. Outlet - Exhaust Valve |
| 4. Bacterial Filter | 21. Inlet - Bellows Drive Gas |
| 5. Absorber valve block | 22. Outlet - to breathing system |
| 6. Heat and moisture exchanger | 23. Input socket - Oxygen monitor sensor |
| 7. Patient | 24. Input socket - Prima SP interface (SP on/off switch) |
| 8. CGO on anaesthetic machine (Fresh Gas Supply) | 25. Input socket:
(i) A200SP Absorber Bag/Vent control position
(ii) Spirometer sensor signal |
| 9. Auxiliary Outlet on anaesthetic machine (Drive Gas Supply) | 26. Interface connections on Prima SP and A200SP |
| 10. Flow sensor - expiratory | 27. APL Valve |
| 11. Flow sensor - inspiratory | 28. Outlet from APL Valve to AGSS |
| 12. Connectors - sensor - pressure monitor | 29. Oxygen sensor |
| 13. Expiratory Valve - Absorber | |
| 14. Inspiratory Valve - Absorber | |
| 15. Inlet - from Ventilator Bellows | |
| 16. Connector - Reservoir Bag | |
| 17. Inlet - Absorber - Fresh Gas Supply | |

INSTALLATION AND OPERATION

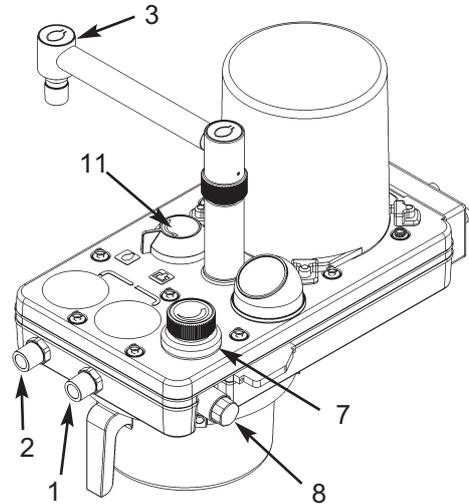
5.2.1 Breathing System Hose, Reservoir Bag, Ventilator

Inspiratory (1) and expiratory (2) hose connectors and the reservoir bag connector (C) are 22 mm male, complying with ISO 5356/1.

The bag arm (3) is height adjustable, and the bag connector can be rotated to the desired position

Ventilator connection point (4)

Connect a 16 mm diameter corrugated hose between the ventilator control unit drive gas outlet (labelled: DRIVE GAS) and the connector (4) at the rear of the absorber.



5.2.2 Fresh Gas Supply

The fresh gas hose from the common gas outlet of the anaesthetic machine assembly is connected at (5).

5.2.3 Anaesthetic Gas Scavenging (AGS)

The outlet (6) from the APL valve (7) must be connected to a receiver system.

WARNING

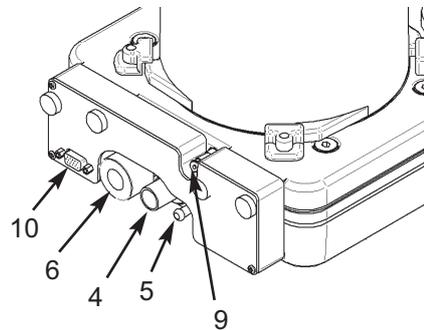
Do not connect a vacuum system directly to the APL valve. A receiving system with a positive and negative pressure control function must be interposed.

The system must comply with the requirements of ISO 8835 part 2.

5.2.4 Oxygen Monitor

The use of an oxygen monitor (and a carbon dioxide analyser) is highly recommended when using any partial rebreathing anaesthetic system.

Oxygen Monitor - the sensor (8) is fitted to the right hand side of the absorber.



Bacterial Filter

Use a breathing system bacterial filter in the expiratory limb of the breathing circuit to protect the oxygen sensor (see section 5 in the AV-S ventilator user manual).

CAUTION

Replacement/Disposal - always follow the instructions supplied with the filter, and always replace at the recommended interval.

5.2.5 Pressure Monitor

Pressure monitor self-sealing connector (9).

Connect to PATIENT PRESSURE port on the rear panel of the AV-S ventilator control unit.

5.2.6 Bag/Vent Switch and Spirometer

The multifunction connector (10) provides an interface between the AV-S ventilator and

(a) the spirometer flow sensors, and

(b) the sensor that detects the position of the Bag/Ventilator switch (11).

INSTALLATION AND OPERATION

5.3 Changing CO₂ Absorbent

WARNING

If the absorbent is to be changed during clinical use, adequate fresh gas flow must be maintained to prevent excessive build up of CO₂.

Removing the canister

WARNING

Condensation, which may collect in the bottom of the absorber canister, is caustic. Avoid skin contact when draining.

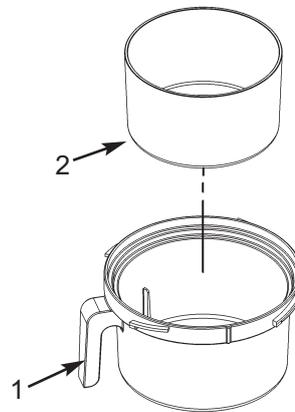
1. Grip the handle (1), turn the canister anti-clockwise, and remove carefully.
2. Check the level of liquid in the canister. Carefully lift out the inner absorbent container (2), or pre-pack unit.

WARNING

Condensate may drip from the container or pre-pack.

Use a cloth to prevent spillage.

3. Dilute the liquid in the canister with water before disposal. Follow your hospital procedure.
4. Dispose of the pre-pack or absorbent from the inner container (2).



Cleaning

Soda lime tends to adhere strongly to surfaces when it has become exhausted.

To maintain good sealing, the canister, absorbent container, seal, and the sealing plate above the canister should be wiped with a damp cloth to remove particles of soda lime, whenever the absorbent is changed.

Refilling with absorbent

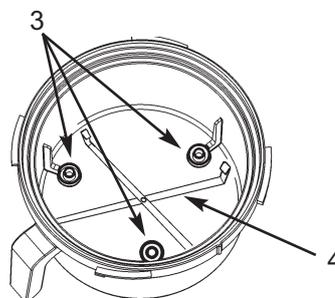
Pre-packed soda lime:

1. Check that the three spacers (3) are in place.

Check that the carrier (4) is in place

Check the manufacturer's instructions included with the pre-pack.

Remove the packaging and insert the new pre-pack into the carrier in the canister.



INSTALLATION AND OPERATION

Bulk packed (loose) soda lime:

2. **WARNING**

Underfilling can lead to inefficient CO₂ absorption.

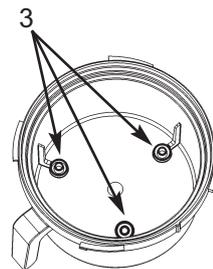
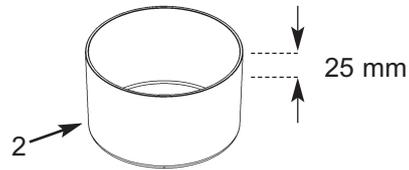
Overfilling may result in poor sealing of the canister, due to caking of granules and abrasion of the canister seal.

Check that the container (2) is clean and dry and empty of dust or soda lime granules.

Place the container on a horizontal surface and fill it with soda lime up to a level 25 mm (1 inch) below the top.

Do not fill above this level.

Check that the three spacers (3) are in place, and place the container in the canister.



Refitting the canister

1. Refit the canister.

Check that the seal and the canister align correctly as the canister is rotated clockwise.

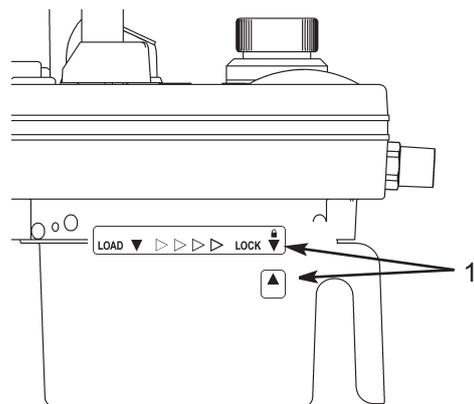
Grip the canister firmly, using two hands to rotate clockwise until the stop is reached.

Check that the arrows (1) are aligned.

WARNING

Failure to rotate the canister to the fully closed position, may cause a system leak and/or a reduction in CO₂ absorption.

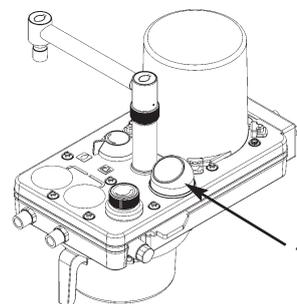
2. Leak test the absorber – see section 6.2.



5.4 Manometer

The manometer (1) is located on the top of the manifold block, to the rear of the inspiratory valve. If the manometer has been removed and refitted, Function test the absorber, checking for leaks at the manometer, before clinical use.

CAUTION Remove the manometer before autoclaving the absorber unit.



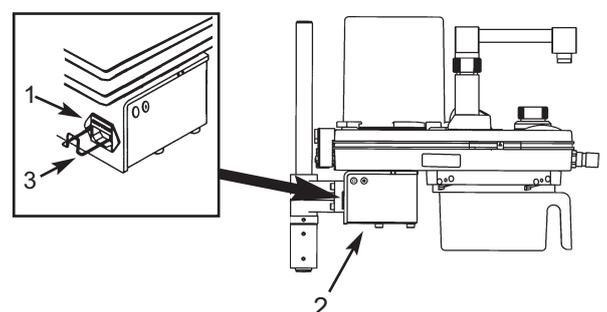
5.5 Heater (option)

Connect the cable (mains electrical supply) to the socket (1) on the back of the heater unit (2). Secure the cable with the safety clip (3).

The heater operates automatically, with a thermostatic control system.

CAUTION

Do not immerse or autoclave the heater assembly. Remove the unit before the absorber assembly is cleaned and sterilised (see section 8.4).



6. PRE-USE CHECKS

6.1 Pre-use Checklist

1. Check the absorbent, replace if necessary.
Before refitting the canister, check that the sealing surfaces are clean and dust free. Ensure that the canister is fully rotated and seals securely when refitted (see 5.3).
2. Check that the fresh gas hose is connected to the anaesthetic machine.
Note that the anaesthetic machine must be leak tested before the absorber pre-use checks are made.
3. Leak test the absorber – see section 6.2
4. Carry out a function check and pressure relief test on the APL valve – see section 6.3.
5. Check the inspiratory and expiratory non-return valves for correct operation – see section 6.4.
6. Check the Bag/Ventilator switch for correct operation – see section 6.5.
7. Heater (if fitted) - connect to mains supply and check operation.
8. Carry out a leak test with the canister removed - see 6.6.
9. Repeat the absorber leak test – see section 6.2.

PRE-USE CHECKS

The procedures detailed in sections 6.2 to 6.6 must be carried out in the order listed.

The absorber must be attached to an anaesthetic machine, which must be leak tested before the checks are carried out.

Check that the manometer is zeroed before use.

6.2 Leak Test

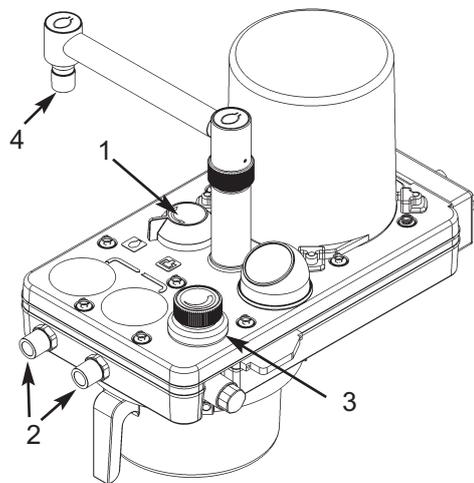
Check that the bag is correctly fitted, and set the switch (1) to 'Bag'.

Connect the fresh gas hose to the anaesthetic machine.

Use a breathing system hose to connect the patient ports (2) to form a closed, leak-free circuit.

Close the APL valve (3).

1. Turn on a flow of 2 L/min of oxygen and pressurise the system.
2. Stop the gas flow when the system pressure reaches 3 kPa (30 cmH₂O) and check that pressure is maintained, i.e. the pressure must not fall to zero in less than one minute.



6.3 APL Valve Test and Pressure Relief Test

APL Valve Function

1. Open the APL valve (3).
Check that gas escapes freely from the system through the valve outlet.

APL Valve Flow Resistance

2. Set maximum flow and check that the retained pressure is less than 0.5 kPa (5 cmH₂O).
3. Reduce flow to minimum.

Pressure Relief

4. Close the APL valve fully (clockwise).
5. Remove the reservoir bag and block the bag port (4).

Use the flow controls on the anaesthesia machine to produce a high flow of gas into the system and check that the APL valve provides excess pressure relief.

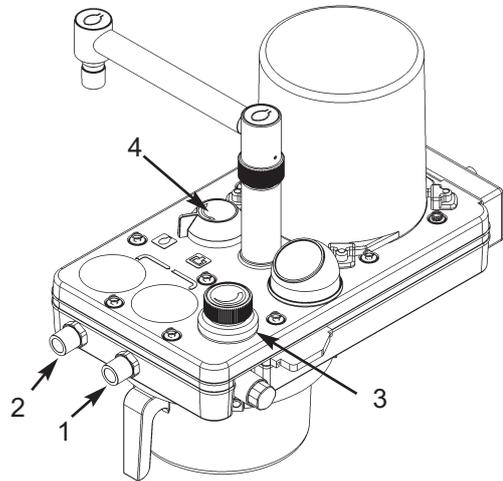
The manometer reading must not exceed 6 kPa (60 cmH₂O) ± 10% at 6 L/min.

Refit the reservoir bag.

PRE-USE CHECKS

6.4 Inspiratory and Expiratory Non-return Valve Test

1. Detach the hose connecting the inspiratory (1) and expiratory (2) connectors.
2. Check that the APL valve (3) is closed.
3. Block the inspiratory valve outlet (1) with a suitable bung, and inflate the reservoir bag with a 2 L/min oxygen flow.
4. Turn off the gas flow and check that the bag does not empty by reverse flow through the expiratory valve (2).
5. Remove the bung and attach a spare reservoir bag to the inspiratory valve connector (1).
6. Turn on a 2 L/min oxygen flow and fully inflate this bag (and the absorber reservoir bag).
7. Turn off the gas flow. Check that gas cannot be forced through the inspiratory valve by gentle squeezing of the spare bag on the valve outlet.
8. Remove the bag from the inspiratory connector (1).



6.5 Bag/Ventilator Switch

1. Refit the breathing hose between the inspiratory (1) and expiratory (2) connectors.
2. Set a flow of 10 L/min and check that bellows starts to inflate.
Ensure that bag is not inflating.
3. Move switch (4) to Bag position and watch bag inflate and bellows stops rising.
When the pressure reads 3 kPa (30 cmH₂O) turn off the flow of gas.
4. Select ventilator, pressure on gauge should drop, but bag should remain inflated.
5. Squeeze bag, there should be no loss of pressure, and bellows must not rise.

PRE-USE CHECKS

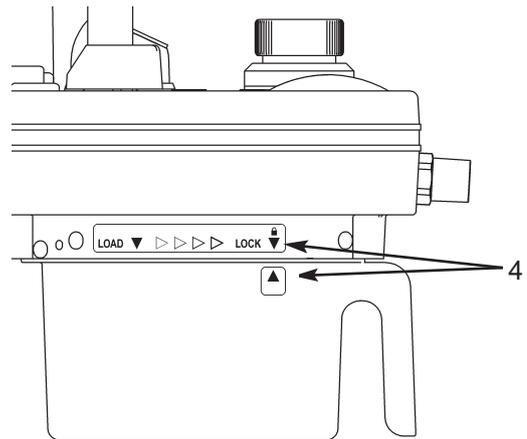
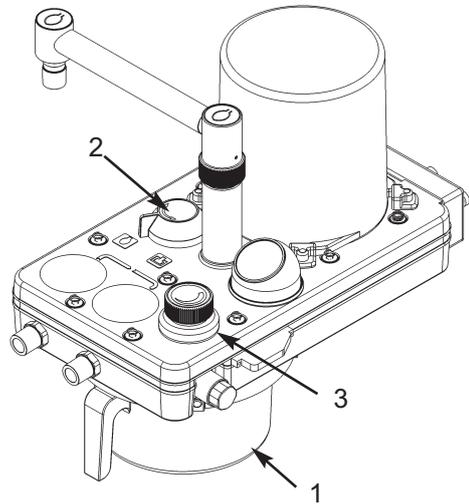
6.6 Leak Test - Absorber Canister Removed

1. Remove absorbent canister (1).
Set the switch (2) to Bag position and close APL valve(3).
2. Pressurise the system to 3 kPa (30 cmH2O) and turn off the gas flow.
3. Check that pressure does not fall to zero within one minute.
4. Refit absorbent canister.
Check that the seal and the canister align correctly as the canister is rotated clockwise.
Grip the canister firmly, using two hands to rotate clockwise until the stop is reached.
Check that the arrows (4) are aligned.

WARNING

Failure to rotate the canister to the fully closed position, may cause a system leak and/or a reduction in CO₂ absorption.

5. A pressure loss will occur as valves operate during refitment.
Repressurise the system to 3 kPa (30 cmH₂O) and turn off gas flow.
6. Check that pressure does not fall to zero within one minute, then open APL valve to release pressure.



7. SERVICE PROCEDURES

7.1 Service Frequency

Servicing and repairs must only be carried out by Penlon-trained technicians and engineers.

- (a) Six-monthly inspection and function testing.
- (b) Annual service which include routine replacement of seals etc., as preventive maintenance.

7.2 Canister and Seals

Cleanliness is the essential requirement for all components in contact with absorbent.

Soda lime tends to adhere strongly to surfaces when it has become exhausted.

To maintain good sealing, the canister, absorbent container, seal, and the sealing plate above the canister should be wiped with a damp cloth to remove particles of soda lime, whenever the absorbent is changed.

These components should be scrubbed under running water when the complete system is dismantled for sterilisation or disinfection.

See section 8.4.

SERVICE PROCEDURES

7.3 Condensate Drainage

WARNING

Condensation, which may collect in the bottom of the absorber canister is caustic and care must be taken not to spill it on the skin when draining.

Wear suitable protective gloves.

Dilute the liquid with water before disposal.

Daily Procedure:

1. Check the level of liquid in the canister (1).
If necessary, remove the canister by turning anti-clockwise.
Carefully lift out the inner absorbent container (2), or pre-pack unit.

WARNING

Condensate may drip from the container or pre-pack.

Use a cloth to prevent spillage.

2. Dilute the liquid in the canister with water before disposal. Follow your hospital procedure.

3. Refit the container or pre-pack:

Pre-packed soda lime:

Check that the three spacers (3) are in place.

Check that the carrier (4) is in place

Insert the pre-pack into the carrier in the canister.

Bulk packed (loose) soda lime:

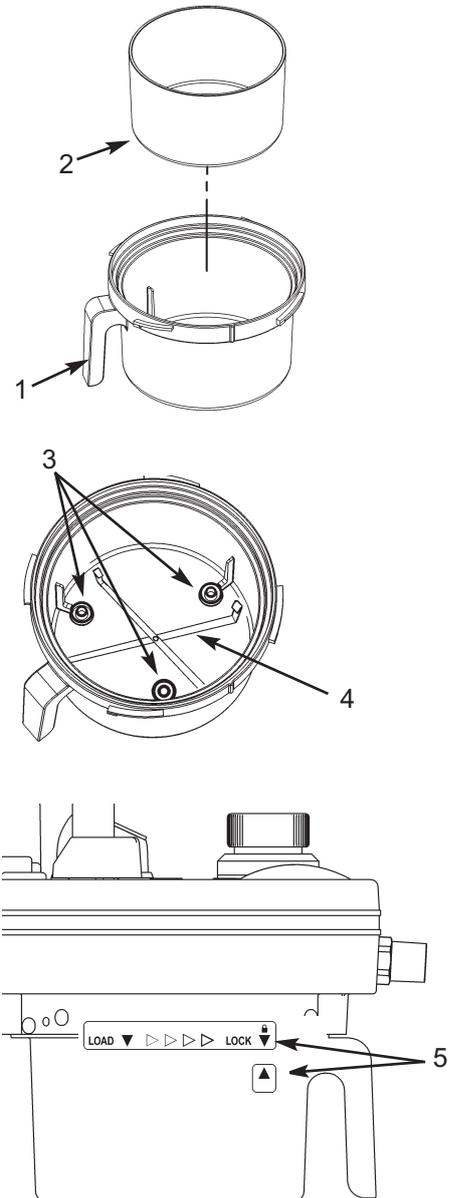
Check that the three spacers (3) are in place, and place the container in the canister.

4. Refit the canister to the absorber.
Check that the seal and the canister align correctly as the canister is rotated clockwise.
Grip the canister firmly, using two hands to rotate clockwise until the stop is reached.
Check that the arrows (5) are aligned.

WARNING

Failure to rotate the canister to the fully closed position, may cause a system leak and/or a reduction in CO₂ absorption.

Leak test the absorber – see section 6.2.



SERVICE PROCEDURES

7.4 Manometer

Remove the manometer (A) before sterilisation or disinfection.

Grip the manometer and detach from the absorber.

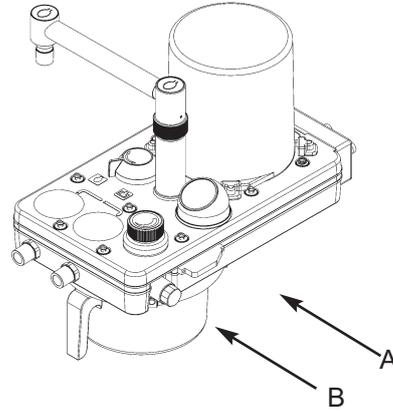
CAUTION Do not sterilise the manometer.

7.5 APL Valve

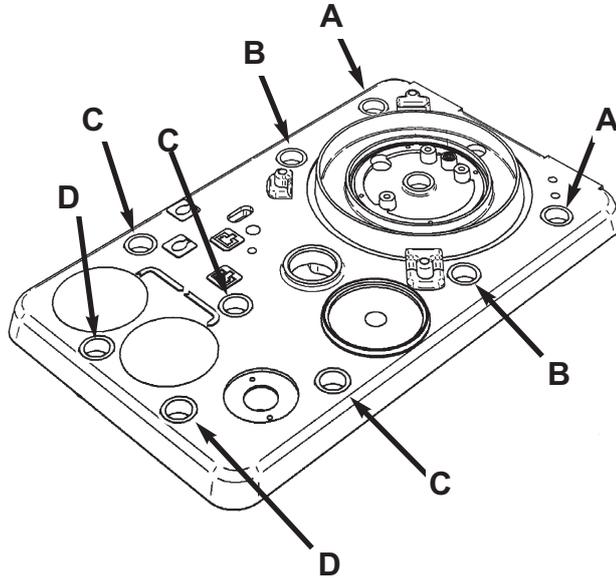
Autoclave the valve (B) as part of the absorber assembly - see section 10.

Check that the valve is in the open position before autoclaving.

Do NOT wash in an automatic cleaning/washing machine.



SERVICE PROCEDURES



7.6 Main Assembly Components Tightening Sequence for Fixing Bolts

Note

*This procedure is part of the service schedule
(see section 8, operation 10).*

1. Refit the Base Plate gasket; Centre Plate, and Bellows Plate gasket
When refitting the Bellows Plate ensure that the Bag/Ventilator knob is aligned with quadrant shaft, and the switch 'Push-Pin' is engaged.
2. Secure the Bellows Plate with nine bolts.
3. Apply a small amount of Loctite 243 to the nine fixing bolts.
Fit the bolts and hand tighten.
4. Starting at the fixing points 'A' at the rear of the absorber assembly, tighten the bolts in sequence A to D, to 1.5 Nm.

8. SERVICE SCHEDULE

- 1 Initial Checks** (every 6 months, plus component replacement at 12 months)
 - 1.1 Check serial number to determine service required.
 - 1.2 Check general condition of Absorber and fittings.
 - 1.3 Remove the absorbent canister.
Remove the inner canister, or pre-pack.
Drain any condensate from outer canister. *Caution: Caustic solution*
Refit if component replacement is not required.
If a canister lift mechanism is fitted, apply a thin (non-visible) film of oxygen safe grease to guide pins.
 - 1.4 If component replacement is required, disconnect fittings at rear of absorber and remove absorber from anaesthesia machine.
Place absorber on flat work surface.
Remove the absorbent canister.
Replace the canister location tubes (x3) - 500396 (every 12 months)
Remove the heater unit (if fitted).
Replace fresh gas hose - 462631, and two tie-wraps - 103612 (every 12 months)
Note: The Preventive Maintenance Kit contains various lengths of hose. Fit the correct length of hose required for your machine.
- 2 Bag arm assembly** (every 6 months, plus component replacement at 12 months)
 - 2.1 Check the bag arm assembly for movement and security of attachment
 - 2.2 Unscrew Bag arm connector.
Replace O-ring - 041217, and internal O-ring - 041207 (every 12 months)
- 3 Manometer** (every 6 months, plus component replacement at 12 months)
 - 3.1 Grip manometer assembly and remove by pulling firmly upwards.
Remove manometer and ensure it indicates zero. If not adjust using small screw.
 - 3.2 Using a hand-bulb and test manometer apply increasing pressure, up to 100 cmH₂O.
Ensure manometer reads within +/- 5 cmH₂O.
 - 3.3 Replace manometer O-ring - 5000349 (every 12 months)
- 4 Bellows assembly** (every 6 months, plus component replacement at 12 months)
 - 4.1 Remove bellows canister.
Examine bellows, diaphragm and canister seal for cleanliness and deterioration
 - 4.2 Replace canister seal - 5000072 (every 12 months)
 - 4.3 Replace bellows and diaphragm valve as part of ventilator service procedure
- 5 Electrical Interface Box** (every 12 months)
Disconnect electrical interface connector.
Undo the four screws securing electrical box to absorber, and remove electrical box
Replace four O-rings - 0691
- 6 Internal component inspection / replacement (upper assembly)** (every 12 months)
 - 6.1 Inspect APL valve:
2008 specification (grey label with black text):
Remove label and use tool 5003177 to unscrew the APL valve from absorber.

Pre-2008 specification (black label with grey text):
Do not remove APL valve.

SERVICE SCHEDULE

- 6.2 Undo the nine bolts and lift up Bellows Plate
- 6.3 Replace Bellows Plate gasket - 5000080
Replace Inspiratory and Expiratory Disc valves (x2) - 5000394
Fit valve disc cages – 5002459 (ensure cage guides do not interfere with dome guides)
- 7 APL Valve** (every 12 months)
 - 7.1 Pre-2008 specification (black label with grey text):
Replace APL valve seal (white) – 5000364.
 - 7.2 2008 specification:
Replace O-ring – 0383 and O-ring 5000126
- 8 Internal component inspection and replacement (Lower)** (every 12 months)
 - 8.1 Detach the Centre Plate
 - 8.2 Replace the Base Plate gasket - 5000081
 - 8.3 Replace the Bag/Ventilator switch O-rings (x2)- 5000202, and cap O-ring - 0501
- 9 By-pass plate removal** (every 12 months)
 - 9.1 Remove the two screws from the canister plate that secure the valve seals and supports, and remove
Remove further two 'E' clips from the bypass plate guides.
Detach the Bypass Plate from the Bellows Plate.
 - 9.2 Replace gasket - 5000092 (absorbent canister)
 - 9.3 Replace large O-ring - 5000754, and small O-ring - 5000755
 - 9.4 Replace valve seals (x3) - 5000097
 - 9.5 Replace seal support internal O-rings (x3) - 5000135
 - 9.6 Apply oxygen-safe grease to the Bypass Plate Guides.
Reassemble
- 10 Reassembly** (every 12 months)
 - 10.1 Refit Base Plate gasket; Centre Plate; Bellows Plate gasket
 - 10.2 When refitting Bellows Plate ensure that (a) the Bag/Ventilator knob is aligned with the quadrant shaft, and (b) the switch 'Push-Pin' is engaged.
Secure the assembly with nine bolts, as follows:
Apply a small amount of Loctite 243 to the threads, fit the bolts and hand tighten.
Starting at the rear of the absorbers, tighten bolts to 1.5 Nm, in the sequence shown in section 7.6.
 - 10.3 Refit the APL valve (2008 specification valve, removed earlier in operation 6.1).
Using service tool 5003177, tighten the valve to 15 Nm.
Note: if a suitable torque wrench is not available, tighten to 8 Nm +20^o rotation (or firm hand tight + 20^o rotation). Recheck when the correct torque wrench is available.
 - 10.4 Refit Bag Arm connector and tighten (hand tight). Do NOT use Loctite.
 - 10.5 Refit manometer ensuring it securely snaps into place
 - 10.6 Refit electrical box and connect the interface cable
 - 10.7 Refit bellows assembly
Refit absorbent canister assembly, ensure full rotation to locked position
 - 10.8 Refit heater (if fitted)

SERVICE SCHEDULE

- 10.9 Carry out electrical tests:
Earth Continuity at 1 amp or less (maximum 0.2 ohms)
Insulation resistance at 340 - 500 Vdc (not less than 20 Mega Ohms)
Enclosure leakage (maximum 100 micro amps)
- 10.10 Connect heater (if fitted) to power supply for the duration of the following tests.
Check that the centre plate is heated.
- 11 Set-up** (every 6 months)
- 11.1 Connect absorber to anaesthetic machine that has been **checked** for leaks.
Check that manometer reads zero.
- 12 Leak Test** (every 6 months)
- 12.1 Absorber canister fitted, in locked position
- 12.2 Ensure that a bag is fitted to the bag port, and Bag/Vent switch is set to 'Bag' position.
- 12.3 Connect patient ports with hose to form a closed circuit.
- 12.4 Close APL valve.
- 12.5 Set a flow of 2 L/min on the anaesthesia machine.
- 12.6 Reduce the gas flow to minimum when Manometer reads 3 kPa (30 cmH₂O).
Ensure pressure remains stable for at least 10 seconds.
- 13 APL Valve Test And Pressure Relief Test** (every 6 months)
- 13.1 Fully open APL valve
- 13.2 Set maximum flow rate.
Check that manometer indicates less than 5 cmH₂O.
- 13.3 Turn off gas supply
- 13.4 Close the APL valve fully.
- 13.5 Use O₂ flow and check that the APL valve relieves pressure at 6 kPa (60 cmH₂O) +/- 10%, at 6 L/min flow rate.
If necessary, lift label and adjust setting screw.
- 14 Inspiratory and Expiratory Non-return Valve Test** (every 6 months)
- 14.1 Remove hose from patient ports.
- 14.2 Occlude Inspiratory port with suitable bung.
- 14.3 Fully close APL valve
- 14.4 Fit re-breathing bag to bag arm and inflate with O₂ flush.
Ensure bag does not deflate within one minute.
- 14.5 Remove bung from inspiratory port.
Transfer rebreathing bag, from bag-arm to Inspiratory port.
Occlude bag-arm with suitable bung.
- 14.6 Inflate bag with O₂ flush.
Remove occlusion from bag port.
Ensure rebreathing bag fitted to inspiratory port does not deflate within one minute.
- 14.7 Remove bag from inspiratory port
Refit bag to bag-arm.

SERVICE SCHEDULE

15 Bag / Ventilator Switch Test (every 6 months)

- 15.1 Ensure ventilator bellows and bag-arm bag are deflated
- 15.2 Refit hose to patient ports.
- 15.3 Set bag/vent switch to 'vent' and ensure APL valve is fully closed.
- 15.4 Set a flow of 10 L/min and check that the bellows starts to inflate.
Ensure that the bag is not inflating.
- 15.5 When the bellows has inflated half-way move the Bag/Vent switch to Bag position.
Observe that the bag inflates, and that the bellows stops rising.
- 15.6 When the pressure reads 3 kPa (30 cmH₂O) turn off the flow of gas.
- 15.7 Select ventilator.
Pressure on gauge should drop, but bag should remain inflated.
- 15.8 Squeeze bag.
There should be no loss of pressure and bellows must not rise.

16 Absorber Bypass Function (every 6 months)

- 16.1 Remove absorbent canister.
Select Bag position and close APL valve
- 16.2 Pressurise the system to 3 kPa (30 cmH₂O).
Turn off gas flow.
- 16.3 Check that the pressure remains stable for at least 10 seconds.
- 16.4 Refit absorbent canister, ensure full rotation to locked position
A pressure loss will occur as valves operate.
Re-pressurise the system to 3 kPa (30 cmH₂O).
Turn off gas flow.
- 16.5 Check that the pressure remains stable for at least 10 seconds.
Open APL valve to release pressure.

17 Paperwork (every 6 months)

- 17.1 Fill out appropriate service report.

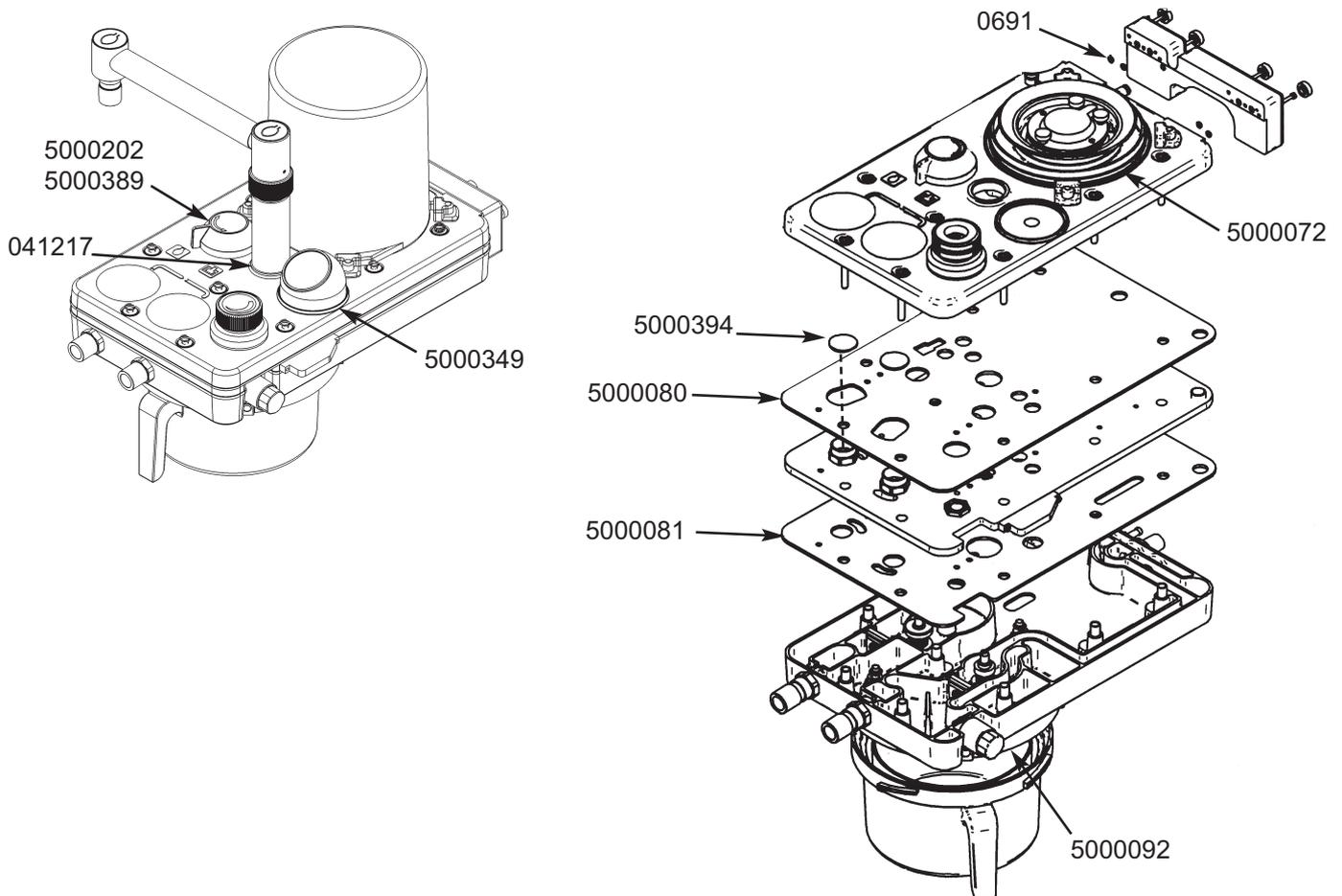
9. PARTS LIST

A200SP Preventive Maintenance Kit Annual Service Kit - Part No 57294

Kit Contents

<i>Component Description</i>	<i>Part No</i>
Fresh gas hose (1.0 m)	462631 (not shown)
Fresh gas hose (0.5 m) (SP3 Keomed)	462631 (not shown)
Fresh gas hose (1.2 m) (Prima SP)	462631 (not shown)
Tie wrap (x2)	103612 (not shown)
Seal - Bellows Canister	5000072 (not shown)
APL valve seal	5000364 (not shown)
By-pass seal (x3)	5000097 (not shown)
O-ring - Seal support internal (x3)	5000135 (not shown)
O-ring - Bag vent switch cap washer	0501 (not shown)
Seal (small) - Bypass plate	5000754 (not shown)
Seal (large) - Bypass plate	5000755 (not shown)
Location Tube (x3) - Absorbent canister	5000396 (not shown)
Label - APL valve (fit if valve is adjusted)	5000389 (not shown)

<i>Component Description</i>	<i>Part No</i>
O-ring - Manometer	5000349
O-ring - Bag arm connector	041217
O-ring - Bag arm (internal)	041207
Disc valves (x2)	5000394
Gasket - Bellows Plate	5000080
Gasket - Base Plate	5000081
Gasket - Canister	5000092
O-ring - Bag vent switch (x2)	5000202
O-ring (x4) - heater unit	0691

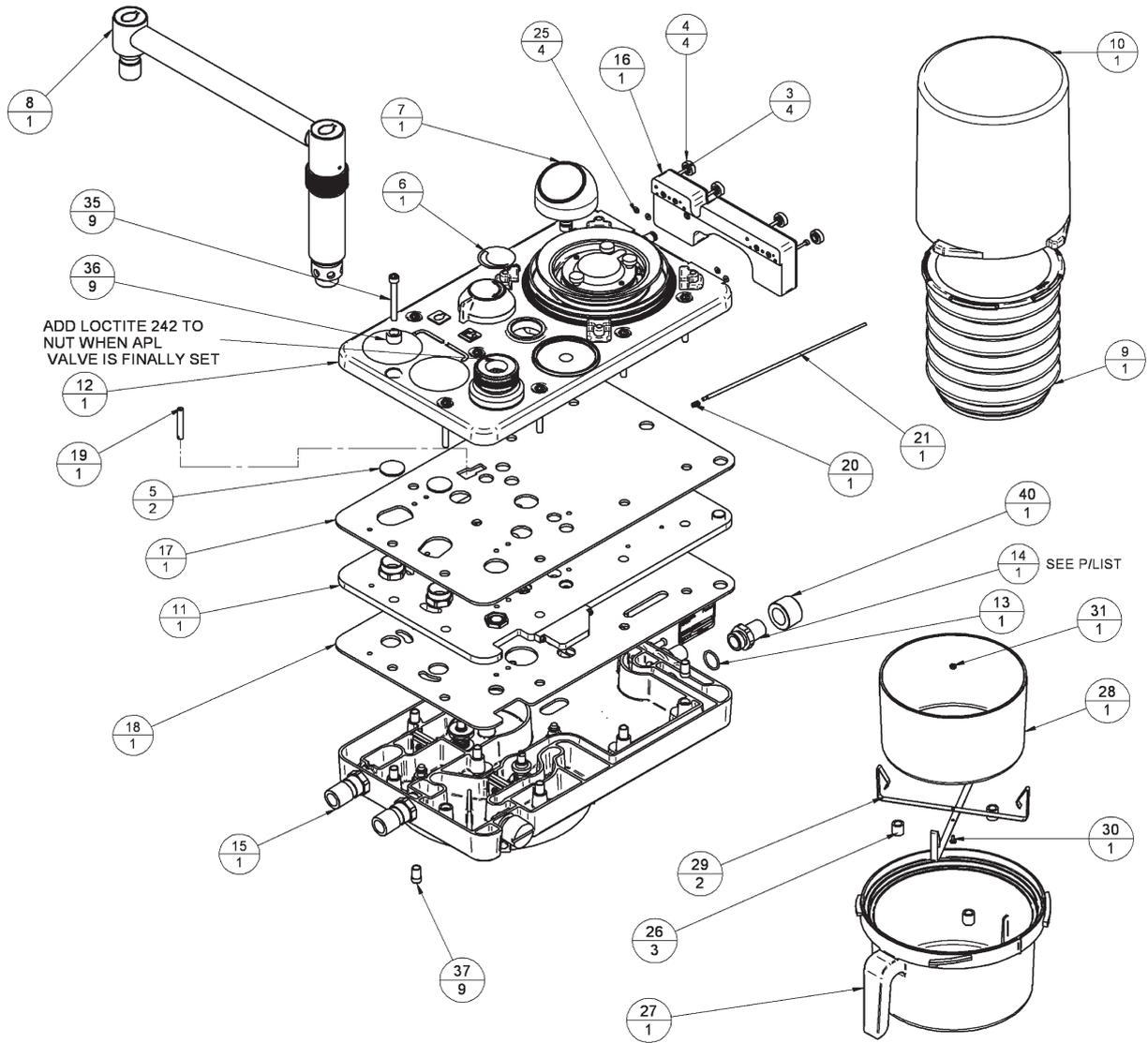


PARTS LIST

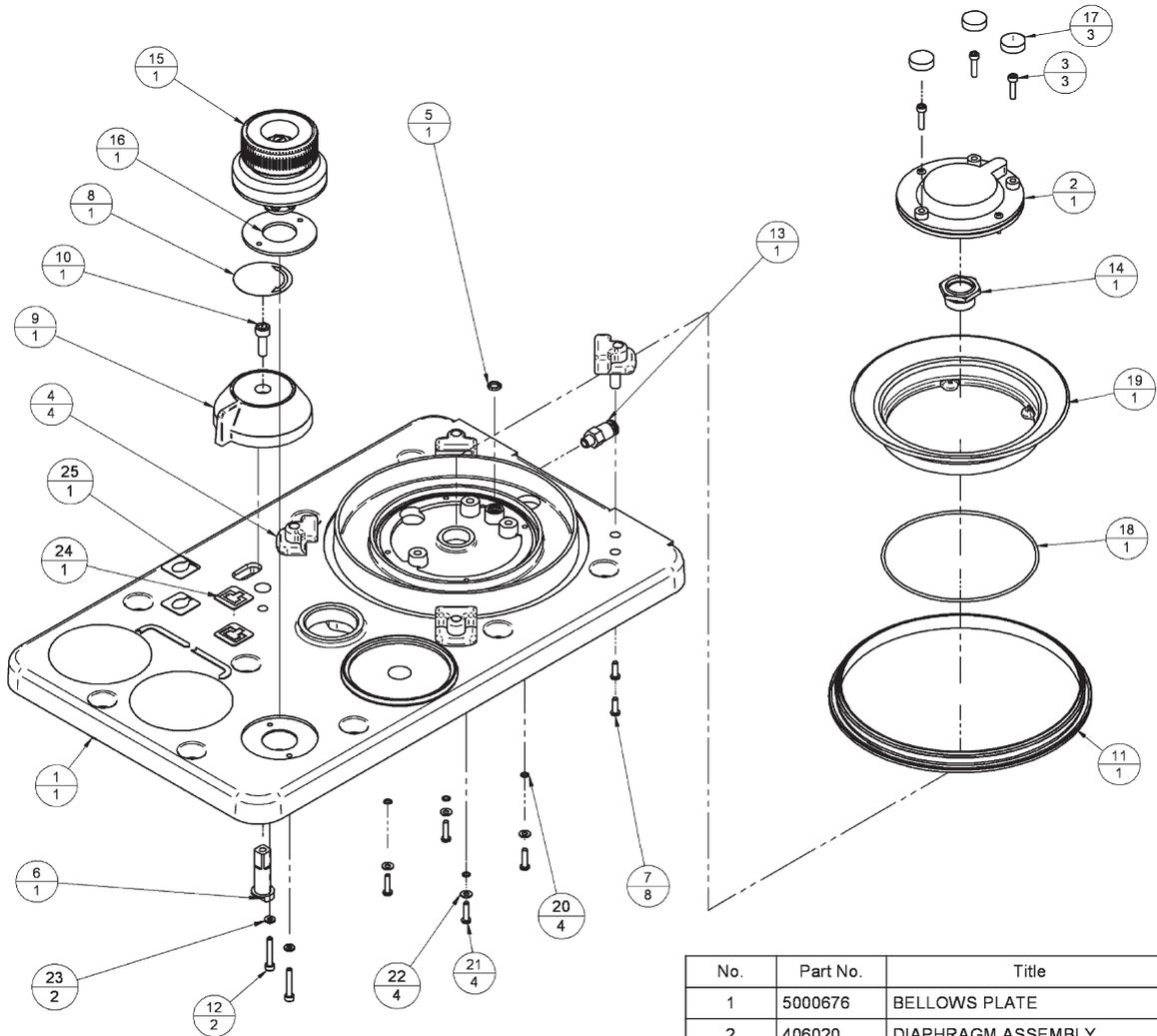
A200SP Absorber Main Assembly Components

No.	Part No.	Title	Qty.
1*	5000654	CLAMP PL BOLT	2
2*	5000653	CLAMP PL V3	1
3	019075	M3 x 30 CAP HD	4
4	011108	M3 SKIFFY CAP	4
5	5000394	VALVE DISC	2
6	5000389	APL VALVE LABEL	1
7	5000121	PRESSURE GAUGE ASSEMBLY	1
8	5000117	BAG ARM ASSEMBLY	1
9	406027	ADULT BELLOWS ASSEMBLY	1
10	300049	CANISTER SCREEN PRINTED	1
11	5000696	CENTRE PLATE ASSY	1
12	5000701	BELLOWS PLATE ASSY	1
13	5000129	O RING 18.0 I/D x 2.0 CSØ VITON	1
14	5000388	19mm TAPER	1
15	5000700	BASE PLATE ASSY	1
16	5000709	ELECTRICAL BOX ASSY	1
17	5000080	BELLOWS PLATE GASKET	1
18	5000081	BASE PLATE GASKET	1
19	5000307	PUSH PIN	1
20	5000962	SPRING Ø5.33 x 8.0LG	1
21	5000308	PUSH ROD	1
22*	5000736	POINTER LABEL	1
23*	5000735	LOCK AND LOAD LABEL	1
24*	5000928	A200SP WARNING LABEL	1
25	0691	O RING 1/8" I/D x 0.07 CS	4
26	5000396	LOCATION TUBE	3
27	5000074	CANISTER OUTER	1
28	5000073	CANISTER INNER	1
29	5000734	SPRING CLIP	2
30	019122	M3 x 6 LG BUTTON HD	1
31	01066	M3 NUT SS	1
32*	103612	BLACK CABLE TIE, 3" x 0.1"	2
33*	462631	1/2" O.D. x 1/4" I.D. 1 METER	1
34*	40019	FRESH GAS HOSE CONNECTOR	1
35	01063	M6 x 50 LG. CAP SCREW	9
36	5000652	CUP WASHER	9
37	5000306	LOCATION DOWEL	9
38*	15023	PRODUCT LABEL INC' CE MARK	1
39*	5000507	PRODUCT LABEL PNA	1
40	5001253	TAPER ADAPTOR 30M TO 19F	1

PARTS LIST



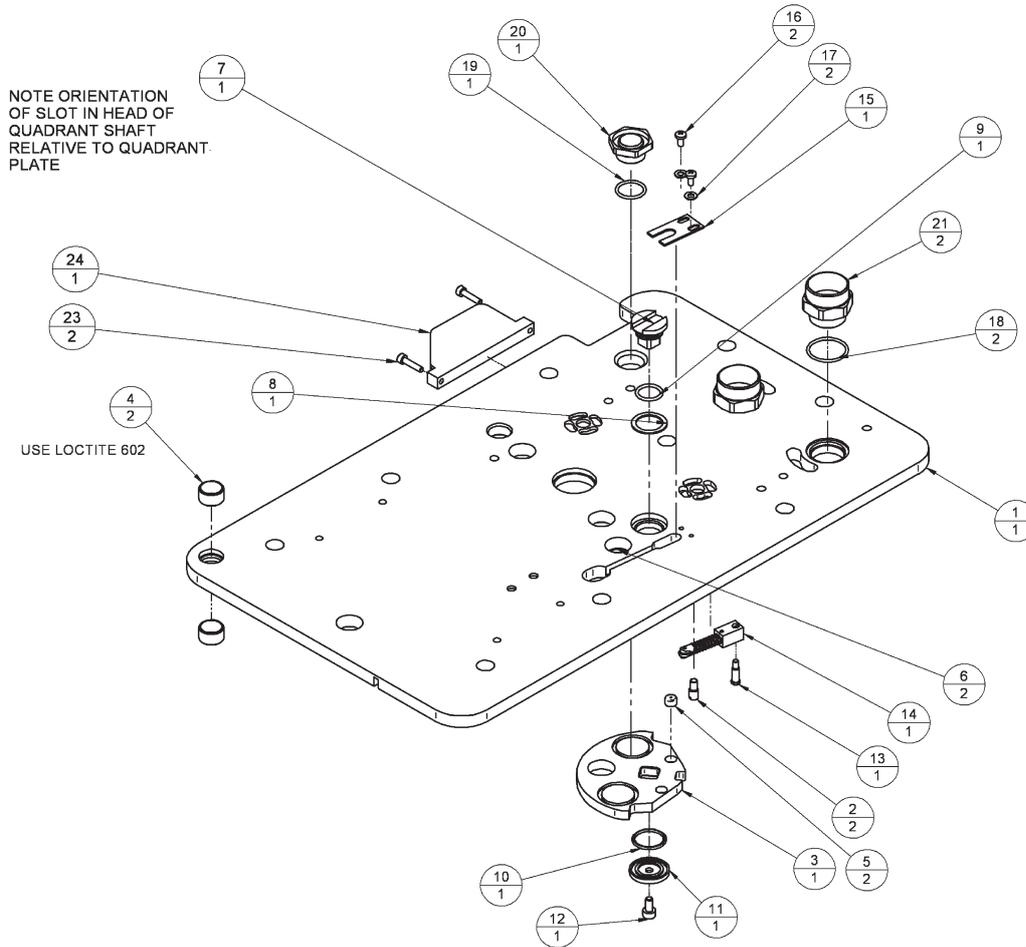
PARTS LIST



Bellows Plate Assembly

No.	Part No.	Title	Qty.
1	5000676	BELLOWS PLATE	1
2	406020	DIAPHRAGM ASSEMBLY	1
3	019110	M3 x 14 CAP HD SCREW	3
4	406037	BELLOWS LOCATION	4
5	041204	5.1 I/D x 1.6 CSØ VITON	1
6	5000109	SWITCH SHAFT	1
7	020807	No4 x 3/8" Self Tap	8
8	5000393	SWITCH KNOB LABEL	1
9	5000076	SWITCH KNOB	1
10	011130	M5 x 16 SKT. CAP S.S	1
11	5000072	BELLOWS CANISTER SEAL	1
12	019003	M3 x 20 SS SK HD	2
13	054529	VALVE-ONE WAY	1
14	406059	BELLOWS BASE - SEAT	1
15	5000123	APL VALVE ASSEMBLY	1
16	5000916	APL VALVE SEAL WASHER	1
17	011108	M3 SKIFFY CAP	3
18	5000694	O RING Ø91.5 x 1.78 CSØ	1
19	5000495	BELLOWS RING A200SP	1
20	025608	M3 NYLON WASHER	4
21	5000661	No4 x 1/2" Self Tap SS TYPE B	4
22	01067	M3 PLAIN WASHER	4
23	5000918	APL VALVE WASHER	2
24	5000737	A200SP VENT LABEL	1
25	5000738	A200SP BAG LABEL	1

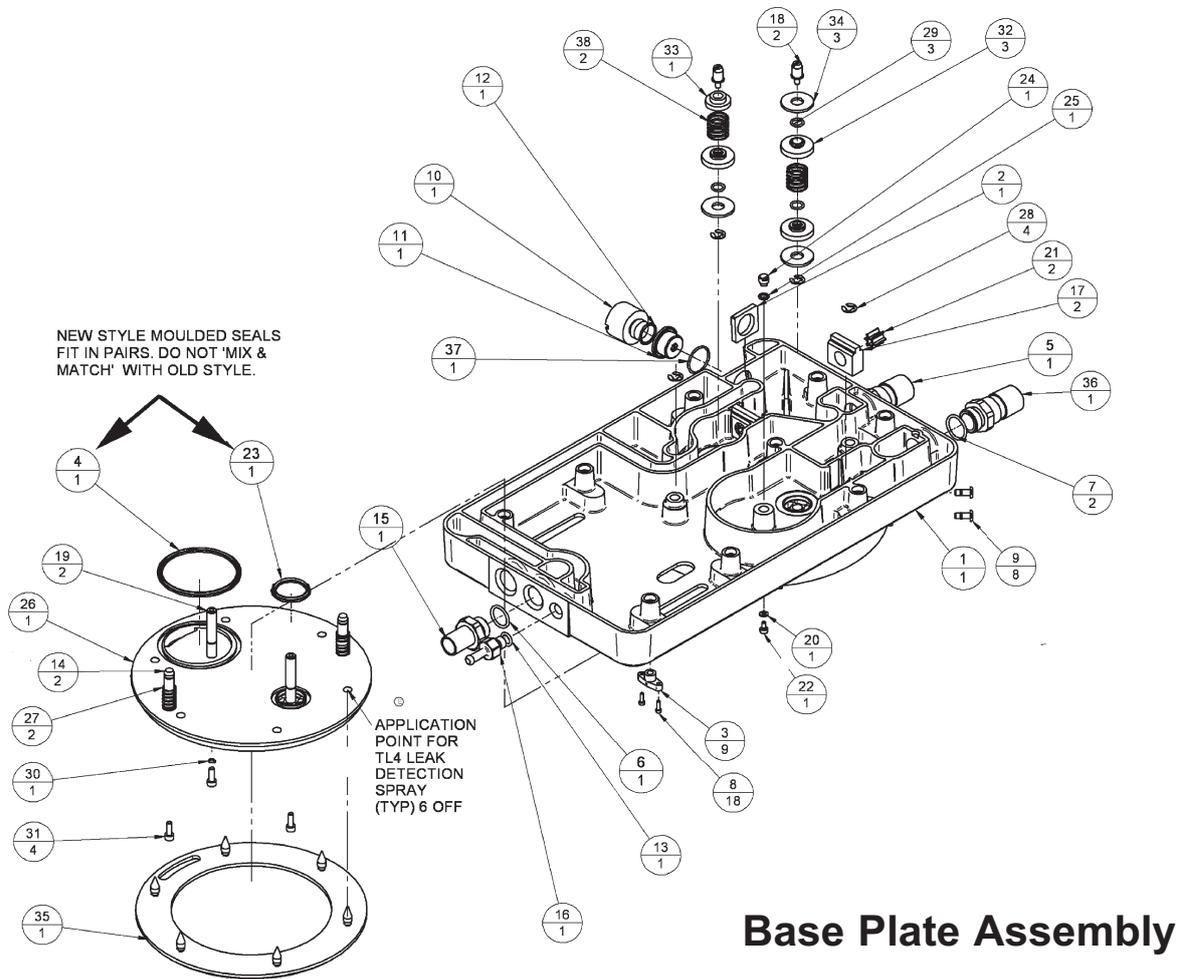
PARTS LIST



Centre Plate Assembly

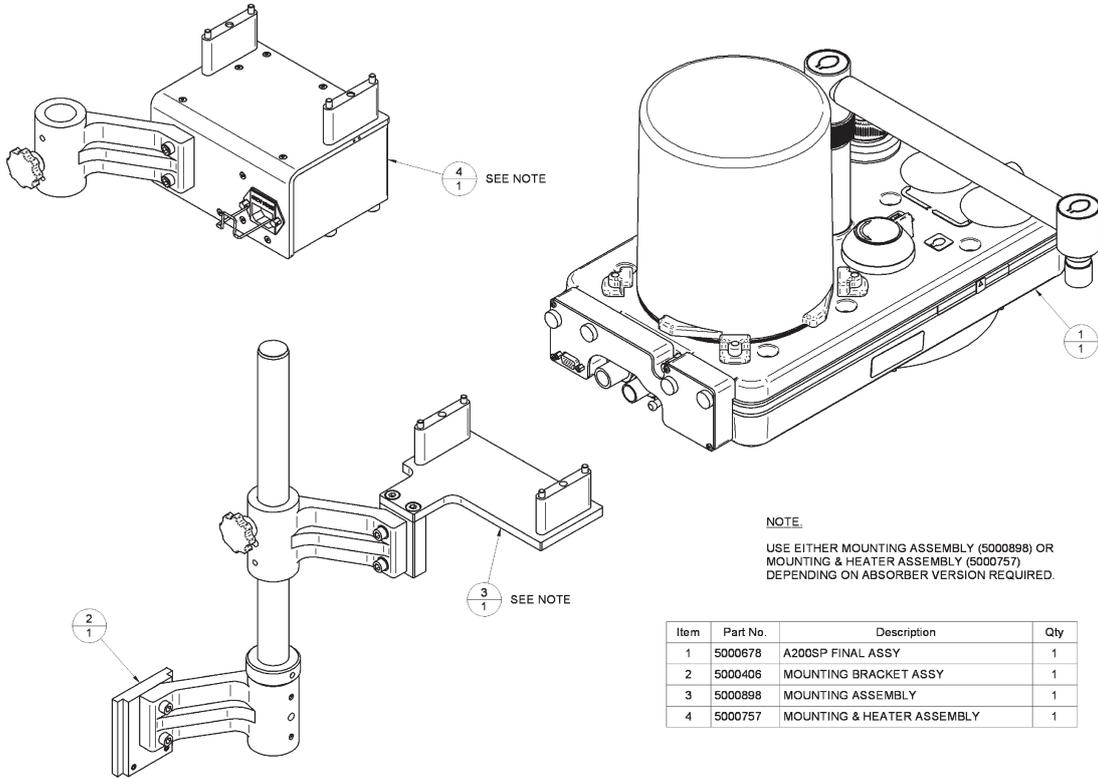
No.	Part No.	Title	Qty.
1	5000669	CENTER PLATE	1
2	5000643	QUADRANT STOP	2
3	5000677	SWITCH QUADRANT	1
4	5000075	HOLLOW DOWEL	2
5	5000660	QUADRANT WEAR PAD	2
6	5000202	O RING Ø18.0 x 2.0 CSØ SILICON	2
7	5000098	QUADRANT SHAFT	1
8	5000644	QUADRANT WASHER	1
9	041222	O' RING	1
10	0501	O RING	1
11	5000640	CAP WASHER	1
12	01029	M4 x 8 SKT HD CAP SCREW SS	1
13	5000649	YOKE PIVOT PIN	1
14	5000647	QUADRANT SWITCH ASSY	1
15	5000309	PUSH ROD PLATE	1
16	01153	M3 x 6 PAN HD	2
17	01067	M3 PLAIN WASHER	2
18	041231	O' RING Ø 20.0 x 1.5 CS	2
19	5000126	O RING Ø14.0 x 1.5 CSØ VITON	1
20	5000111	APL VALVE SEAT	1
21	5000115	VALVE SEAT	2
22*	057001	LOCTITE 603/601	A/R
23	019110	M3 x 14 CAP HD SCREW	2
24	5000546	SENSOR GUARD	1

PARTS LIST



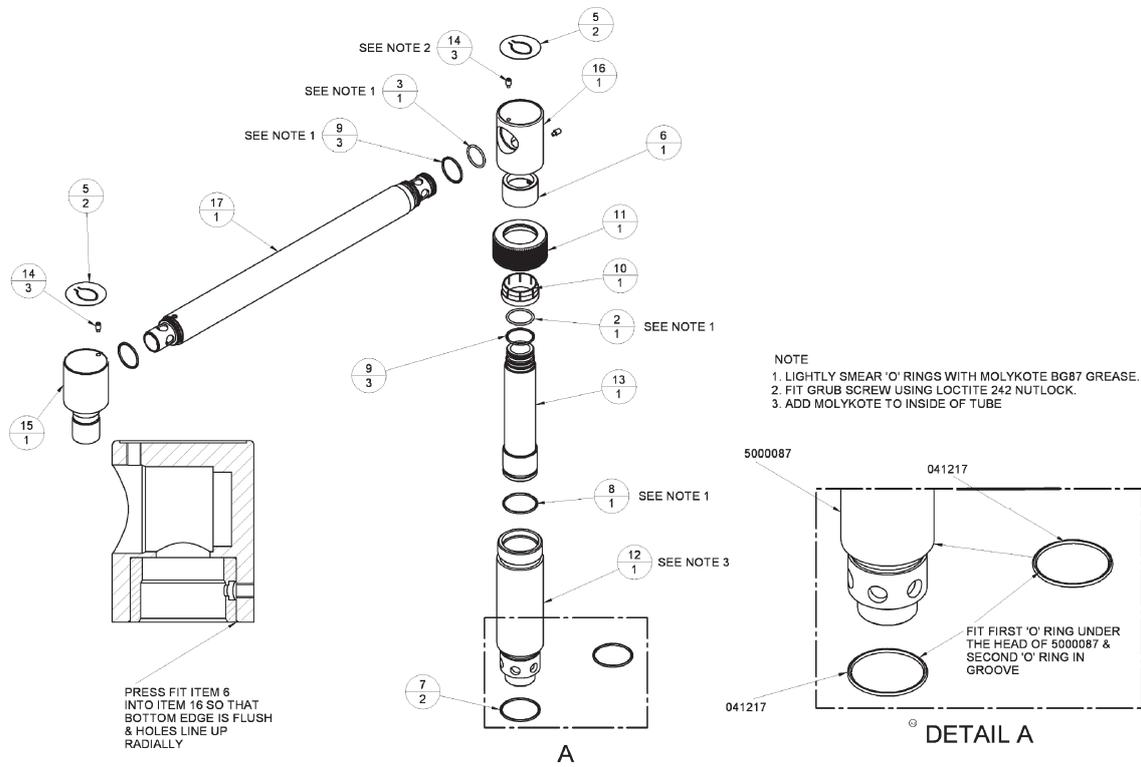
No.	Part No.	Title	Qty.	No.	Part No.	Title
1	5000675	BASE PLATE	1	20	01067	M3 PLAIN WASHER
2	5000346	CELL LOCATION PLATE	1	21	5000328	Ø12.5mm ALUMINIUM HONEYCOMB
3	5000641	COMPRESSION NUT	9	22	019011	M3 x 6 LG SKT HD
4	5000755	BYPASS PLATE SEAL LARGE	1	23	5000754	BYPASS PLATE SEAL - SMALL
5	5000779	22mm TAPER INSP'	1	24	5000659	BASE PLATE PLUG
6	5000343	O RING 16.0 I/D x 2.0CSØ VITON	1	25	041204	5.1 I/D x 1.6 CSØ VITON
7	5000129	O RING 18.0 I/D x 2.0 CSØ VITON	2	26	5000672	BYPASS PLATE
8	5000069	M2.5 x 8LG SS SKT CAP HD	18	27	5000134	COMPRESSION SPRING
9	5000358	CANISTER LOCATION PIN	8	28	020420	CIRCLIP EXTERNAL Ø8mm SHAFT
10	800833	PLUG O2 SENSOR	1	29	5000135	O RING 8.0 I/D x 1.5 CSØ VITON
11	5000345	CELL LOCATION SPIGOT	1	30	041256	O RING
12	041206	O ring ref 0151-16 (BS4518)	1	31	019067	M4 x 12 SKT HD CAP
13	5000344	O RING 8.0 I/D x 2.0CSØ VITON	1	32	5000103	SEAL SUPPORT PLATE
14	5000089	SUPPORT PIN	2	33	5000093	SPRING LOCATION SPIGOT
15	5000096	17mm TAPER	1	34	5000097	VALVE SEAL
16	5000094	FRESH GAS CONNECTOR	1	35	5000092	CANISTER SEAL
17	5000095	ORIFICE PLATE	2	36	5000780	22mm TAPER exp'
18	5000598	VALVE STEM TOP	2	37	041239	O RING Ø21 x 1.5
19	5000597	VALVE STEM	2	38	5001140	SPRING

PARTS LIST



Installation Components and Heater Unit

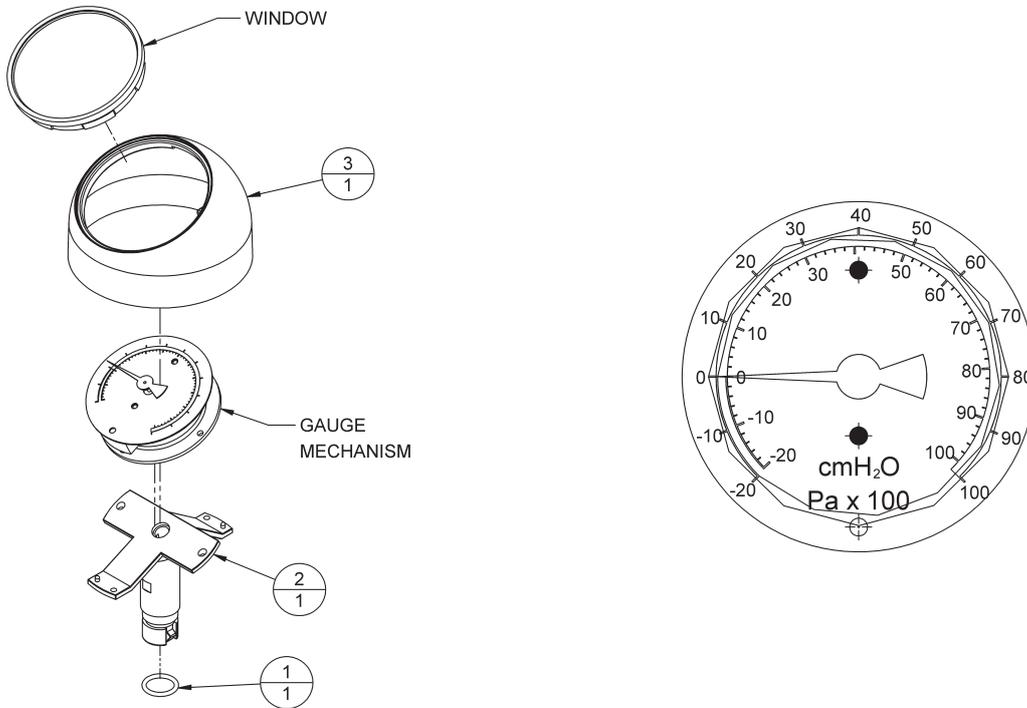
PARTS LIST



Bag Arm Assembly

Item	Part No.	Description	Qty
1*	057003	LOCTITE 243/242	A/R
2	041212	'O' RING Ø19.1 x Ø1.6 VITON	1
3	5000131	O RING 17.0 I/D x 1.5 SECTION VITON	1
4*	029011	MOLYKOTE BG87	A/R
5	5000391	BAG ARM LABEL	2
6	5000658	BAG ARM SWIVEL ADAPTOR	1
7	041217	O' RING	2
8	041207	O' RING 0251-16	1
9	041231	O' RING Ø 20.0 x 1.5 CS	3
10	5000085	BAG ARM LOCKING RING	1
11	5000086	BAG ARM LOCKING NUT	1
12	5000087	BAG ARM CONNECTOR	1
13	5000084	BAG ARM TUBE INNER	1
14	5000127	M4 x 8 SKT SET SCREW DOG POINT SS	3
15	5000077	BAG END ADAPTOR	1
16	5000078	BAG ARM SWIVEL	1
17	5000079	BAG ARM	1

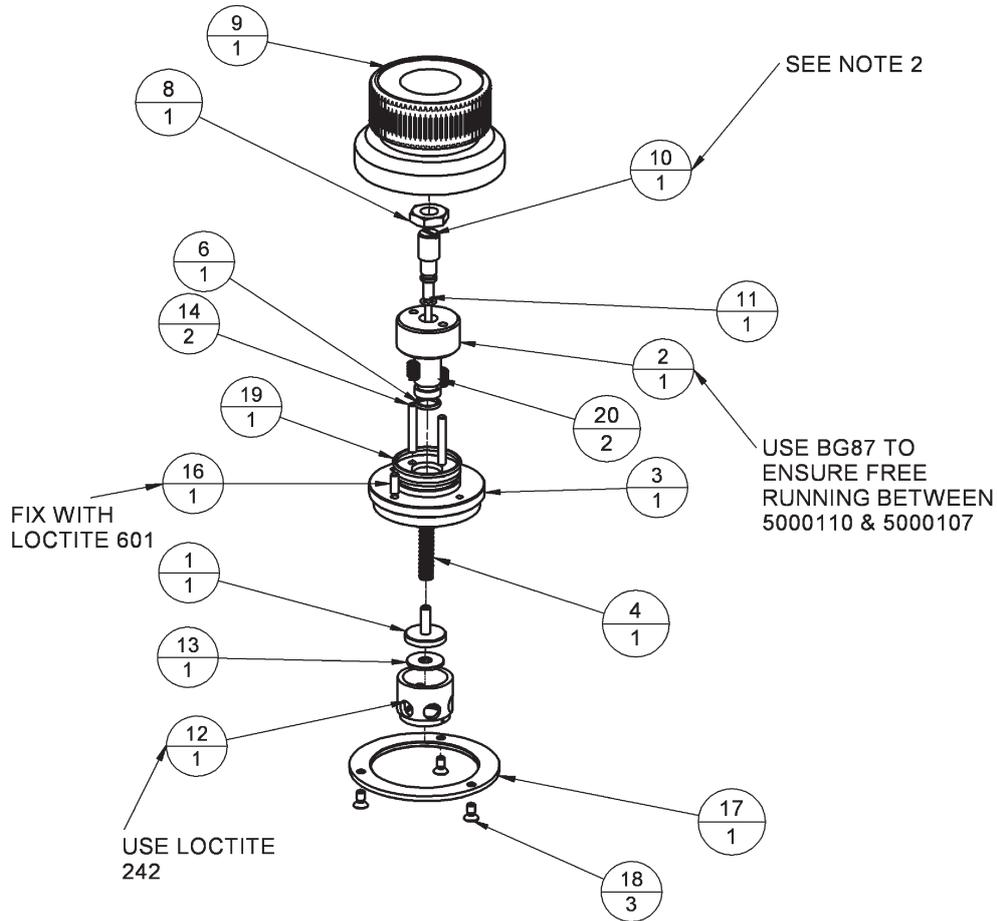
PARTS LIST



Manometer

Item	Part No.	Description	Quantity
	5000121	Manometer Assembly	1
Includes:			
1	5000349	'O' Ring 10.0 I/D X 1.5 Viton	1
2	5000083	Gauge Connector	1
3	5000082	Gauge Cover	1

PARTS LIST

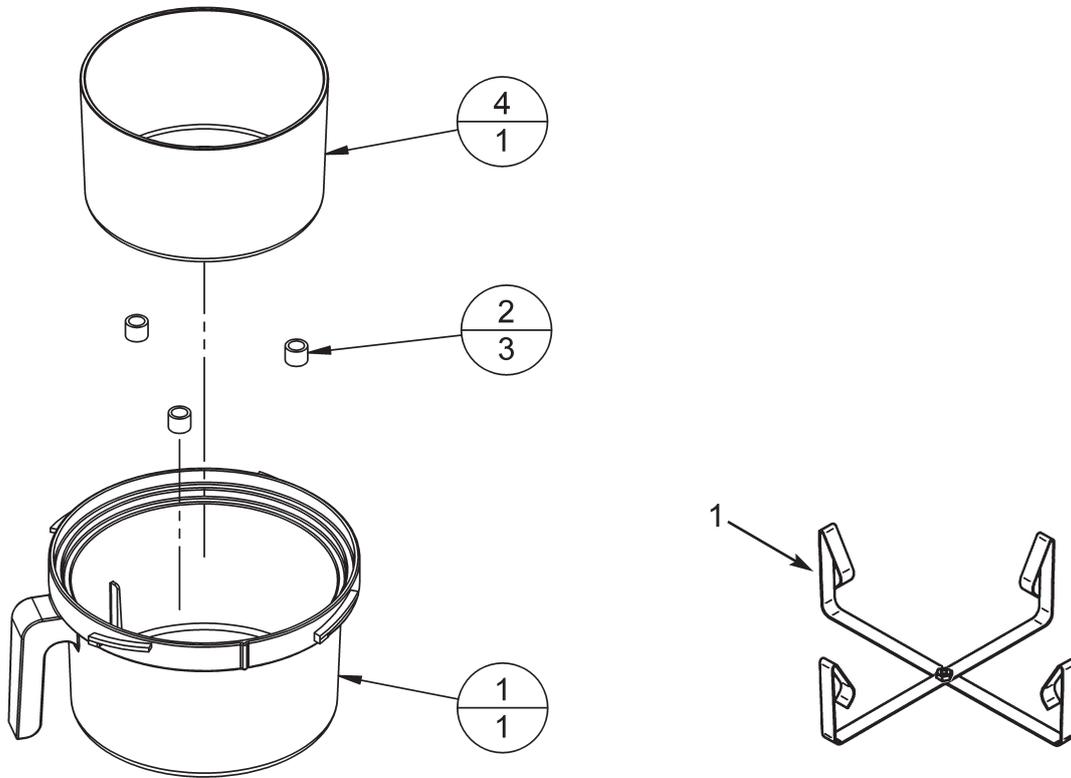


APL Valve (to early 2008)*

ITEM NO	Part No	Title	Req'd
1	5001016	APL VALVE SEAL SEAT	1
2	5000106	APL VALVE ADJUSTER	1
3	5000107	APL VALVE BODY	1
4	5001112	SPRING MODDED	1
6	041245	O SEAL Ø7.0 x 1.5	1
8	5000681	M8 LOCKNUT	1
9	5000110	APL VALVE KNOB	1
10	5001015	APL VALVE SHAFT	1
11	041256	O RING	1
12	5000363	RETAINING SLEEVE	1
13	5000364	PLUNGER SEAL	1
14	020510	DOWEL PIN Ø3 x 20	2
15*	029011	MOLYKOTE BG87	A/R
16	020533	DOWEL PIN Ø3 x 8	1
17	5000468	KNOB LOCATION PLATE	1
18	019117	M3 x 6LG CSK HD	3
19	041238	O' RING Ø 23.0 x 1.5	1
20	5000679	SPRING	2

* For 2008 specification valves see Appendix 4

PARTS LIST

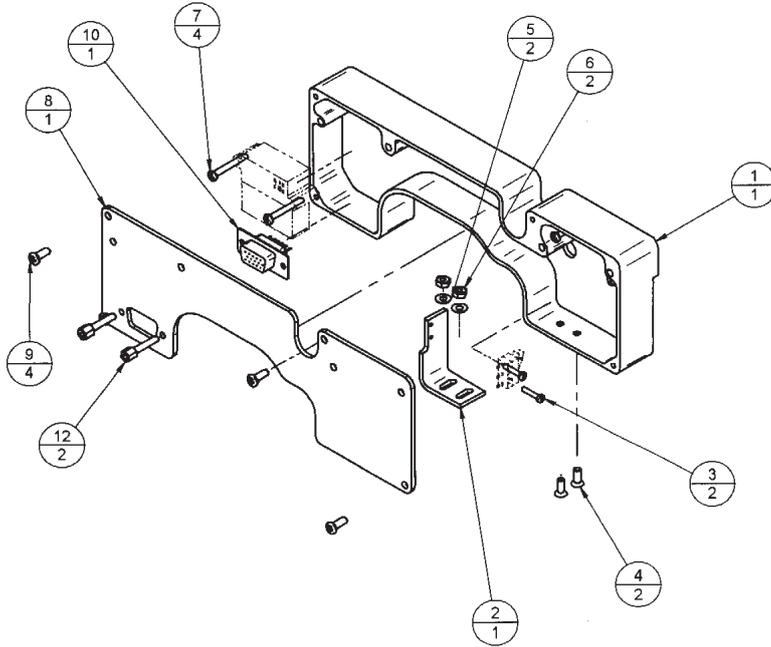


Canister Assembly

Item	Part No.	Description	Quantity
1	5000074	Canister Outer	1
2	5000396	Location Tube	3
3*	tba	Soda Lime Pre-Pack	1
4	5000073	Canister Inner (for loose fill only)	1
5	5000863	Carrier assembly (use with pre-pack only)	1

*not shown

PARTS LIST



Electrical Interface Box Assembly

Item	Part No.	Description	Quantity
1	5000707	Electrical Box	1
2	5000318	Bracket - microswitch	1
3	500553	Screw - M2 x 10	2
4	019170	Screw - M3 x 8	2
5	025006	Washer - M3	2
6	01066	Nut - M3	2
7	019106	Screw - M2.5 x 20	4
8	5000708	Plate	1
9	019002	Screw - M3 x 8	4
10	5000462	Cable assembly (includes 5000496 and 5000462)	1
11	500963	Label	1
12	104005	Fixing - Screwlock 4-40	2

10. APPENDIX

Appendix 1

Sterilisation

10.1 Sterilisation Policy

Follow your local hospital guidelines. Autoclavable components are listed in section 8.5.

10.2 Bacterial Filters

The use of respiratory bacterial filters is essential to protect the oxygen sensor mounted at the side of the side of the absorber.

Fit a bacterial filter to the expiratory limb of the breathing circuit.

In addition a heat and moisture exchange (HME) unit should be fitted at the patient Y-piece.

Refer to the diagram in section 5 – 'Breathing Circuit Connections', and the information on flow resistance in sections 4.2.1, and 4.2.2.

Filters may be sterilisable or single use. Please read the labelling supplied by the manufacturer.

CAUTION

Replacement/Disposal - always follow the instructions supplied with the filter or HME.

Always renew components at the recommended interval

NOTE

If a bacterial filter has not been used in the expiratory limb of the breathing circuit, the oxygen sensor may be contaminated and must be replaced.

10.3 Patient Circuit Components

The components should be separated, washed with warm soap and water solution, rinsed in warm water and air dried.

For sterilisation, follow the instructions supplied by the manufacturer.

APPENDIX: STERILISATION

10.4 Absorber Assembly Procedure Before Sterilisation

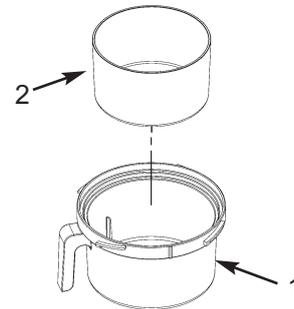
CAUTION Removal and refitting must only be carried out by qualified service personnel. When the absorber is lifted or carried by hand, always support the weight of the unit under the base. Do not lift the absorber by gripping any of the components attached to the manifold block.

CAUTION Do NOT clean any component in an automatic cleaning/washing machine.

Absorber Canister

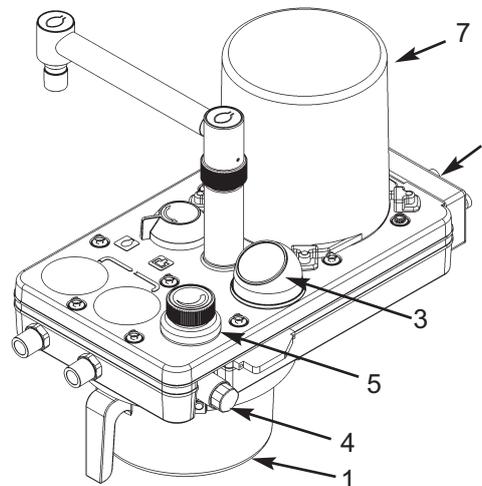
WARNING Condensation, which may collect in the bottom of the absorber canister is caustic and care must be taken not to spill it on the skin when draining.

1. Remove the absorber canister (1), by turning anti-clockwise.
2. Carefully lift out the inner absorbent container (2), or pre-pack unit.
WARNING Condensate may drip from the container or pre-pack. Use a cloth to prevent spillage.
3. Dilute the liquid in the canister with water before disposal. Follow your hospital procedure.
4. Thoroughly scrub off all particles of absorbent from the canister, inner container, seal and underside of the absorber assembly.



Manometer, APL Valve and Oxygen Sensor

5. Remove the manometer (3)
Do not autoclave.
6. Remove the oxygen sensor (4) - disconnect the cable and unscrew the sensor from the side of the absorber
Do not autoclave.
7. APL Valve (5) - autoclave the valve as part of the absorber assembly - check that the valve is in the open position before autoclaving.



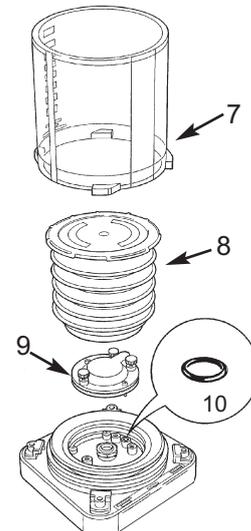
Electrical Interface, Cables and Tubing

8. Disconnect all cable connectors and hoses, then remove the electrical interface unit (6).

Disconnect the mains lead from the heater unit (if fitted).
(refer to the illustration on next page)

Bellows Assembly - removal

9. Turn the bellows housing (7) anti-clockwise, then lift it from the base.
Remove the bellows (8), by carefully pulling it off the base.
Do not dismantle.
10. Undo the three retaining screws, then remove the exhalation valve assembly (9).
Check that the small O-ring (10) located in the bellows base under the diaphragm valve is in place.
The ventilator will not function if the O-ring is missing.



APPENDIX: STERILISATION

Dismantling and Cleaning before sterilisation

Absorber :

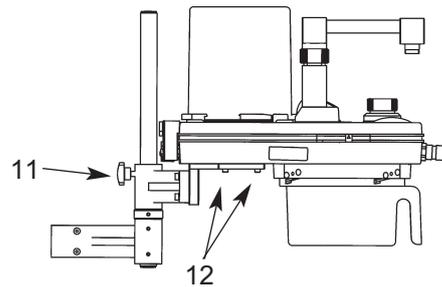
CAUTION Removal and refitting must only be carried out by qualified service personnel. Always support the weight of the unit under the base. Do not lift the absorber by gripping any of the components attached to the manifold block.

11. Remove the absorber assembly from the anaesthetic machine:
 - a) Loosen the pole-mount knob (11). Carefully lift the absorber assembly from the polemount..

- b) Remove the four screws (12), securing the absorber to the pole-mount bracket assembly (13), (or 14, if heater unit is fitted).

WARNING: Do NOT immerse or autoclave the heater unit (15).

12. Wash the absorber assembly internally with warm water and soap solution, then rinse and air dry.
13. Refit the canister, the absorber assembly can now be autoclaved as a single unit.



Ventilator Bellows Assembly:

Exhalation Diaphragm Valve

The exhalation diaphragm valve is under the bellows and can be removed by loosening the three thumbscrews.

The valve seat is now visible.

WARNING

Great care must be taken. Do not damage the precision surface of the valve seat (14).

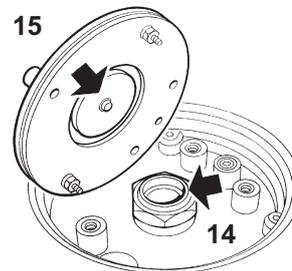
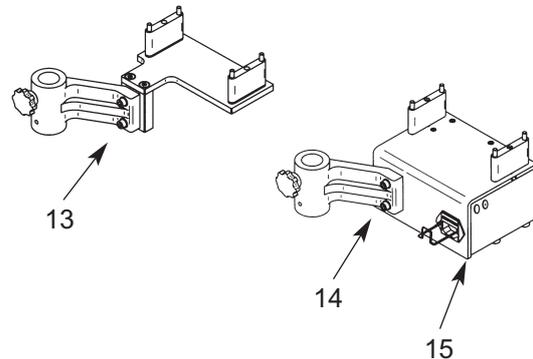
Never use any hard object or abrasive agent to clean it; use only a soft cloth.

If the valve seat is damaged, the diaphragm valve will leak and may cause serious malfunction.

Clean the seat, and the metal disk (15) attached to the base of the diaphragm valve, thoroughly and remove all contamination from the surfaces of both components.

NOTE If excessive contamination is discovered, check that a bacterial filter is used in the expiratory limb of the breathing circuit (and an HME at the patient tee-piece).

After cleaning, check that the small O-ring (10) located in the bellows base under the diaphragm valve is in place. The ventilator will not function if the O-ring is missing.



APPENDIX: STERILISATION

10.5 Sterilisation and Disinfectant Treatment Table

Note:

1. Thorough rinsing in warm water and drying in air should follow chemical disinfection.
2. Do NOT clean any component in an automatic cleaning/washing machine.
3. Before clinical use, ALWAYS carry out the Pre-use Checks listed in section 6 of this manual.

10.5.1 Absorber

<i>Component</i>	<i>Soap water</i>	<i>Cidex Sonacid (Note 1)</i>	<i>Steam Autoclave</i>	<i>Maximum Temperature</i>	
				<i>°F</i>	<i>°C</i>
Breathing hoses (check manufacturer's instructions)	yes	yes	yes	278	137
Safelock fittings	yes	yes	yes	278	137
Reservoir bag (check manufacturer's instructions)	yes	yes	yes	278	137
Manifold block (including non-return valves)	yes	yes	yes	278	137
Frame assembly	yes	yes	yes	278	137
Absorber Canister	yes	yes	yes	278	137
Absorbent Container	yes	yes	yes	278	137
Carrier (for pre-pack)	yes	yes	yes	278	137
APL valve	yes	yes	yes	278	137
Pressure gauge	no	no	no	–	–
PEEP valve	yes	yes	yes	278	137
Heater (option)	no	no	no	–	–

10.5.2 Ventilator Bellows

Item	Method
Bellows	Gas, liquid, autoclave (20 cycles max.)
Hoses	Gas, liquid, autoclave
O rings	Gas, liquid, autoclave
Bellows base	Gas, liquid, autoclave
Exhalation valve assembly	Gas, liquid, pasteurise, low temperature autoclave
Bellows canister	Liquid, autoclave

APPENDIX: STERILISATION

10.6 Absorber Assembly Reassembly after Cleaning and Sterilisation

CAUTION

When the absorber is lifted or carried by hand, always support the weight of the unit under the base.

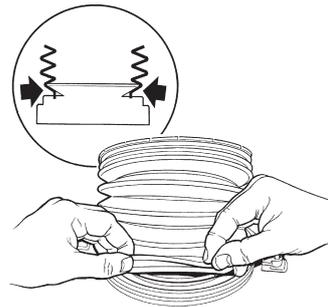
Do not lift the absorber by gripping any of the components attached to the manifold block.

Ventilator Bellows

Refit the diaphragm valve assembly to the bellows base and refit the bellows assembly and housing.

CAUTION

Always check for correct fitment of the bellows (see illustration), and function test the ventilator before clinical use (refer to ventilator user manual).



Absorber

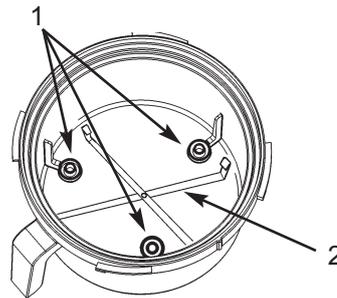
Reverse the dismantling procedure given in section 10.4.

See section 5.3 for correct refitment of the absorbent canister.

Note

When refitting the absorbent container, or pre-pack to the canister, ensuring that the three spacers (1) are located as illustrated.

If a pre-pack is used, check that the carrier (2) is in place.



Refitting the canister

1. Refit the canister.

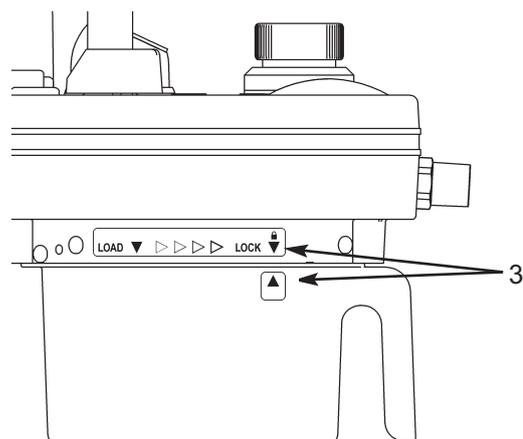
Check that the seal and the canister align correctly as the canister is rotated clockwise.

Grip the canister firmly, using two hands to rotate clockwise until the stop is reached.

Check that the arrows (3) are aligned.

WARNING

Failure to rotate the canister to the fully closed position, may cause a system leak and/or a reduction in CO₂ absorption.



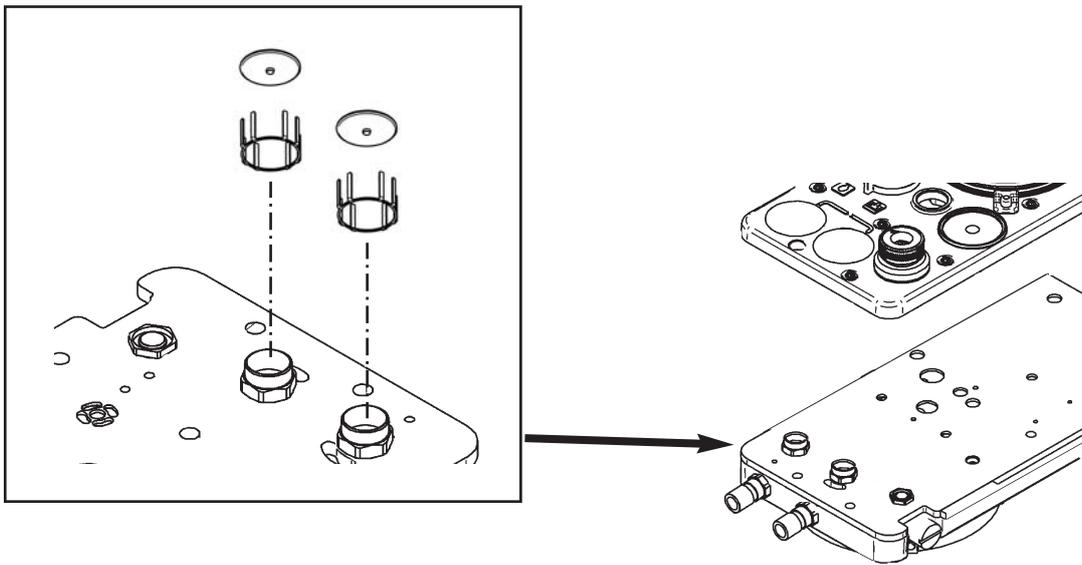
Before clinical use, **ALWAYS** carry out the Pre-use Checks listed in section 6 of this manual.

APPENDIX: Inspiratory and Expiratory Valves

Appendix 2

Inspiratory and Expiratory Valve Discs and Locating Cage (Introduced late 2007)

Retrofit Kit Fitting Instructions



Purpose

Fitting instructions for Retrofit Kit to update existing units with new components for the Inspiratory and Expiratory Valves.

Kit Parts List

<i>Part No.</i>	<i>Description</i>	<i>Quantity</i>
5001999	Valve disc	2
5002459	Valve disc cage	2
5002374	Fitting tool	1

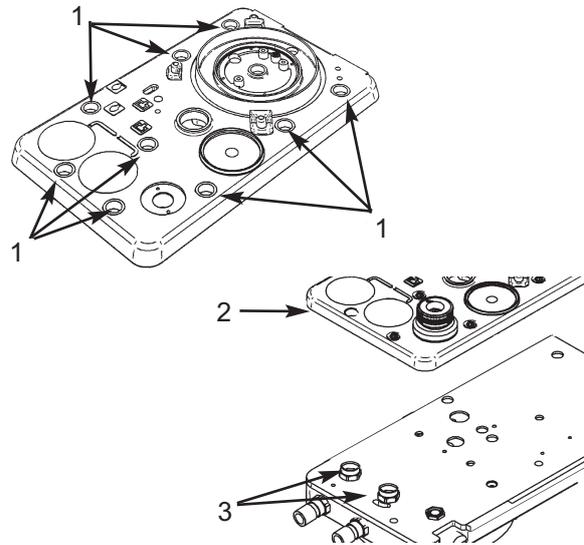
NOTE

If other components require renewal, please order replacements through the normal channels. (e.g. Part No. 5000389: Label for APL valve - fit only if valve is adjusted)

APPENDIX: Inspiratory and Expiratory Valves

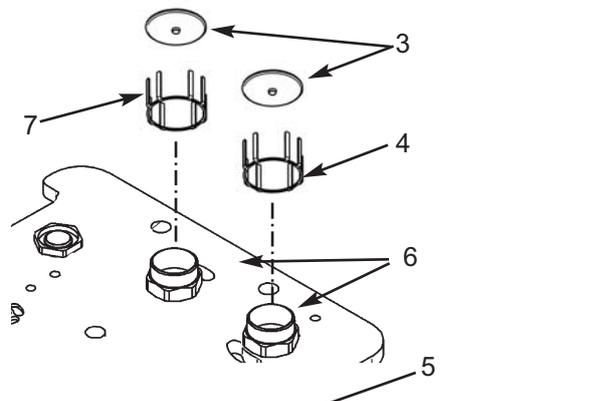
Procedure

1. Unscrew the bag arm connector, and remove the bag arm.
2. Undo, and remove the nine bolts (arrowed - 1) securing the bellows plate assembly (2).
Carefully lift the front of the assembly, then slide back to disengage the switch push-pin.
3. Remove and discard the Inspiratory and Expiratory valve discs (3).



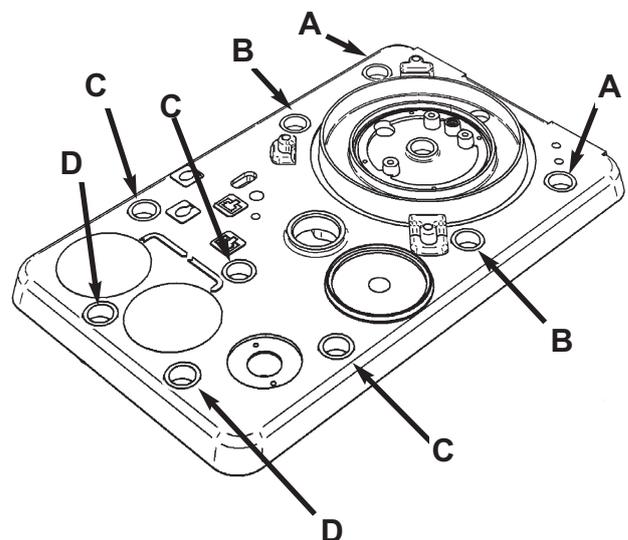
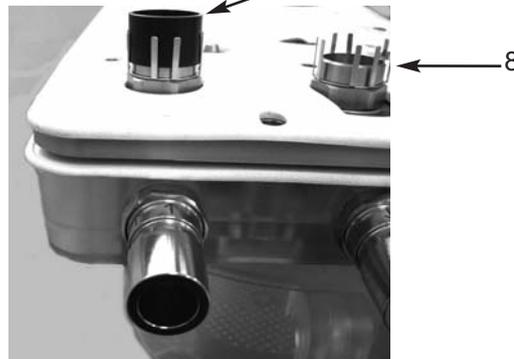
Fitting the valve disc cages

4. Carefully remove the cages (4) from their packaging.
Use the fitting tool (5) to locate each cage correctly, and to press the cage (5) **carefully** over the valve seats (6).
Apply even pressure, taking care not to bend the guides (7) of each cage.
Note correct fitted position of the cage (8) in the photograph.



Reassembly

5. Fit the new valve discs (3).
6. Refit the bellows plate assembly (2), ensuring that:
 - (a) the Bag/Ventilator knob is aligned with the quadrant shaft, and
 - (b) the switch 'Push-Pin' is engaged.
7. Secure the assembly with nine bolts (1), as follows:
Apply a small amount of Loctite 243 to the threads, fit the bolts and hand tighten.
Starting at the rear of the absorbers, tighten bolts to 1.5 Nm, in the sequence (A - D) shown in the illustration.
8. Refit the bag arm and tighten the connector (hand tight). Do NOT use Loctite.
9. Carry out pre-use checks (refer to service manual).
NOTE: The negative pressure test is not required.



APPENDIX: Canister (2008 Specification)

Appendix 3

Canister and Release/Lock System (2008 Specification)

Retrofit Kit Fitting Instructions

Purpose

Fitting instructions for Retrofit Kit to update existing A200SP Absorbers with a new canister and release/lock system.

WARNING

Do not use the existing canister with the new release/lock system.

Canister Release/Lock System

The canister release/lock mechanism is operated by a lever at the base of the canister assembly.

Absorbent Refill

The canister can be removed and refilled during a clinical procedure.

WARNING

If the absorbent is to be changed during clinical use, adequate fresh gas flow must be maintained to prevent excessive build up of CO₂.

Bypass mode

The absorber reverts to bypass mode when the lever is turned clockwise to release the canister.

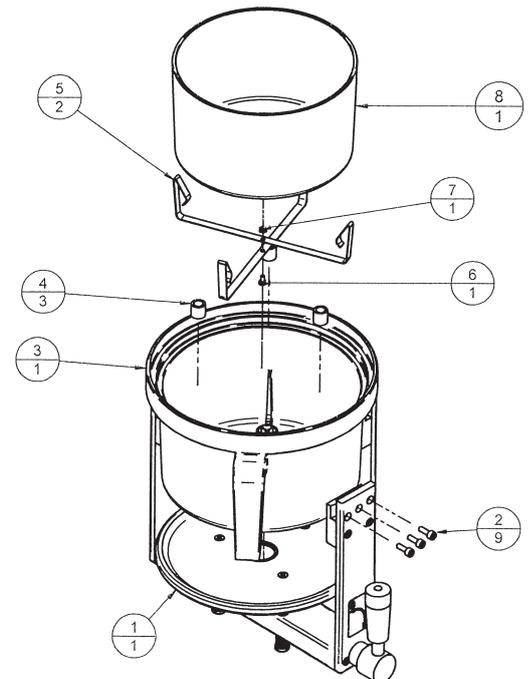
Expiratory gas passes directly to the APL valve and bag, or ventilator, without passing through the absorbent.

It is strongly recommended that a capnometer is used to prevent the risk of hypercapnia.



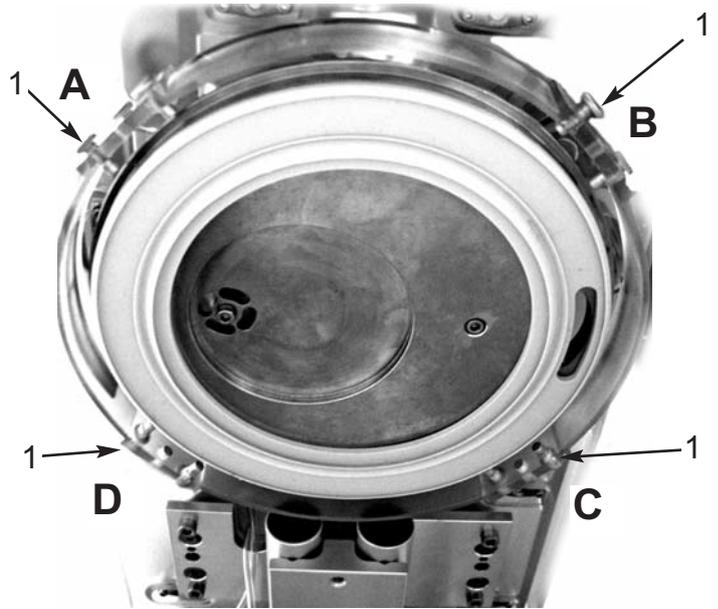
Kit Parts List

Ref.	Part No.	Description	Quantity
1	5002710	Canister Release/Lock Assembly	1
2	019067	Screw, M4 x 12	9
3	5003008	Canister	1
4	5000396	Location tube	3
5	5000734	Spring clip	2
6	019122	Screw, M3 x 6	1
7	01066	Nut, M3	1
8	5000073	Canister, inner	1



Procedure

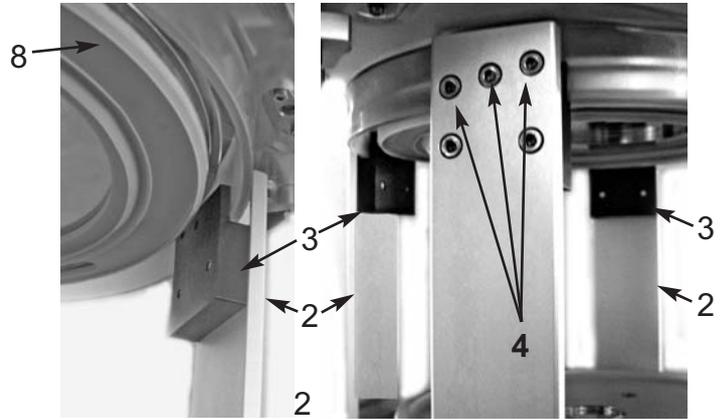
1. Switch off the anaesthetic machine, and relieve all gas pressure in the system.
2. Remove the canister by turning anti-clockwise.
 - a) Carefully lift out the inner absorbent container, or pre-pack unit.
WARNING Condensation, which may collect in the bottom of the absorber canister is caustic and care must be taken not to spill it on the skin when draining. Wear suitable protective gloves.
 - b) Dilute the liquid with water before disposal.
 Follow your hospital procedure.
Condensate may drip from the container or pre-pack. Use a cloth to prevent spillage.
 - c) Dispose of the canister and contents.
Do not use the existing canister with the new lock/release system.
Ensure safe disposal - follow your hospital procedure.



3. Carefully remove the pins (1) from the absorber lower moulding mounting points (A, B, C, and D).

4. Fit the new lift assembly:

Offer up the release/lock assembly and locate each upright (2) and plate (3) at the absorber lower moulding mounting points (B, C, and D) as illustrated (underside of absorber, viewed from front).

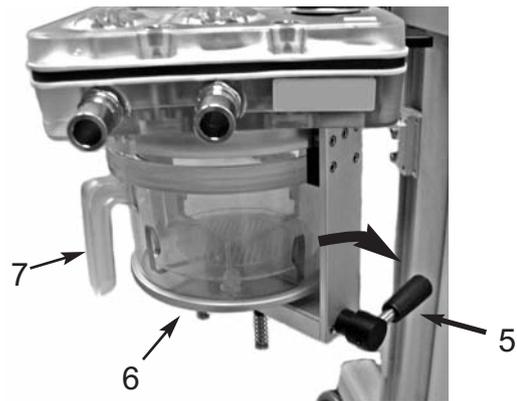


Fit the screws (4) to secure the lift assembly.

Check the action of the lever (5). Ensure that the mechanism raises and lowers the base plate smoothly and evenly.

5. Rotate the lever (5) clockwise to lower the canister release/lock assembly.

6. Refer to section 5.3 in the User Manual and fill the new inner canister with absorbent (or use a pre-pack).
 Fit the new canister (7).

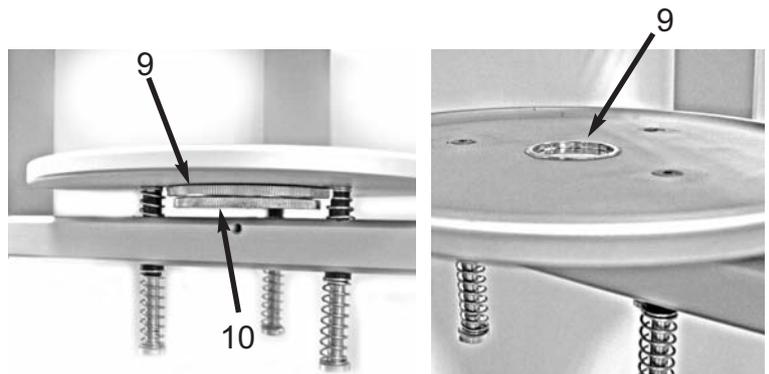


WARNING Do not refit the existing canister.
 Check that the canister is located centrally in the base plate (6).
 Turn the lever (5) anti-clockwise to lock the canister in place.

Ensure that the top of the canister engages correctly into the seal (8) as you rotate the lever anti-clockwise to the locked-on position.

7. Carry out pre-use checks (refer to service manual), INCLUDING A LEAK TEST.

8. If the absorber fails the leak test:
 - a) Rotate the lever (5) clockwise to lower the canister release/lock assembly, and remove the canister (7).
 - b) Loosen the locknut (9).
 - c) Screw out the adjuster (10), approximately half a turn.
 - d) Tighten the locknut (9).
 - e) Repeat the leak test.



Ensure that personnel who use the absorber are aware that the unit has been modified.

IMPORTANT: Give them a copy of the revised user instructions included with the retrofit kit.

APPENDIX: Canister (2008 Specification)

Canister and Release/Lock System Description and Service Information

Purpose

Information for A200SP Absorber with a new canister and release/lock system.

WARNING

Do not use the existing canister with the new release/lock system.

Canister Release/Lock System

The canister release/lock mechanism is operated by a lever at the base of the canister assembly.

Absorbent Refill

The canister can be removed and refilled during a clinical procedure.

WARNING

If the absorbent is to be changed during clinical use, adequate fresh gas flow must be maintained to prevent excessive build up of CO₂.

Bypass mode

The absorber reverts to bypass mode when the lever is turned clockwise to release the canister.

Expiratory gas passes directly to the APL valve and bag, or ventilator, without passing through the absorbent.

It is strongly recommended that a capnometer is used to prevent the risk of hypercapnia.



APPENDIX: Canister (2008 Specification)

Modified canister and new release and lock system

Additional Information

Section 1: WARNINGS and CAUTIONS

WARNING 15

Refitting the canister:

Ensure that the top of the canister engages correctly into the seal in the absorber as you rotate the lever anti-clockwise to the locked-on position.

Failure to lock the canister in the fully closed position, may cause a system leak and/or a reduction in CO₂ absorption.

Do not use an early type canister with this lock/release system.

Section 3: DESCRIPTION

3.1 Canister

Canister Release/Lock System

The canister release/lock mechanism is operated by a lever (1) at the base of the canister assembly.

Swivel the front of the absorber assembly away from the side of the anaesthetic machine, and turn the lever clockwise to release the canister.

Note: the illustration shows the canister in the unlocked position.

Absorbent Refill

The canister (2) can be removed and refilled during a clinical procedure.

WARNING

If the absorbent is to be changed during clinical use, adequate fresh gas flow must be maintained to prevent excessive build up of CO₂.

3.8 Bypass System

The absorber reverts to bypass mode when the lever is turned clockwise to release the canister. Expiratory gas cycles to the patient, without passing through the absorbent.

It is strongly recommended that a capnometer is used to prevent the risk of hypercapnia.



APPENDIX: Canister (2008 Specification)

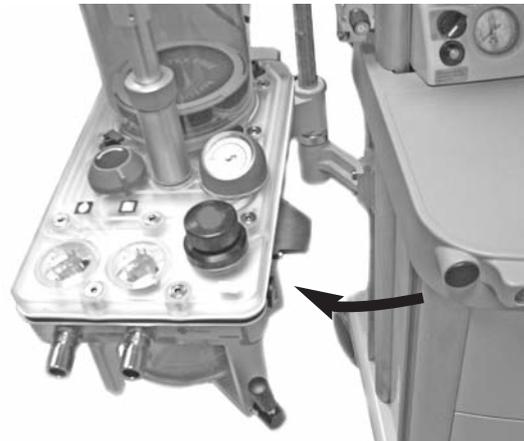
Section 5: INSTALLATION and OPERATION

5.3 Changing CO₂ Absorbent

Removing the canister

WARNING Condensation, which may collect in the bottom of the absorber canister, is caustic. Avoid skin contact when draining.

1. Swivel the front of the absorber assembly away from the side of the anaesthetic machine.
2. Turn the lever (1) clockwise to release the canister (2).
Carefully remove the canister from the absorber.



Disposal of condensate, cleaning the canister, and refilling with absorbent:

Please refer to the existing instructions detailed in section 5.3 in the User Manual.

Refitting the canister

1. Fit the canister (2) and check that it is located centrally within the base plate (3). Turn the lever (1) anti-clockwise to lock the canister in place.

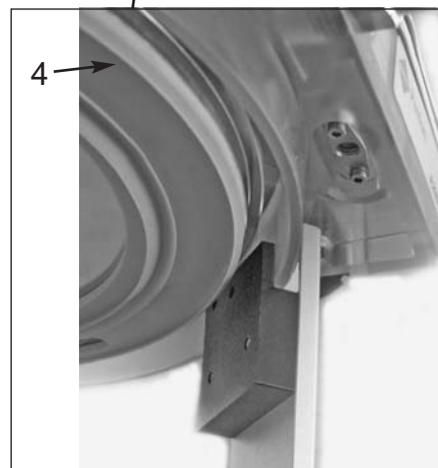
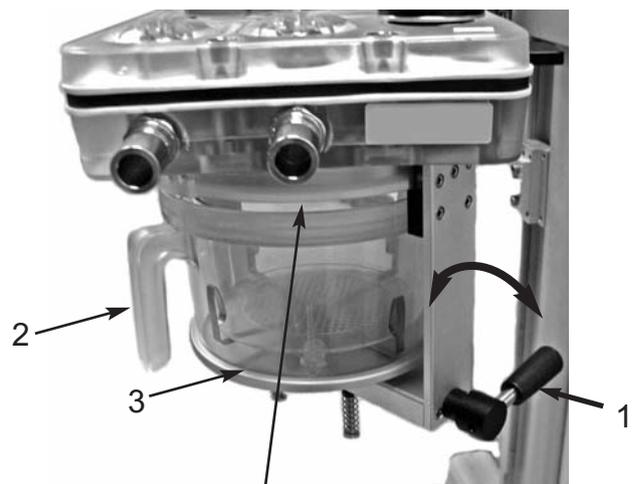
Ensure that the top of the canister engages correctly into the seal (4) as you rotate the lever anti-clockwise to the locked-on position.

WARNING

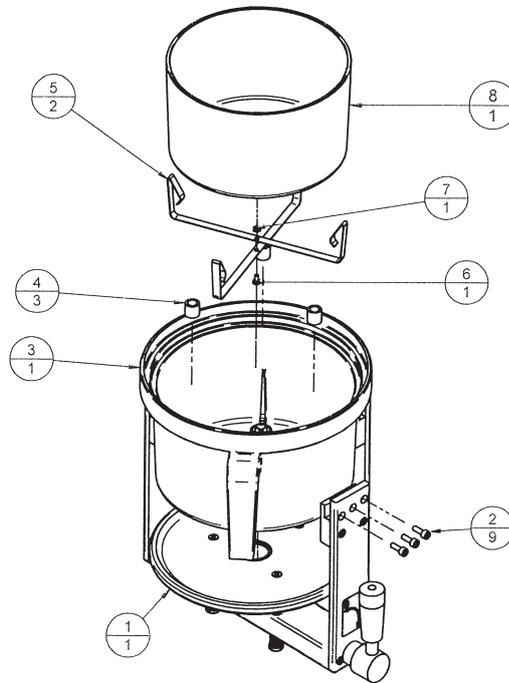
Failure to lock the canister in the fully closed position, may cause a system leak and/or a reduction in CO₂ absorption.

Do not use an early type canister with this lock/release system.

2. Leak test the absorber - see section 6.2 in the User Manual.



APPENDIX: Canister (2008 Specification)



Parts List

<i>Ref.</i>	<i>Part No.</i>	<i>Description</i>	<i>Quantity</i>
1	5002710	Canister Release/Lock Assembly	1
2	019067	Screw, M4 x 12	9
3	5003008	Canister	1
4	5000396	Location tube	3
5	5000734	Spring clip	2
6	019122	Screw, M3 x 6	1
7	01066	Nut, M3	1
8	5000073	Canister, inner	1

APPENDIX: Canister (2008 Specification)

Additional Service Procedures

Pre-use checks

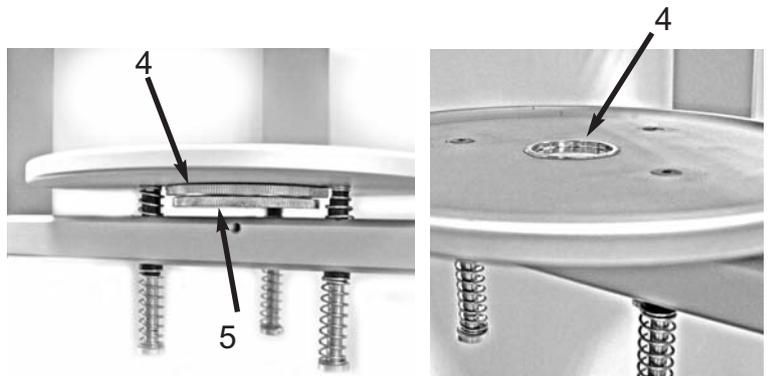
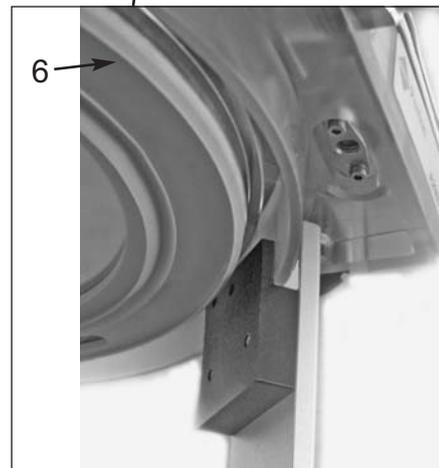
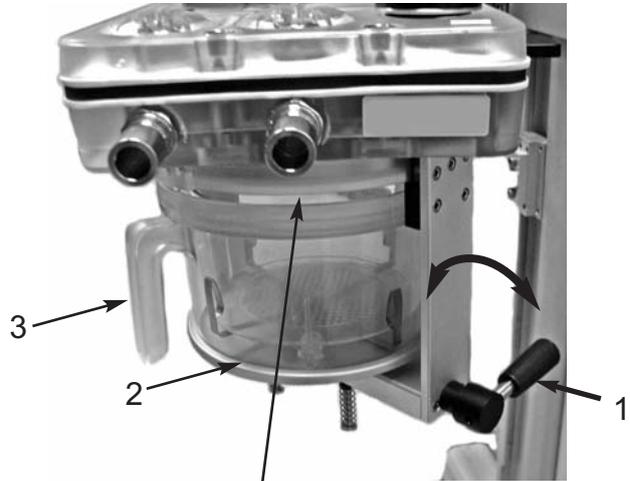
If the absorber fails the leak test:

1. Check the action of the lever (1). Ensure that the mechanism raises and lowers the base plate (2) smoothly and evenly.
 - a) Rotate the canister lever (3) clockwise to lower the canister release/lock assembly, and remove the canister.
 - b) Loosen the locknut (4).
 - c) Screw out the adjuster (5), approximately half a turn.
 - d) Tighten the locknut (4).
 - e) Fit the canister

Check that the canister is located centrally in the base plate (2).
Turn the lever (3) anti-clockwise to lock the canister in place.

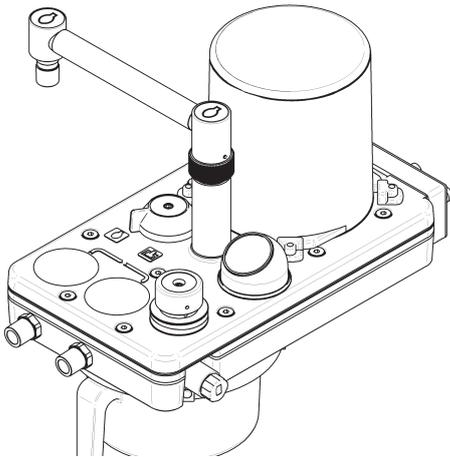
Ensure that the top of the canister engages correctly into the seal (6) as you rotate the lever anti-clockwise to the locked-on position.

- e) Repeat the leak test.



APPENDIX: APL Valve (2008 Specification)

Appendix 4 : 2008 Specification APL Valve APL Valve - Retrofit Kit Part No. 5003182



Purpose

Fitting instructions for Retrofit Kit to update existing A200SP Absorbers with latest specification APL Valve (introduced in April 2008).

Identification

1. The new valve has four drillings 'X' on the top face.
2. The new valve is secured by screwing directly into the absorber centre plate assembly.

Service Tool

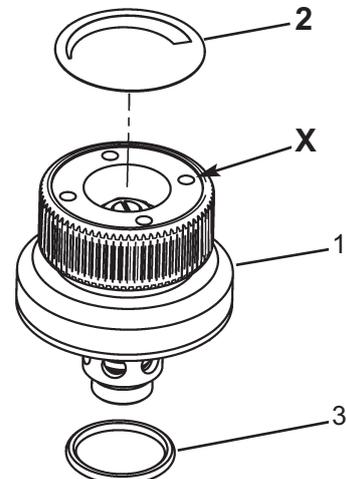
5003177 APL valve fitting adaptor

Kit Parts List

Ref No.	Part No.	Description
1	5003173	APL valve assembly
2	5003175	Label
3	0383	O-ring

NOTE

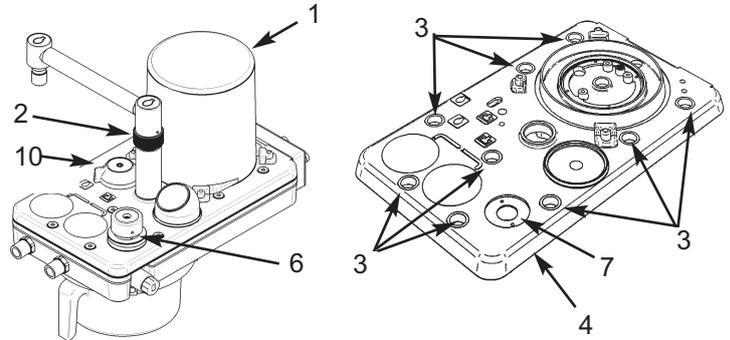
If other components require renewal during the refit procedure, please order replacements through the normal channels.



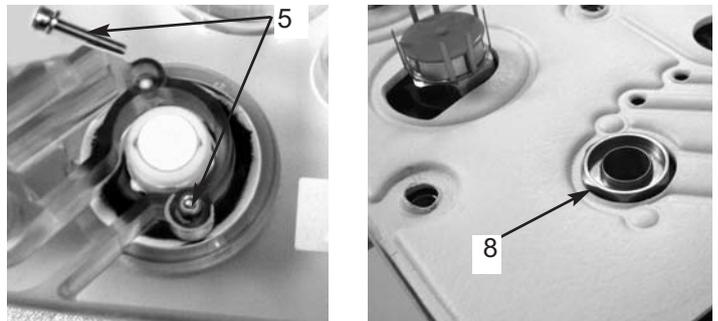
APPENDIX: APL Valve (2008 Specification)

Procedure

1. Remove the bellows canister (1) and bellows.
2. Unscrew the bag arm connector, and remove the bag arm and post (2).
3. Undo, and remove the nine bolts (arrowed - 3) securing the bellows plate assembly (4).
Carefully lift the front of the assembly, then slide back to disengage the switch push-pin from the interface unit (5) at the rear of the absorber.

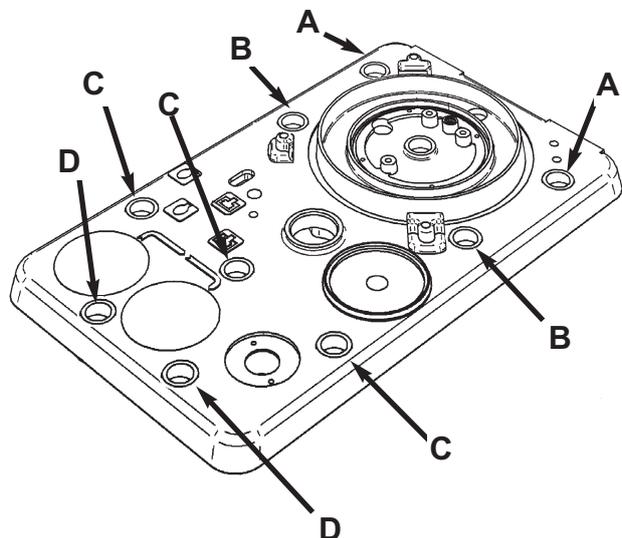
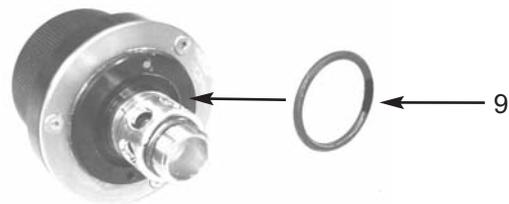


4. Invert the bellows plate assembly and remove the two screws (6) and washers.
5. Remove the APL valve (7) and seal (8).
6. Remove the APL valve seat (9) from the centre plate assembly.



Reassembly

7. Refit the bellows plate assembly to the centre plate, ensuring that:
 - (a) the Bag/Ventilator switch linkage is aligned, and
 - (b) the switch 'push-pin' is engaged.
8. Apply a small amount of Molycote BG87 grease to the O-ring (10), and fit the O-ring to the new APL valve.
9. Fit the APL valve to the absorber, and screw in hand-tight only.
10. Refit the bag arm assembly (2) and tighten the connector (hand tight). Do NOT use Loctite.
11. Check that the Bag/Ventilator switch (11) will turn.
12. Secure the assembly with nine bolts as follows:
Apply a small amount of Loctite 243 to the threads, fit the bolts and hand tighten.
Starting at the rear of the absorbers, tighten the bolts to 1.5 Nm, in the sequence (A - D) shown in the illustration.



APPENDIX: APL Valve (2008 Specification)

13. Fit the service tool 5003177 (12) to the APL valve.
Set a torque wrench to 15 Nm, and carefully tighten the APL valve.

CAUTION

Do not exceed 15 Nm.

14. Refit the bellows and canister (1).



Pre-use checks

15. APL Valve Test And Pressure Relief Test

- 15.1 Fully open APL valve.
- 15.2 Set maximum oxygen flow rate. Check that the manometer shows a reading (<5 cmH₂O).
- 15.3 Turn off gas supply.
- 15.4 Close the APL valve fully.
- 15.5 Use O₂ flow and check that the APL valve relieves pressure at 60 cmH₂O (6 kPa) +/- 10%, at 6 L/min flow rate.
- 15.6 If the APL valve fails the test, reset the valve as follows:
 - a) Undo the locknut.
 - b) Set a flow of 6 L/min.
 - c) Adjust the screw, as illustrated, to achieve 60 cmH₂O on the manometer.
 - d) Retighten the locknut and repeat the test procedure.



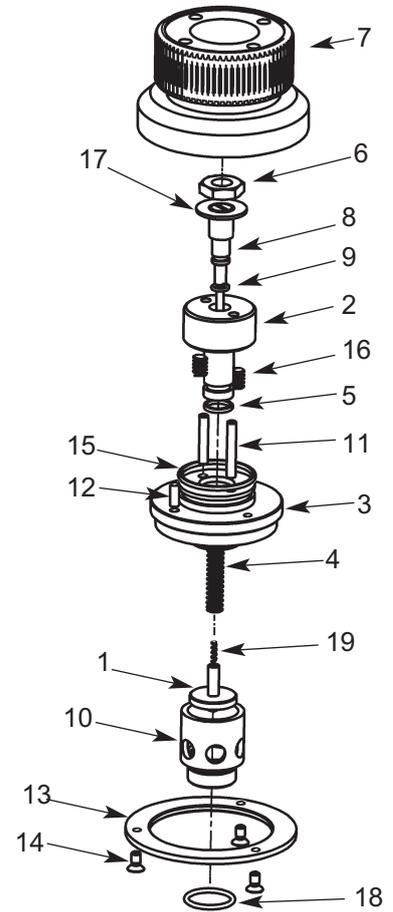
16. Leak Test

- 16.1 Absorber canister fitted, and in locked position.
- 16.2 Ensure that a bag is fitted to the bag arm port, and Bag/Ventilator switch is set to 'Bag' position.
- 16.3 Connect breathing system and occlude the patient Y-piece.
- 16.4 Close the APL valve.
- 16.5 Use the O₂ flush to pressurise the system to 30 cmH₂O.
Ensure that the pressure remains fixed for at least 10 seconds.
17. Fit the label to the APL valve.

APPENDIX: APL Valve (2008 Specification)

APL Valve 2008 Specification Parts List

Ref	Part No.	Description	Qty
1	5001016	Valve seat	1
2	5000106	Valve adjuster	1
3	5000107	Valve body	1
4	5001112	Spring	1
5	041245	O-seal	1
6	5000681	Locknut, M8	1
7	5000110	Valve knob	1
8	5001015	Valve shaft	1
9	041256	O-ring	1
10	5003176	Valve seat	1
11	020510	Dowel pin (dia 3 x 20)	1
12	020533	Dowel pin (dia 3 x 8)	1
13	5000468	Location plate - knob	1
14	019117	Screw (M3 x 6)	3
15	041238	O-ring	1
16	5000679	Spring	2
17	01148	Washer, M8	1
18	5000126	O-ring	1
19	5003174	Spring	1





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