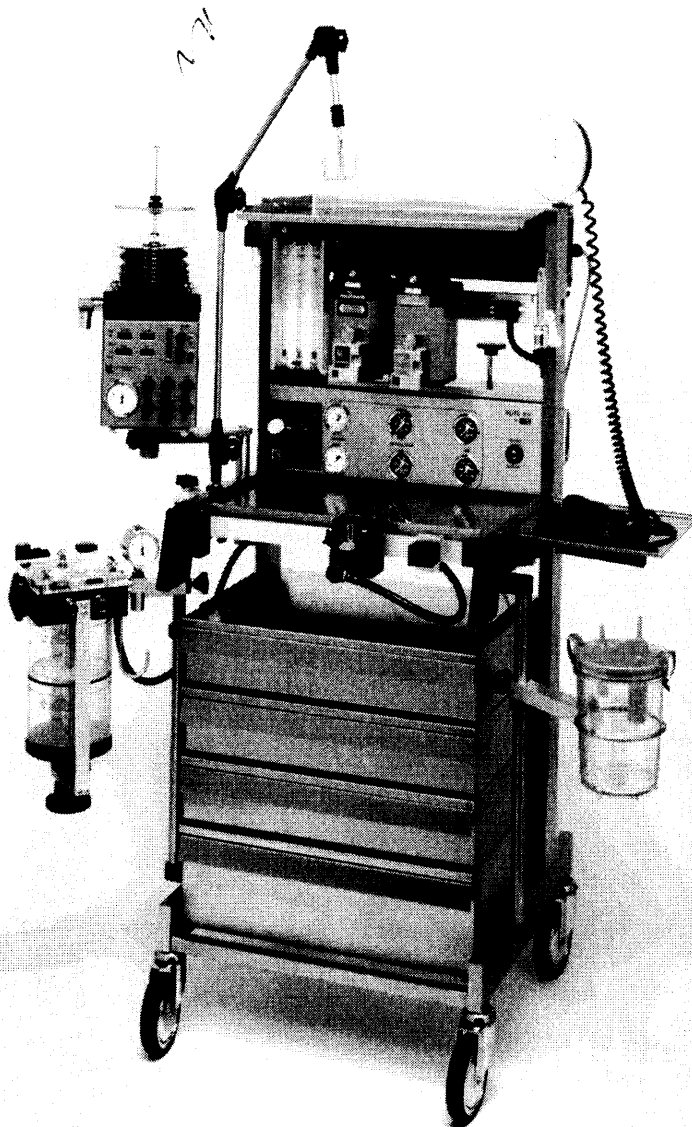


ELITE 615

**ANAESTHETIC
MACHINE**



Ulco Medical
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USER & SERVICE MANUAL

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Warranty statement

All Ulco products are guaranteed to be free of defects of workmanship or material for a period of one year from the date of delivery. The following are exceptions to this warranty:

1. Defects caused by misuse, mishandling, tampering, or by modifications not authorised by Ulco or its appointed agents and are not covered.
2. Rubber and plastic components and materials are warranted to be free of defects at the time of delivery.

Any product which proves to be defective in workmanship or material will be replaced, credited or repaired with Ulco holding the option. Ulco is not responsible for deterioration, wear or abuse. In any case, Ulco will not be liable beyond the original selling price.

Goods are subject to the terms of applicable warranty. Defective products will be accepted for return at Ulco's discretion, and only during the warranty period. Application of this warranty is subject to the following conditions:

1. Ulco or its authorised agents must be promptly notified, in writing upon detection of the defective material or equipment.
2. Defective material or equipment must be returned, shipping prepaid, to Ulco or its authorised agent.
3. Examination by Ulco or its authorised agent must confirm that the defect is in fact covered by the terms of this warranty.
4. Notification in writing, of defective material or equipment must be received by Ulco or its agent no later than two (2) weeks following expiration of this warranty.

In order to assume complete protection under this warranty, the warranty registration card, and or periodic manufacturer's service record (if applicable) must be returned to Ulco within 2 weeks of receipt of the equipment.

The above is the sole warranty provided by Ulco. No other warranty expressed or implied is intended. Representatives or agents of Ulco are not authorised to modify or amend the terms and conditions of this warranty.

About this manual

This manual provides information for the preparation, assembly and maintenance of the Elite 615 anaesthesia machine, together with suitable equipment from the Ulco range. Although this equipment has been carefully designed for simplicity of assembly and use, it is recommended that the contents of this manual be studied before attempting preparation or maintenance of the equipment. Explanatory diagrams are provided in order to help the reader understand the concepts described.

This user manual should be read in conjunction with the user manual(s) for the vaporisers and ventilator (if attached).

Safety precautions

Before the first use

The unit must be connected to a 240V AC supply for a minimum of 14 hours before the first use to ensure that the main back-up supply battery is fully charged.

Follow the Instructions for Use

In order to use the equipment, these instructions must be fully read and understood and strictly followed. Any equipment mentioned is only to be used for the intended purpose.

Liability for proper function or damage

This equipment is an adjunct to patient safety and it must in no way replace the normal monitoring by skilled personnel. The manufacturers accept no responsibility for incidents arising from either incorrect use or malfunction of this equipment.

If the equipment is serviced or repaired by persons not employed or authorised by Ulco, or if the equipment is not used for the purposes for which it is intended, then the liability for the proper function of the equipment is transferred to the owner/operator.

Maintenance and Repairs

An authorised Ulco Technical Service Representative must perform maintenance of this equipment. Ulco products in need of factory repairs must be sent to the nearest local agent or direct to Ulco.

Ulco recommends that anaesthesia products/equipment be serviced at three month intervals. Periodic Manufacturer's Service Contracts are available for products manufactured and or sold by Ulco. These agreements are available from Ulco Technical Services.

Use of anaesthetic agents

Explosive anaesthetic agents, such as ether or cyclopropane, must not be used due to the risk of fire. Ulco accepts no liability if the wrong anaesthetic agent is used.

Power Connection

Ulco equipment is to be used only in rooms with mains power supply installations complying with national safety standards (eg IEC 601).

Electrical connections for other equipment not listed here should only be made following consultations with the respective manufacturers or other expert.

Mobile telephones must not be used within 10 metres of anaesthetic equipment and workstations as they can impair the correct functioning of electrical medical equipment.

Monitoring and alarms

If the unit alarms, check the patient. Establish that the patient is being ventilated correctly.

It is strongly recommended that pulse oximeters, oxygen analysers and end tidal CO2 monitors be used. These will help ensure patient safety, make precise ventilation possible and so achieve the best possible ventilator parameters for the patient.

Routine care

Avoid use of solvents and abrasive cleaning agents.

Background

Anaesthesia machines such as the Elite 615 are engineered to very high standards of design and finish and all units are able to accommodate the most comprehensive specifications required in modern anaesthesia. Ulco machines are manufactured from non-ferrous materials such as stainless steel, anodised aluminium and chromed brass or acetal.

The cantilever construction of the frames provides a stable and unobstructed unit for the mounting of a wide range of anaesthesia equipment accessories. The Elite 615 can be easily upgraded from its basic configuration with optional accessories and attachments including a full range of patient monitors to provide a comprehensive anaesthesia workstation.

If equipment that has not been specifically designed or supplied by Ulco is to be attached to the Ulco machine, it is recommended that customers consult Ulco as to the suitability of the equipment and necessary modifications to the apparatus.

Ulco and its agents provide a comprehensive regular maintenance service and it is recommended that advantage be taken for the safe and reliable upkeep of this equipment. Refer to the accompanying service manual for details on how to maintain your Ulco machine. There is a service contract included with the equipment – please fill it in and return it to Ulco.

Customers requiring further service or advice with operating problems should contact Ulco or one of their accredited agents.

Major features

- > all working surfaces are designed to be easy to clean and front wheels are lockable to prevent unwanted movement
- > a monitor shelf comes as standard although an additional shelf can be fitted as an option
- > an aluminium accessory rail is fitted to the front three sides of the working area for easy attachment of many options
- > the absorber post can be mounted either on the left or right hand sides or both, allowing the absorber to be swapped from side to side
- > as a further option, one side can be used for a patient suction bottle mount

Overall strengths

- > sturdy, strong, durable and easy to understand construction
- > high quality and quantity of patient safety features
- > pure flexibility of design allowing tailoring of options to exact requirements

Typical configuration

- > Elite 615 - 3 gas machine with anti-hypoxic device
- > EV500 Campbell ventilator
- > 2kg absorber
- > Vaporiser(s)
- > Auxiliary flowmeter
- > Folding writing table
- > Universal arm
- > 2 extra drawers (4 in total)
- > Second absorber mounting post

Major components of the machine

Gas controls

On the left hand side of the control console are the gas flow controls and rotameters. Gas controls can be differentiated by their shape and colour. The white oxygen (O₂) control is furthest to the left and to international design standards. The nitrous oxide (N₂O) control is dark blue and air is black and white.

The basic Elite 615 is a three gas machine with one tube each for oxygen, nitrous oxide and air. The machine can also be supplied as a three gas, five tube machine with two tubes for nitrous oxide and oxygen. It can also be supplied with only two tubes – nitrous oxide and oxygen.

Flowmeters

Having passed through the system, each gas enters the base of the flowmeter via the flow control valve and the anti-hypoxic device if fitted. The flow control valves allow for fine adjustment of the flow rate through each of the flowmeter tubes (rotameters). This ensures that accurate gas mixtures are achieved.

When the flow control valve(s) is(are) opened, the gas continues at low pressure upward through the flowmeter tube, whose float responds to indicate the rate of flow in litres per minute or parts thereof.

Note that the rate of flow is indicated by the top edge of the float (bobbin) against the flowmeter scale. Indicated flows are accurate to within $\pm 1.875\%$ of indicated flow $+0.625\%$ of indicated reading.

Therefore, for a flowmeter with a full scale reading of 10 L/min set to deliver 7.5 L/min, the maximum permissible error is:

$$\begin{aligned} & \pm \frac{((7.5 \times 1.875) + (10.0 \times 0.625))}{100} \text{ L/min} \\ & = \pm((0.141) + (0.063)) \text{ L/min} \\ & = \pm 0.204 \text{ L/min} \end{aligned}$$

Gases passing through the flowmeter mix together at rates of flow selected by the anaesthetist. Passing along the backbar, the combined gases enter the vaporiser inlet (if fitted). If the vaporiser is fitted and is in the OFF position, the gases bypass the vaporising chamber and pass directly to the common gas outlet via the non-return valve fitted in the terminating block of the backbar. From here they pass to the anaesthetic equipment and to the patient.

If the vaporiser is selected ON, gas mixtures entering the vaporiser collect a proportion of the anaesthetic agent from the vaporising chamber within. The percentage volume is determined by setting the vaporiser control at the percentage figure calculated by the anaesthetist. Having passed through the vaporiser, the gas mixture now combined with the anaesthetic agent again enters the backbar and is delivered to the patient as described previously (see the vaporiser manual for further details).

Access to the flowmeter tubes is simply a matter of removing the grub screw at the top front of the flowmeter and lifting the protective acrylic cover up and out. Take hold of a flowmeter tube, and lift it gently until it clears the Base block. The tube is then angled outward carefully and pulled down and out.

Service replacement kit Part No A3047-99 should be replaced at least once a year.

Patient Block

The patient block is mounted on the front rail of the working area. In its entirety it houses the common gas outlet, the emergency oxygen flush and a patient safety relief valve set to relieve at 50cm/H₂O pressure (which can be set higher or lower). The common gas outlet is a 22/15mm male stainless steel cone with a weight bearing thread for attaching items such as the fresh gas connecting hose to the CO₂ absorber or a Bain adaptor. The patient block can slide along the front rail to the most convenient position where it can be locked into position.

Fresh gas from the backbar is supplied to the patient block via the one way valve direct to the back of the common gas outlet. This is in turn connected to the patient safety valve housing a safety valve that is adjusted to relieve at approximately 50cm/H₂O pressure. The emergency oxygen flush is supplied with oxygen direct from the oxygen manifold in the console. When depressed, the oxygen flush flow is set by a metered orifice that leads from the high pressure oxygen side of the flush valve to the common gas outlet. The flow is normally 35 to 75 L/min.

Vaporisers

Various methods of mounting vaporisers are currently used such as the 'off line' or 'fixed' systems. The most common is the 'Selectatec' type mounting system in which a mounting block is permanently attached to the backbar, and the vaporiser is locked on by means of DZUS (aircraft type) quick release fastener. Gas flow is diverted through the vaporiser via the ports when the Vaporiser is placed on the mounting block. The Selectatec system allows for interchangeability of vaporiser(s), either for the use of an alternate volatile agent or for maintenance and servicing, as well as rendering the machine 'vapour free' if necessary.

Vaporisers can be easily mounted on the back bar via the Selectatec mounting and should be securely locked into place.

Vaporisers not attached to the anaesthesia machine must be prevented from tipping over. Storage racks are available to store unused vaporisers. Vaporisers should be emptied prior to being moved.

Note: It is important to read the relevant instruction manual issued with each vaporiser prior to use.

Ventilator

The ventilator can be mounted to either the left or right hand upright of the machine. The ventilator mount fits into the bracket. All parts can be tightened into position with

locking screws. The base plate is fitted to the mount, and the ventilator is then secured to the base plate with the four nylon screws supplied.

The ventilator drive hose can then be connected. The drive gas connection for the ventilator is the last gas inlet on the right of the gas manifold. Air or oxygen drive are optional. The ventilator drive gas inlet is supplied with the correct gas hose and ring index for the drive gas specified eg. oxygen.

Note that the ventilator silencer is connected to the back of the ventilator and that the 30mm male scavenging outlet is on the top of the exhaust.

Further information regarding the operation of the EV500 ventilator can be found in its user manual.

Soda-lime absorber

The soda-lime absorber mount bracket attaches to the post towards the front of the machine. The absorber mount sits over the upright and should be allowed to seat itself into position. The top locking screw and side locking screw can then be fastened to hold in position. The exhaust hose can then be attached to the 30mm exhaust valve scavenging outlet. The absorber fresh gas hose from the common gas outlet can now be connected to the fresh gas inlet on the side of the absorber. This connection hose is made from strong teflon reinforced nylon hose so it will not perish. No latex tubing is used in Ulco machines.

The anti-hypoxic device

The Elite 615 contains many features to ensure patient well-being. The first of these is the anti-hypoxic device. This is a now mandatory device in Australia and many overseas markets. This allows the anaesthetist to deliver 100% oxygen to the patient but never less than a nominal 25% oxygen in the presence of nitrous oxide in the mix. This also means that no nitrous oxide can flow without oxygen. Other devices sometimes allow oxygen flow once nitrous oxide has been turned on. No Ulco machines allow this, meaning that oxygen flow must be established before nitrous oxide.

The device is suitable for use as a remote mounted unit or as a complete unit comprising the anti-hypoxic device together with the flowmeter block (consisting of rotameter tubes for oxygen and nitrous oxide). The flowmeter block is fitted with a 23mm female cagemount fitting for connection to any existing anaesthesia machine. Both systems are available from Ulco for use by O.E.M.s.

The device has been designed to eliminate inherent faults common in other similar products. In some such devices, both the oxygen and nitrous oxide begin to flow as soon as the nitrous oxide control is turned on. The operator can thus become accustomed to setting all flows whilst only using the nitrous oxide flow control. This is a safe practise assuming the anaesthesia machine is fitted with an anti-hypoxic device. Many machines both in Australia and overseas, however, do not have such a device, enabling the operator to deliver a 100% nitrous oxide flow inadvertently.

The Ulco anti-hypoxic device prevents this by ensuring that no nitrous oxide is permitted to flow unless the oxygen flow control is first turned on. The nitrous oxide

needle valve is held in place by the oxygen flow control. The nitrous oxide flow control knob is free to rotate, however, in order to prevent damage if force is applied trying to achieve a flow when no flow is allowed. When correctly adjusted and calibrated, the device will prevent the delivery of hypoxic mixtures, and oxygen flow will be maintained at 25% nominal flow ($\pm 5\%$).

The device itself is tamper proof and cannot be interfered with by the operator, but is easy to adjust and calibrate by trained technical staff.

Gas manifold

The gas manifold is fitted to the rear of the machine. All gases that supply the machine are connected via the manifold. Pipeline air, nitrous oxide and oxygen are connected from the wall, as well as all pin index reserve cylinders. All yokes are pin-indexed, and once cylinders are located, can be secured into position. The clip mounted cylinder spanners are designed to fit the cylinder valves, and make it possible to reach through and turn on the reserve cylinders from the front of the machine. The Elite 615 is fitted with colour-coded ring indexed gas hoses for wall gas supply: white for oxygen, blue for nitrous oxide and black and white for air.

Main regulators

The regulator, gauge and yoke for each gas are assembled in line to reduce the risk of high pressure leaks. The brass yoke bolt (RG203) which has the Bodok seal (RG204) attached to it and is fitted with a sintered bronze filter (RG2031), passes through the yoke assembly and is screwed into the yoke adaptor body (RG201). The gauge is attached by the gauge connector (RG202) to the adaptor body (RG201). A stainless steel banjo bolt (RG206) is used to mount the regulator main body (RG201) to the adaptor body (RG201) and the use of Dowty Seals (RG205) prevent any leaks from occurring. A pressure relief valve (not shown) is fitted to the underside of the regulator body (RG101) and is set to start relieving at 600 kPa.

Note: Bodok seals must be examined and replaced if necessary every time the cylinders are replaced.

Second stage regulators

There are two second stage regulators fitted, one each for the oxygen and nitrous oxide supplies. These regulators are situated down stream from the anti-hypoxic device and flowmeter assembly. They are used to calibrate and fine tune the anti-hypoxic device (see separate instructions).

The second stage regulators are also used as a buffer to protect the anti-hypoxic device against any pressure fluctuations that may occur in both the pipeline and the cylinder regulated pressure:

Pipeline pressure-415 kPa

Cylinder regulated pressure-350-370 kPa

Second stage regulator pressures when set to deliver the correct mixtures on the anti-hypoxic device are usually <220 kPa. This allows for fluctuations in supply pressure of more than 100 kPa before the set flows are affected.

Pressure gauges

Pressure gauges are well placed just above the working surface. The top row shows pipeline pressure, while the bottom row shows the pressure in the reserve gas cylinders.

A simple visible indicator called the Visiwink is mounted on the right. When green it indicates oxygen is ON. When red it indicates that oxygen pressure is OFF.

Scavenging

On the left-hand upright of the frame is the scavenging block, which should be connected to wall suction. Adequate scavenging can be achieved by adjusting the ball to the marked line. Vacuum adjustment is via the control at the front.

The vacuum reservoir for scavenging is integrated into the frame of the machine using both the frame upright and the supporting member cross-bar. The scavenging block has two locations for pink/red scavenging tubing to be connected. If only one is being used, the other can be sealed by using a bung (supplied). The vacuum tubing is then connected to the outlet tubing on the back of the block.

Auxiliary oxygen outlet

An auxiliary oxygen outlet is mounted on the right-hand frame upright where an oxygen flowmeter can be used. In this way oxygen can be delivered to the patient, instead of using the rotameters and standard common gas outlet. This is used, for example, with neurolipse (?), relative analgesia and local anaesthesia, safely bypassing the possibility of accidental vaporiser delivery or in-circuit complications.

The 0-15 L/min flowmeter can then be connected to the auxiliary outlet. It should be tested to make sure it is operating correctly.

Pipeline hose assemblies

The pipeline hose assemblies are fitted with non-interchangeable connectors (handwheels) at both ends of the hose. They are suitable for Australian wall outlets or cylinder regulators. Each type of gas hose and handwheel is colour coded and diameter size indexed to the ISO (International Standards Organisation) standard for that particular gas. Each hose must be connected to the correct gas inlet and sufficiently tightened to prevent gas leaks. The anaesthesia machine is provided with hooks at the top rear of each leg for hanging the hoses.

Patient circuitry

ULCO manufactures many different types of patient circuitry.

All are connected to the fresh gas line from the common gas outlet.

The first circuit is the Magill's circuit or Mapleson A. It is a spontaneous breathing circuit and is supplied with a mask. The exhaust valve is fitted with a scavenging connector.

The second circuit is a Bain or Mapleson D or E. Again, a scavenging connector is fitted.

The third circuit is the paediatric circuit which goes by many names and comes in many different configurations from many manufacturers. It is suitable for small children and neonates and comes supplied with three masks.

The circle circuit, however, is the most common option.

The circle circuit

For this the absorber is connected to the common gas outlet. Ulco has two different configurations for absorbers.

Version 1: Ulco absorber 1 or 2kg model without auto/manual (bag/vent) switch. This version utilises the same limb to either connect the ventilator or the manual bag.

Version 2: Ulco absorber 1 or 2kg model with bag/vent switch (Part No AB 600 or AB 600LF). This version has separate limbs for the ventilator and manual bag and selection is made by switching the lever either to the bag or vent position. This version eliminates the need to remove the manual bag from the single limb to attach it to the ventilator.

Both versions can be fitted with the optional Manometer gauge (Part No AB 400) and low flow APL valve.

Oxygen failure warning device

This is a nitrous oxide cut-off and whistle alarm. In the event of a complete loss of oxygen from both the wall gas and cylinder gas supply, the machine and the ventilator will continue to operate. Once the pressure drops to approximately 225kPa, an audible alarm will sound and the nitrous oxide supply through the rotameter will be cut off. At the same time the supply of oxygen to the ventilator will cease, ensuring all oxygen is available for the patient. The flow of oxygen can still be seen at the rotameter. At 220kPa there is only about 3 litres of oxygen left in the reservoir cylinder, giving some time for the operator to rectify the pressure problems. This can be achieved by turning on the reserve cylinders amongst other alternatives. Once normal pressure is re-established, the alarms turn off, nitrous oxide will start to flow, and the ventilator will start to cycle again.

The Visiwink only turns red below 125kPa. At this stage, if oxygen is not being supplied, an alternative supply source should be established. If air is connected, there is a safe reserve with a content of around 21% oxygen.

Other accessories

The mounting of patient suction jars and other accessories can be achieved two ways. Firstly, a second post can be installed as mentioned previously, or a simple mount can be secured to the side of the upright that can accommodate most modern suction bottle mounts.

Another accessory which can be supplied on the side is a fold-down writing tray. This is attached by a simple quick locking mounting block on the rail on the side of the work area. The tray can be secured in a horizontal position by swinging the arm brace out from under the tray. Many other accessories can be mounted on the rail via this method, for example, a universal circuit support arm able to swivel in many directions. The lock screw on the side can control excessive movement.

Hooks are mounted on each frame upright and a movable sphygmomanometer mount is positioned on the top monitor tray. An aneroid or mercurial sphygmomanometer can then be used.

Accessory power

The Elite 615 can be fitted with an optional six outlet powerboard at the top rear of the machine. The powerboard is designed to suit Australian standard plugs and is protected by an earth leakage circuit breaker or ELCB. On the bottom right hand corner is a fitting for E P Earth.

If the six outlet power board is supplied, two of the outlets may need to be used to power some of the operational features of the Elite 615. Firstly, the rotameter backlighting is supplied with a short power cord that connects to the back of the rotameter housing and requires connection. Secondly, the ventilator power cord may also be connected here leaving the other four outlets for the operator's own requirements, eg. patient monitoring.

Preparing for use

Protocol for checking the Anaesthetic Machine

This is one of the College Policy Documents of the Australian and New Zealand College of Anaesthetists. The College Policy Documents set down the formal, council-approved guidelines for practice in a wide range of circumstances.

Hospitals require these documents to be readily accessible to relevant staff at all times for reference as required. The Policy Documents are also referred to by Government and other bodies, especially in the process of accreditation of health care facilities.

The College Policy Document 'Protocol for checking the Anaesthetic Machine' reads as follows:

1 Introduction

- 1.1 The regulated supply of gases and vapours for anaesthesia and the provision of controlled ventilation for the patient are the main functions of the anaesthetic machine or workstation. Because oxygenation and ventilation are essential for every patient and because even a brief failure to maintain them may cause irreparable harm, every machine must be regularly and thoroughly checked to ensure that all functions are correctly maintained.
- 1.2 There must be a reserve facility to maintain oxygenation and ventilation of a patient should failure of the primary systems occur.
- 1.3 To ensure early detection of any failure in the anaesthetic machine, it is essential that appropriate alarms are present in the machine and that there is monitoring of the state of the patient as specified in College Policy Document P18 Monitoring During Anaesthesia.
- 1.4 This protocol incorporates three components:
 - 1.4.1 Level One check. This is very detailed and is required a) on any new machine and b) on all machines after the required regular servicing. This check will usually be performed by the service person – whether from the equipment provider, or from the Bio Engineering Department.
 - 1.4.2 Level Two check. This should be performed at the start of each anaesthetic session.
 - 1.4.3 Level Three check. This should be performed immediately before commencing each subsequent anaesthetic.
- 1.5 Accreditation for checking the anaesthetic machine requires:
 - 1.5.1 Level One. Attendance at a manufacturer's course or a programme developed by the hospital's Anaesthesia Department in consultation with a qualified Biomedical Engineer.

- 1.5.2 Levels Two and Three. Checks must follow protocols specifically developed for the machine under test. All personnel must be trained in correct procedures and accredited to perform them by the Anaesthesia Department. The specific protocols should be attached to the machine.

2 Protocols

- 2.1 Level One check. This must be performed by on anaesthesia machines a) before they enter service and b) following all service inspections, which must be performed at regular and specified intervals.
 - 2.1.1 The Hospital, Anaesthesia Department or body responsible for the equipment shall keep a detailed record of the equipment and the checking procedures. This process requires that a checklist be maintained. The checklist will be based on manufacturer's recommendations. The protocols shall describe checking and calibration protocols and the intervals at which these must be performed.
 - 2.1.2 The anaesthetic machine must have a prominent label to advise of past service(s) and to indicate when the next check is due. This label must be visible to the anaesthetist.
 - 2.1.3 Gas Delivery System. The check shall include:
 - 2.1.3.1 Quantifying and minimising leaks
 - 2.1.3.2 Excluding crossed pipelines within the machine
 - 2.1.3.3 Ascertaining the correct functioning of non-return valves throughout the system
 - 2.1.3.4 Ascertaining the integrity of oxygen failure prevention and warning devices
 - 2.1.4 Anaesthetic Vapour Delivery System. The check shall include the accuracy of vapour output and delivery devices.
 - 2.1.5 It is essential to ascertain that the machine as supplied complies with the relevant Australian or New Zealand standard.
 - 2.1.6 The check specified above must be undertaken by a suitably qualified person, usually the service provider. The check must be recorded with inclusion of information as to what was checked, and by whom. After servicing, the particular checklist will relate to the actual service performed.
- 2.2 Level Two check. This check must be undertaken by a suitably qualified person (such as an anaesthetist, technician or nurse) in accordance with a protocol specific for the particular machine. Thus several different protocols may be required in a single hospital. These will serve to verify the correct functioning of the anaesthesia machine before it is used for patient care. Equipment required for the tests must be available on each machine.

2.2.1 High Pressure System.

2.2.1.1 Check oxygen cylinder supply. Ensure that cylinder content is sufficient for its intended purpose.

2.2.1.2 Check that piped gas supplies (where present) are at the specified pressures and that following high pressure system checks, the cylinders are turned off.

2.2.1.3 Confirm correct pipeline supply by using an oxygen analyser or multigas analyser distal to the common gas outlet.

2.2.2 Low Pressure System.

2.2.2.1 Check control valves and flow meters. Turn on each gas and observe the appropriate operation of the corresponding flow meter. Check the functioning of any interactive anti-hypoxic device

2.2.2.2 Check that any required vapouriser is present:

2.2.2.2.1 Check that adequate anaesthetic liquid is present.

2.2.2.2.2 Ensure that the vapouriser filling ports are closed.

2.2.2.2.3 Check correct seating and locking of a detachable vapouriser.

2.2.2.2.4 Test for circuit leaks for each vapouriser in both on and off positions.

2.2.2.2.5 Ensure power is available for electrically operated vapourisers.

2.2.2.3 Check for pre-circuit leaks using a method sensitive to 100mL/minute and appropriate for specific machine.

2.2.2.4 Breathing systems. Check the general status to ensure correct assembly and absence of leaks. The precise protocol will depend on the anaesthesia circuit to be used.

2.2.2.4.1 Perform leak test on the breathing system by occluding the patient connection, applying a fresh gas flow of 300mL/min and ensuring that a pressure of greater than 30cm H₂O is sustained.

2.2.2.4.2 In the circle system check its integrity and the functioning of unidirectional valves. This can be accomplished with a breathing bag on the patient limb of the Y-piece. Ventilate the system manually using an appropriate fresh gas flow. Observe inflation and deflation of the attached breathing bag and check for normal system resistance and compliance. Observe movement of unidirectional valves. Check function of adjustable pressure limiting (APL) valve

by ensuring easy gas spill through APL when the two breathing bags are squeezed.

- 2.2.3 Automatic Ventilation System. This should be checked according to the manufacturer's recommendations. This test protocol must be present on the machine. A test lung (such as a suitably compliant bag) may be used to check the function of the ventilator. Where practicable, gas flow should be reduced to check for leaks. The functioning of disconnection and high pressure alarms should be checked at this time.
- 2.2.4 Scavenging System. This should be checked after connection to APL valve and ensuring a free gas flow. If there is negative pressure in any part of the system, ensure that this does not lead to emptying of the breathing system. With the patient occluded, a full breathing system should not empty with the APL valve open.
- 2.2.5 Emergency Ventilation System. Verify the presence and functioning of an alternative method of providing oxygen and of controlled ventilation (such as self-inflating bag).
- 2.2.6 Other apparatus to be used. This should be checked according to specified protocols. Attention should be given to:
 - 2.2.6.1 Equipment used for airway maintenance and intubation of the trachea.
 - 2.2.6.2 Suction apparatus.
 - 2.2.6.3 Gas analysis devices.
 - 2.2.6.4 Monitoring equipment. Special attention should be paid to alarm limits and any necessary calibration.
 - 2.2.6.5 Intravenous infusion devices.
 - 2.2.6.6 Devices to reduce hypothermia during anaesthesia.
 - 2.2.6.7 Breathing circuit humidifiers.
 - 2.2.6.8 Breathing circuit filters.
- 2.2.7 Final check. Ensure vapourisers are turned off and that the breathing system is purged with air or oxygen as appropriate.
- 2.3 Level three check. Immediately before commencement of each anaesthetic, the anaesthetist should:
 - 2.3.1 Check a changed vapouriser using the protocol outlined in 2.2.2.2.
 - 2.3.2 Check a changed breathing circuit using the protocol outlined in 2.2.2.4.
 - 2.3.3 Check that equipment as specified in 2.2.6 is ready for the next case.

This policy document has been prepared having regard to general circumstances, and it is the responsibility of the practitioner to have express regard to the particular circumstances of each case, and the application of this policy document in each case.

Policy documents are reviewed from time to time, and it is the responsibility of the practitioner to ensure that the practitioner has obtained the current version. Policy documents have been prepared having regard to the information available at the time of their preparation, and the practitioner should therefore have regard to any information, research or material which may have been published or become available subsequently.

Whilst the College endeavours to ensure that policy documents are as current as possible at the time of their preparation, it takes no responsibility for matters arising from changed circumstances or information or material which may have become available subsequently.

Promulgated: 1984

Reviewed: 1990, 1996

Date of current document: Oct 1997

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Operational checklist procedure - pretesting

The procedure described below is one method of checking out the Anaesthesia machine that will detect almost any serious problem. (Special procedures may be required if the machine has been modified or has special medical equipment attached to it.)

The complete check-out procedure or its equivalent should be performed prior to the first time a machine is used each day. The main checks should also be carried out before each use of a machine on a different patient.

Ensure that an anaesthetic machine checklist is completed as the procedure is carried out, with all details submitted.

Comprehensive pre-use and or daily inspection procedure is a vital component of a complete anaesthesia patient safety program. It must not, however, be relied upon to prevent all equipment related complications. Some types of failures may not be detected without an exhaustive inspection protocol, and some equipment failures will inevitably occur during use.

There is no substitute for the continuous presence, vigilance and good judgement of a trained anaesthetist during anaesthesia and mechanical ventilation.

Before starting, be sure to have all necessary equipment

Start by verifying that the items necessary for the procedure are present. Appropriate emergency drugs and equipment should be close at hand. Be sure to check Laryngoscopes, as they are the equipment items that fail most frequently.

Visual examination

Visually examine the anaesthesia machine to identify obvious problems, such as broken flowmeter tubes or missing probes and breathing circuit connectors. Identify and log the machine serial number on the anaesthetic record as this may be needed if a problem were to be suspected. Visually check:

- > frame and castors
- > monitor shelf
- > console
- > working table
- > drawer – for easy movement

General preparation - precheck

1. Turn on the monitoring equipment and allow time to stabilise before calibrating.
2. Connect the scavenging system (all fittings should be sequential to prevent misconnection). Activate the system prior to carrying out any procedure and check to avoid polluting the Operating Room.
3. Check back bar integrity and Selectatec type mounts (see figure A3046). Clear all obstructions such as tubes and lines which could prevent correct Vaporiser mounting.
4. The seal between the vaporiser and the Selectatec mounting block is dependent on an 'O' ring retained at the bottom of each of the valve stems. It is therefore important that they be examined each time the vaporiser is removed from the anaesthesia machine.

Note: Make sure that only one 'O' ring be kept with each machine. Vaporisers not attached to the anaesthesia machine must be prevented from tipping over and should be emptied prior to being moved.

Cylinder Fitting

1. Check the cylinder for correct gas type.
2. Check that an intact Bodok seal is fitted to the yoke.
3. Remove the seal wrap from the cylinder valve.
4. Open the cylinder valve momentarily to blow any foreign matter from the gas outlet.
5. Insert the cylinder into the apparatus yoke, ensuring that the outlet orifice of the cylinder valve engages with the inlet of the yoke. Tighten the yoke clamping screw.

Component integrity

The apparatus is now ready for testing prior to use. All the components and assembly are fully tested prior to despatch from our works but may have loosened during transport. The following ensures components are secure.

1. Fit the gas cylinders or pipeline supply as detailed above.
2. Test the vaporiser, spacer cone, socket joints and safety valve for leaks by blocking the common gas outlet. Raise the pressure in the backbar using the oxygen flow control valve on the flowmeter until the patient safety valve pressure is obtained. Check for leaks from the outlet back to the flowmeter (a soapy solution can be used to test this).
3. Turn off all gas supplies (clean all traces of soap solution, if used, from the machine).

General

Assuming all hose connections have been established, oxygen flow should first be established at the rotameter. Bellows volume is then adjusted on the ventilator (see user manual for EV500 ventilator for further details), making sure the absorber is on and operational. The ventilator can then be turned on and set for the patient. The patient is then being ventilated.

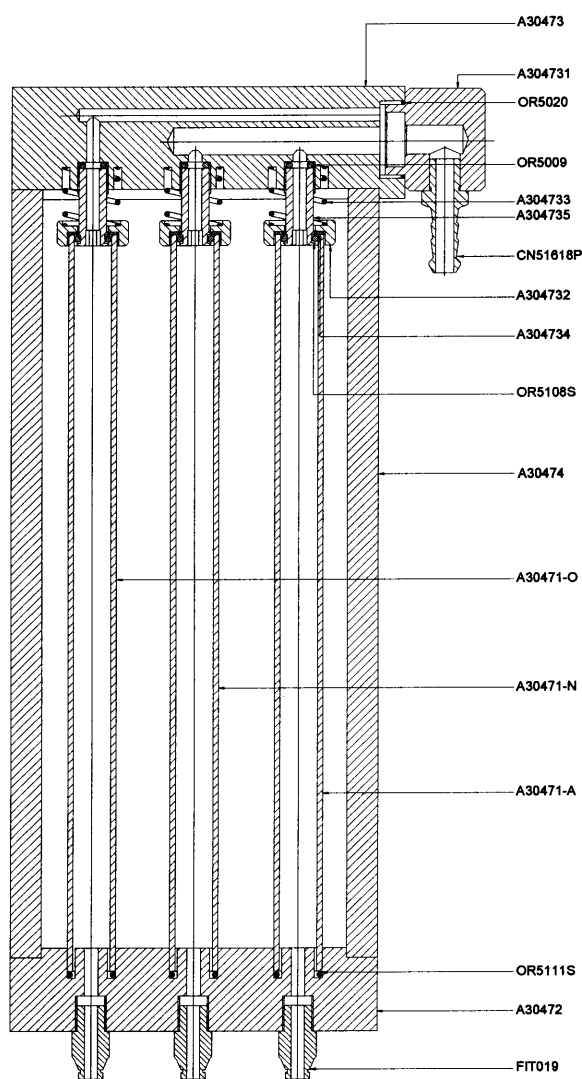
The first line of safety to the patient is the anti-hypoxic device. Once the nitrous oxide control is fully opened, only the oxygen control needs to be used. The anti-hypoxic device ensures that a nominal ratio of at least one part oxygen to three parts nitrous oxide is delivered at all times should nitrous oxide be used. The anaesthetist can choose to increase the amount of oxygen delivered, or reduce the amount of nitrous oxide, however the 1:3 ratio cannot be breached. Air is available at all times with or without the presence of oxygen, nitrous oxide, or both.

Should pipeline supply fail, the operator simply needs to reach through to turn on the supply from the appropriate compressed gas cylinder. The cylinder pressure gauge on the front of the machine will then register a reading.

The normal gas pressure range for the Elite 615 is 350 to 450 kPa.

Servicing

Flowmeters



Three tube flowmeter

Access to the flowmeter tubes is simply a matter of removing the grub screw at the top front of the flowmeter and lifting the protective acrylic cover up and out. Take hold of a flowmeter tube, and lift it gently until it clears the Base block. The tube is then angled outward carefully and pulled down and out.

Service replacement kit Part No A3047-99 should be replaced at least once a year.

Gas manifold

The gas manifold is at the rear of the machine.

Main regulators

The regulator, gauge and yoke are assembled in line to reduce the risk of high pressure leaks. The brass yoke bolt (RG203) has the Bodok seal (RG204) attached

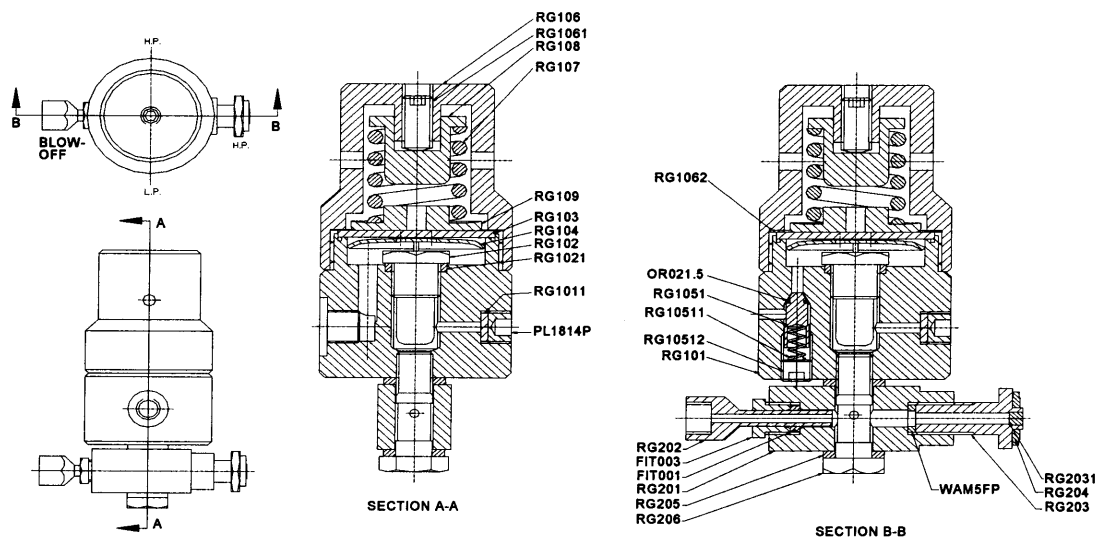
to it and is fitted with a sintered bronze filter (RG2031). Bodok seals must be examined and replaced if necessary every time the cylinders are replaced.

Servicing the regulator

It is recommended that the diaphragm (RG103) be replaced every 12 months and a total rebuild kit (RG 1-99) is available and should be replaced on a 2 yearly basis.

The kit consists of new diaphragm, capsule, dowty seals and all 'O' rings. Springs should be also be replaced every 2 years.

First stage pressure regulator



Anti-hypoxic device

The device itself is tamper proof and cannot be interfered with by the operator, but is easy to adjust and calibrate by trained technical staff.

Technical description of the anti-hypoxic device

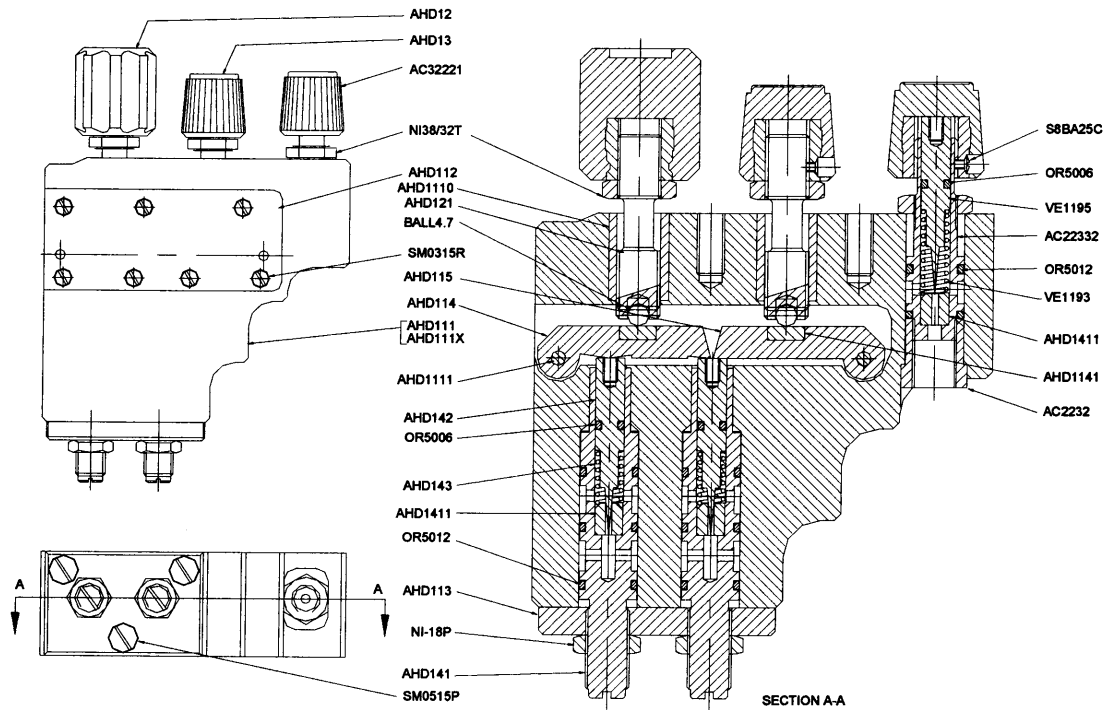
The device is factory set to deliver 25% ($\pm 5\%$) nominal oxygen flow. Medical air flow (if fitted) is independent of the device and is not considered a hypoxic gas. It cannot dilute the mixture to less than 21% oxygen flow.

A needle valve is located behind each of the oxygen and nitrous oxide control knobs. Each of the needle valves may be depressed by a brass arm which in turn operates a control lever. When the control knob is closed, this depresses the lever which in turn depresses the needle valve, thereby closing it.

If the oxygen knob is opened, the lever behind the nitrous oxide knob continues to block the nitrous oxide needle valve. As the nitrous oxide control is opened, the needle valve will only open as far as the oxygen lever will allow it. The nitrous oxide knob is only capable of controlling the arm above the nitrous oxide needle valve whereas the oxygen arm is capable of controlling the oxygen needle valve as well as the nitrous oxide valve. This means that when the oxygen control is closed, it automatically closes the flow of nitrous oxide.

The distance from the fulcrum point of the oxygen arm to the oxygen needle valve is $\frac{1}{3}$ the distance from the fulcrum point of the same arm to the nitrous oxide needle valve. This ensures that as oxygen is closed the flow of nitrous oxide is also closed, in a ratio of 1:3.

Due to differences in gas densities and machining tolerances, the second stage regulators are used to achieve the final desired settings.



Anti-hypoxic device

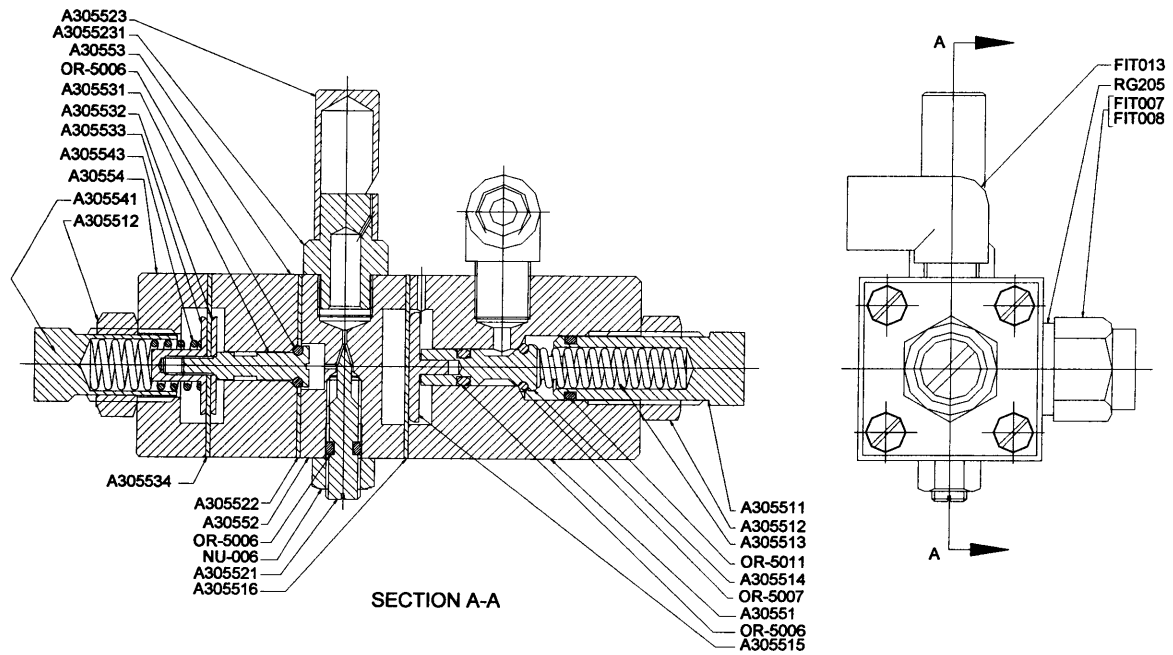
Oxygen failure warning device

It is recommended that the oxygen failure warning device have a new service kit replacement at least once a year (part number A3055–99).

After replacement kit (consisting of 2 springs, diaphragms and 'O' rings) has been fitted, the unit has to be calibrated as follows:

1. Attach the test gauge to the oxygen test point in the console.
2. Disconnect the oxygen pipeline from the wall outlet.
3. Shut off all flows.
4. Fit a full oxygen cylinder to the machine and open the cylinder slowly to allow gradual pressure build up.
5. Adjust the main oxygen regulator until the pressure on the test gauge is 220kPa.
6. Loosen lock nut A305512 and adjust the oxygen activating pressure bolt A305541 until the whistle starts to sound (ensure that oxygen is present at the flowmeter).
7. Increase the main regulator pressure gradually until the whistle stops sounding. Note the pressure on the test gauge which should be below 300kPa.
8. Reset the oxygen regulator pressure to 220kPa.
9. Remove the test gauge from the oxygen test point and fit it to the nitrous oxide test point.
10. Open the nitrous oxide cylinder and check that nitrous oxide cannot flow if the control valve is opened.
11. Loosen lock nut A305512 on the nitrous oxide side and adjust bolt A305513 until the flow just starts.
12. Fit the test gauge to the Oxygen test point and decrease the oxygen pressure to 200kPa.
13. Nitrous oxide flow must stop at approximately 210kPa. Adjust if necessary.
14. The whistle pitch and loudness may be adjusted by means of screw A305521.

Carry out the test as described in Testing section.



Oxygen failure warning device

Testing

Gas supply circuit test

Before any tests are carried out, it is important to ensure that the cylinders are not leaking around the main valve or the Bodok seal.

Oxygen circuit (cylinder)

1. Connect the cylinder to the yoke of the pin-index unit.
2. Check that the oxygen flow control valve is closed – do not force in any direction.
3. Turn cylinder ON and check contents gauge – do not use if less than half full.
4. Turn cylinder OFF and check that the gauge does not drop more than one division in one minute. Should the gauge drop more than one division in one minute, locate the leak and rectify.
5. Ensure that no leaks are present around the cylinders main valve or Bodok seal.

Oxygen circuit (pipeline)

6. Check as for item 1.2.
7. Connect oxygen pipeline hose to suitable supply and to the apparatus.
8. Check that the pressure is 400kPa.
9. Check for leaks and rectify should they exist.

Nitrous oxide (cylinder)

10. Connect nitrous oxide cylinder to yoke of pin index unit.
11. Check that nitrous oxide flow control valve is closed.
12. Turn on nitrous oxide cylinder and check relative gauge rise.
13. Turn off cylinder and check that the gauge pressure does not drop more than one division in a minute. Test as in 4.

Nitrous oxide (pipeline)

14. Check that nitrous oxide flow control valve is closed.
15. Connect nitrous oxide pipeline hose to suitable supply and to the apparatus.
16. Check that pressure is 400kPa.
17. Test as in 13.

Flowmeters

- 1.1 One by one, turn on the gas supply for gases displayed on the flowmeter.

- 1.2 Rotate all the flow control valves anti-clockwise to open. Ensure that the appropriate bobbin or ball rotates freely and that the rise and fall of the bobbin or ball is free relative to the valve position.
- 1.3 Close the flow control valve and ensure that the bobbin or ball returns to the base of the tube.
- 1.4 Repeat this procedure for each gas, turning off gas supply after use.

NOTE Use the oxygen analyser to ensure that no cross connection of gases has occurred.

System

1. Connect a manometer with Tee piece to the common gas outlet and occlude the other end of the Tee with the palm of the hand.
2. Open the oxygen flow control valve carefully to 100mL. Flow is reached. The manometer gauge should indicate at least 40cm/H₂O pressure, if this pressure cannot be achieved a leak exists and should be rectified.
3. Repeat test with vaporiser fitted, and test with vaporiser in the ON and OFF positions.

WARNING If the system is gas tight, higher pressures may be achieved and these could damage the manometer gauge if care is not taken.

Emergency Oxygen Flush

4. Ensure that oxygen supply is ON. Depress the flush button to check that flow exists.
5. Connect a 2 litre bag to the common gas outlet, and using a stop watch to time, depress the flush button. Ensure that the bag fills within three seconds. This ensures flows of 35L/min.

Oxygen Warning Device

6. Turn ON both the oxygen and nitrous oxide supply (use the pipeline Emergency Oxygen Flush).
7. Set a flow of 1 litre of oxygen and a flow of 3 litres of nitrous oxide on the appropriate flowmeters.
8. Turn OFF the oxygen supply and observe the pipeline gauge pressure of the oxygen supply.
9. When the pipeline pressure drops to approximately 220kPa the whistle should start to sound and shortly after the nitrous oxide flow should cut off (bobbin or ball drops to the base of the flow tube).
10. The oxygen flow must be maintained and the whistle should sound for at least 7 seconds. It is advisable to have an oxygen analyser fitted to the common gas outlet in order to ensure that the oxygen percentage does not drop to below 21% for the duration of the warning.

11. Reinstall oxygen supply and the nitrous oxide flow should resume and the whistle is silenced.
12. If the test is satisfactory, turn off all flow control valves and their relative supplies.

Anti-Hypoxic Device

13. With all gas supplies connected, attach oxygen analyser to the common gas outlet.
14. Turn ON air (if fitted) and open and close flow control valve. The air flowmeter bobbin should rise and fall in the normal way (air is not a hypoxic gas).
15. Turn ON oxygen and nitrous oxide supplies.
16. Ensure that the oxygen flow control valve is closed and that no oxygen flow is registering in the oxygen flowmeter tube (bobbin is at the base of the tube).
17. Open the nitrous oxide flow control valve several turns and observe the nitrous oxide flowmeter tube. No flow should register (the device prevents flows of 100% nitrous oxide).
18. With the nitrous oxide flow control valve left open and with NO nitrous oxide flow, open the oxygen flow control valve until 1 litre oxygen is flowing. Note that nitrous oxide is now flowing at around 3L/min, and the oxygen analyser is at $\pm 25\%$ oxygen flow.
19. Gradually reduce the flow of oxygen and note that the nitrous oxide is simultaneously reduced while the oxygen percentage remains above 21%.

NOTE The anti-hypoxic device is not a mixer - the function of the device is to prevent inadvertent delivery of hypoxic mixtures. The oxygen percentage should be set $\pm 5\%$ (21% to 30%). No nitrous oxide flow should be able to be set without first setting an oxygen flow.

Setting and calibrating the anti-hypoxic device

WARNING The anti-hypoxic device cannot recognise or differentiate between gases. It is therefore imperative that a calibrated oxygen analyser is used when setting and calibrating, and when in use with a patient.

The device is calibrated to deliver non-hypoxic mixtures of oxygen and nitrous oxide at a preset percentage of oxygen throughout the normal working range. The percentage may vary above or below the setting of the nominal 25% due to various factors, but it is normally set so that the oxygen is never less than 21% in the mix.

Setting

With the correct gases connected to the appropriate fittings of the anaesthesia machine and to the device:

1. Turn the oxygen flow control clockwise to fully OFF (but do not use force).

2. Turn the nitrous oxide flow control anti-clockwise to fully ON (again without force).
3. Set the second stage regulators to deliver maximum pressure by turning fully clockwise.

Zero adjust the needle valves

4. Connect a flexible tube to the oxygen outlet port of the device and immerse the other end of the tube into a container of water.
5. Loosen the lock nut of the oxygen needle valve cartridge, and unscrew the stud just until a leak appears, then screw the stud back in to just shut off the leak. Do not over adjust it.
6. Repeat the above procedure for the nitrous oxide needle valve cartridge.
7. Tighten the lock nuts, being careful not to disturb the settings.
8. Zero adjust is now complete.

Setting to deliver the correct percentage

9. Shut off both the oxygen and nitrous oxide second stage regulators.
10. Open the oxygen flow control valve 3 or 4 turns (1080 or 1440 degrees), leaving the nitrous oxide fully ON.
11. Turn the oxygen second stage regulators ON (clockwise) slowly until full flow is registered on the flowmeter. Lock the second stage regulator.
12. Using the control valve, turn the oxygen flow down to 1L/min.
13. Turn the nitrous oxide second stage regulator ON (clockwise) slowly until the flowmeter registers 3L/min. Lock the second stage regulator.
14. Test the flows throughout the whole range by opening the oxygen flow control only (nitrous oxide should already be fully open). With the oxygen analyser still connected to the common gas outlet, the oxygen percentage should not be less than 21% throughout the range.

Minor adjustments can be made using the second stage regulators.

Oxygen Failure Warning Device with Nitrous Oxide Cut-off

1. With all the flow controls fully closed and oxygen supply turned OFF, depress the emergency oxygen flush button to deplete all the oxygen from the system. The visual indicator (Visiwink) on the front of the console should now be red in colour.
2. Restore the nitrous oxide supply only and turn on the flow control. There should be no nitrous oxide flow.
3. Close the nitrous oxide flow control.
4. Restore oxygen supply, and the whistle should sound for a short duration. The Visiwink should turn green, advising that the oxygen supply is now ON.

5. Attach the oxygen analyser to the common gas outlet and calibrate to 21%, allowing time to settle.
6. Set oxygen flow to 1L/min, and observe that the O₂ analyser now registers 100% oxygen.
7. Set the nitrous oxide flow to 3L/min and note that the O₂ analyser now shows 25%.
8. Shut off all oxygen supplies (cylinder and pipeline).
9. Depress the emergency oxygen flush button gently until the whistle just starts to sound then release.
10. The nitrous oxide should cut off shortly after the whistle sounds. The continuously flowing oxygen should never drop below 21% and should rise to near 100%.
11. The whistle should be sounding until the oxygen is totally depleted and the Visiwink indicator turns red.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

Troubleshooting

Leaks

The problem of leaks anywhere in the patient circuit can be difficult to solve and can occur anywhere from the rotameter block forward to the patient circuit. This includes:

- > vaporiser mounts
- > vaporisers themselves
- > how the vaporisers are mounted
- > the common gas outlet connection
- > the absorber
- > the patient circuit itself

It is important to go through a logical test procedure. Check sheets published by the Australian College of Anaesthetists (supplied) help by suggesting test procedures.

If a vaporiser or absorber or circuit is changed, it is important *not* to assume there is no leak.

In the event of a major leak, the bellows of the ventilator will stop rising and start to fall. The monitor display will start to flash and the low pressure light will illuminate. 15 seconds later an audible alarm will sound which can be silenced by touching the 'off/reset' button on the ventilator, muting the alarm for 60 seconds.

Once the leak problem has been solved, and there is sufficient difference between the end inspiratory pressure and the end expiratory pressure, (6cm H₂O) or the bellows are refilled, the ventilator¹ will cancel all alarms and will begin to cycle normally.

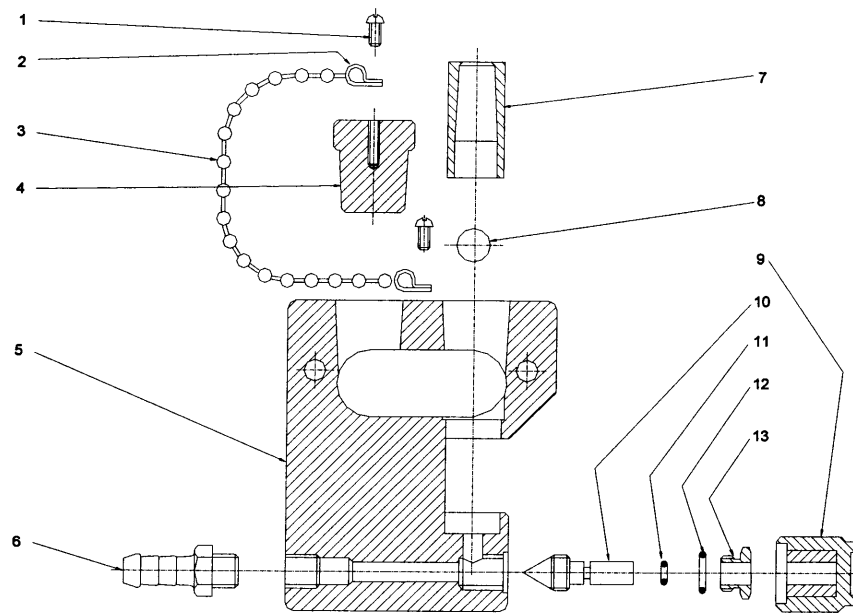
¹ For further details regarding the EV500 ventilator, see the user manual.

Assembly Drawings

The following assembly drawings are included to enable user and service personnel to identify parts and assemblies for servicing and maintenance requirements.

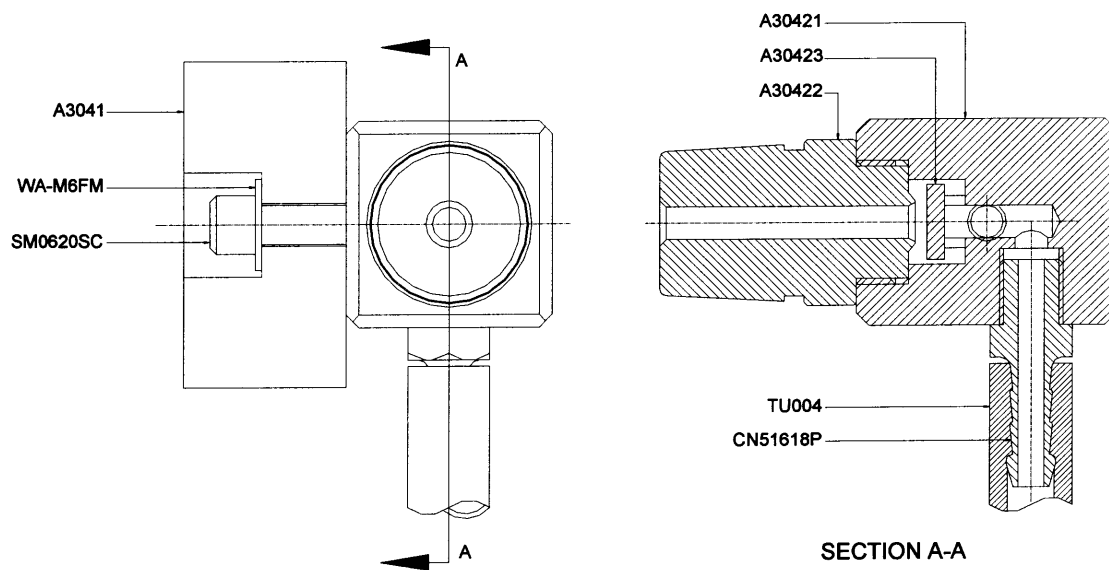
Included are:

- > Scavenging Block
- > Sub-assembly fresh gas non-return valve
- > Selectatec
- > 3 tube rotameter
- > Oxygen failure alarm
- > Sub assembly ventilator cut-off valve
- > Console assembly
- > Patient block
- > Anti-hypoxic device



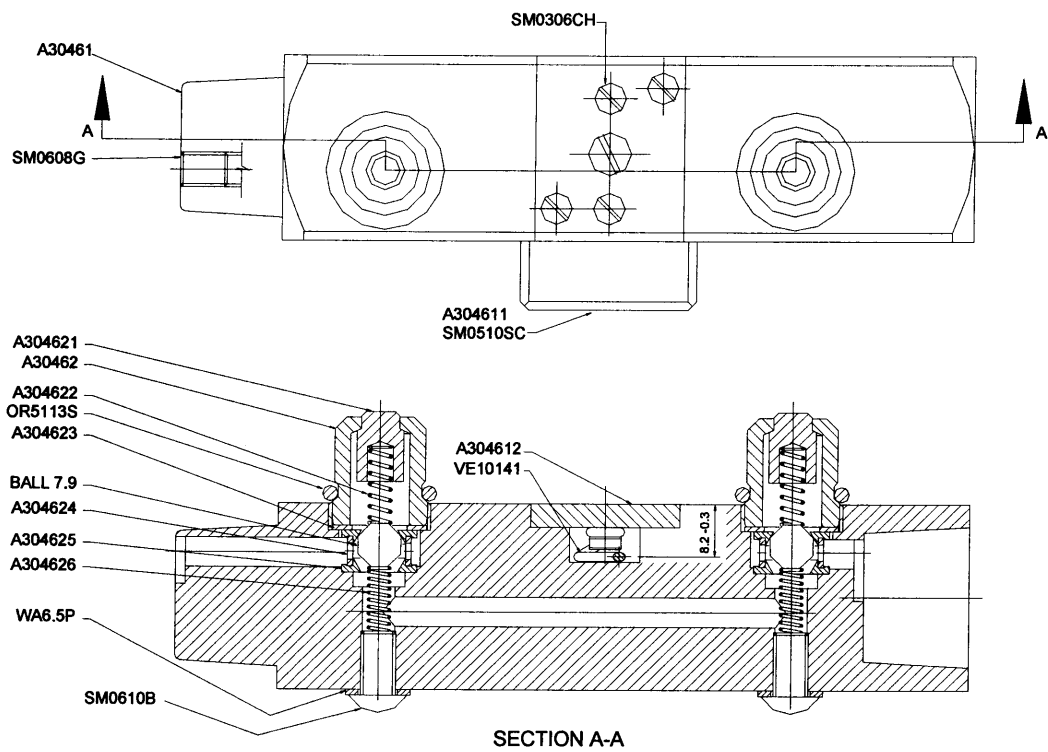
| | | | | | |
|---|--------------------|----------|----|----------------|----------|
| 1 | Screw | SI1814R | 8 | Ball | BALL9.5S |
| 2 | Clip/Chain | CH-CLIP | 9 | Knob/Suction | A302731 |
| 3 | Chain/Mini | CHAIN-01 | 10 | Needle/Suction | A302732 |
| 4 | Plug/19 Scavenging | EX019PL | 11 | "O" Ring | OR5006 |
| 5 | Block/Scavenging | A30271 | 12 | "O" Ring | OR5011 |
| 6 | Connector/Tube | CN51618P | 13 | Bush/Needle | A302743 |
| 7 | Flow Tube | A30272 | | | |

Scavenging Block

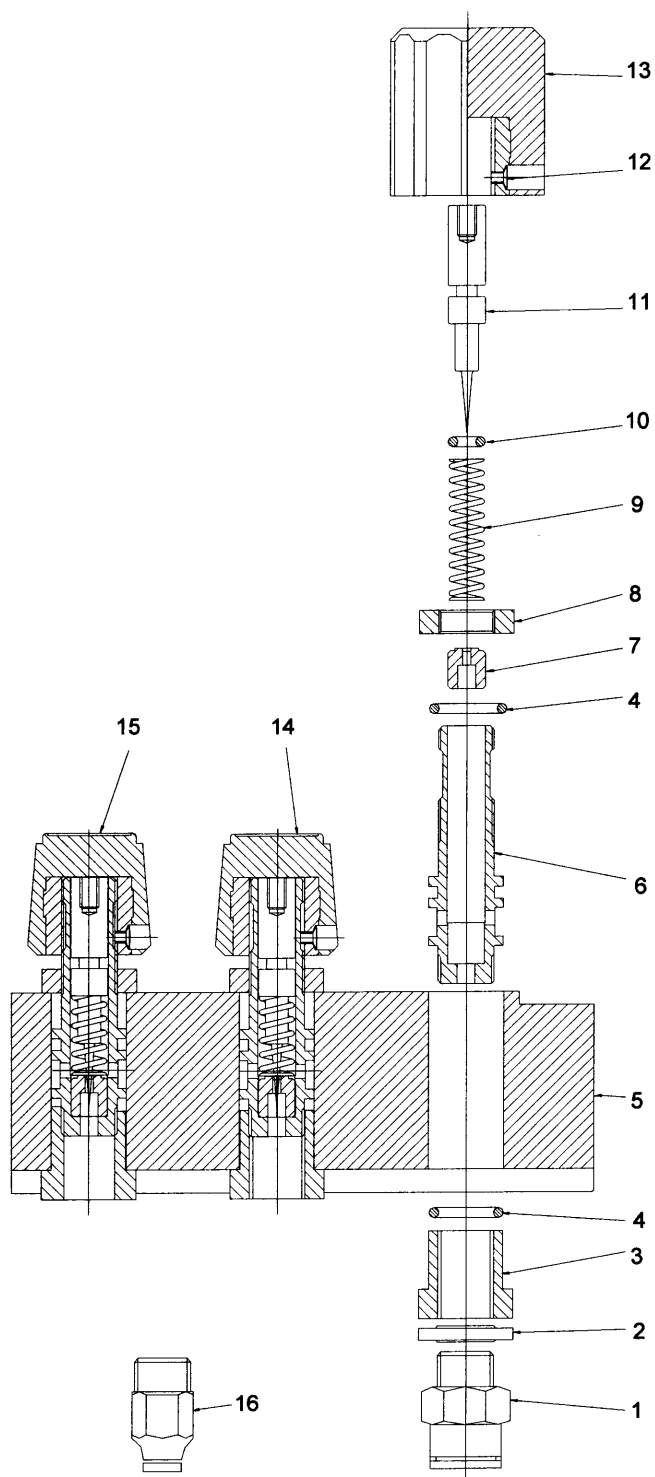


Sub-assembly fresh gas non-return Valve

Selectatec

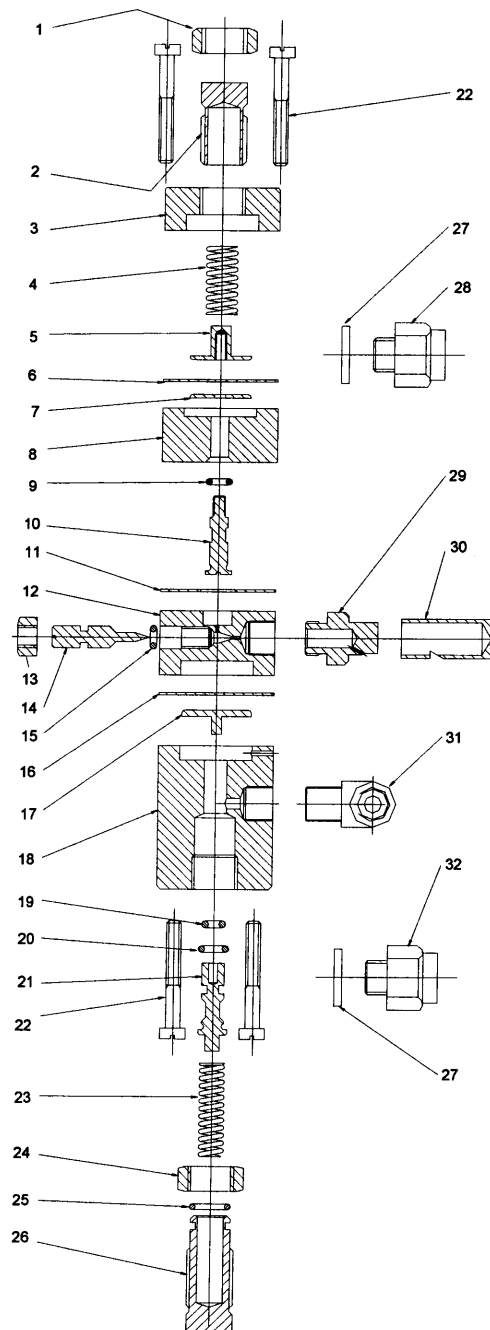


Selectatec

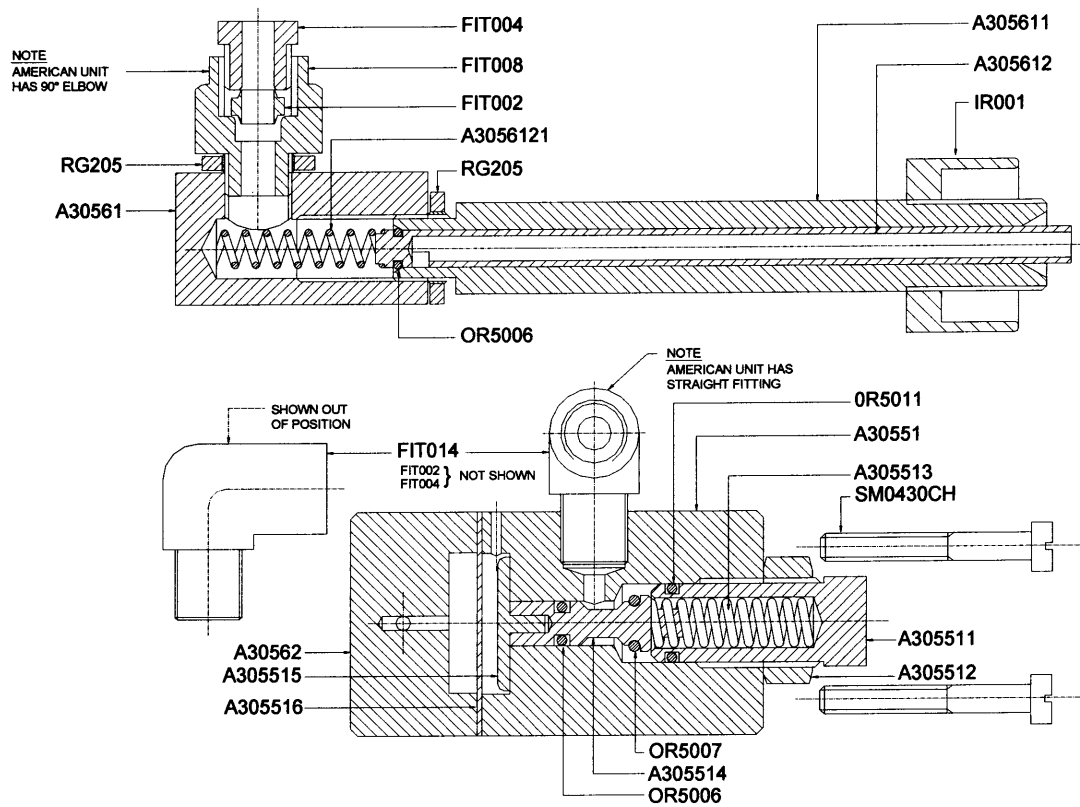


3 tube rotameter

| | |
|-----------------------------------|----------|
| 1 Nut/Lock | A305512 |
| 2 Stud/Oxy Adjustment | A305541 |
| 3 Block/Oxy Adjustment | A30554 |
| 4 Spring/Oxy Adjustment | A305543 |
| 5 Nut/Whistle | A305533 |
| 6 Diaphragm/Oxy | A305534 |
| 7 Washer/Whistle | A305532 |
| 8 Body/Oxy Failure Alarm | A30553 |
| 9 'O' Ring | OR5006 |
| 10 Spool/Whistle | A305531 |
| 11 Gasket/Whistle | A305522 |
| 12 Block/Whistle | A30552 |
| 13 Nut/Lock | NU006 |
| 14 Needle/Whistle Adj. | A305521 |
| 15 'O' Ring | OR5006 |
| 16 Diaphragm/N2O | A305516 |
| 17 Spool Actuator/N2O | A305515 |
| 18 Body/N2O Fail Alarm | A30551 |
| 19 'O' Ring | OR5006 |
| 20 'O' Ring | OR5007 |
| 21 Spool/N2O Valve | A305514 |
| 22 Screw | SM0430CH |
| 23 Spring/N2O Adjustment | A305513 |
| 24 Nut/Lock | A305512 |
| 25 'O' Ring | OR5011 |
| 26 Stud/Adjustment N2O | A305511 |
| 27 Seal/Dowty | RG205 |
| 28 Fitting/Straight M-Adaptor 1/4 | FIT008 |
| 29 Stud/Whistle | A3055231 |
| 30 Whistle | A305523 |
| 31 Fitting/Male L-Adaptor 3/16 | FIT013 |
| 32 Fitting/Str M-Adaptor 3/16 | FIT007 |

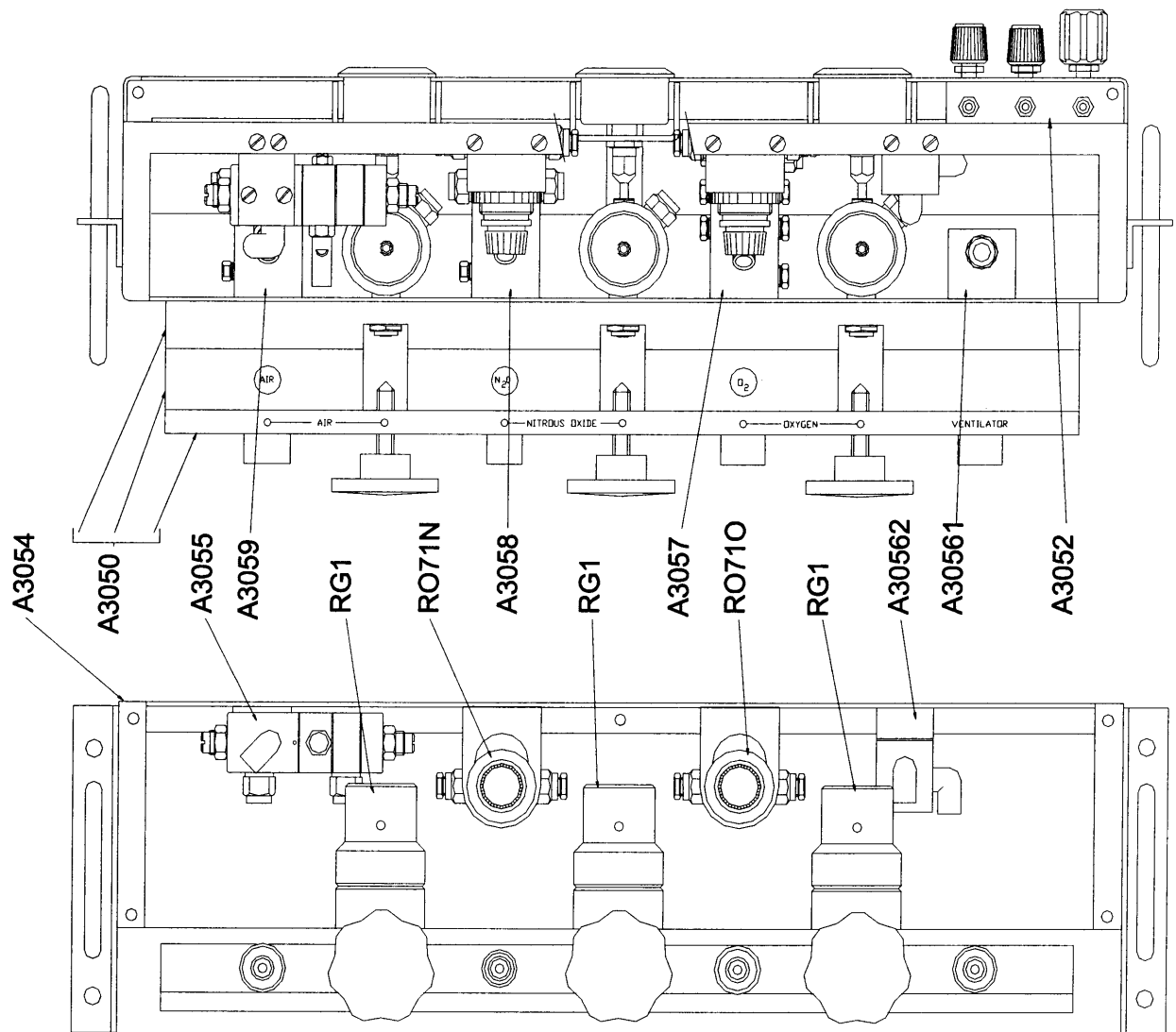


Oxygen failure alarm

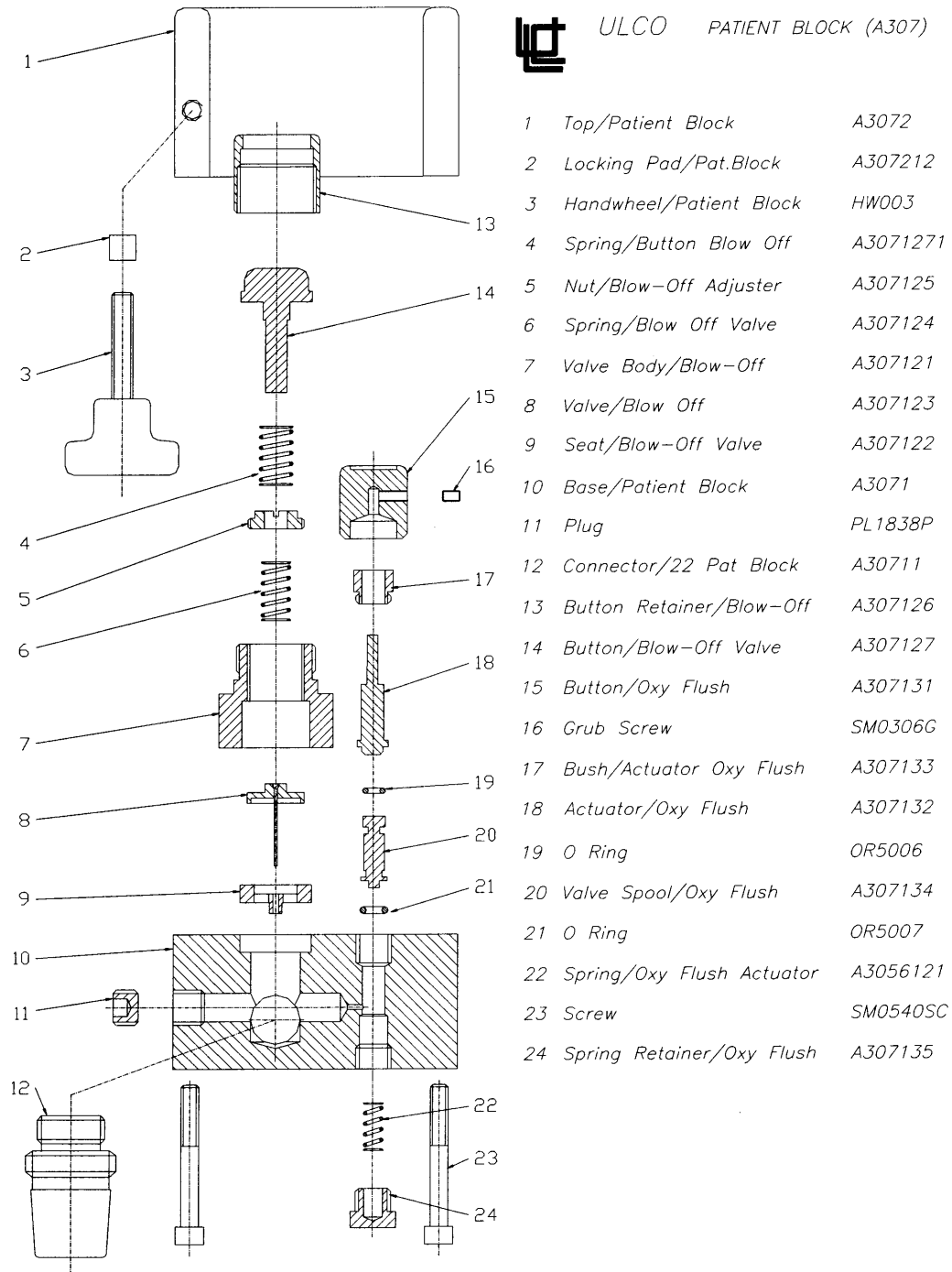


Sub-assembly Ventilator Cut-off Valve

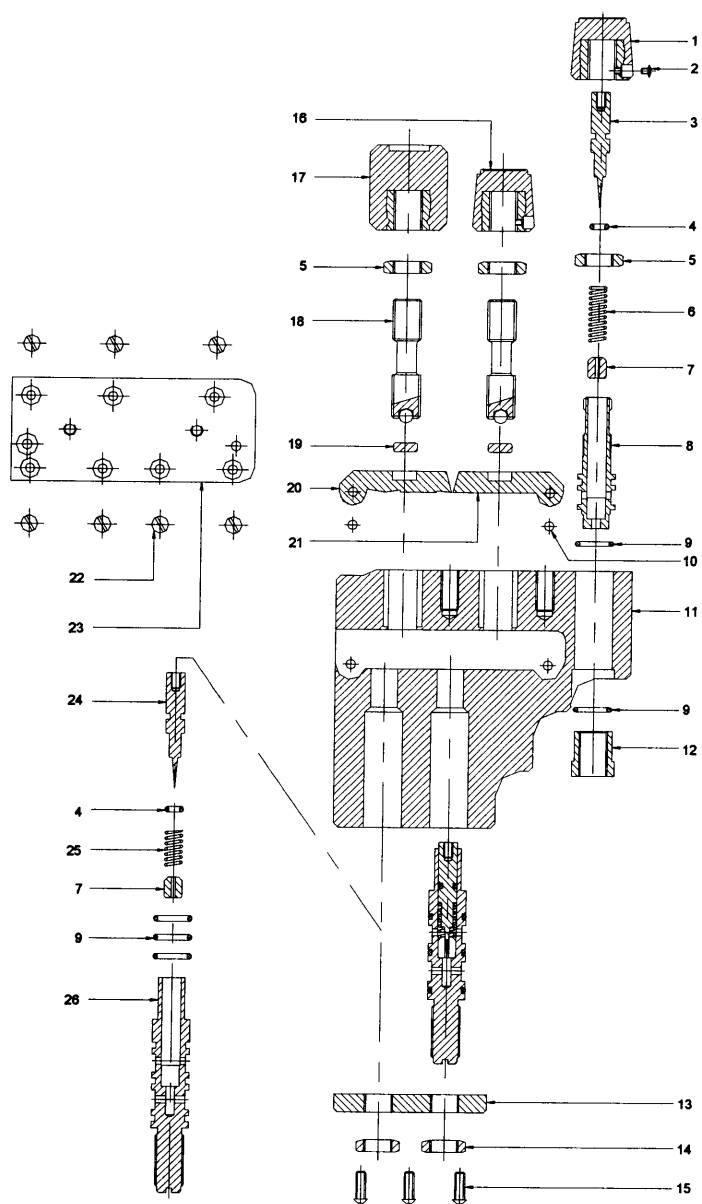
Console Assembly



A3051 (FRONT COVER ASSEMBLY) AND A3053



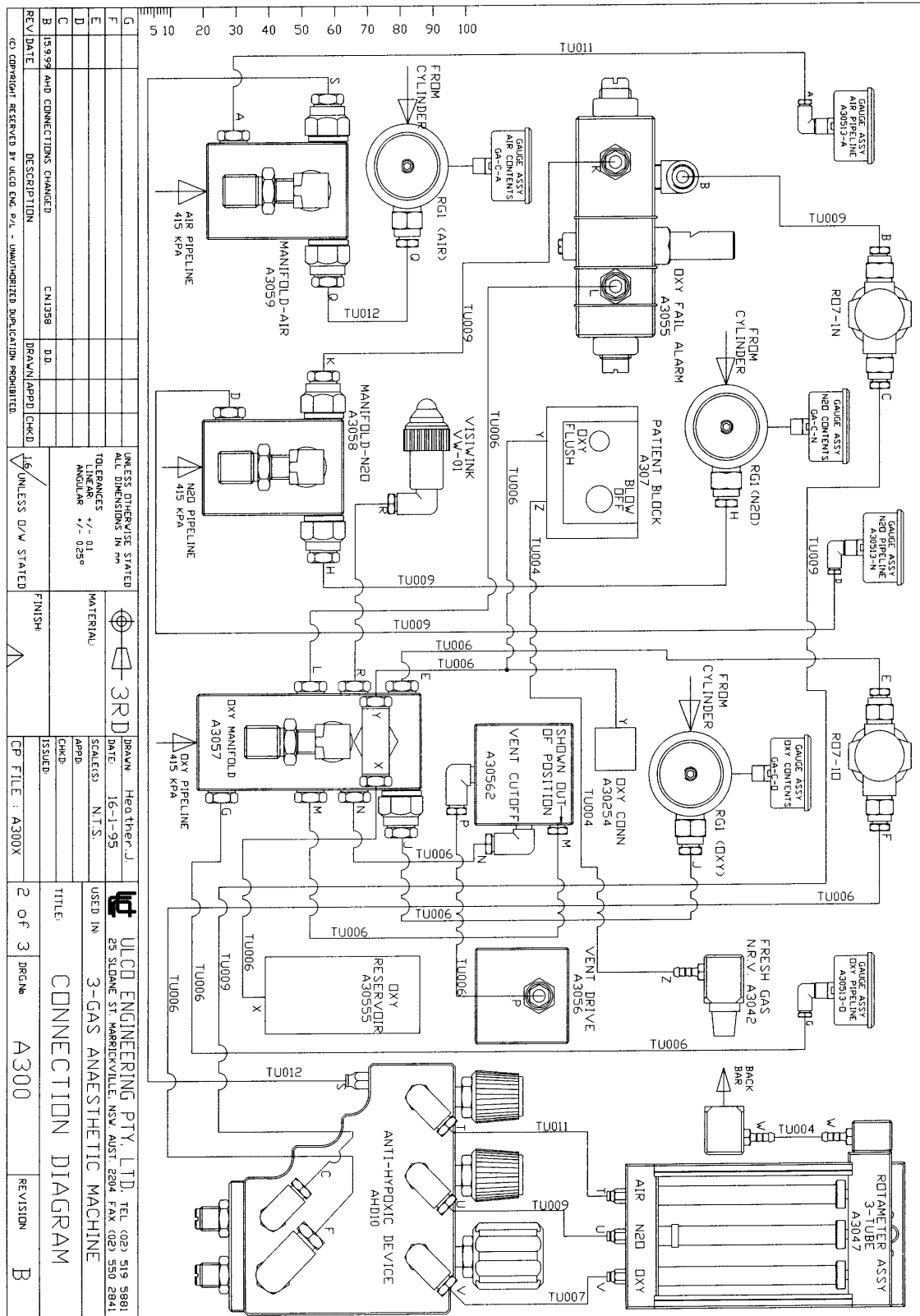
Patient block (exploded)



Anti-hypoxic device

ULCO ANTI-HYPOXIC DEVICE (AHD10)

| | | | |
|--------------------------|---------|-------------------|---------|
| 1 Knob/Air | AC32221 | 15 Screw | SM0515P |
| 2 Screw | SBB425C | 16 Knob/Nitrous | AC22341 |
| 3 Needle/Valve | VE1195 | 17 Knob/Oxy | AC22331 |
| 4 O Ring | OR5006 | 18 Stud/Adjusting | AHD121 |
| 5 Nut | N38/32T | 19 Lever/Insert | AHD1141 |
| 6 Spring/Needle Valve | VE1193 | 20 Lever/Oxy | AHD114 |
| 7 Seat/Valve | AHD1411 | 21 Lever/N2O | AHD115 |
| 8 Body/Rot Needle Valve | AC22332 | 22 Screw | SM0315R |
| 9 O Ring | OR5012 | 23 Cover/Lever | AHD112 |
| 10 Pin | AHD1111 | 24 Needle/Valve | AHD142 |
| 11 Body | AHD111 | 25 Spring/Valve | AHD143 |
| 12 Fitting/Valve Adaptor | AC2232 | 26 Body/Valve | AHD141 |
| 13 Plate/Valve | AHD113 | 27 Insert | AHD1110 |
| 14 Nut | N18P | | |



Specifications**Physical**

Height 1370 mm
Width 720 mm
Depth 1370 mm
Weight 70 kgs (not including vaporiser or absorber)

Standard items

Gas circuits Pipeline oxygen and nitrous oxide (400 kPa) with air gauge as an option
Backbar assembly All back bar components fitted with 23 mm connectors
Flowmeter 2 gas (oxygen and nitrous oxide)
Vaporiser mounts Selectatec type x 2
Oxygen failure Warning device with audio-visual warnings
Drawer units 1 x large drawer 150 mm deep & 1 x small drawer 100 mm deep
Common Gas outlet:
Emergency O₂ flush 45 L/min flow
Patient safety valve ... 50 cm/H₂O
Male connector 22/15 mm

Optional Items

Additional drawers Maximum two (2) small drawers, total of four (4)
Vaporisers Halothane, Ethrane and Isoflurane (Selectatec type)
3 gas flowmeters With air flowmeter tube
Anti-hypoxic device Prevents delivery of hypoxic mixtures, maintains 25% O₂ flow
MCS valve ADE switch selects Bain or Lack configuration
Paediatric circuit Jackson Rees system
Magill circuit For spontaneous breathing anaesthesia
Bain adaptor For controlled breathing anaesthesia
Bain circuits Co-axial circuits for use with Bain adaptor
CO₂ absorber 1 or 2 kg capacity

Terms and conditions

All merchandise to be returned must have prior written authorisation by Ulco, and a valid Return Goods Authorisation (RGA) number shall appear on the shipping label, packing slip, purchase order and any other related documents.

When requesting authorisation to return material, the following information should be provided:

1. Customer purchase order and date.
2. Ulco invoice number and date, and method of shipment (available form delivery document).
3. Part number, quantity, and description of goods to be returned.
4. Reason for returning goods.

The following are acceptable reasons for return of goods:

1. Material failure within warranty period.
2. Service or repairs.
3. Ordered in error or duplication of order.

Any shipping errors or shortages of goods must be reported to Ulco within seven (7) days of receipt of such goods.

Goods are subject to any terms of any applicable warranty. Premature failure of products shall be accepted for return at Ulco's discretion, and only during the warranty period.

Goods to be returned which are not under warranty should have been purchased within thirty days of request for return, and returned within thirty days after request. Goods shall be returned unused, and in Ulco containers. Goods may be subject to a 20% restocking charge, with the exception of goods failure within the warranty period or due to Ulco error.

The following merchandise is not eligible for return, unless proven defective:

1. Sterile material, unless shipped in error by Ulco.
2. Rubber and plastic components that have been used.
3. Specially ordered or produced items.
4. Goods that have been altered or abused.

All items to be returned shall be shipped, including RGA number, to:

Ulco Medical
25 Sloane St
Marrickville NSW 2204
Australia

GOODS RETURN AUTHORISATION

RGA Number

Customer Details

Name

Address

State/Country

Postcode

Returned Product

Date of Purchase

Date of return

Reason for returning goods (please give a short description of the fault):

Signature

Return to

ULCO Medical
25 Sloane St
Marrickville NSW 2204
Australia

Always obtain RGA number from ULCO prior to returning goods.

