We all know that a warm animal recovers from anaesthesia more quickly and easily. Judicious use of the heated circuits and warm air blanket system found in this section helps promote this.

We list a range of standard circuits and replacement circuit tubing, alongside the Midmark anaesthetic machines.

We’re happy to arrange a free trial of the warming systems – all you pay for is any consumables used.

Call us to request a trial, or if you need any other help.
Low-Flow Anaesthesia

Lynne Hughes MVB, DiplECVAA, DVA, FCARCS, MRCVS, University College Dublin

The use of breathing systems containing a method of carbon dioxide absorption (i.e. soda lime canister) can considerably reduce the cost of inhalation anaesthesia in small animal practice. This is because, when carbon dioxide is removed from the exhaled breath, the remainder of the respiratory gases may be recycled and inhaled repeatedly.

The advantages of absorption of carbon dioxide include decreased fresh gas requirement, decreased expense of volatile agent, decreased environmental pollution and decreased loss of heat and moisture from the patient.

There are some disadvantages to the use of soda lime including that it may become exhausted, leading to hypercarbia. The material can be dusty and caustic and care should be taken with handling. The granules add some resistance to the work of breathing, and under certain circumstances the reaction of carbon dioxide with soda lime may contribute to hyperthermia.

Breathing systems with soda lime are of two main types: circle and to-and-fro. The circle system is superior as carbon dioxide absorption is more efficient and the design is less cumbersome. In particular the circle offers the following advantages over the to-and-fro:

- The canister is positioned vertically, therefore channelling of gases through areas without absorbent does not occur.
- The canister is separated from the patient by a length of tubing reducing the possibility of caustic soda lime dust reaching the respiratory tract.
- The tubing does not exert appreciable drag on the endotracheal tube.
- The pressure relief valve is situated remotely from the patient, allowing ease of manipulation.
- Dead space is small and does not increase with duration of anaesthesia.
- One-way valves ensure gas moves in one direction only, rather than forwards and backwards.
- The risk from hyperthermia is reduced, as heat generated by the absorption of carbon dioxide may be dissipated by the breathing tubes.

All circle systems depend on functioning soda lime and one-way valves for correct operation. If these criteria are met then the system allows rebreathing of exhaled gases, from which carbon dioxide has been removed by the absorbent. Oxygen flow may be reduced to that required by the body for cellular metabolism. This is called 'low-flow' anaesthesia and is the most cost-effective way to deliver inhalation anaesthesia.

The exact arrangement of a circle system varies, however the main components include:
- canister containing soda lime, for absorption of carbon dioxide
- two one-way valves, to ensure uni-directional gas movement.
- inspiratory breathing tube (limb) and expiratory breathing tube. These are normally arranged in parallel, but may also have the inspiratory limb inside the expiratory limb, as in the F-circuit.
- Y-piece which connects to both breathing tubes and to the endotracheal tube. This should be the only source of dead space gas.
- reservoir bag. This should be large enough to hold 2-3 times maximal tidal breath of the patient.
- pop-off, pressure relief or scavenging valve, to prevent build up of pressure in the system and allow effective scavenging of waste gases.
- pressure manometer. This is a useful addition, especially when carrying out IPPV.

Low-flow Anaesthesia

Oxygen required for cellular metabolism in anaesthetised dogs and cats is reported to be from 2-7 mL/kg-1min-1 and depends on metabolic rate, age, temperature etc. A safe (over)-estimate is 10 mL/kg-1min-1. This allows a small amount of gas to be vented through the partially open pressure relief valve, but still retains economy and results in minimal atmospheric pollution. This flow may be used during periods when anaesthetic depth is stable and no rapid changes in vapour concentration are anticipated. However, as it takes considerable time to change the anaesthetic concentration within the breathing system, a higher flow, for example 100 mL/kg-1min-1, may be used from time to time.

During maintenance periods, open/close the pressure relief valve slightly and/or alter the oxygen flow to ensure there is adequate gas in the reservoir bag at all times. If the reservoir bag empties during the course of an anaesthetic, it should be refilled by increasing the gas flow at the flowmeter. Using the oxygen flush mechanism will result in dilution of the volatile anaesthetic agent. This is desirable only at the end of anaesthesia.

When nitrous oxide is used in a circle system, care should be taken to provide adequate inspired oxygen. As oxygen is continuously consumed by the patient, and nitrous oxide is not, the proportion of oxygen in the system will decrease over time. The use of an inspired oxygen analyser is recommended, but in the absence of this monitor, a maximum of 50% nitrous oxide should be used, and oxygen flow should be at least 20 mL/kg-1min-1.

Monitor of inspired and exhaled carbon dioxide is beneficial when using a circle system. This will detect inadequate respiration (elevated end-tidal CO2 levels), but also mal-functioning valves and exhausted soda lime (elevated inspired CO2 levels).

When using the circle in spontaneously breathing patients, most systems are suitable for patients > 10-12 kg body weight. The manufacturer’s guidelines should be consulted with regard to smaller patients. If the circle has a pressure manometer, it is an ideal breathing system for provision of intermittent positive pressure ventilation in all sizes of patients, including cats. This may be carried out manually (by squeezing the bag) or by attaching the system to an appropriate mechanical ventilator.

Conclusions:

“Low flow anaesthesia is the most cost-effective way to deliver inhalation anaesthesia”

“If the circle has a pressure monitor it is an ideal breathing system for provision of intermittent positive pressure ventilation in all sizes of patients, including cats”

Printed with kind permission of Midmark.
Veterinary Instrumentation and Henry Schein Veterinary Equipment are very pleased to have been appointed exclusive UK Distributor for Midmark. The Midmark family also includes the Matrx range of Anaesthesia Machines and Cardell Monitors. With over 90 years of healthcare manufacturing and clinical use experience, Midmark are recognised as leaders in Veterinary Dentistry, Anaesthesia and Monitoring.

Midmark VMS™ Standard

Specifications

Dual View Oxygen Flowmeter - glass tube with a fused scale reading from 0.2 to 4 lpm – quickly switch from standard to magnified view at the touch of a finger.

Easy-to-view Inhalation/Exhalation Valves allow easy monitoring of respiration for patient safety.

Automatic Air Intake Valve – opens to provide room air to patient if contents of breathing bag are depleted.

Oxygen Flush.

1500cc CO₂ Absorber with “Quick Release” Lever feature for easy absorbent replacement (accepts pre-pack canisters or 1350gm loose absorbent).

Dome-type Inhalation and Exhalation Valves – no tools needed to disassemble.

Scavenging/Adjustable Pressure Limiting Valve.

-60 to +60 cm H₂O Pressure Gauge.

15mm and 22mm diameter Corrugated Breathing Circuits.

One- and two-litre Breathing Bags.

Chrome Portable Stand with 5-leg Spider Base and Casters.

Accepts VIP 3000 and TEC 3 Vaporisers (Mounting Kit included).

Oxygen Low-flow Flowmeter or Nitrous Oxide Flowmeter add-on capability.

Please note cylinder mounting blocks required if using cylinders. (see overleaf).

Optional shelves available.

Midmark VMS

|MID91800070  | Midmark VMS Standard* |
|MID91800166  | Midmark VMS Wall Mount* |

ADDITIONAL OPTIONS

|MID91800709  | Low Flow O₂ Kit |
|MID91800138  | Quick Release Conversion Kit |
|MID93305007  | Post Mount Assembly (for adding 2nd vaporiser) |
|MID91800167  | VMS to VMS Plus Conversion Kit |
|MID93805114  | Occlusion Valve |
|MID91805140  | Tray Shelf for VMS |
|MID91805141  | Ventilator Shelf for VMS |
|MID91805146  | Mayo Tray (1) |

ACCESSORIES

Note: For Vaporisers, view page 387.

For cylinder mount blocks, view page 386.

Carriage is extra for all items marked *

Also available in a wall mount configuration

Midmark VMS™

The VMS Small Animal Anaesthesia Machine is a long-time favorite of veterinary professionals. It is designed for safe, simple, and controllable small animal inhalation anaesthesia. The Dual View Oxygen Flowmeter (0.2-4 LPM) allows you to quickly switch from standard to magnified view. Midmark is the only company to have a negative pressure safety valve that allows room air into the system if the oxygen flow is cut off to the patient.

385
A new twist on a time-proven Anaesthesia Machine. The Midmark VMS Plus provides more functionality than ever before with two shelves for convenient placement of monitors and equipment. Its dual vapouriser mounting capacity allows you to easily switch from one agent to another. Exactly the same specification as the Midmark VMS Standard shown on previous page.

**MIDMARK VMS PLUS**

- MID91800075 Matrix VMS Plus

_Carriage is extra for all items marked *_

**ADDITIONAL OPTIONS**

- MID91800709 Low Flow O₂ Kit
- MID93805114 Occlusion Valve
- MID91800129 IV Holder Kit
- MID91305187 Mounting Kit for 2nd Vapouriser

Small E or D Size Cylinder Mounting Blocks with single-stage regulators are available to complete your portable system. Includes High Pressure Hoses and Cylinder Wrench.

**CYLINDER MOUNTING BLOCKS**

- MID94305384 1 Cylinder O₂
- MID94305383 2 Cylinder O₂
- MID94305372 1 O₂ & 1 N₂O Cylinder
- MID94305385 2 O₂ & 2 N₂O Cylinder

**VMS / VMS Plus Maintenance Kit**

All the parts you need for routine anaesthesia machine maintenance. Saves money against purchasing separately.

**VMS / VMS PLUS MAINTENANCE KIT**

- MID91303015 Maintenance Kit
**Oxygen Concentrator**

An Oxygen Concentrator is an electronically operated device that provides an uninterrupted supply of oxygen as and when required at the touch of a button.

The Oxygen Concentrator draws in room air, separates the oxygen from other gases in the air and delivers the oxygen at high concentrations to the patient.

Although the Concentrator filters oxygen from the room air, it will not affect the normal amount of oxygen in the room.

**Features and benefits**

- High Oxygen concentration levels over the whole flow range
- Variable Flow rate up to 5 l/min
- OSD Sensor for continuously monitoring Oxygen levels
- Visual and audible alarms for low Oxygen levels, power failure, pressure drop and service required
- Dimension (H x W x D) 62.2 x 34.2 x 30.4 cm
- Weight 16.3 kg
- Flowrate 0.5 to 5 l/min
- Oxygen Concentration at 0.5 - 5 l/min 93% }
- Electrical Requirements 230 V, 50 Hz

**Classification II Type B**

**Specifications**

- Circuit breaker with reset function
- Easy-to-view hour meter
- Data output socket compatible with PC, Notebook or Smart-Track. Remote for diagnostic analysis of the unit
- Intelligent power management system utilises turn-down technology providing less power consumption below 2 l/min flowrates
- Low noise, quiet operation
- Weighing only 16.3 kg the Compact 525 is the smallest and lightest 5 litre concentrator.

**OXYGEN CONCENTRATOR**

**OXYCON**

- Oxygen Concentrator
- 68161HADISSX0.1 O₂ Concentrator Connector to O₂ Pendant
- 19221HADISSX0.1 O₂ Concentrator Connector to O₂ Schrader

**Carriage is extra for all items marked **

---

**Conventional ‘Tec’ Vapouriser Systems**

Anaesthetic machines using calibrated “TEC” Type Vapourisers deliver into the circuit a gas mixture containing a specified percentage of volatile. In non-rebreathing circuits the patient will breathe this exact mixture. In circuits where some rebreathing occurs, the gas mix will not be the same as dialled on the vapouriser.

**FLUOSORBER**

- 02SS10 Flusorber (Single)
- 02SS15 Flusorber (Pack of 6)

**FLUOSORBER**

- 02SS10 Flusorber (Single)
- 02SS15 Flusorber (Pack of 6)

---

**Carriage is extra for all items marked •**
An electronically controlled, time-cycled, pressure-limited Ventilator, the Matrix by Midmark Model 3000 replaces the breathing bag, providing smooth, even delivery of anaesthesia. Designed specifically for veterinary practice, the Model 3000 assures a constant volume for each delivered breath, regardless of patient compliance and airway resistance. Easy-to-use controls make operation simple and convenient. Replaces the breathing bag, freeing technician to assist in other procedures. Precise control of anesthetic state allows lower levels of anaesthesia for more responsive patients, more economical operation, with blood CO₂ and pH levels closer to normal. Interchangeable bellows adapt to animals from 1 kg to 300 kg – no tools required. Maximum working pressure limit (MWPL) adjustable from 10-60 cm H₂O. Dual airway pressure alarms signal any breath exceeding preset maximum or minimum. Optional low supply gas alarm signals supply gas pressure below 35 psi. Respiratory rates from 6-40 breaths per minute at inspiratory flow rates from 0-100 lpm. Tidal volumes from 20-3,000 cc. Built in scavenging point. Please note to connect the Model 3000 to an oxygen supply a demand wye piece (91806029) and O₂ hose (9180 6032) are required.

MATRX MODEL 3000 SMALL ANIMAL ANAESTHESIA VENTILATOR

MID91806002 Model 3000 with 0-300ml Bellows Bellows Housing and Adapter (Approx Patient Weight Range Up to 30 kg) *
MID91806001 Model 3000 with 300-1600ml Bellows and Bellows Housing (Approx Patient Weight Range 14-120 kg) *
MID91806029 DISS O₂ White
MID91806032 DISS O₂ FxF 4 ft. White
Ventilator Accessories

All models of the Matrx Model 3000 Anaesthesia Ventilator include Model 3000 Controller, Bellows Base Assembly, Pressure Sensing Tube and Tee, Driving Gas Tube, Power Cord, Spare Fuse and Operating Manual.

**BELLOWS**
- MID91806021 0-300ml Attachment (Includes Bellows, Adapter and Housing)
- MID91806026 0-300ml Bellows
- MID91806027 0-300ml Bellows Adapter
- MID91806028 0-300ml Bellows Housing
- MID91806042 300-1600ml Bellows
- MID91806044 300-1600ml Bellows Housing
- MID91806043 1600-3000ml Bellows
- MID91806045 1600-3000ml Bellows Housing

**DEMAND WYE**
- MID91806029 DISS O₂ White
- MID91806030 DISS O₂ 90° White

**SUPPLY HOSE**
- MID91806032 DISS O₂ FxF 4 ft. White

**STANDS**
- MID91806033 5 Leg 42” with Casters and Mounting Plate
- MID91806034 5 Leg 37” with Casters and Bushing Mount

**MOUNTING ARMS/ PLATES**
- MID91805152 Mounting Arm with Plate and Extension for VMS

**Circuits**

Ayres Non-rebreathing System with Scavenger Adapter

Connects in seconds to any Matrx™ Anaesthesia Machine. Designed especially for the small animal patient with less than 7kg (15 lbs) body weight, it provides minimal dead space and less resistance to flow as compared to a full-circle system.

**AYRES NON-REBREATHING SYSTEM**
- MID94515185 Ayres System Complete
- MID92305073 FS-2 Outlet Adapter
- MID61930908 Black Rubber Tubing each (122 cm x 11mm OD x 6mm ID)
- MID92315080 'T' Tube Adapter
- MID92316019 Breathing Tube
- MID92305098 Bag to Tube Adapter
- MID91800194 1L Bag with Scavenger Adapter
- MID91305439 Scavenger Adapter
- MID91815246 Tube Connector x 19mm x 15mm
- MID92800173 1L Bag with Hole No Scavenger Adapter

Breathing Circuits

Designed to maximize patient safety and user convenience. A 360 degree connector rotation eliminates tubing twists or kinks. Unique Z-wave tubing provides superior flexibility.

**BREATHING CIRCUITS**
- MID91316420 22mm Diameter
- MID91316419 15mm Diameter with 1 Litre Breathing Bag
- MID20221100 2” (50.8mm) Diameter 180cm

Unilimb Rebreathing Circuit

Unique tube-within-a-tube design enhances performance and convenience. Aids in heat and moisture retention, speeding patient recovery time. Unique design reduces clutter of multiple tubes.

**UNILIMB REBREATHING CIRCUIT**
- MID91316417 Unilimb Rebreathing Circuit 100cm
- MID91316431 Unilimb Rebreathing Circuit 150cm
- MID91316432 Unilimb Rebreathing Circuit 180cm
- MID91316435 Pedi Unilimb Rebreathing Circuit 100cm
**Circuits**

**Modified Ayres ‘T’ Piece**
- The Standard Circuit for patients weighing less than 10kg
- Low resistance
- No valves
- An open circuit
- Complete with scavange connector 025534.

**Modified Ayres ‘T’ Piece Semi Disposable**
- As above but lighter in construction.

**‘T’ Piece Scavenge Connector & Rebreathing Bags**
- Pollution is a problem with all open circuits. This Connector fits into the tail of the rebreathing bag and connects to standard scavenging systems. Also fits Mini Bain.

**‘T’ PIECE SCAVENGE CONNECTOR**
- 025534 ‘T’ Piece Scavenge Connector
- 025051 0.5 Litre Rebreathing Bag
- 025104 4 Litre Rebreathing Bag
- 025106 2 Litre Rebreathing Bag

**Bain Circuit**
- Fresh gas passes down the inner tube. Exhaust gas returns via the outer tube. Good heat and moisture exchange.
- Use 2.0 to 2.5 times respiratory minute volume. The adapter is re-usable but the circuits are semi-disposable.
- Use in patients 10kg plus.

**BAIN CIRCUIT**
- 025080 Bain Circuit Mount (required initially)
- 025081 Bain Circuits Tube Set only

**Bain Circuit Semi-Disposable**
- As above but supplied as a complete circuit which can be reused many times. 1.6 m length.

**LACK Parallel Circuit**
- This is a safer system than co-axial circuits. Both tubes are visible and can be checked for leaks, damage and security.
- Use in patients 10kg plus.

**LACK PARALLEL CIRCUIT**
- LACK 1 LACK Parallel Circuit Complete
- LACK 4 LACK Replacement Tubes Set

**LACK Parallel Circuit Semi-Disposable**
- As above but supplied complete with head unit and 2 litre bag 1.6m length.

**LACK PARALLEL CIRCUIT SEMI DISPOSABLE**
- LACKSD LACK Circuit Semi Disposable

**Mini LACK Parallel Circuit**

**MINI LACK PARALLEL CIRCUIT**
- LACKMINC Mini LACK Parallel Circuit Complete
- LACKMINIRTS Mini LACK Replacement Tubes Set
- LACKMINIRMAN Mini LACK Replacement Manifold

**Circle Circuits Semi-Disposable**
- An economical Circuit for 10kg or more.
- There is a degree of rebreathing but the CO2 is removed by the in-circuit soda lime.
- Minimum flow replenishes patients metabolic oxygen.
- Rubber bung allows Soda Lime to be replenished.

**CIRCLE CIRCUITS SEMI DISPOSABLE**
- 025085 Circle Circuit
Small Furry/Exotic Mask and Non-Rebreathing Circuit

These Very Small Masks were designed specifically for use on small exotics, small furries and birds. The fresh gas supply hooks up to the standard GA machine outlet. The Soft Conforming Mask may be trimmed for maximum fit. The fresh gas feed may be re-positioned within the mask. Exhaust gases are fed into the scavenge system. Tape the circuit onto the table.

**SMALL FURRY/EXOTIC MASK SYSTEM**

- **025091** Mask 9.0mm Opening 25cm 10” Tubing
- **025092** Mask 12.5mm Opening 25cm 10” Tubing
- **025093** Mask 14.0mm Opening 25cm 10” Tubing
- **025095** Masks Set of 3 (as above)

**CONNECTORS SEMI DISPOSABLE**

- **025536SDF** 22mm Male to 30mm Scavenge Female
- **025536SDM** 22mm Male to 30mm Scavenge Male
- **025088** 15mm Elbow 15m - 22mm + 7.6mm Port

**VII Common Gas to Male Luer Connector**

Taping components together for small patient anaesthesia is not ideal. Gas leakage has health and safety connotations, IPPV is difficult to achieve and capnography becomes unreliable. Our common gas to male luer adapter provides an answer. Developed with help from Alan Humphries of Village Vets in Liverpool and Kevin Eatwell of R(D)SVS, Edinburgh, our common gas to male luer device connects between the 15mm female end of an anaesthetic circuit and any standard male luer lock device – such as a cut-down urinary catheter. An easily accessible female luer lock port on the top of the device allows for connection of a capnography probe. The device has been designed to contribute minimally to respiratory dead space.

**VI COMMON GAS TO MALE LUR CONNECTOR**

- **025617** VI Common Gas to Male Luer Connector

**AAS Smooth Wall Anaesthesia Circuits**

The smooth inner wall of these Y Hose Sets makes them easier to clean, and decreases circuit resistance. The inner hose diameter is reduced from the standard 22mm down to 12mm on the small and 16mm on the larger set. This significant reduction in circuit volume improves response to changes in anaesthetic setting. Suggested flow rate is 30ml/kg/min, 60ml/kg for the first 5 minutes.

Please note that the Smooth Wall Circuits contain tubing and rebreathing bags only. Circles and manifolds required separately.

**AAS SMOOTH WALL ANAESTHESIA CIRCUITS**

- **AASCIR-0007** Smooth Wall Circuit 12mm Inner Diameter 1.6m + Y Connector 0.5L & 1.0L Bags for Animals 2-20kg
- **AASCIR-0009** Smooth Wall 16mm Inner Diameter 1.6m + Y Connector 0.3L Bags for Animals over 20kg

**Connectors Semi Disposable**

- **025536SDF** 22mm Male to 30mm Scavenge Female
- **025536SDM** 22mm Male to 30mm Scavenge Male
- **025088** 15mm Elbow 15m - 22mm + 7.6mm Port

**Anaesthetic Circuit Consumables**

Use Soda Lime to replenish to and fro circle systems. Turns pink to white.

**CONSUMABLES**

- **025052** Soda Lime 5Kg *
- **025104** 4 Litre Rebreathing Bag Anti-static Rubber
- **025106** 2 Litre Rebreathing Bag Anti-static Rubber
- **025051** 0.5 Litre Rebreathing Bag Anti-static Rubber

**TUBING**

- **025535** Scavenge Tubing 22mm Diameter (per metre)
- **025088** 15mm Elbow 15m - 22mm + 7.6mm Port

*Carriage is extra for all items marked *
Anaesthesia Pre-Warming™: A Darvall Solution for hypothermia

Peri-Anaesthesia Hypothermia

Hypothermia (body temperature below 36°C) occurs in up to 80% of anaesthetized cats and dogs. Causes include small body size relative to body surface area, vasodilatation, inhaling cold, dry anaesthetic gases, loss of heat from open body cavities in surgery and lack of shivering during anaesthesia. All of these combine to create the complex and difficult to manage syndrome: peri-anaesthesia hypothermia.

The Pre-Warming Solution

The AAHA Guidelines for Anaesthesia include monitoring body temperature and providing thermal support from pre-anaesthetic through to recovery. Providing thermal support before anaesthesia may seem counter-intuitive, but recent research shows that regardless of the premedication drugs used, smaller dogs and cats lose over 1°C before anaesthesia and then rapidly lose twice that fifteen to thirty minutes after induction (Graph 1). Fortunately studies also show that effectively warming patients from the time of premedication to the time of induction (for at least 30 minutes) can prevent that initial drop in body temperature and may slow the early stage rapid heat loss immediately following induction. Heating hypothermic animals during anaesthesia is difficult and time consuming.

Pre-warming small animals is highly beneficial and can easily be done by placing the premedicated patient in a warmed cage. Cage heating devices not specifically designed for sedated or anaesthetized animals such as jugs of warm water or heated wheat bags, can cause burns. The margin of safety for causing significant thermal injury is surprisingly narrow. Forced warm air blanket systems are ideal for use in pre-warming cages because they deliver a large flow of warm air at constant, thermostatically controlled temperatures. However forced warm air systems designed for use in humans are not designed with appropriate blankets or to duct warm air into a cage. Darvall has solved this problem with an innovative Cage Door Adapter™ that lets the door open/shut properly with 2 sizes of blankets to fit cages. In addition One Cocoon® heater can warm up to 3 cage blankets simultaneously and blankets can be re-used between animals.

Warm Air Blanket

Forced warm air blanket systems are most effective during induction. Forced warm air blanket systems for humans are most effective during induction. Darvall’s innovative Heated Smooth-Wall Anaesthesia Breathing Circuits® target this critical heat loss from inspiring cold, dry air by warming the inspired gases immediately from the time of intubation (Graph 2).

Next Generation Forced Warm Air Blanket System

Darvall’s warm air blanket system is designed for cats or dogs during surgery or in cages before and after anaesthesia. The contact surface is porous, rather than punched with small holes, resulting in low surface air flow. When positioned over or underneath animals, warm air diffuses across the blanket’s surface and the patient’s hair-coat traps the warmth close to the animal. A recent study in dogs anaesthetised for surgery showed that the Darvall Vet Cocoon® system consistently increased body temperature during surgery but there is a lag period of 30-45 min. before the animal’s body temperature starts to rise (Graph 3).


Peri-Anaesthesia Thermal Support Selector™

Chart for selecting effective warming treatment options by type and length of procedure.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>OHE - Young Animal</th>
<th>Long Orthopaedic Surgery</th>
<th>Dental Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of Anaesthesia</td>
<td>30 to 60 min</td>
<td>90 to 150 min</td>
<td>60 to 180 min</td>
</tr>
<tr>
<td>Premedication - Start Pre-Warming (&gt;30 min)</td>
<td>Darvall Cocoon® CAGE Over-blanket*</td>
<td>Darvall Cocoon® CAGE Over-blanket*</td>
<td>Darvall Cocoon® CAGE Over-blanket*</td>
</tr>
<tr>
<td>Patient Clip, Catheter Placement, Induction</td>
<td>Circulating warm water or insulated electric blanket</td>
<td>Circulating warm water or insulated electric blanket</td>
<td>Circulating warm water or insulated electric blanket</td>
</tr>
<tr>
<td>Intubation - Start Heating Inspired Gas</td>
<td>Darvall Heated Smooth-Wall Circuits®</td>
<td>Darvall Heated Smooth-Wall Circuits®</td>
<td>Darvall Heated Smooth-Wall Circuits®</td>
</tr>
<tr>
<td>OR/Procedure Table</td>
<td>Circulating warm water or insulated electric blanket</td>
<td>Darvall Cocoon SURGERY Under-blanket*</td>
<td>Darvall Cocoon SURGERY Under-blanket*</td>
</tr>
<tr>
<td>Recovery - Warming to &lt; 37°C</td>
<td>Darvall Cocoon® CAGE Over-blanket*</td>
<td>Darvall Cocoon® CAGE Over-blanket*</td>
<td>Darvall Cocoon® CAGE Over-blanket*</td>
</tr>
</tbody>
</table>
Inspiring cold, dry air can be a cause of heat loss for animals under anaesthesia. The Darvall heated smooth wall breathing circuit solves this longstanding problem in small animal anaesthesia. Recent research demonstrates that most temperature loss occurs after induction, during the patient’s clip and prep for a procedure. Darvall heated smooth wall breathing circuits provide warm inspired gas to the patient from the moment of intubation. Darvall’s heated smooth wall tubing (SWT) begins to warm patients from the inside, from their very first breath after induction, reducing loss of body temperature prior to surgery.

Warm animals recover better. Our small diameter, low resistance smooth wall circuits are so efficient they allow you to use a circle system on animals as small as 2kg. The totally new Darvall heated circuits with thermostatic control warm inspired gas which can minimize heat loss in anaesthesia.

- Warms inspired gas: 38.5°C-40°C
- Efficient: internal warming
- Immediate: from the first breath
- Prevents heat loss*
- Airway temperature sensor
- Animal temperature monitoring
- Heats without Harm

Provide immediate and effective warmth from the start of anaesthesia. Our totally new Darvall heated, smooth-wall anaesthetic circuits and heated ZDS Qubes have a microprocessor with temperature sensor and warm up to 45°C, resulting in inspired air between 38.5°C and 40°C. Optional Separated animal esophageal/rectal temperature probe provides safe warming with close-loop control.

Available both heated and unheated the smooth inner wall of the Y hose sets makes them easier to clean and decreases circuit resistance. End connectors are moulded on, for additional security. The inner hose diameter is reduced from the standard 22mm down to 12mm on the small and 16mm on the larger set. This significant reduction in circuit volume improves responses to changes in anaesthetic setting. Suggested flow rate is 30ml/kg/min, 60ml/kg for the first 5 minutes. Minimum flow rate with Tec vapourisers is 300ml.

*Animals 2-7kg use Darvall low-volume Circle absorber
AAS DARVALL HEATED MINI LACK CIRCUIT & ACCESSORIES

- **AAS8689** - Heated Mini Lack Circuit 2-20kg (contains Tubing & Rebreathing Bag only - Manifold required)
- **LACKMINIRMAN** - Mini Lack Manifold

Darvall Unheated Smooth Wall Circuits & Accessories

- **AAS DARVALL ACCESSORIES & UNHEATED SMOOTH WALL CIRCUITS**
  - **AAS8305** - Smooth Wall Mini Lack 2-20kg (contains Tubing & Rebreathing Bag only - Manifold required)
  - **LACKMINIRMAN** - Mini Lack Manifold

Want more information on Patient Warming?
E-mail info@vetinst.com
Darvall Heated ZDS Qube

The Darvall Qube is a zero dead space anaesthesia non-rebreathing mask system for exotics, available heated to take all the advantages of inspired gas warming down to the smallest of patients. The exotics mask kit includes small rodent/reptile mask, larger bird/rabbit mask and endotracheal tube connector. Patients can be induced using the sealed masks, reducing the environmental contamination involved in transferring patients from induction chambers. Inspired gas warming is then available throughout the anaesthetic, with the concomitant benefits for the patient.

As a specialist referral centre we have procedures that require the patient to be under General Anesthesia for several hours, and this inherently cause issues with keeping the patient's temperature normothermic.

Using The darvall heated circuit has added to our ability to maintain the patients temperature, the heated tubing has made a positive impact on reducing the time it takes to warm them post surgery.

The AAS Darvall ZDS Starter Kit contains the Heated Controller Unit, 1 x Heated ZDS Qube, 2 x Face Masks, 1 x ET Adaptor; 1 x Fresh Gas Tube & 1 x Exhalation Tube.

**AAS DARVALL ZDS QUBE & MASKS**

- **AAS8556** Starter Kit for Heated ZDS Qube
- **AAS8457** Heated ZDS Qube with Mask Set 8407
  - Controller Unit required
- **AASCIR-0028** ZDS Mask Set for Rodents: 3 Masks & Diaphragms
- **AASCIR-0027** ZDS Mask Set for Exotics: 2 Masks, Diaphragms & ET Adaptor
- **AAS0835** ZDS Mask Circuit

Images & testimonial courtesy of David White RVN, Senior Veterinary Nurse, Southern Counties Veterinary Specialists
The benefits of preventing hypothermia both during and after surgery are well documented, both in terms of improved patient care and more efficient use of resources.

Use of warm air blankets to pre-warm patients, heated anaesthetic circuits for all procedures plus blankets under anaesthetised animals during longer procedures, over 60 minutes, followed by post-op cage blanket use will help optimise patient recovery from anaesthesia. Spend a moment reading the informative article at the start of this section for more information.

AAS Darvall Warm Air System

AAS Darvall Warm Air Blankets

What makes them different from the rest?
The Darvall series of warm air blankets are specifically designed for veterinary use. The unique blanket surface design is porous polyester which provides low uniformly distributed air flow, providing efficient warming, reducing the ‘wind chill’ factor and minimising hair contamination. Traditional warm air blankets have a punched out surface allowing a higher rate of air flow out of the blanket. OK for humans, as we are on a very different scale, but much less suitable for veterinary patients.

Blankets are available in a range of standard under and over blankets with a special design for dentistry and oral surgery which leaves the head area free of hoses etc. Recovery blankets have dual hose inlets positioned for right or left recumbency patients improving access for connection in a kennel. Standard under and over blankets have two hose inlets, allowing easy positioning of the hose. Tube blankets are also available.

Starter Pack of Darvall Warm Air Blankets

Not sure what you will use?
Get a starter pack to try all sizes.
Pack includes 2 each of both sizes of surgery under-blanket, 2 of both sizes of recovery over-blanket, and 2 dentistry blankets. A total of 10 blankets which covers the most commonly used varieties.

AAS Darvall Cocoon Warm Air Unit

The Darvall Cocoon Heating Unit is easy and straightforward to use. Running quietly, it produces minimal noise pollution in theatres and recovery areas. Features include auto step-down heating 46°C, 43°C, 40°C with cooling also available at 34°C, all under micro-processor control. A 0.2 micron replaceable filter helps prevent microbial contamination of the warm air. A Mobile Base is included with the Unit. Routine use of the base with the unit will help extend the period between filter replacements, which are typically every 2 years.

The Starter Kit contains the Cocoon Warm Air Unit, Stand, Starter pack of Blankets and Cage Door Adaptor.

AAS Darvall Cocoon Warm Air Blankets

Recovery Overblanket

Recovery Overblankets are available in 2 sizes, Cats and Small Dogs (pictured) code AAS05360 and for Medium/Large Dogs code AAS05359

Overblanket

2 additional sizes are available with single air inlets.

And for those very large patients, Overblanket for Extra-Large Dogs and Foals code AAS01958

Starter Pack of Darvall Warm Air Blankets

Not sure what you will use?
Get a starter pack to try all sizes.
Pack includes 2 each of both sizes of surgery under-blanket, 2 of both sizes of recovery over-blanket, and 2 dentistry blankets. A total of 10 blankets which covers the most commonly used varieties.
Underblankets

Usually used during procedures, underblankets again have 2 inlets allowing hose positioning flexibility. Can also be used in-cage.

2 sizes: AAS02979 for Cats and Small Dogs, AAS02275 for Medium/Large dogs.

Dentistry Underblanket

This useful blanket has the air inlet at the opposite end to the standard underblanket, allowing easy access to the patient’s head without hose complications. Order code AAS07898

Tube Blankets

Available for cats and small dogs (AAS05362) and Medium/Large Dogs (AAS05364) these useful tubes can be positioned closely around the patient as required

AAS Darvall Warm Air System Blankets

AAS DARVALL WARM AIR SYSTEM BLANKETS

AAS05359 Darvall Warm Air Recovery Blanket for M/L Dogs
Pack of 10
AAS05359S Darvall Warm Air Recovery Blanket for M/L Dogs Single
AAS05360 Darvall Warm Air Recovery Blanket for Cats & Small Dogs Pack of 10
AAS05360S Darvall Warm Air Recovery Blanket for Cats & Small Dogs Single
AAS05310 Darvall Warm Air Over Blanket for M/L Dogs
Pack of 10
AAS05310S Darvall Warm Air Over Blanket for M/L Dogs Single
AAS01958 Darvall Warm Air Recovery Blanket for X/L Dogs & Foals
Pack of 10
AAS01958S Darvall Warm Air Recovery Blanket for X/L Dogs & Foals Single
AAS05362 Darvall Warm Air Tube Blanket for Cats & Small Dogs
10 Pack
AAS05362S Darvall Warm Air Tube Blanket for Cats & Small Dogs Single
AAS05364 Darvall Warm Air Tube Blanket for M/L Dogs 10 Pack
AAS05364S Darvall Warm Air Tube Blanket for M/L Dogs Single
AAS8460 Darvall Warm Air Sample Pack of Assorted Blankets

Not sure about whether to make the investment in a Cocoon Warm Air Heater?

A Cocoon is available for a free 2 week trial period, subject to purchase of blankets to use. Call us on 0845 130 9596 or e-mail info@vetinst.com to book your trial now.

You will be impressed!
A second short hose connects the blanket to the cage door, making disconnection of the unit quick and easy without disturbing the patient.

**Two Cage Adaptor**

A useful Y adaptor allowing 2 blankets in adjoining cages to run from 1 heater unit.

---

**AAS Darvall Accessories**

**Cage Door Adaptor**

Additional accessories are available for the Darvall system include a cage door adaptor allowing the main hose to attach to the adaptor which is firmly fixed to the cage bars.

---

**Bair Hugger Convertor**

Connects Bair Hugger® Heater Hose to Darvall Cage Door Adapter.

Attaches to Darvall Cage Door Adapter (AAS7882).

**BAIR HUGGER CONVERTER**

AAS08430  Bear Hugger Heater Hose Adapter

---

**Washable Warm Air Blanket**

The Blankets are re-usable being made of a silky polyester fabric with an inlay of nylon waterproof material to keep the airflow circulating upwards towards the patient.

**WASHABLE WARM AIR BLANKET**

C9B7550  Washable Warm Air Blanket (75cm x 50cm)
C9B9060  Washable Warm Air Blanket (90cm x 60cm)
C9B12060  Washable Warm Air Blanket (120cm x 60cm)
C9SET  Washable Warm Air Blanket Set of 3 (as above)
**Eldridge Anaesthesia Mask**

New mask designed to minimise roll and slipping. 3 sizes available.

**IM3 Masks**

IM3 Masks are designed for rapid induction of anaesthesia with a minimum of fuss and minimum pollution. They all have the following features.

- Very low dead space, important when masking down using circle systems.
- Removeable rubber diaphragm which minimises gas leaks and permits cleaning.
- Made from virtually indestructable pvc which will not degrade like the latex rubber type.
- Clear plastic allows visualisation of patient’s muzzle.
- Buy a full set (5) and get a Free Resuscitation Bag - Small.

<table>
<thead>
<tr>
<th>Code</th>
<th>Inner Diameter</th>
<th>Outer Diameter</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>025538C</td>
<td>25mm</td>
<td>65mm</td>
<td>60mm</td>
</tr>
<tr>
<td>025538CVS</td>
<td>35mm</td>
<td>60mm</td>
<td>60mm</td>
</tr>
<tr>
<td>025539C</td>
<td>55mm</td>
<td>85mm</td>
<td>85mm</td>
</tr>
<tr>
<td>025538C</td>
<td>80mm</td>
<td>130mm</td>
<td>140mm</td>
</tr>
<tr>
<td>025547V</td>
<td>60mm</td>
<td>100mm</td>
<td>170mm</td>
</tr>
</tbody>
</table>

**Resuscitation Bag**

For emergency artificial respiration. The device is ideal for administering either pure oxygen or room air to oxygen deprived patients. A special valve allows lung inflation on compression of the bag and passive exhalation of CO₂ whilst fresh air refills the bag. Can be used with a standard endotracheal tube or an airtight mask.

**Anaesthetic Chamber**

Most very small patients may be induced using a chamber. The Kit contains the chromed inlet and outlet fittings.

- Relatively stress free
- Patient remains visible
- Standard 15mm inlet, standard scavenge tube outlet
- 300mm x 300mm x 180mm (12” x 12” x 7”)
- 3m of scavenge tubing included.

**Feline Inhalant Delivery System**

Feline asthma is increasingly recognised in small animal practice. Existing treatments include oral corticosteroids and bronchodilators. These regimes are far from ideal due to side effects or poor owner compliance.

Metered Dose Inhalers (MDI) have been the treatment of choice for human asthmatics for many years. Inhaled medication has been shown to be more effective with fewer side effects. It is now possible to use these agents in cats with our unique aerosol chamber designed for cats. The chamber works with standard human MDIs and works well with the small tidal volume of feline patients. Patients quickly accept the system.

The Kit comes complete with two masks. Chamber is 11cm x 4.5cm, (4.5” x 1.75”)

- Reusable and easy to clean
- Designed to be dispensed for client home use.
- Includes two different sized masks
- Directions included with suggested treatment regimes

**FELINE INHALANT DELIVERY SYSTEM**

- 025700 Feline Inhalant Delivery System
**Intubation Accessories**

**Endotracheal Tube Brushes**

Endotracheal tubes require cleaning to prevent cross contamination between patients. Thorough cleaning also ensures that there is no mucus obstructing the tube which could be fatal. Appropriately small endo tube brushes are hard to find.

**ENDOTRACHEAL TUBE BRUSHES**

<table>
<thead>
<tr>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>END02</td>
<td>Endotracheal Tube Brush 12 inch 2mm</td>
</tr>
<tr>
<td>END03</td>
<td>Endotracheal Tube Brush 12 inch 3mm</td>
</tr>
<tr>
<td>END04</td>
<td>Endotracheal Tube Brush 12 inch 4mm</td>
</tr>
<tr>
<td>END05</td>
<td>Endotracheal Tube Brush 12 inch 5mm</td>
</tr>
<tr>
<td>END06</td>
<td>Endotracheal Tube Brush 12 inch 6mm</td>
</tr>
<tr>
<td>END07</td>
<td>Endotracheal Tube Brush 16 inch 7mm</td>
</tr>
<tr>
<td>END010</td>
<td>Endotracheal Tube Brush 12 inch 10mm</td>
</tr>
<tr>
<td>END012</td>
<td>Endotracheal Tube Brush 12 inch 12mm</td>
</tr>
<tr>
<td>ENDOSET</td>
<td>Endotracheal Tube Brush Set (as above)</td>
</tr>
</tbody>
</table>

**Endotracheal Tube Stylet**

Intubation is much easier using a malleable stylet. These plastic coated stylets may be bent to the desired shape. Each Stylet has an adjustable rubber stopper to ensure that the stylet tip is not exposed at the endotracheal tube tip. The Stylets work especially well with silicone tubes which tend to be soft.

**ENDOTRACHEAL TUBE STYLET**

<table>
<thead>
<tr>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>025605</td>
<td>Stylet Tube Sizes 2.0-3.5mm</td>
</tr>
<tr>
<td>025606</td>
<td>Stylet Tube Sizes 4.0-6.5mm</td>
</tr>
<tr>
<td>025607</td>
<td>Stylet Tube Sizes 7.0-10mm</td>
</tr>
</tbody>
</table>

**Endotracheal Light**

This small Penlight has attached a flexible metal rod with a light at the tip. A 5mm tube easily slides over the light tube. Offers both rigidity and light, especially useful in cats and small dogs.

**ENDOTUBE LIGHT**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>025600</td>
<td>Endotube Light</td>
</tr>
<tr>
<td>025601</td>
<td>Spare Endotube Light Bulb</td>
</tr>
</tbody>
</table>

**Safe-Seal Endotracheal Tubes**

Almost all ET tubes used today depend upon an inflation cuff to seal the tube in the trachea, not so the Safe-Seal™ ET Tube featuring the Blaine Bafflex System.

This new technology uses a series of 6 silicone baffles with carefully engineered pattern and spacing to seal the trachea without pressure points. The flexible baffles allow an "o-ring effect".

The Safe-Seal ET tube lies in the trachea and the sealing baffles touch the tracheal wall leaning towards the larynx. Thus, when the patient inspires the silicone baffles are sucked against the trachea forming a tight seal.

The special design allows passage of pressure exceeding 20-30 centimeters of water in the patient’s lungs. If the pop-off valve is accidentally left closed, the excess pressure is released and no harm will come to the patient.

These soft, flexible baffles are atraumatic to the tracheal surface due to the limited contact of the baffles.

There is minimal contact with the tracheal wall when using the Safe-Seal Tube as opposed to the large area of contact of inflation cuff tubes. This means the tube can be left in the same position for extended periods of time.

Another advantage is the “squeegee” effect when extubating, by scraping the trachea clean of any fluids present.

The Safe-Seal ET Tube with the Blaine Bafflex System eliminates dangers of deflation or over inflation.

The Safe-Seal Tube’s baffles keep the tip of the tube centered in the trachea.

Although the Safe-Seal ET Tube has a different ‘feel’ to regular tubes, new users quickly adjust and rarely switch back.

SAFE: Baffles prevent over insufflation - no pressure points

EASY: Faster insertion and removal - less training needed

ECONOMICAL: Only three sizes needed for dogs ranging 5 - 100kgs

The new Safe – Seal Endo Tube utilizes a series of silicone baffles to replace the inflation cuff. It eliminates the risks of over inflation, under inflation and leaky tubes. The soft, flexible baffles seal the trachea without pressure and cleanses the trachea of all fluids upon extubation.

Only 3 sizes of tubes are necessary for dogs weighing 5 to 100kgs. The ET tube’s one piece construction of medical grade silicone is autoclavable.

**Advantages & benefits**

- Solid one piece construction of medical grade silicone.
- No moving parts to fail.
- Can be left in the same position in the trachea for extended periods.
- The tube will rotate in the trachea during surgery without injury.
- Transparent, so blood or fluids can be visualized in the tube.
- Autoclavable

**SAFE-SEAL ENDOTRACHEAL TUBES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET18L</td>
<td>Safe-Seal ET Large 30 - 100 kg</td>
</tr>
<tr>
<td>ET14M</td>
<td>Safe-Seal ET Medium 11 - 35 kg</td>
</tr>
<tr>
<td>ET12S</td>
<td>Safe-Seal ET Small 5 - 15kg</td>
</tr>
<tr>
<td>ETSET</td>
<td>Safe-Seal ET Set of 3 (S, M, L)</td>
</tr>
<tr>
<td>02545-553</td>
<td>Cleaning Brush for Safe-Seal ET - Large</td>
</tr>
<tr>
<td>02545-540</td>
<td>Cleaning Brush for Safe-Seal ET - Medium</td>
</tr>
<tr>
<td>02545-544-2</td>
<td>Cleaning Brush for Safe-Seal ET - Small</td>
</tr>
<tr>
<td>02545SET</td>
<td>Cleaning Brush Set for Safe-Seal ET</td>
</tr>
</tbody>
</table>
**Large Diameter Silicone Endotracheal Tube**

**Features:**
- Connector included.
- Lateral Murphy eye at distal tip allows ventilation in the event of obstruction of the main opening at the tip.
- 10 to 14mm diameter.
- Transparent: blood and mucous visible
- Comfortable c.f. rubber and PVC.
- Durable c.f. rubber and PVC.
- NOT autoclavable (use cold sterilants e.g. perasafe page 353).
- Sensible pricing.

<table>
<thead>
<tr>
<th>LARGE DIAMETER ENDOTRACHEAL TUBE</th>
<th>Inner Diameter (mm)</th>
<th>Length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>025620</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>025621</td>
<td>11</td>
<td>40</td>
</tr>
<tr>
<td>025622</td>
<td>12</td>
<td>44</td>
</tr>
<tr>
<td>025623</td>
<td>14</td>
<td>48</td>
</tr>
<tr>
<td>025625</td>
<td>Set of 4 tubes</td>
<td></td>
</tr>
</tbody>
</table>

**EZ Tie Endotracheal Tube Securing Device**

Maintaining an endotracheal tube in the correct position is a critical component of anaesthesia or surgery. Any shift or displacement of an endotube during anaesthesia can be life threatening. A common practice is to use a length of cotton gauze roll to first tie around the tube then around the animal's muzzle. Roll gauze can come untied or be difficult to quickly untie.

The EZ Tie is designed to be quick and easy to hold any endotracheal or anaesthesia mask safely in place. The thin but strong plastic tubing has 2 sliding clasps. These clasps readily move along the tubing but hold steady under tension. The first clasp is used to tighten around the ET tube or mask. The second slides along to tighten around the patient's muzzle. It also works extremely well with challenging brachycephalic breeds such as pugs and felines.

**EZ TIE ENDOTRACHEAL TUBE SECURING DEVICE**

| 025094 | EZ Tie Endotracheal Securing Device Pack of 3 |

**Laryngoscopes**

Intubation of certain breeds of certain species can be very difficult without the appropriate laryngoscope. Deflection of soft tissues and a light source makes life very much easier. In a crisis e.g. a blue brachycephalic, the appropriate laryngoscope will be a life saver.

**LARYNGOSCOPES**

| 025118FO | Laryngoscope Set with 0, 1, 2, 3 & 4 Blades Fibre Optic |
| 025118FOBULB | Spare Bulb for Fibre Optic Laryngoscopes |
| 025127 | Wall Bracket for Laryngoscope Sets |
| 025120 | Laryngoscope for Rabbit Fibre Optic includes Miller No 0 Blade and 00 Blade |
| 025125/L | Spare Bulb Non FO laryngoscopes Large |
| 025125 | Spare Bulb Non FO Laryngoscopes Small |

**LED Laryngoscopes & Handles**

Powered by a high output LED Laryngoscope Handle that provides superb illumination. The unique Vmag range of Blades includes 3x swivelling lens that provides excellent magnification.

Please note further larger sizes of the Laryngoscope Blade are available but these do not have a magnification loupe.

**LED LARYNGOSCOPES & HANDLES**

| AW600.080.000V | LED Laryngoscope Handle - AA Battery Powered |
| AW600.080.002V | LED Laryngoscope Handle - C Cell Powered |
| AW600.080.004V | LED Laryngoscope Handle - Angled Handle |
| AWVмаг00 | Laryngoscope Blade (Miller size 00) with Magnification Loupe |
| AWVмаг0 | Laryngoscope Blade (Miller size 0) with Magnification Loupe |
| AWVмаг1 | Laryngoscope Blade (Miller size 1) with Magnification Loupe |
Oesophageal Stethoscope

Very simple yet very effective. The anaesthetist can monitor heart and lungs yet still have hands and eyes free for other signs. Supplied complete with headset and three probes. Probe length - 50cm.

OESOPHAGEAL STETHOSCOPE
025101 Oesophageal Stethoscope including 3 Probes
025101/24F 24F Probe for Stethoscope (8mm O/D)
025101/P18F 18F Probe for Stethoscope (6mm O/D)
025101/P12F 12F Probe for Stethoscope (4mm O/D)
Non-Invasive Blood Pressure Monitoring in Anaesthetised Patients

Donald C. Sawyer, DVM, PhD, DACVA, HDABVP

Oscillometric technology for non-invasive monitoring offers a simple and effective means of repeatedly and harmlessly determining arterial blood pressure in both healthy and sick patients. It should be part of the routine physical examination especially in animals over 5 years with baseline data recorded as part of the medical record. When adverse events occur, comparisons can be made to recorded baseline measurements. Monitoring blood pressure as part of the anaesthesia protocol will improve morbidity and mortality not only for patients at risk, but for healthy animals as well. As veterinary clinicians become more knowledgeable about the benefits of arterial blood pressure monitoring, it will be an integral component of improved patient care.

Arterial Blood Pressure

Cardiac output is the product of volume ejected from the heart per beat (stroke volume) and heart rate (per minute). The resultant pulsatile pressure generated in the vascular system causes distention of arterial vessels that has a maximum value, systolic arterial pressure (SAP) and a minimum value, diastolic arterial pressure (DAP). Mean arterial pressure (MAP) is roughly the average pressure during the cardiac cycle that occurs as blood is pushed through vessels.

There are a number of problems associated with the Doppler technique that make it inefficient for use in the Operating Theatre. Most important, this system is not automated. Sensor position may change, especially during surgery with the patient draped. The assistant performing Doppler measurements may be required to do other tasks, thus taking them away from the monitoring process. In addition, measurements are not displayed other than on the anaesthetic record, nor does the system provide alarms to alert the clinician of trouble. Noise in the OR and differences in hearing acuity among individuals can cause difficulty in obtaining reliable readings.

Oscillometry

Oscillometry uses microprocessor technology to detect oscillations produced by vascular pulsation in a peripheral artery. A compression cuff is placed around an appropriate location on the extremity and is automatically inflated to occlude the underlying artery. Each time the heart beats, oscillations occur within the artery that are transmitted through the cuff and pressure hose to a transducer located within the monitor. A microprocessor analyzes oscillations and displays values SAP, MAP, DAP and PR. Recent advances in animal specific algorithms in brands such as the Cardell® Monitor have allowed thousands of veterinary practices worldwide to provide reliable use in dogs, cats, puppies, kittens and other animals. Published studies in peer reviewed journals have validated the Cardell against direct arterial pressure in anaesthetized dogs and cats.

Tissue perfusion is maintained during arterial pressures of 60 to 150 mm Hg (8.0 – 20.0 kPa). When mean pressure falls below 60 mm Hg, blood flow may be too low to adequately perfuse essential organs such as the brain, heart, lungs, liver and kidneys. Sustained systolic pressures over 170 mmHg (22.6 kPa) can result in severe consequences such as blindness, stroke, haemorrhage, and death.

Methods

Direct monitoring of blood pressure requires cannulation of a peripheral artery. It does not have practical application in most clinical settings for small animal patients but in animals with life-threatening disorders where continuous measurement of arterial blood pressure is essential, invasive monitoring should be considered. Indirect or non-invasive blood pressure (NIBP) measurement using Doppler flow ultrasonography includes the use of a sphygmomanometer combined with a flow detector or sensor placed over an artery. By noting the pressure value on the manometer gauge when the occluding cuff is inflated to stop blood flow and then deflated to resume complete flow, SAP can be determined. MAP would need to be calculated if it is possible to determine DAP and pulse rate (PR) counted.

Conclusion:

For monitoring anaesthetised patients, assessment of therapeutic responses especially in patients with cardiac disease, or those needing critical or emergency care, avoiding intervals of hypotension is essential to maintain adequate cerebral, coronary and splanchnic organ blood flow. Whether one uses SAP values of 80 (10.6 kPa) or MAP of 60 as low alert thresholds, values from the monitor can be followed not only for early warning but also to establish an upward trend of improved pressures as corrective measures are instituted. Most anaesthetised patients should have indirect SAP values in the range of 85 to 130 mm Hg (11 – 17 kPa). If SAP is above 150 mm Hg, arterial hypertension is evident. Assessment must be made to evaluate other signs for light anaesthesia, sympathetic responses from deep pain, or other complications. There is no question that automated monitoring of arterial blood pressure in companion animals is in the best interest of veterinarians, clients, and their pets. It should be a standard of practice not only during anaesthesia but also as a diagnostic and therapeutic tool for better patient care.

Donald C. Sawyer, DVM, PhD, DACVA, HDABVP

Printed with kind permission of Midmark.
Midmark has designed the precision and consistency you expect from the Cardell® name into a fast, light, and intuitive touch screen vital signs monitor. Above all, an anesthesia monitor should be safe, reliable, and user-friendly. The Cardell® Touch is highly advanced, yet easy to use. With veterinary specific algorithms and exclusive Cardell® Blood Pressure Technology, the Touch is the latest innovation from the most trusted name in veterinary vital signs monitoring.

**Feature include:**

- 10.5” touch screen makes patient set up faster and easier or use the traditional-style buttons located below the screen
- Redesigned menus and improved controls allow for intuitive navigation
- Smaller, lighter form factor allows for easy transportation without sacrificing visibility
- World Class Cardell® BP, Nellcor™ SpO₂, and upgrade to CO₂ monitoring at any time by adding a Respironics sidestream or mainstream CO₂ module
- Phasein Multigas available
- Enhanced ECG data export capabilities
- USB port for downloading patient data
- Customizable alarm settings for up to three users
- Optional integrated 3-channel graphical printer
- 2-year warranty

**CARDELL TOUCH MULTIPARAMETER MONITOR**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARD8013001</td>
<td>Cardell Touch with Printer</td>
</tr>
<tr>
<td>CARD8013002</td>
<td>Cardell Touch without Printer</td>
</tr>
<tr>
<td>CARD8013003</td>
<td>Cardell Touch with Invasive BP with Printer</td>
</tr>
<tr>
<td>CARD8013004</td>
<td>Cardell Touch with Invasive BP without Printer</td>
</tr>
<tr>
<td>C-6AT5</td>
<td>Capnostat Mainstream CO₂ Probe</td>
</tr>
<tr>
<td>CARDLOFLO</td>
<td>Capnostat Sidestream CO₂ Probe</td>
</tr>
<tr>
<td>CARD0021745</td>
<td>Phasein Mainstream Multigas for Cardell Touch</td>
</tr>
<tr>
<td>CARD0021746</td>
<td>Phasein Sidestream Multigas for Cardell Touch</td>
</tr>
<tr>
<td>MID3473ADU-00</td>
<td>Loflo Filterline with Large Adapter</td>
</tr>
<tr>
<td>MID3743INF-00</td>
<td>Loflo Filterline with Small Adapter</td>
</tr>
</tbody>
</table>
Cardell Model 9401 Blood Pressure Monitor

Provides reliable blood pressure monitoring in a compact and affordable package. The Model 9401 offers systolic, diastolic, mean arterial pressure and heart rate in seconds. It has an automatic mode allowing the user to set measurements from 1-90 minutes. A STAT mode provides continuous readings for five minutes. A manual mode allows the user to take a measurement at any time. There are high and low alarms for all parameters. The Cardell BP technology is known for working reliably in all our patient species. It comes with 13 cuffs in 7 different sizes.

CARDELL MONITORS
CARD9401  Cardell 9401

Cardell Accessories

CARDELL ACCESSORIES
CARDPRINT  Cardell Printer for 9400 Series
CARDSENSOR  Nello Vetstat SpO2 Sensor
CARDTEMP  Temperature Probe
CARDC20B  Cardell Cuffs 20mm Box 10
CARDC20BS  Cardell Cuffs 20mm Single
CARDC26B  Cardell Cuffs 25mm Box 10
CARDC26BS  Cardell Cuffs 25mm Single
CARDC39B  Cardell Cuffs 30mm Box 10
CARDC39BS  Cardell Cuffs 30mm Single
CARDC412  Cardell Cuffs 40mm Box 10
CARDC412S  Cardell Cuffs 40mm Single
CARDC515  Cardell Cuffs 50mm Box 10
CARDC515S  Cardell Cuffs 50mm Single
CARDC600  Cardell Cuffs Box 5 Mixed
CARDSV8  Large Animal Reuseable Cuff 80mm
CARDSV10  Large Animal Reuseable Cuff 102mm
NIBP-TUBE  NIBP Inflation Tube
Non-invasive blood pressure monitoring. Hypertension is often overlooked during diagnosis, treatment and routine physical examinations in small animals. In addition many hypotensive patients, such as those suffering from shock, benefit greatly from Doppler measurement of blood pressure when knowing the pressure can mean effective and timely treatment.

Combining Doppler with an appropriate sized ‘cuff’ for small animals, provides the veterinarian with the same non-invasive method for testing blood pressure as is available in human medicine. A small probe is placed over a peripheral artery (e.g digital or coccygeal). An ultrasonic crystal in the probe transmits pulse wave sound back to the amplifier. The pressure cuff is inflated until the pulse sound is no longer audible. The cuff is slowly deflated, using the manometer, until pulse sounds are audible once more, at which point the manometer displays a numeric value of the animal’s systolic pressure.

Lightweight hand-held unit; high quality, vet spec sphygmomanometer. Comes complete with 2 cuffs (2.5cm and 5.0cm). Runs on 9 volt battery. Complete with headset and carrying case. All consumables are available.

**DOPPLER ULTRASONIC BLOOD FLOW MONITOR**

- **025850** Doppler Ultrasonic Blood Flow Monitor Full Kit

---

**PetMap Graphic II Blood Pressure Measurement**

- Proven PetMap BP technology with PPO (PetMap Proprietary Optimizations). Species and cuff site settings to improve accuracy.
- Easy to use “no menu” touch screen display
- Real-time display of oscillometric “envelope”
- Selectable BP cycle times for measurement reminders
- Tabular display of readings
- Graphic display of last 45 readings and NSV (Nominal Session Value)
- SD memory card to record all BPHR values and “power off” screen image
- AC/DC Adapter option for wall power.

**PETMAP GRAPHIC**

- **PGBM2** PetMap Graphic II Blood Pressure Monitor
- **PGCUFF2** Cuff - 2cm
- **PGCUFF2.5** Cuff - 2.5cm
- **PGCUFF3** Cuff - 3cm
- **PGCUFF3.5** Cuff - 3.5cm
- **PGCUFF4** Cuff - 4cm
- **PGCUFF4.5** Cuff - 4.5cm
- **PGCUFF5.5** Cuff - 5.5cm
- **PGCUFF6.5** Cuff - 6.5cm
- **PGCUFF8** Cuff - 8cm
- **PGCUFF10** Cuff - 10cm
- **PGCUFF13** Cuff - 13cm
Apalert Respiration Monitor

Increasing sophistication of monitors leads nurses to monitor the instruments rather than the patient. Simple respiratory monitoring plus a competent nurse offers the most reliable patient monitoring. Respiratory arrest almost always precedes cardiac arrest in an anaesthetic emergency. Prompt action at the point of respiration failure will usually save the patient. The APALERT is:

- Reliable. It beeps at each breath and the display shows the interval since the last breath.
- Rechargeable approx 70hrs use. You can still use it as it recharges.
- Adjustable by beep volume and sensitivity.
- Alarming. The alarm gets louder if you ignore it. The alarm can be reset by the surgeon using magic eye facility without compromising sterility.

This unit saves lives with a minimum of fuss.

APALERT RESPIRATION MONITOR

025005 Apalert Monitor Complete Kit
025007 Apalert Probe
025100 Mains Adaptor

Breathe-Safe Monitor MKIII

This tiny monitor is a simple apnoea alert monitor. The microprocessor beeps with every breath.

- Highly sensitive.
- Easy to use - just connect between the endotracheal tube and anaesthesia circuit.
- No adjustments. A sophisticated algorithm will recognise and indicate with a beep every breath from a kitten to St Bernard.
- Apnoea Alert. If your patient fails to breathe for 45 seconds a distinctive apnoea alert will sound.
- Auto shut off.
- High density long-life lithium battery will last for years.

BREATHE-SAFE MONITOR MKIII

025010 Breathe-Safe Monitor MKIII

Henry Schein Pulse Oximeter

Pulse Oximeter by Henry Schein
- Robust
- Reliable
- Great Value.

Supplied with Standard 4 x AA Batteries.

Rechargeable Docking Base Kit available. The Kit contains 4 x AA Rechargeable Batteries. Please note if using the Rechargeable Docking Base please only the 4 x AA Rechargeable Batteries supplied to avoid Unit damage and warranty invalidation.

Features:

- LCD display.
- RTC (Real Time Clock) display.
- Backlight control and automatic power-off function for power saving.
- SpO2 0-100%
- Pulse rate measurement 30-350bpm.
- Display numeric and waveform of SpO2 simultaneously.
- Long battery life - up to 48 hours on 4 “AA” or 36 hours on Ni-MH rechargeable batteries.
- Powerful data storage capacity.
- Data can be transferred to PC for storage, review and printing.
- The latest 10 minutes trend graph and table of SpO2 and Pulse Rate can be reviewed in the screen.
- Audible and visible alarm capability.
- Pitch tone.

PULSE OXIMETER

HSEH100B Pulse Oximeter
HSVES47 SpO2 Sensor (Replacement)
HS0316112409 Rechargeable Docking Base Kit (includes Rechargeable Batteries)
HS2121064164 Rechargeable Replacement Batteries x 4 for HS Pulse Oximeter

Rechargeable Docking Base Kit.

The Kit contains:

- 1 x Rechargeable Docking Base
- 4 x AA Rechargeable Batteries.

Please note that the Pulse Oximeter is not included with the Kit.

Please note if using the Rechargeable Docking Base please only the 4 x AA Rechargeable Batteries supplied to avoid Unit damage and warranty invalidation.
I.V. Accessories

i-Warm Infusion Warmer by Cardell

Features:
- Portable and lightweight
- Convenient hanging belt to hang on I.V. pole
- Current temperature displayed in Fahrenheit or Celsius
- Temperature overheating protection
- Indicators for warming (orange), power (green), and overheating (red)

I.WARM INFUSION WARMER
CARDWARM  Cardwarm Infusion Warmer

I.V. Splints

Maintains foreleg in extension for long term I.V. therapy. Different sizes to suit all patients. Stainless steel, will autoclave. Well tolerated, even by cats. Supplied with full instructions.

I.V. SPLINTS
028037  I.V. Splints Small - Cat Size
028038  I.V. Splints Medium - up to 20lb Dog
028039  I.V. Splints Large - 20 to 40lb Dog
028040  I.V. Splints Ex Large - 40 to 80lb Dog
028040S  I.V. Splint Set (as above)

Drip Stand Cage Door Mount

- Clips onto all mesh or bar fronted cages.
- Stainless steel.
- Adjustable for height.
- Occupies no floor space.
- Moves with cage door causing no obstruction when examining patient.

DRIP STAND, CAGE DOOR MOUNT
028035  Drip Stand (Cage Door Mounting) (Single)
028036  Drip Stand (Cage Door Mounting) 3 Pack