# Oxylog 2000

## Emergency Ventilator

Instructions for Use

Software 3.n


MT 621-97

# Contents

# For Your Safety and that of Your Patients

### Strictly follow the Instructions for Use

Any use of the apparatus requires full understanding and strict observation of these instructions. The apparatus is only to be used for purposes specified here.

### Maintenance

The apparatus must be inspected* and serviced* regularly by trained service personnel at six monthly intervals (and a record kept).
Repair* and general overhaul of the apparatus may only be carried out by trained service personnel.
We recommend that a service contract be obtained with DrägerService and that all repairs also be carried out by them. Only authentic Dräger spare parts may be used for maintenance*.
Observe chapter "Maintenance Intervals".

### Accessories

Do not use accessory parts other than those in the order list.

### Not for use in areas of explosion hazard

Electrical connections to equipment which is not listed in these Instructions for Use should only be made following consultations with the respective manufacturers or an expert.

### Liability for proper function or damage

The liability for the proper function of the apparatus is irrevocably transferred to the owner or operator to the extent that the apparatus is serviced or repaired by personnel not employed or authorized by DrägerService or if the apparatus is used in a manner not conforming to its intended use.

Dräger cannot be held responsible for damage caused by non-compliance with the recommendations given above. The warranty and liability provisions of the terms of sale and delivery of Dräger are likewise not modified by the recommendations given above.

Dräger Medizintechnik GmbH

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*
Definitions:
Inspection = examination of actual condition
Service = measures to maintain specified condition
Repair = measures to restore specified condition
Maintenance = inspection, service, repair
Maintenance = Inspection, service, repair

# Intended medical use

Oxylog 2000 is a time-cycled, volume-constant emergency ventilator for patients with a tidal volume from 100 mL upwards.

**For the ventilation modes:**

- Controlled ventilation IPPV, with variable $T_I$ : $T_E$, can be set to approx. 60 or 100 vol.% $O_2$
- Synchronized controlled ventilation SIPPV
- Synchronized intermittent mandatory ventilation SIMV
- Spontaneous breathing with positive airway pressure CPAP

**With monitoring:**

- Airway pressure Paw
- Expiratory minute volume MV

**With surveillance:**

- Airway pressure Paw
- Electric power supply
- Gas supply

**Areas of use:**

- Mobile use for emergency medical care or primary care of emergency patients
- During transport in emergency rescue vehicles or by helicopter
- During transfer by road or air
- When moving ventilated patients around the hospital
- In accident and emergency departments
- During secondary transport from one hospital to another

**Ventilation must be monitored**

**The ventilator must always be used under the supervision of qualified medical personnel so that remedial action can be taken immediately if a malfunction develops!**

**Manual ventilation equipment must be kept ready to hand**

If the life-supporting function of the ventilator can no longer be guaranteed on account of a fault, such as a power failure or break in the medical gas supply, ventilation of the patient must be continued without delay using other ventilation equipment, such as a manual ventilation bag, with PEEP and/or increased inspiratory $O_2$ concentration if necessary.

# How to operate Oxylog 2000


① The most important rotary knobs, namely those for **ventilation frequency (Freq.)** and **tidal volume (VT**) are located in the centre of the front panel. They are larger in diameter than the other rotary knobs. The scale ranges for each patient group are colour-coded for easier presetting: infants (green), children (blue), adults (brown).

② The smaller rotary knobs for **ventilation time ratio ($T_I$ : $T_E$), maximum airway pressure (Pmax)** and **end expiratory pressure (PEEP)**, with a stop for PEEP values above 10 mbar, are grouped together in one area.

③ **Switch for IPPV/SIPPV or SIMV/CPAP ventilation modes. The »☼ Info«** and **»🔔 Reset«** keys on the display are used to change from IPPV to SIPPV. The frequency knob is turned to 0 to change from SIMV to CPAP.

④ The **ON/OFF switch O/I** is located beside the switch for the ventilation modes.
Both switches are protected by guards to prevent them being moved accidentally.

⑤ The **mixer switch** is used to select either **100 vol. % $O_2$** or approx. **60 vol. % $O_2$** during ventilation.

⑥ Analog mechanical pressure gauge for continuous **indication** of inspiratory and expiratory **airway pressure** – independent of power supply.

⑦ The **liquid crystal display** for the measured MV, PEEP, Peak, Mean, Frequency, and $V_{Texp.}$, as well as for **Advisory** and **Warning messages** is located above the two rotary knobs for frequency and tidal volume VT.
Alarms appear on the display as plain text. The red alarm indicator flashes and an acoustic warning sounds at the same time.

⑧ Briefly press the **»☼ Info«** key to display additional settings and measured values.
This also illuminates the screen.
Press the key for 3 seconds to test the display, light and alarm tone.

⑨ The alarm tone can be **suppressed for approx 2 minutes** by pressing the **»🔔 Reset«** key in the event of an alarm.
When the cause of the alarm has been rectified, the warning message can be reset by pressing this key. A new, more important alarm will be displayed immediately.

### Supplies

Gas supply
**$O_2$ from a cylinder** with pressure reducer or from the **medical gas pipeline system**. Supply with medical air or from an optional $O_2$-air blender in emergencies.

Power supply
**Internal rechargeable NiCd battery pack** and external power supply if necessary
or
**Non-rechargeable alkaline manganese battery pack** with external power supply if necessary.

# Operation

## Device check

## Checklist for Oxylog 2000

**Full understanding of the Instructions for Use is essential!**

**Check before start-up**

OK?

Either cylinder pressure equals at least 100 bar or connected to piped medical gas supply ☐

Power supply assured: fully charged pack of rechargeable or new batteries
If external power supply: either connected to mains or to on-board power supply ☐

All tubing connected ☐

**Function check**
Connect test lung to breathing valve ☐

Rotary knobs: **VT** to 0.5 L
**Freq.** to 12/min
**TI : TE** to 1: 2
**Pmax** to 60 mbar
**PEEP** to 5 mbar
Switch for ventilation modes set to **IPPV**

ON/OFF switch to **I**:

Display: **Self test**
**SW-version xx.xx**
Red alarm indicator lights up briefly
Alarm tone sounds twice
Green LED lights up with external power supply

After approx. 6 seconds

Display: **Self test OK** ☐

Oxylog 2000 ventilates the test lung ☐

Test Paw low alarm: Remove test lung, alarm after approx. 20 seconds ☐

Test Paw high alarm: Keep test lung compressed. Alarm ☐

**For fault messages**, see Instructions for Use "Fault, Cause, Remedy"

**Function check completed correctly** ☐

**Use a machine which has been cleaned and disinfected and is ready for operation.**
Care, page 17
Preparation, page 20
Checking readiness for operation, page 28

## Using controlled ventilation IPPV

For ventilation frequencies of 5 to 40/min.

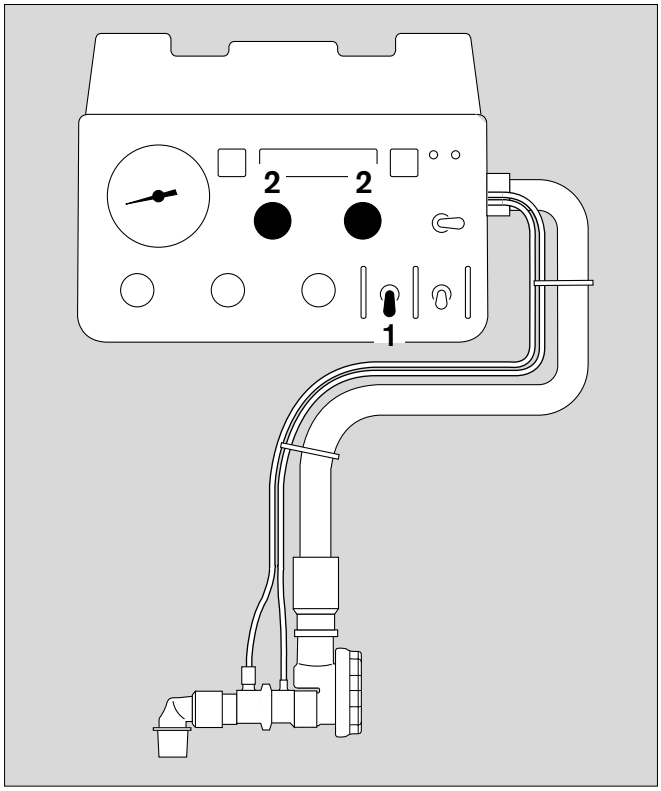
During IPPV, the minimum ventilation frequency is limited to 5/min by Oxylog 2000.

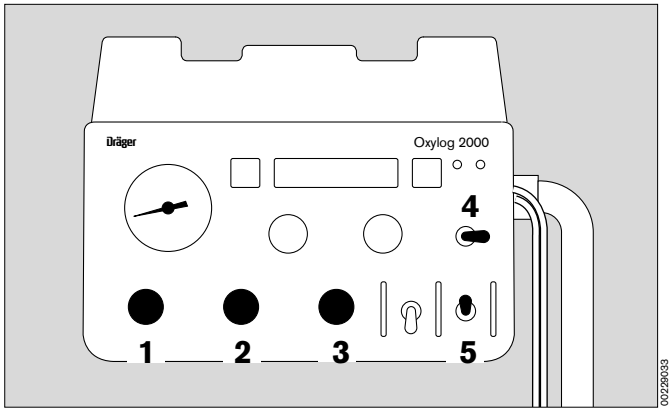
**1** Switch for ventilation modes set to IPPV.

To speed up settings, set the scale range to the **same colour** on the »**Freq.**« and »**VT**« knobs. This ensures that the ventilation parameters are set as appropriate to the patient group concerned, namely infants / children / adults.

**2** Set »**Freq.**« and »**VT**« knobs.

| Body weight (kg) | **Freq.** 1/min | **VT** litres |
|---|---|---|
| Green range for infants (7.5 to 20) | 30 to 40 | 0.1 to 0.3 |
| Blue range for children (20 to 40) | 20 to 30 | 0.3 to 0.8 |
| Brown range for adults (over 40) | 5 to 20 | 0.8 to 1.5 |






1 Set »**TI : TE**« knob to 1 : 1.5.

2 Set »**Pmax**« knob to 60 mbar initially.

3 Set »**PEEP**« knob to 0 mbar* initially.

4 Use the mixer switch to set the required $O_2$ concentration:
Air Mix ≈ 60 Vol.% $O_2$**
or
No Air Mix = 100 Vol.% $O_2$

**In air mix mode, the applied tidal volume VT is reduced in case of high airway pressure, due to the physical properties of the injector used for mixing.**

- Increase the tidal volume $V_T$ in accordance with the measured minute volume MV.

5 ON/OFF switch set to I.
Display:

| **Self test**<br>**SW-version xx.xx** |
|---|

When the patient is connected:

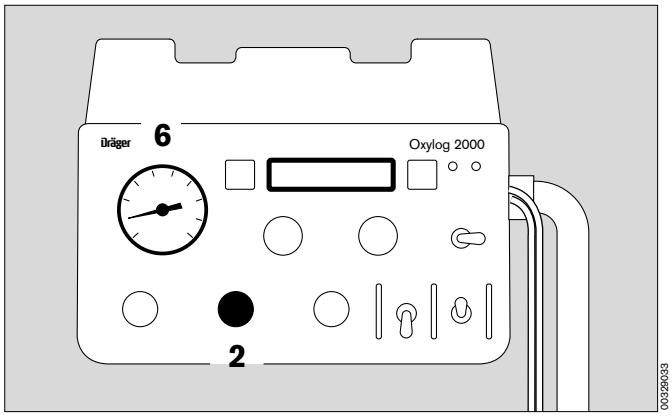
- Check the minute volume MV displayed and adjust settings to suit the patient.

The following display appears if the expiratory minute volume is less than 1 L/min:

| **IPPV MV = 0** |
|---|

6 Read off the maximum airway pressure Paw on the pressure gauge.

2 Set »**Pmax**« knob to approx. 10 mbar higher than the maximum airway pressure.




If the airway pressure in the range of settings between 20 and 60 mbar exceeds the maximum airway pressure »**Pmax**«, the machine immediately switches over to expiration to protect the patient and outputs the warning message:

| **Paw high** |
|---|

The set tidal volume VT cannot be fully applied!

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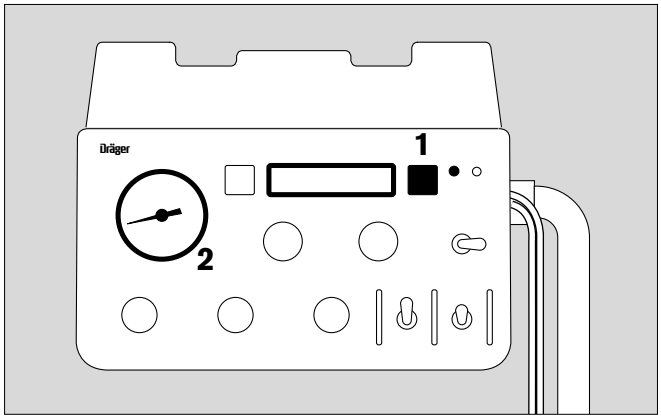
* The end expiratory pressure may equal up to 2 mbar even when PEEP = 0 is set.

** See also page 50, in the Appendix.

If airway pressures are too high and there is a »**Paw high**« alarm:

- Check position of tube.
- Check patient airways and use suction if necessary.
- Ensure that the ventilation hose is not kinked.



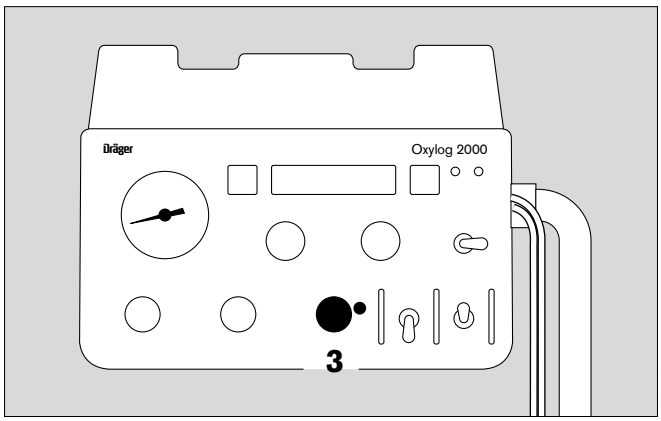

To reset the warning message:

1 Press »🔔 **Reset**« key.

2 **Watch the pressure gauge so that faults in ventilation can be detected quickly and danger to the patient averted.**

**Applying PEEP**

3 Set »**PEEP**« knob to the required value and check on pressure gauge.




To override the stop for PEEP values greater than 10 mbar:

- **Press and hold** metal pin in scale and **turn dial on knob over pin at the same time**.
  Proceed accordingly to reduce PEEP values below 10 mbar.

**For cardio-pulmonary resuscitation**

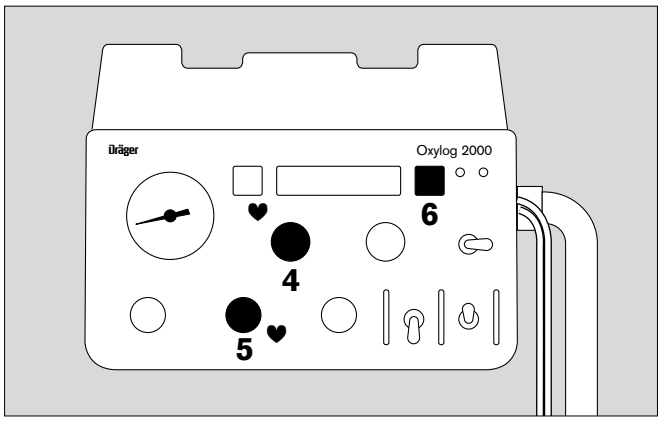
When applying cardiac massage for adults with the aid of an assistant:

4 Set »**Freq.**« knob to ♥ = 12 breaths per minute.

5 Set »**Pmax**« knob to ♥ = pressure limited to 80 mbar.

Display:

| |
|---|
| **Pmax= 80 mbar CPR** |



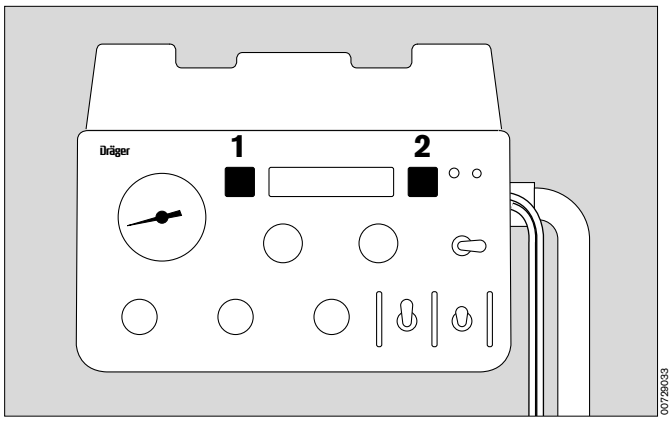

6 Press »🔔 **Reset**« to clear display.

The airway pressure is limited to max. 80 mbar without interrupting inspiration prematurely (ventilation with limited pressure).
A single beep is produced to advise that pressure limitation is active.

## Using SIPPV

SIPPV = Synchronized controlled ventilation

In SIPPV mode, the controlled ventilation strokes can be triggered within a time period and synchronized with the patient's inspiratory effort!
The ventilation frequency in this mode is higher than that set.
If there is no inspiratory effort by the patient, the ventilation strokes are automatically applied by the machine at the set frequency.




- Set ventilation initially as described for IPPV mode, page 7.
  Then:

1 Press »☼ **Info**« key to obtain the display: **IPPV** → **SIPPV**.

2 Press »🔔 **Reset**« to confirm and SIPPV mode is applied by the machine.

The maximum inspiration time is always limited to 1.3 seconds. The following warning message appears if the measured frequency exceeds the set frequency by more than 50 %:

| |
|---|
| **high frequency** |

## Using SIMV

SIMV = Synchronized intermittent mandatory ventilation

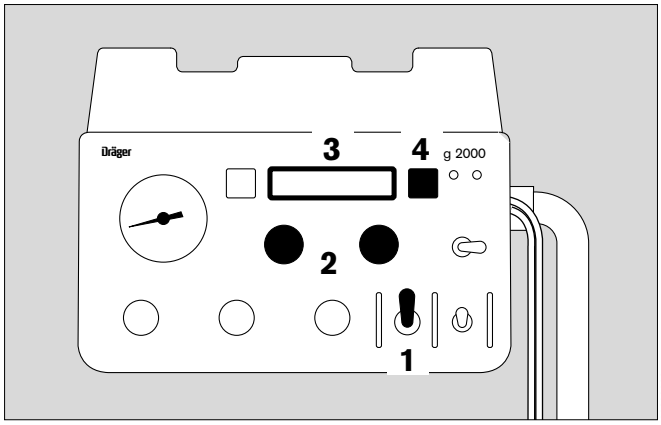
SIMV is a combination of mechanical ventilation and spontaneous breathing, with spontaneous breathing possible between the ventilation strokes. If the patient does not breathe spontaneously within a time period, the machine automatically applies a mechanical ventilation stroke.

When mechanical ventilation strokes are being applied at low frequencies, the trigger window should be not more than 6 seconds in order to guarantee a minimum expiration time of 0.5 seconds. The duration of the trigger window decreases as the frequency of mechanical ventilation strokes increases.

With synchronization, the mechanical ventilation stroke is applied during a preset period to coincide with the patient's inspiratory effort. The frequency of the mechanical ventilation strokes remains constant. Synchronization is briefly indicated by a star (*).

For frequencies of 5 to 40/min:
The mechanical strokes and their time parameters are determined by the frequency set for SIMV/CPAP:

| **Freq.** setting | Effect |
|---|---|
| 0 | No mechanical strokes → CPAP (page 12) |
| 5 to 18.5/min | Fixed inspiration time = 1.3 s |
| 18.5 to 40/min | Fixed $T_I$ : $T_E$ = 1 : 1.5 |




**1** Switch for ventilation modes set to »**SIMV/CPAP**«.

Set the ventilation pattern for the mechanical ventilation strokes

**2** using the »**$V_T$**«
and »**Freq.**« knobs.

A frequency of less than 10/min should preferably be set to allow the patient sufficient time for spontaneous breathing.

**3** Display:

**Tinsp = 1.3 s**

if the set frequency is lower than 18.5/min

or:

**$T_I$ : $T_E$ = 1 : 1.5**

if the set frequency is higher than 18.5/min.

To clear the display:

**4** Press »🔕 **Reset**«.

The following message appears if the expiratory minute volume is less than 1 L/min:

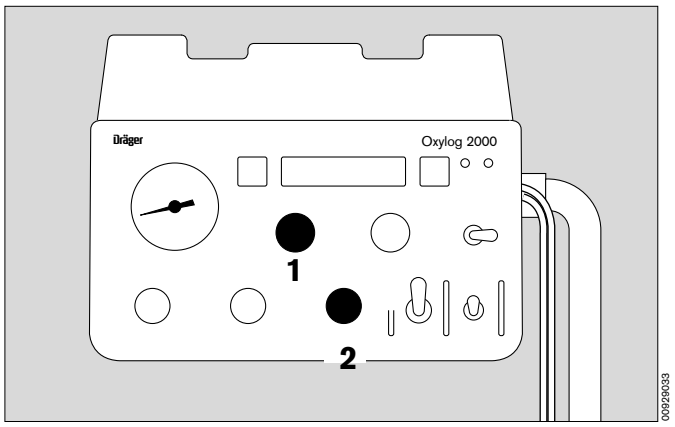
**SIMV MV = 0**

**During spontaneous breathing, pure oxygen is supplied even when »Air Mix« is set on the machine.**

1 Reduce the ventilation frequency via the »**Freq.**« knob when spontaneous breathing resumes.

**Change over to CPAP mode at frequency settings of less than 5/min.**

2 Use the »**PEEP**« knob to set the positive airway pressure.

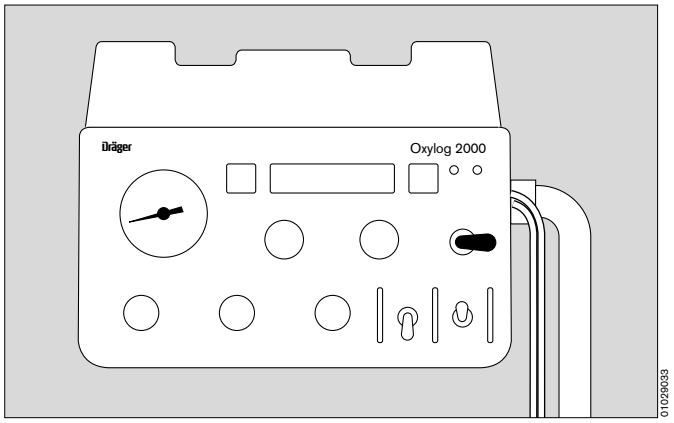



**Use in toxic surroundings**

**Use only in SIMV mode to protect a patient with spontaneous breathing from toxic ambient air!**

- Set mixer switch to »**No Air Mix**« otherwise toxic ambient air will be drawn into the machine.

**Move the patient to an environment with clean air immediately so that toxic air is not inspired when spontaneous breathing recommences!**




## Using CPAP

CPAP = Spontaneous breathing with positive airway pressure

**CPAP mode should only be selected if the patient has sufficient spontaneous breathing!**

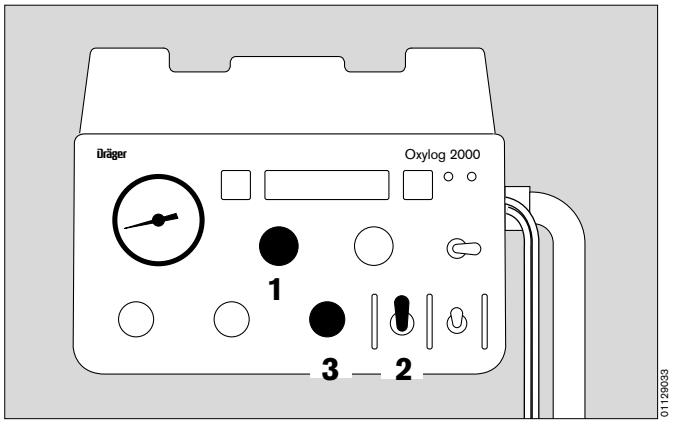
Check via the pressure gauge:
The patient must be able to produce a negative pressure of at least 2 mbar below PEEP during inspiration.

1 Set »**Freq.**« knob to 0.

2 Switch for ventilation modes set to »**SIMV/CPAP**«.

3 Set »**PEEP**« knob to required positive airway pressure.

**For CPAP, the spontaneously breathed tidal volume is always applied with 100 vol.% $O_2$.**
**The position of the »Air Mix/No Air Mix« switch is irrelevant.**



When spontaneous breathing is insufficient:

- change to SIMV or IPPV/SIPPV.

**The automatic »Paw low« warning for a disconnection is not effective in CPAP mode!**
**Check that connections are tight!**

## Displaying settings and measured values

The ventilation mode and expiratory minute volume MV are continuously shown in the top line of the display.

Specific ventilation parameters appear in the bottom line of the display, depending on the ventilation mode set (examples):

**For IPPV/SIPPV**

| | |
|---|---|
| Inspiration time | **Tinsp = 2.0 s** |
| Inspiratory flow | **FLOW = 30.0 L/min** |
| Mean pressure | **MEAN = 15.0 mbar** |
| End expiratory pressure | **PEEP = 5.0 mbar** |
| Peak pressure | **PEAK = 20.0 mbar** |
| Respiration rate (SIPPV only) | **Frequency = 10/min** |

**For SIMV**

| | |
|---|---|
| Inspiratory flow | **FLOW = 30.0 L/min** |
| Mean pressure | **MEAN = 15.0 mbar** |
| End expiratory pressure | **PEEP = 5.0 mbar** |
| Peak pressure | **PEAK = 20.0 mbar** |
| Respiration rate | **Frequency = 10/min** |
| Tidal volume | **VT exsp. = 450 mL** |

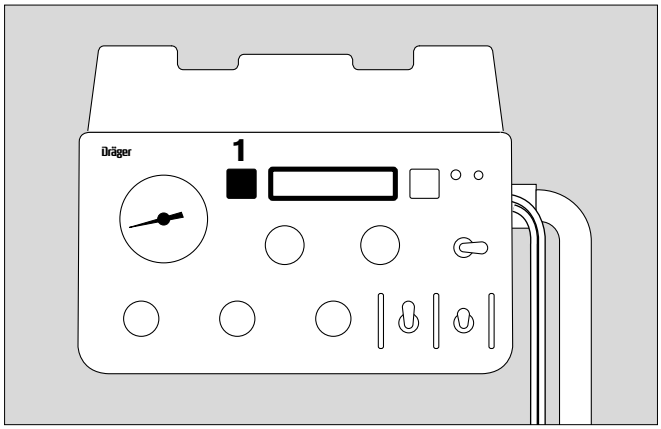
**For CPAP**

| | |
|---|---|
| Pos. airway pressure | **CPAP = 8.0 mbar** |
| Respiration rate | **Frequency = 10/min** |
| Tidal volume | **VT exsp. = 450 mL** |

In the event of an alarm, the parameters displayed in the bottom line will be "overwritten" by the warning messages.

Displaying measured values:

1 Briefly press the »☼ **Info**« key.



## In the event of a power failure

**Automatic ventilation, volume measurement and alarms do not operate if the power fails!**
**Spontaneous breathing can continue via the integrated demand valve.**
**Ventilation must be continued immediately with an independent ventilation device!**

## Alarms

**1** The red alarm indicator lights up / flashes,

– the alarm tone sounds, either continuously, intermittently or as a single beep (every 30 seconds),

– the backlit warning message appears on the second line of the display.

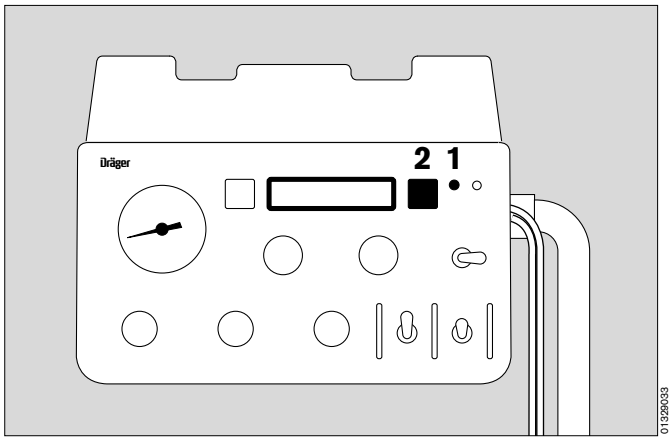
● Assess the alarm tone:
Continuous or intermittent tone = Urgent! Immediate action is required!

Single beep (every 30 seconds) = Advisory message

● Read warning message on the display and remedy the fault with the aid of the table "Fault – Cause – Remedy" on page 33.

The alarm tone can be suppressed for approx. 2 minutes during an alarm:

**2** Press »🔔 **Reset**« key.
If the alarm situation persists, the alarm tone will resume after 2 minutes – or immediately if a new, more important alarm occurs.




When the fault has been rectified:

**1** The red alarm indicator goes out and the alarm tone ceases.

To clear the warning message:

**2** Press »🔔 **Reset**« key.

The warning message cannot be reset until the underlying fault has been rectified.

**A message which has not been cleared will be replaced by a new, more important message.**

## Electrical operation time

Oxylog 2000 can be used for about six hours with a fully charged pack of rechargeable NiCd batteries.
The electrical operation time with NiCd batteries can decline as the battery capacity is reduced with time.

Oxylog 2000 can be used for about four hours with new alkaline manganese batteries.

The average pneumatic operation time for ventilating adults (minute volume MV = 10 L/min) from a 2.5 L / 200 bar cylinder is approx. 45 minutes, see page 26.

The following display appears when the electrical operation time runs down:

**Charge NiCd**

or

**Change bat.**

The remaining electrical operation time equals approx. 10 minutes.
The illumination in the display cannot be switched on during this time.

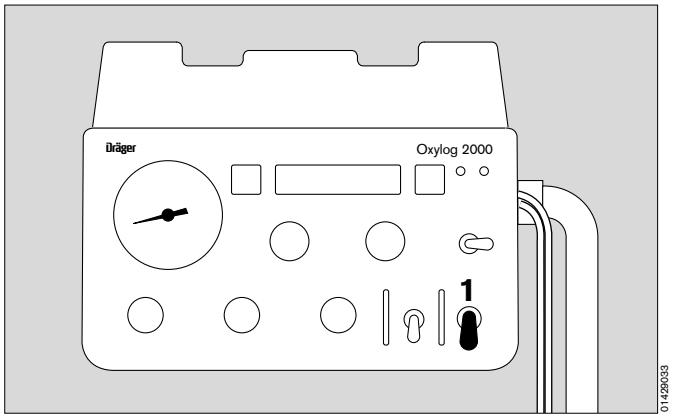
If necessary:

- Continue ventilation with a self-inflating manual ventilation bag.
- Fit a new pack of alkaline manganese batteries, page 23
  or
  connect to the external power supply, page 21.

## Shutdown

After disconnecting the patient:

**1** Set ON/OFF switch to O.




When $O_2$ is supplied from a cylinder:

- Close cylinder valve completely.

When medical gas is supplied from the pipeline system:

- Unplug probe.

# Care

– Clean breathing valve and ventilation hoses each time after use.

– Clean ventilator and medical gas hoses if heavily soiled.

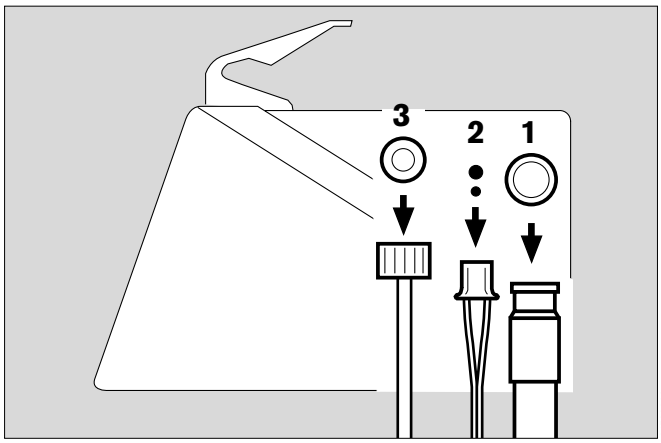
## Stripping down

- Remove Oxylog 2000 from holder.

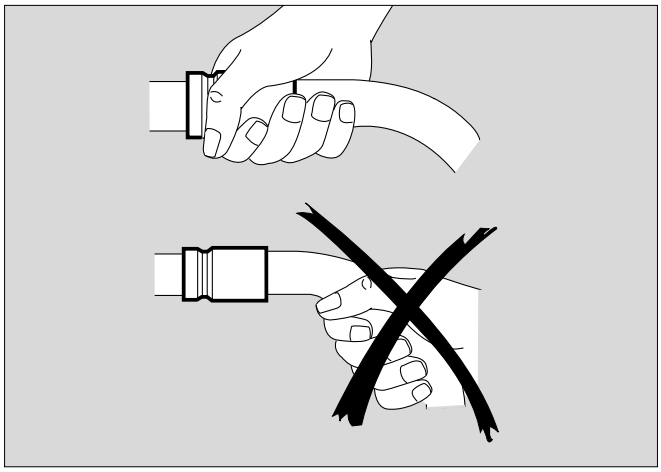
**1** Disconnect ventilation hose from socket.

**2** Disconnect flow measuring hoses from sockets.

**3** Unscrew medical gas hose from Oxylog 2000.




- **When disconnecting hoses, always grip the sleeve and not the corrugations!**
  If this is not done, the corrugations or hose may be torn from the sleeve.

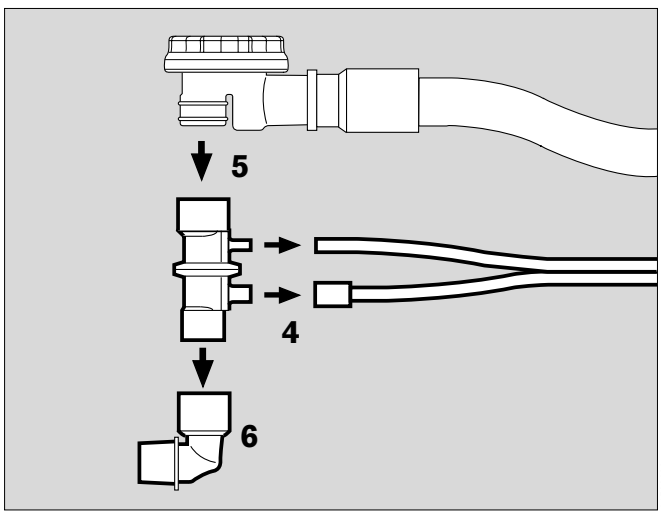



**4** Disconnect flow measuring hoses from flow sensor.

**5** Disconnect flow sensor from breathing valve – **do not twist**.

**6** Detach angled connector from flow sensor.

- **Do not allow any objects to enter the flow sensor. Do not purge with compressed air. The wind vane inside may be damaged and cause measuring errors!**
- Detach ventilation hose from breathing valve.

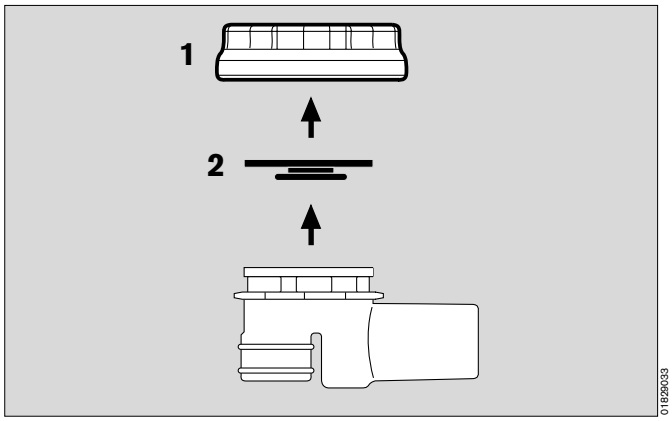


### Disassembling the breathing valve

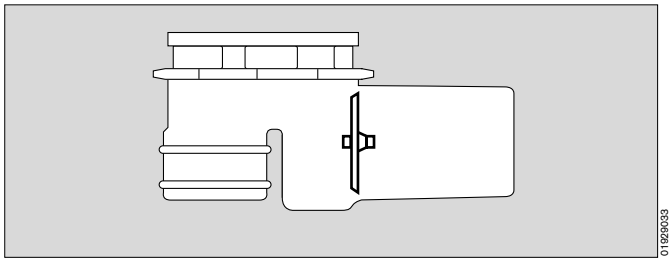
**1** Turn cover about 90° anticlockwise = unlock and remove.

**2** Remove silicone diaphragm.

- Do not disassemble breathing valve any further!
- **Do not allow any objects to enter the housing of the breathing valve!**
  **Do not damage the silicone diaphragm and other parts.**




- Do not remove rubber disc from housing, otherwise the valve will not work properly.




## Cleaning / disinfecting

Use surface disinfectants. To ensure material compatibility, use disinfectants based on:

– Aldehydes
– Alcohol
– Quaternary ammonia compounds

Disinfectants based on:

– Compounds containing phenol
– Compounds releasing halogen
– Strong organic acids
– Compounds releasing oxygen

may cause damage to materials, particularly those used for the breathing valve, flow sensor and angled connector.

Users in the Federal Republic of Germany are recommended to use only disinfectants on the current DGHM list (DGHM: German Society for Hygiene and Microbiology).

The DGHM list (published by: mhp-Verlag, Wiesbaden) also specifies the active ingredient in each disinfectant. Disinfectants based on the active ingredients specified above are recommended for users in those countries in which the DGHM list is not available.

### Wipe disinfecting

Ventilator and medical gas hose

- Disinfect by wiping with Buraton 10 F or Terralin (made by Schülke & Mayr, Norderstedt), for example. Follow the manufacturer's instructions. Remove heavy soiling with a disposable cloth first.
- Do not allow any liquid to enter the ventilator or medical gas hose!

### Bath disinfecting

Disassembled parts of the breathing valve, flow sensor, ventilation hose and flow measuring hoses should be

- disinfected by immersion in Gigasept FF = formaldehyde-free (made by Schülke & Mayr, Norderstedt). Follow the manufacturer's instructions. Agitate parts thoroughly in the solution. Do not clean with a hard brush! Do not allow any objects to enter the breathing valve or flow sensor!
- Rinse parts thoroughly with distilled water.
- Allow to dry **completely**. The breathing valve and flow measuring hoses may not function correctly if water remains in these parts.

## Sterilizing

Sterilize if necessary.

The disassembled parts of the breathing valve, the flow sensor, the angled connector, the flow measuring hoses and the ventilation hose

- can be sterilized in hot steam at 134 °C.

### After care

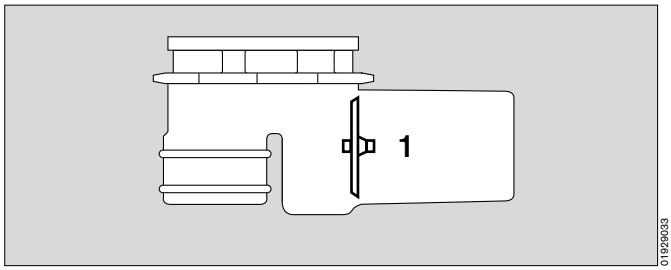
- Reassemble, page 20.
- Connect to power supply, page 21 and gas supply, page 25.
- Check readiness for operation, page 28.

# Preparation

## Assembly

### Attaching the breathing valve

**1** The rubber disc in the housing must not be damaged or bent, otherwise the valve will not work properly.

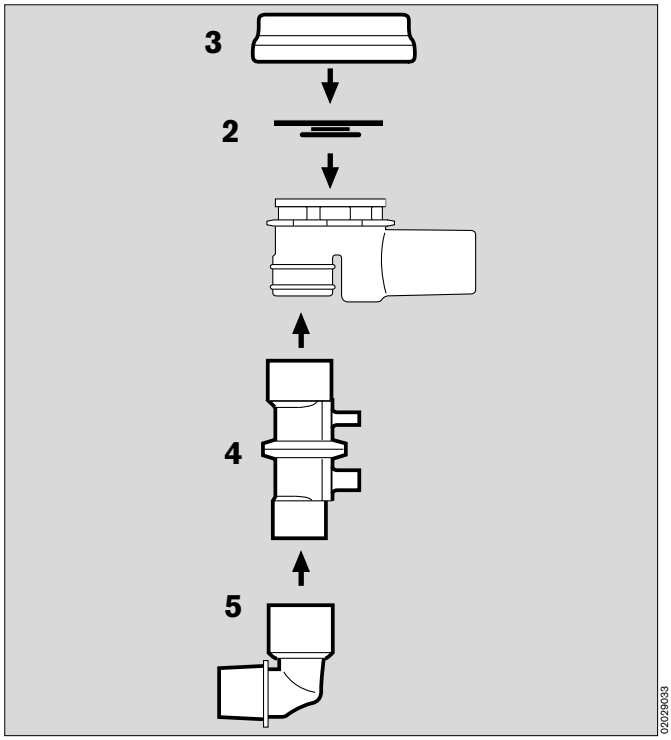



**2** Place diaphragm in breathing valve – ensure that it is inserted correctly.

**3** Fit cover and turn approx. 90° clockwise = lock.

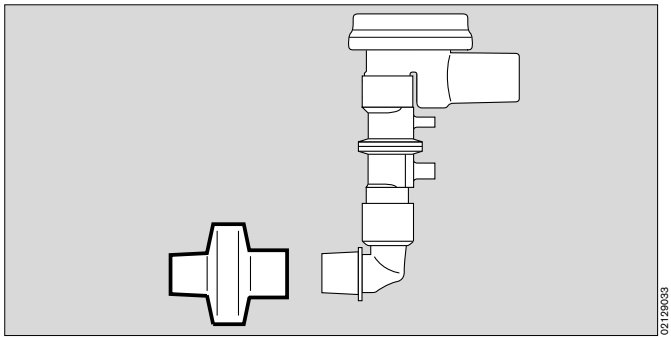
**4** Plug flow sensor into breathing valve; note groove.

**5** Push angled connector onto flow valve.
**The angled connector must always be used, otherwise the flow measurement may be inaccurate!**



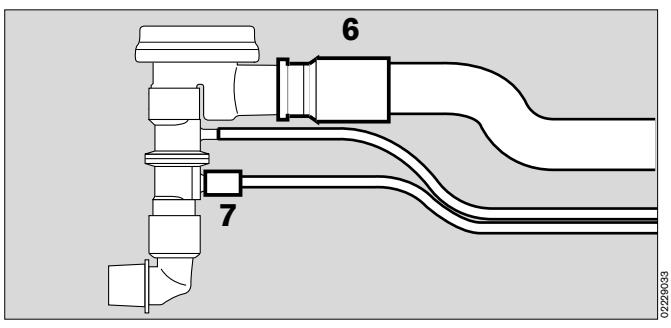

### When using a bacterial filter

- Always connect the bacterial filter to the angled connector.




**6** Connect ventilation hose to breathing valve.
**Do not use electrically conductive hoses, as these can endanger both the ventilator and the assistant during defibrillation!**

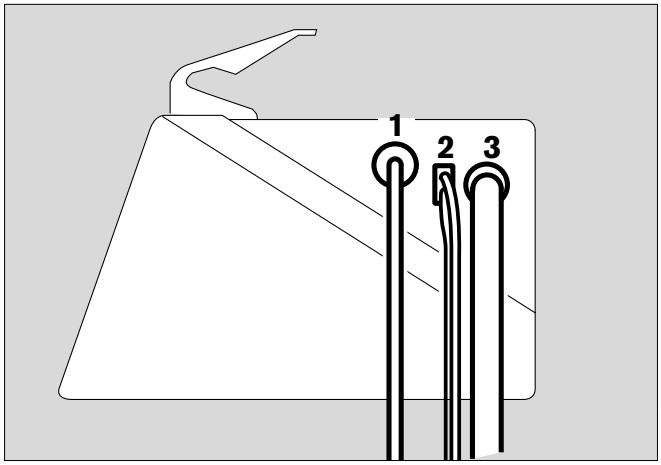
**7** Connect flow measuring hoses to sockets on flow sensor – note different diameters.



1 Screw medical gas hose firmly into place by hand.

2 Plug flow measuring hoses into Oxylog 2000.
**Do not allow pressure to build up at the connector for flow measurement, otherwise the internal sensor may be destroyed!**

3 Connect ventilation hose to socket on Oxylog 2000.




## Connecting power supply

Oxylog 2000 is designed to operate on power supplies with different voltages:

### Internal supply

Internal rechargeable NiCd battery pack
or
alkaline manganese batteries.

### Additional external power supply

DC voltage from the on-board power supply via DC/DC converter
or
power supply unit.

To recharge the NiCd battery pack
and
to extend the electrical operation time when using NiCd or alkaline manganese batteries.

**A fully charged NiCd battery pack or fresh alkaline manganese batteries must always be installed for safety reasons, even when operating from an external power supply!**

### When operating with internal NiCd battery pack

Fit NiCd battery pack, see page 37.

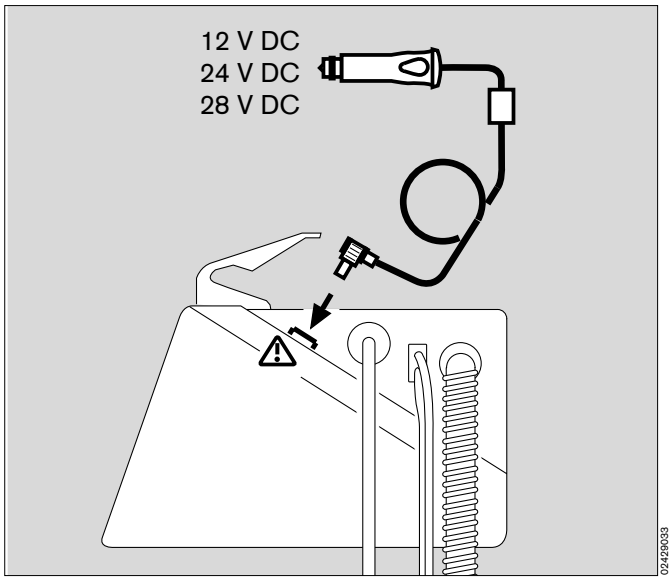
**External power supply with DC/DC converter**

- A **DC/DC converter 84 12 071 must always be used** when operating the ventilator with external DC voltage (e.g. from the on-board power supply of the vehicle).

  The fluctuations in the on-board supply may be so great that the supply voltage falls below or exceeds the range permitted for the Oxylog 2000.

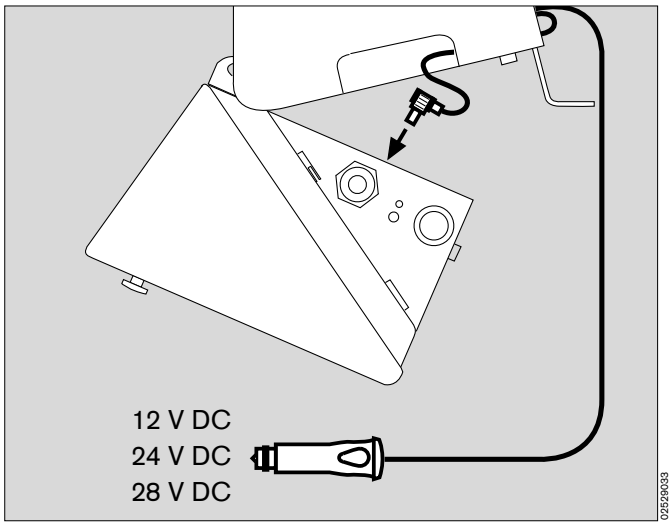
  The voltage supplied by the on-board system fluctuates on account of various withdrawal conditions. The DC/DC converter transforms this input voltage into a constant output voltage of approx. 12 V DC.

- Connect one side to the on-board power supply of the vehicle and the other to the connector for external DC power at the top of the ventilator.




Using the converter in combination with the ventilator holder:

- Plug the angled connector into the DC input socket of the Oxylog 2000. Plug the vehicle connector into an on-board socket.




Connecting the converter to the on-board power supply without vehicle connector:

Cut the on-board cable to the required length. Remove the capacitor from the vehicle connector and connect it between the positive and negative leads in the cable. (The capacitor is required to ensure the converter's immunity to interference.) Connect the on-board cable to the on-board supply as follows:

red = positive
blue = negative

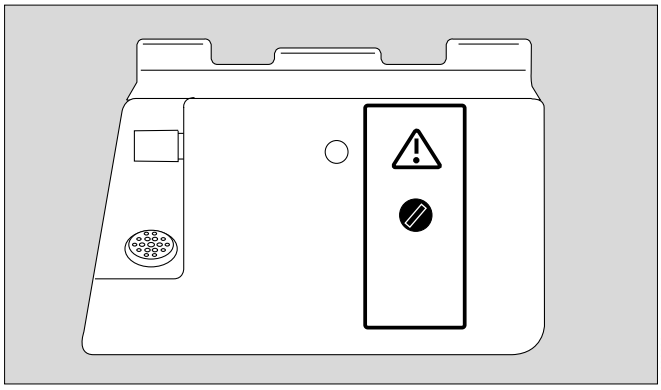
**External power supply from power supply unit**

- Only use power supply unit 84 12 074!
- Connect mains plug to mains socket and DC plug to DC socket on Oxylog 2000.

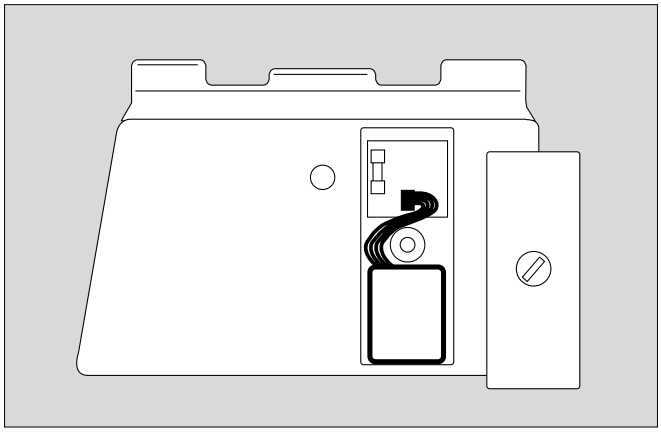
**Operation with alkaline manganese batteries**

Use battery holder 18 35 505.
Only use alkaline manganese batteries, type IEC LR6 (round cell).

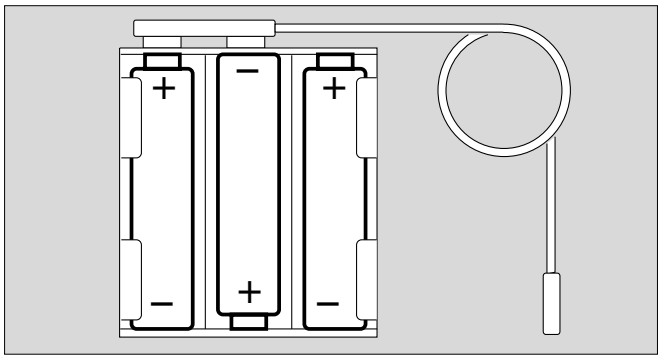
- Undo screw in cover of battery compartment, e.g. with a coin, and remove cover.




- Remove used batteries (or flat NiCd batteries) and disconnect.




- Remove used batteries from battery holder and insert six new batteries. Ensure correct polarity!
- Plug battery holder into socket in battery compartment and insert battery pack in compartment.
- Refit cover and tighten screw.
- **Do not recharge alkaline manganese batteries; they must be disposed of as special waste, page 36.**




The ventilator can be operated for approx. four hours when new batteries have been fitted.

An additional external supply can be connected to extend the electrical operation time:

- Use a DC/DC converter
  or
- use a power supply unit.

If advisory or warning messages are output, see table "Fault – Cause – Remedy" on page 33.

### Beware, batteries may become discharged

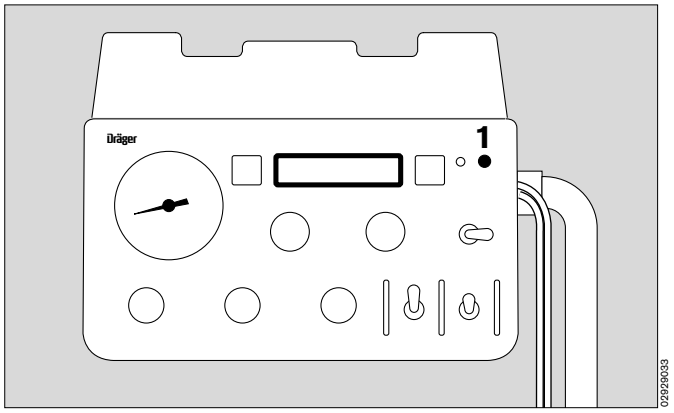
Even when using an external power supply (e.g. power supply unit), the batteries may self-discharge slightly. It takes about two years for the batteries to become flat.

### Charging the NiCd battery pack

The ambient temperature must be between 0 and 35 °C when charging the batteries!

When using an external power supply:

1 The green LED "DC power available" lights up regardless of whether the ventilator is switched on or off. The internal NiCd battery pack is being charged.




- Display when ventilator is switched off:

  **Stand-by**
  **NiCd charging**

- It takes about eight hours to recharge a completely flat NiCd battery pack.
- Display when ventilator is switched off:

  **Stand-by**
  **NiCd charged**

The ventilator can be operated for approx. 6 hours at room temperature when the internal NiCd batteries are fully charged.

- The following display appears at the end of the electrical operation time:

  **Charge NiCd**

Operation can continue for about 10 minutes.

The electrical operation time may be reduced by low ambient temperatures and the condition of the rechargeable batteries, see "Technical data", page 41.

**Positioning Oxylog 2000**

Positioning Oxylog 2000

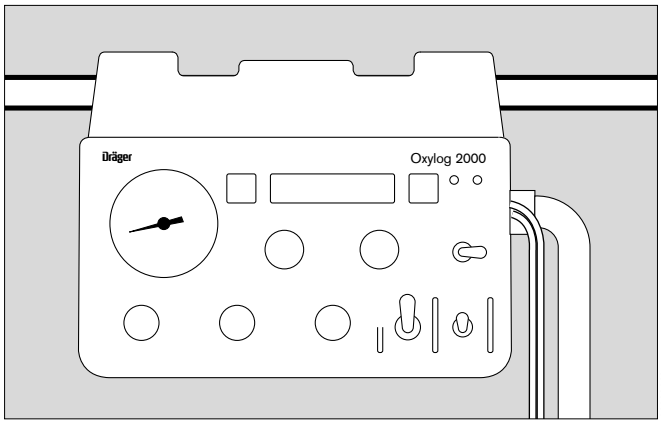
- Place on a level surface where it cannot slide or fall

or:

- Hang from the headboard of a bed.

or:

- Hang from a wall rail.




For mobile use in vehicles:

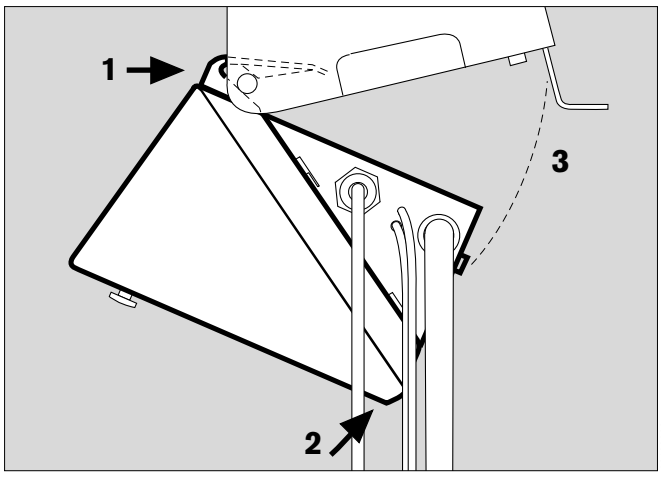
- Hang Oxylog 2000 in ventilator holder.

**1** Hang ventilator from the bar on the holder using clamps.

**2** Swing ventilator upwards until it engages.

To remove the ventilator:

**3** Push the release catch upwards.




## Connecting gas supply

**Take care when handling $O_2$ !**

**Secure $O_2$ cylinders so they cannot fall over and keep away from excessive heat.**

**Do not grease or lubricate $O_2$ fittings, such as cylinder valves and pressure reducers, and do not handle with greasy hands – fire risk!**

**Only open / close cylinder valves by hand and rotate smoothly. Do not use tools.**

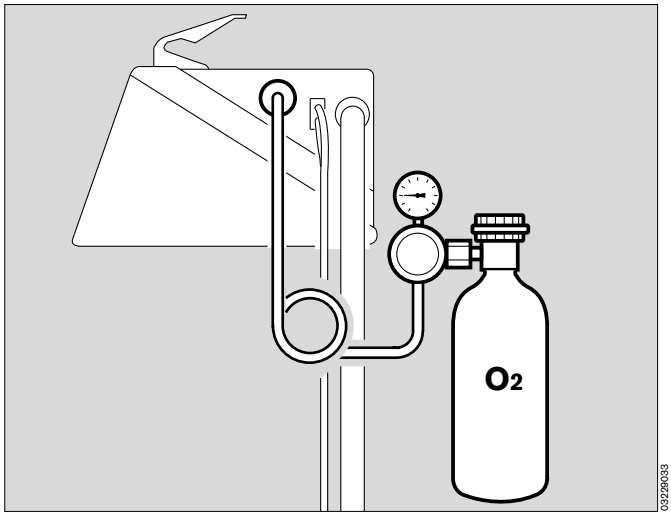
**$O_2$ makes all fires burn more fiercely!
No smoking and no naked lights.**

### Supply from an $O_2$ cylinder

**Only use compressed gas cylinders which comply with national regulations and have been approved.**

Use a full cylinder (cylinder pressure 200 bar).

- Screw pressure reducer (2.7 to 6.0 bar delivery pressure, 5 bar nominal pressure) to $O_2$ cylinder. **Only use a pressure reducer with a vent valve at the outlet to limit the delivery pressure to approx. 5 bar in case of a fault!**
- Connect Oxylog 2000 to pressure reducer with medical gas hose.
- Turn cylinder valve **slowly** and open fully.




**Do not fit any flow control valves or flowmeters in the gas supply to Oxylog 2000!**
The ventilator may not function properly.

### Determining the pneumatic operation time

Example:

Cylinder pressure measured on the pressure gauge of the pressure reducer: 200 bar

Liquid capacity of the $O_2$ cylinder: 2.5 L

Supply of medical gas: 2.5 L x 200 bar = approx. 500 L

### Approximate operation time for Oxylog 2000

Example:

IPPV mode, frequency 10/min, $V_T$ = 1 L

Minute volume = 10/min x 1 L = 10 L/min

$$\text{Operation time} = \frac{\text{Medical gas supply [L]}}{\text{(MV +1*) [L/min]}}$$

$$\text{Operation time} = \frac{500}{11} = \text{approx. 45 minutes}$$

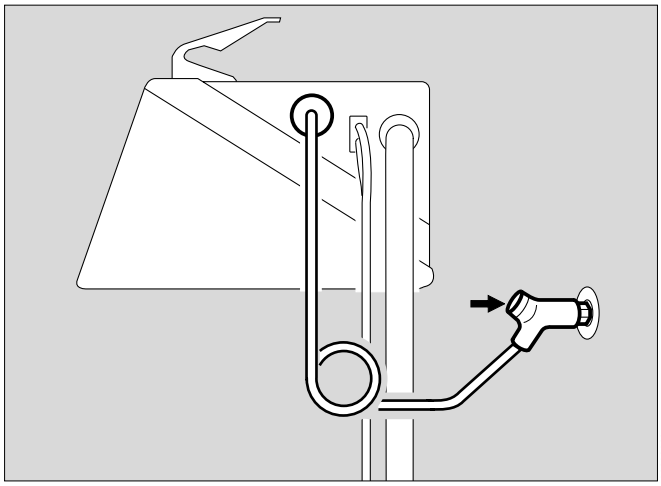
The gas consumption is reduced by approx. 50 % and the operation time increases to approx. 90 minutes when Oxylog 2000 is switched to "Air Mix".

---

* Gas consumption of ventilator: approx. 1 L/min

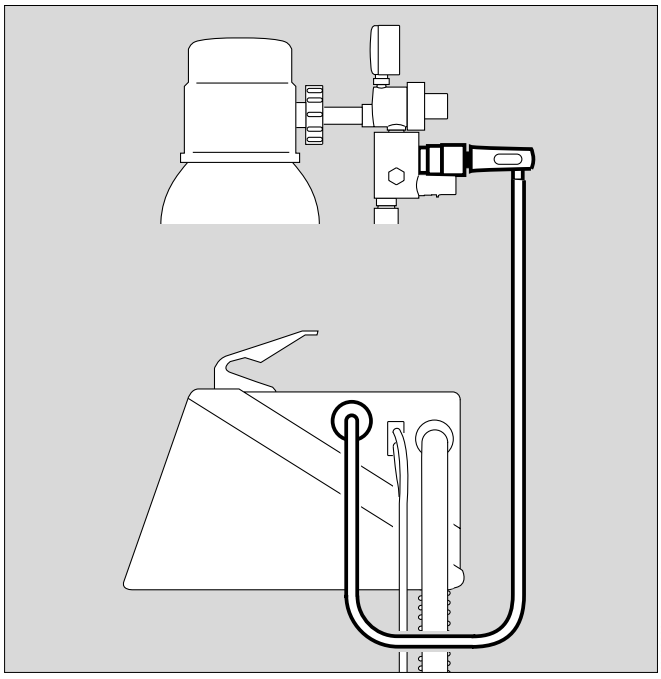
### Supply from a piped medical gas system

- Screw $O_2$ medical gas hose into Oxylog 2000 and plug gas probe into $O_2$ terminal unit until it engages once = parking position.




### Supply with Dräger Oxator

- Screw $O_2$ medical gas hose into Oxylog 2000.
- Firmly plug connector into one of the two $O_2$ couplings – until it engages.
- Follow Instructions for Use of Oxator.




### Supply from O2-air blender

- Note supply pressures for $O_2$ and medical gas input:

  **4.0 to 6.0 bar**

### Carrying system 2000

The carrying system 2000 is recommended for rapid mobile use of the Oxylog 2000:
Accommodates the Oxylog 2000, $O_2$ cylinder with pressure reducer, the bag of accessories and hose holder – for immediate use of the ventilator, see Order List.

# Checking readiness for operation

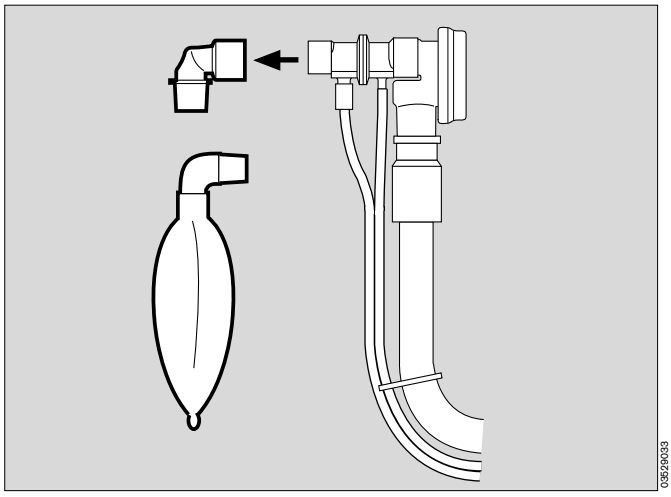
– Whenever the breathing valve is changed.
– Whenever the ventilator has been stripped down / assembled.
– At least every six months.

The results must be documented in the ventilator logbook.

**Connecting the test lung 84 03 201**

The test lung comprises an elbow connector for connection to the Y-piece, a catheter connector dia. 7 to simulate the resistance of the airways and a 2 L breathing bag to simulate the compliance.

- Detach angled connector from flow sensor.
- Push elbow connector into patient connection of flow sensor.



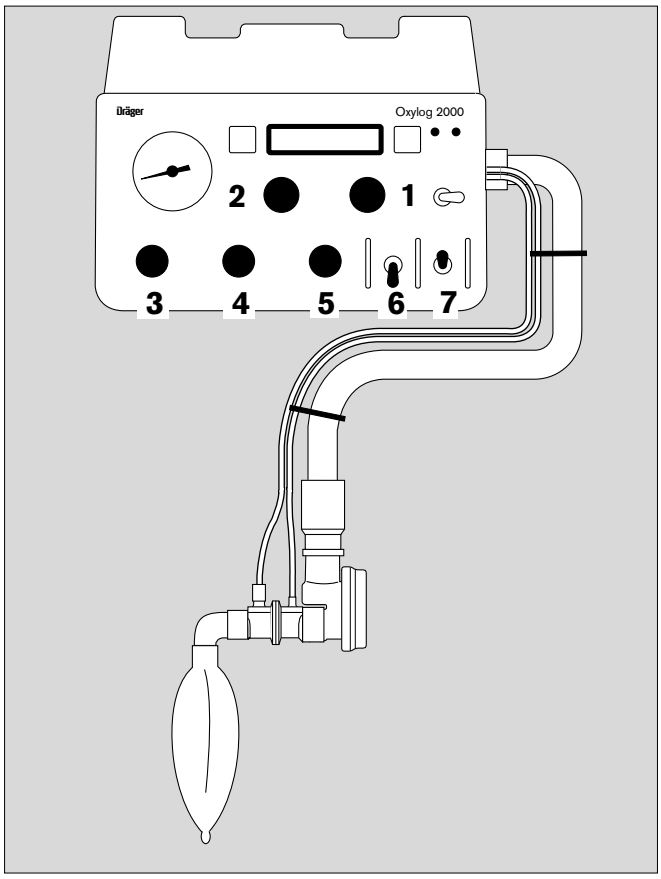

Connecting the gas supply:

- Open cylinder valve slowly and fully.

or:

- Push gas probe firmly into the terminal unit until it engages.

## Checking ventilation




1 Set »**VT**« knob to 0.5 L.

2 Set »**Freq.**« knob to 12/min.

3 Set »**TI : TE**« knob to 1 : 2.

4 Set »**Pmax**« knob to 60 mbar.

5 Set »**PEEP**« knob to 5 mbar.

6 Set switch for ventilation modes to **IPPV**.

7 Set ON/OFF switch to **I** (ON).

- The ventilator carries out an electrical and pneumatic self test.
- Display:

  **Self test**
  **SW-version xx.xx**

  The software version is shown in the bottom line.
- The red alarm indicator and the display illumination light up briefly.
- The alarm tone (beep) sounds twice. For safety reasons, the alarm tone is output on two mutually independent channels. Both are tested in the self test. This is why the alarm tone sounds twice for the same length of time.
- The green LED "DC power available" lights up constantly when an external power supply in the range 11 to 13 V DC is connected.

The self test is complete within no more than 6 seconds.

- Display:

  **Self test O.K.**

- Oxylog 2000 ventilates the test lung with the set ventilation pattern.

- Alternating between inspiration and expiration, the pressure gauge should indicate a defined inspiratory pressure and the end expiratory pressure of approx. 5 mbar.
- The display shows a minute volume of

  **IPPV MV = 6**

  with a tolerance of + 1.0 L/min.
- Disconnect the test lung.
- Display after approx. 25 seconds:

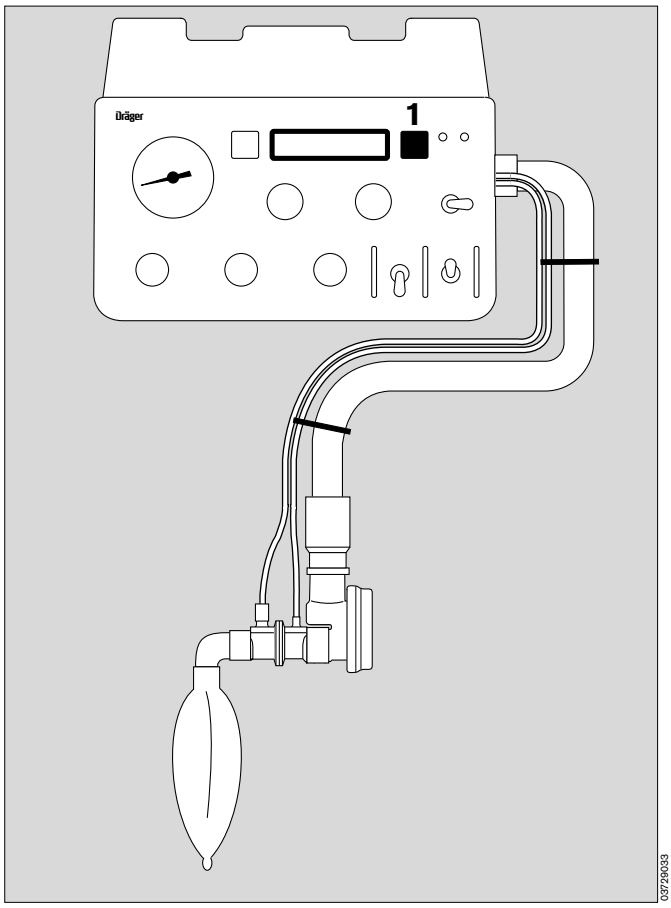
  **IPPV MV = 0**
  **Paw low**

- Reconnect the test lung.
- The intermittent alarm tone should cease after approx. 25 seconds.

**1** Press »🔔 **Reset**« to clear the display.

If the tolerance is larger:

- Replace flow sensor.




## Checking end expiratory pressure PEEP

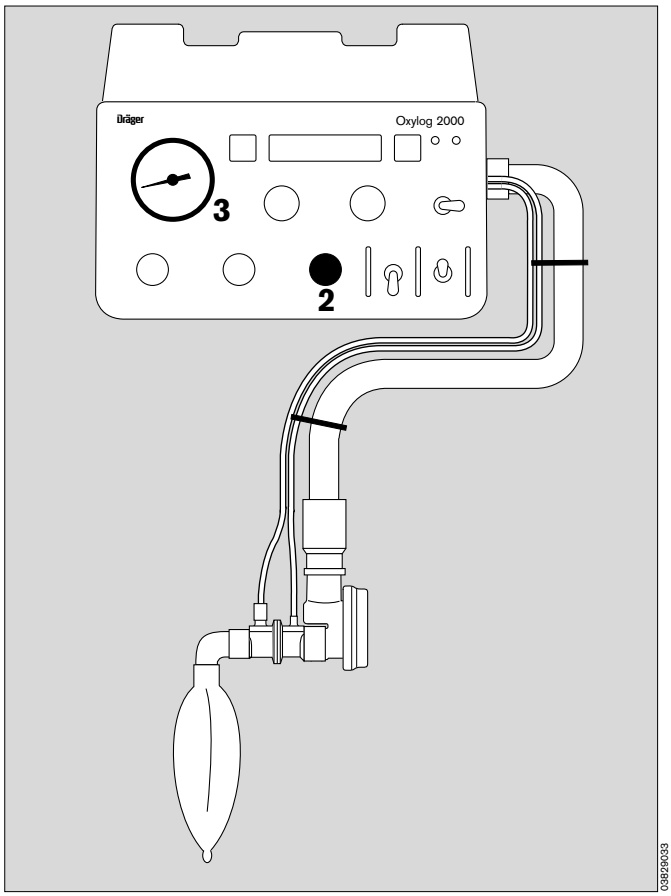
**2** Set »**PEEP**« knob to 0 mbar.

**3** Display on pressure gauge at end of expiration:
**0 mbar** +2 mbar tolerance

**2** Set »**PEEP**« knob to 10 mbar.

**3** Display on pressure gauge at end of expiration:
**10 mbar** ±2 mbar tolerance.

**2** Set »**PEEP**« knob back to 0 mbar.



## Checking »Paw high« alarm

**1** Set »**VT**« knob to 1.0 L.

**2** Set »**Freq.**« knob to 5/min.

**3** Set »**TI : TE**« knob to 2 : 1.

**4** Set »**Pmax**« knob to 40 mbar.

- Keep test lung compressed and watch pressure gauge:
- At an airway pressure of 36 to 40 mbar, the ventilator should switch over to expiration and the test lung deflates.

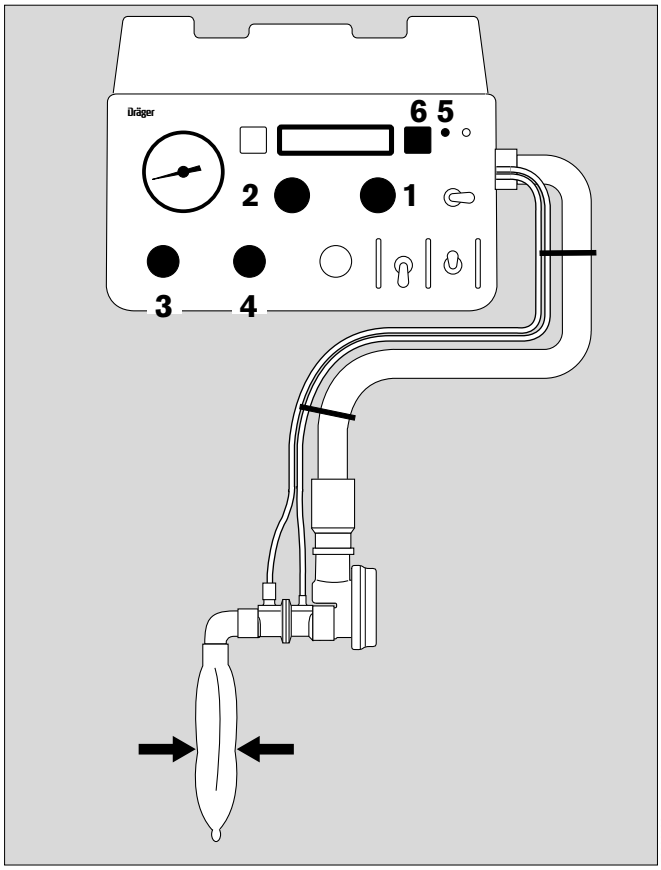
**5** The red alarm indicator flashes and the following message appears on the display:

**Paw high**

The intermittent tone sounds.

- Release test lung.
- The intermittent tone ceases.

**6** Press »🔔 **Reset**« to clear the display.




## Checking »Paw low« alarm

Use the same settings as above.

- Disconnect test lung from breathing valve.

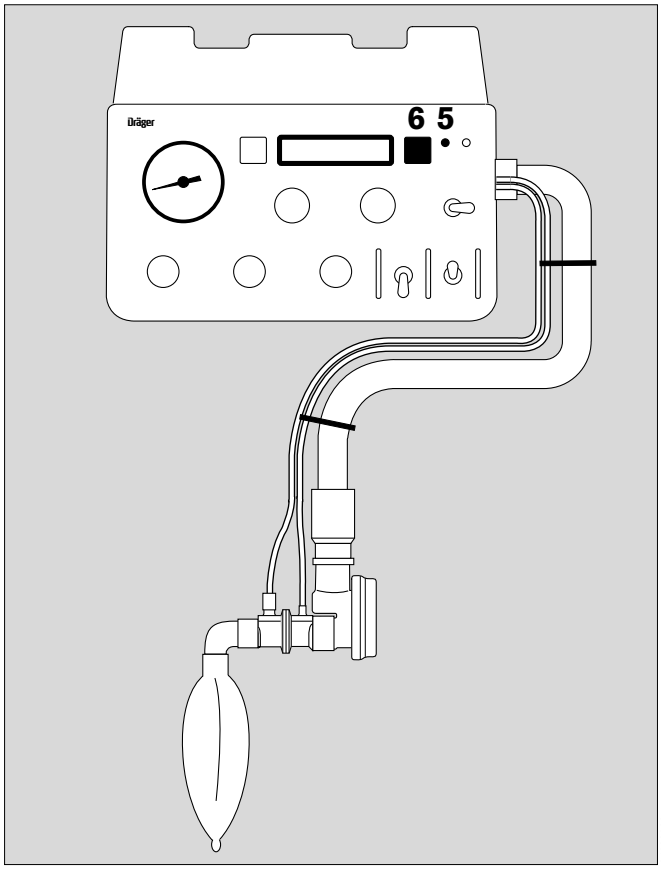
**5** The red alarm indicator flashes after approx. 25 seconds and the following message appears on the display:

**Paw low**

The intermittent tone sounds.

- Reconnect test lung.
- The intermittent tone ceases after approx. 25 seconds.

**6** Press »🔔 **Reset**« to clear the display.



## Checking synchronization for SIMV

1 Set switch for ventilation modes to **SIMV**.

2 Set »**Pmax**« knob to 60 mbar.

3 Set »**PEEP**« knob to 10 mbar.

4 Compress and release test lung several times to simulate spontaneous breathing.

- A synchronized ventilation stroke must be produced within approx. 5 seconds.
  Synchronization is only effective if a star (*) briefly appears behind the measured value on the display.
  Example:

  | SIMV MV = 6.0 * |
  |---|

1 Set switch for ventilation modes to **IPPV**.

3 Set »**PEEP**« knob to 0.

## Checking »Main supply down« alarm

Use the above settings.

4 Connect external power supply (power supply unit or DC/DC converter).
The green LED lights up.

5 Interrupt external power supply:
the red alarm indicator flashes, the green LED goes out. The following message appears on the display:

| Main supply down |
|---|

The intermittent tone sounds.
The ventilator continues operation with the internal battery pack.

- Press »🔔 **Reset**« to clear the display.
  The intermittent tone ceases.
  The message »Main supply down« disappears.
- Reconnect external power supply = set ON/OFF switch to **0**.

**The ventilator is ready for operation when all these checks have been completed successfully.**

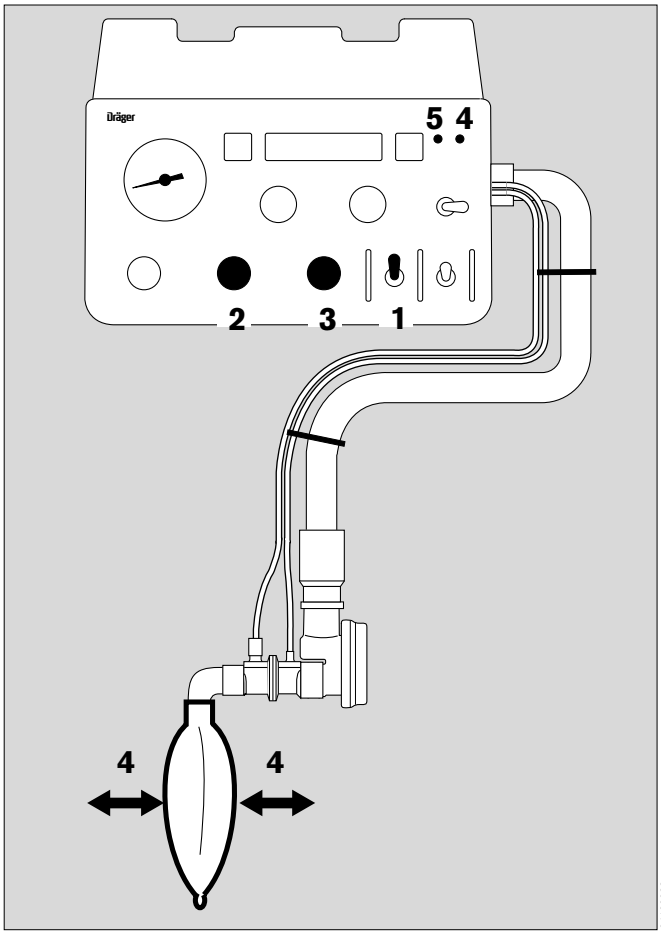
- Disconnect test lung, replace angled connector.

### Prolonged storage

If Oxylog 2000 is not used for more than 3 months:

- Remove battery pack (alkaline manganese batteries).

The NiCd battery pack can remain in the ventilator.



# Fault – Cause – Remedy

The following table is intended to assist in identifying and rectifying the underlying cause of any faults triggering an alarm.
The messages are listed in alphabetical order.

| Fault / Message | Cause | Remedy |
|---|---|---|
| **Apnea**<br>Alarm indicator flashes, intermittent tone sounds. | Spontaneous breathing by patient has failed in CPAP mode. | Change over to IPPV or SIMV. |
| **Bat. discharged**<br>Alarm indicator flashes, intermittent tone sounds. Ventilation ceases. | Battery pack flat, no external power supply. | Replace alkaline manganese battery pack or connect external power supply. |
| **Change bat.**<br>Alarm indicator flashes, single beep every 30 seconds. Illumination for display cannot be switched on. | Battery pack will be flat within a few minutes, external power supply not connected. | Replace alkaline manganese battery pack or connect external power supply. |
| **Charge NiCd**<br>Alarm indicator flashes, single beep every 30 seconds, illumination for display cannot be switched on. | NiCd battery pack will be completely flat within a few minutes, external power supply not connected. | Replace NiCd battery pack or connect power supply. |
| **Check settings**<br>Alarm indicator flashes, intermittent tone sounds. | Ventilator performance parameters have been exceeded, the effective flow is less than 4 L/min or greater than 60 L/min. | Correct the appropriate setting :<br>e.g. Freq., $V_T$ or $T_I$ : $T_E$ |
| **Faulty NiCd** | Ventilator connected to external power supply, NiCd battery pack defective. | Replace NiCd battery pack. |
| **Flow meas. INOP** | Flow measurement faulty. The measured values and alarms based on flow measurement are not valid! | Ventilation can be continued.<br>**Observe patient carefully!**<br>Call DrägerService after shutdown. |
| **high frequency** | Hyperventilation, self-triggering. Measured frequency exceeds set frequency by more than 50 %. | Correct settings, change over to IPPV if necessary. |
| **Leakage**<br>Alarm indicator flashes, intermittent tone sounds. | The measured expiratory minute volume is approx. 40 % lower than the inspiratory value.<br>Leak in flow measuring hoses. | Remedy leaks in patient system and possibly in tube.<br>Use new flow measuring hoses. |

| Fault / Message | Cause | Remedy |
|---|---|---|
| **Main power down**<br>Alarm indicator flashes, intermittent tone sounds. | Plug connection to external power supply does not make contact.<br>Power supply unit or DC/DC converter defective. | Check plug connection or replace power supply unit or DC/DC converter.<br>Press »🔔 **Reset**« to confirm.<br>Ventilator continues operation with internal power supply. |
| **NiCd discharged**<br>Alarm indicator flashes, intermittent tone sounds, ventilation ceases. | NiCd battery pack flat, no external power supply | Replace NiCd battery pack or connect power supply. |
| **No NiCd charge**<br>This message only appears in standby mode. | NiCd battery pack not fitted or alkaline manganese battery pack fitted or ambient temperature when charging the internal NiCd battery pack is outside the range 0 to 35 °C or internal fuse defective. | Charge NiCd battery pack at ambient temperatures between 0 and 35 °C. |
| **No NiCd or bat.** | Ventilator connected to external power supply, internal power supply not available. | Fit fully charged NiCd or new alkaline manganese battery pack. |
| **Paw high**<br>Alarm indicator flashes, intermittent tone sounds. The minute volume cannot be fully applied. | Stenosis in the airways. Ventilation hose kinked. Reduced lung compliance. The inspiratory flow resulting from the setting for $V_T$, Freq. and $T_I$ : $T_E$ is too high.<br>Patient "fights" the machine. | Clear airways.<br>Ensure ventilation hose is not kinked. Set higher Pmax value. Set a longer inspiration time (smaller flow) with the $T_I$ : $T_E$ knob.<br>Change ventilation pattern or ventilation mode. Sedate patient if necessary.. |
| Single beep | 80 mbar set – for cardio-pulmonary resuscitation. | No remedy required. |
| **Paw low**<br>Alarm indicator flashes, intermittent tone sounds. | Disconnection / leakage in patient connection, breathing valve or ventilation hose.<br>Diaphragm wrongly fitted in breathing valve or damaged.<br>Leak in cuff. | Ensure connections are tight.<br>Fit diaphragm correctly or replace it.<br>Inflate cuff and check for leaks. |

| Fault / Message | Cause | Remedy |
|---|---|---|
| **Supply press. low**<br>Alarm indicator flashes, intermittent tone sounds.<br>Ventilation ceases. | $O_2$ cylinder empty, cylinder valve closed, probe not plugged into piped medical gas system. | Check gas supply in $O_2$ cylinder, connect to full $O_2$ cylinder. Open cylinder valve. Check gas pressure in piping system, ensure that system pressure is more than 2.7 bar. Push probe fully into wall socket. |
| **XX XX XX XX XX**<br>**Ventilator INOP**<br>Ventilation ceases!<br>Alarm indicator lights up, continuous tone sounds.<br>(XX = fault code) | Internal machine fault. | Switch off ventilator and disconnect from external power supply.<br>Switch ventilator on again.<br>If fault recurs: use alternative machine and call DrägerService. |
| Displayed measured value MV is implausibly high | Flow measuring hoses kinked.<br>Water in flow measuring hoses. | Straighten out kink.<br>Drain water from flow measuring hoses. |
| When switching on:<br>no alarm tones of the same length to be heard. | Internal machine fault. | Switch ventilator off and on again. If fault recurs, use alternative machine and call DrägerService. |
| No message.<br>External power supply connected, green LED does not light up. | Output voltage of power supply unit or DC/DC converter outside the range of 11 to 13 V. | Check plug connection or replace power supply unit or converter. |
| No message,<br>no alarm,<br>ventilator does not work. | No internal or external power supply available. | Fit fully charged NiCd battery pack or new alkaline manganese battery pack. Use alternative machine if applicable. Replace fuse, page 37. |
| No message.<br>Continuous tone sounds for at least 7 seconds. | Sudden failure of the internal power supply when external power supply is not connected. | **Patient must immediately be ventilated by hand!**<br>Connect external power supply.<br>Check internal power supply. |

# Maintenance intervals

**Ventilator and parts must be cleaned and disinfected before starting any maintenance procedures*, as well as before returning machine or parts for repairs!**

| | |
|---|---|
| Internal NiCd battery pack | Replace when display shows »Faulty NiCd« during charging, page 37. Replace every 2 years at the latest. |
| Internal alkaline manganese battery pack | Replace at the latest when when display shows »Bat. discharged« or »Change bat«. |
| Inspection and maintenance | Every 2 years by trained service personnel. |
| Safety inspections | Every 2 years by trained service personnel. |
| Pressure reducer | Basic overhaul by trained service personnel after 6 years. |

## Disposing of the ventilator

**at the end of its service life**

Oxylog 2000 can be returned to Dräger Medizintechnik GmbH for orderly disposal.

## Disposing of alkaline manganese and NiCd batteries

– Do not throw into fire: risk of explosion!

– Do not open by force: risk of cauterization!

– Do not recharge alkaline manganese batteries.

Alkaline manganese and NiCd batteries must be disposed of as special waste:

- in accordance with local waste disposal regulations.

Further information can be obtained from the local environment and public health authorities, as well as from approved waste disposal companies.

**If the glass on the LC display breaks,**
a liquid chemical may escape which must not be allowed to come into contact with the human body. Affected areas of skin must be cleaned with soap!

---

* Definitions:
Inspection = Examination of actual condition
Service = Measures to maintain specified condition
Repair = Measures to restore specified condition
Maintenance = Inspection, service, repair

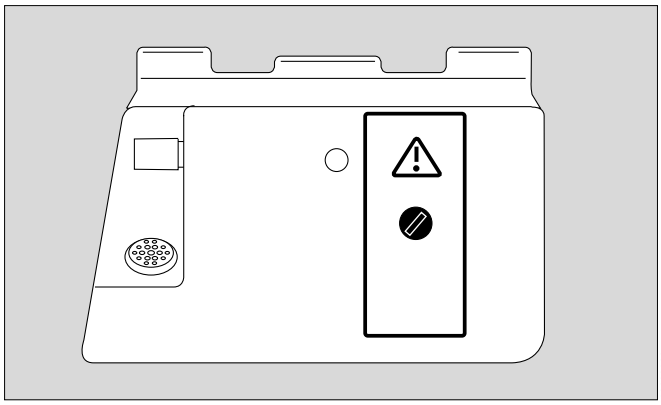
## Fitting/replacing internal NiCd battery pack

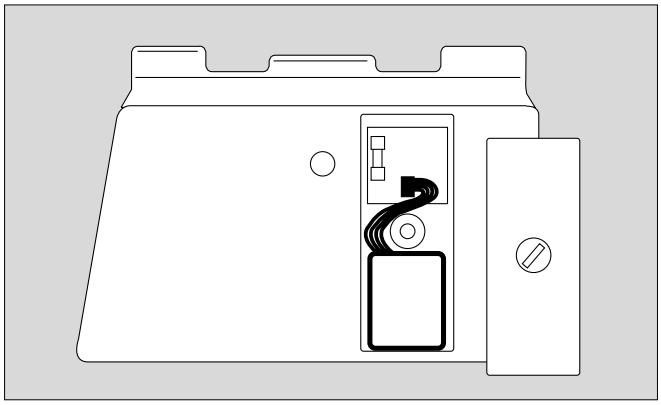
– Before using ventilator for the first time
– When the following display appears during charging:

  **Faulty NiCd**

  and
– Every 2 years as a precautionary measure (check in ventilator logbook).

- Undo screw in cover of battery compartment, e.g. with a coin, and remove cover.
- Remove faulty NiCd battery pack and disconnect plug.
- Connect plug of new NiCd battery pack to socket of battery compartment and place battery pack in compartment.
- Refit cover and tighten screw.
- Charge NiCd batteries:
  – with DC voltage from the on-board supply
  – or with the power supply unit.
- Dispose of the faulty NiCd battery pack as special waste, page 36.
- Charge NiCd battery pack, page 24.
- Screw cover into place.

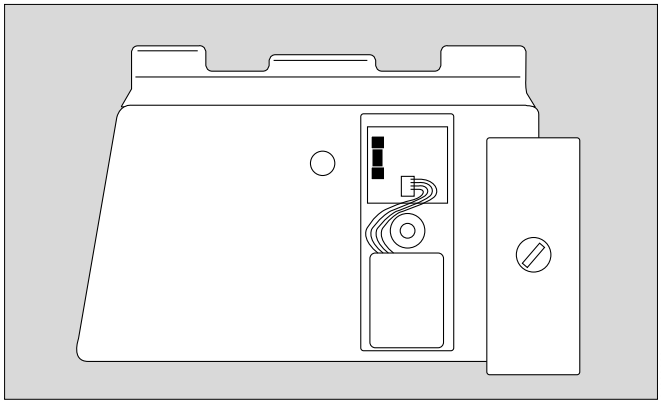



## Replacing the fuse

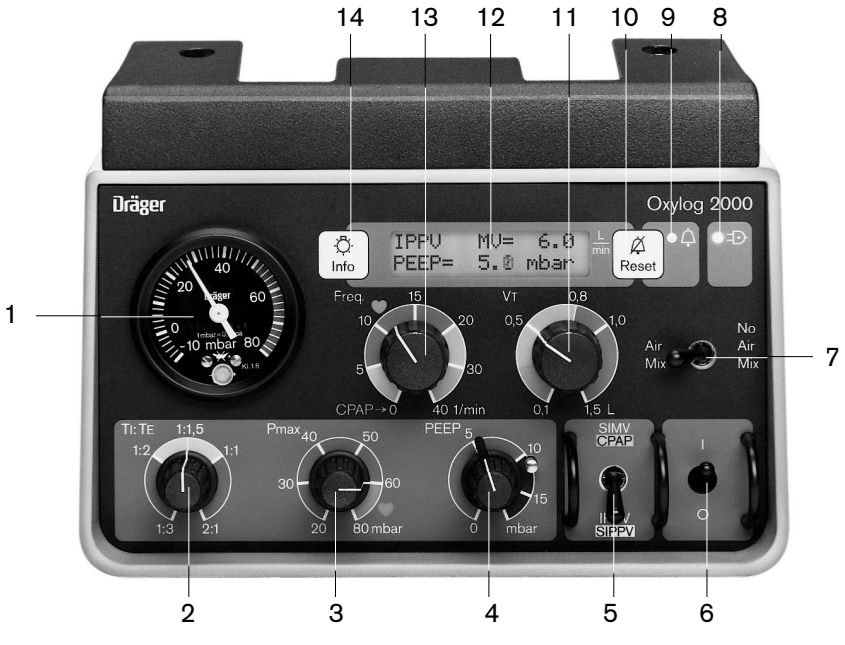
if operation with NiCd or alkaline manganese batteries is impossible.

- Remove defective fuse with the aid of a screwdriver.
- Press new fuse (1 A quick-acting IEC 127-2) into terminal.
- Screw cover into place.



# What's what

## Front view




1 Pressure gauge for airway pressure

2 Rotary knob for ventilation time ratio »**TI : TE**«, infinitely adjustable from 1 : 3 to 2 : 1

3 Rotary knob for limiting the airway pressure »**Pmax**«, infinitely adjustable from 20 to 60 mbar; can also be set to 80 mbar.

4 Rotary knob for »**PEEP**«, infinitely adjustable from 0 to 15 mbar, with lock for PEEP greater than 10 mbar.

5 Switch for ventilation modes: **IPPV/SIPPV** and **SIMV/CPAP**

6 ON/OFF switch »**0 / I**«

7 Selector switch for inspiratory oxygen concentration during IPPV/SIPPV and SIMV
**No Air Mix** = 100 Vol.% $O_2$
**Air Mix** = 60 Vol.% $O_2$

8 Green LED "external power supply available"

9 Red alarm indicator

10 »**Reset**« key to suppress the alarm tone for approx. 2 minutes and to clear the warning messages

11 Rotary knob for tidal volume **VT**, infinitely adjustable from 0.1 L to 1.5 L

12 Liquid crystal display for minute volume, warnings and advisory messages

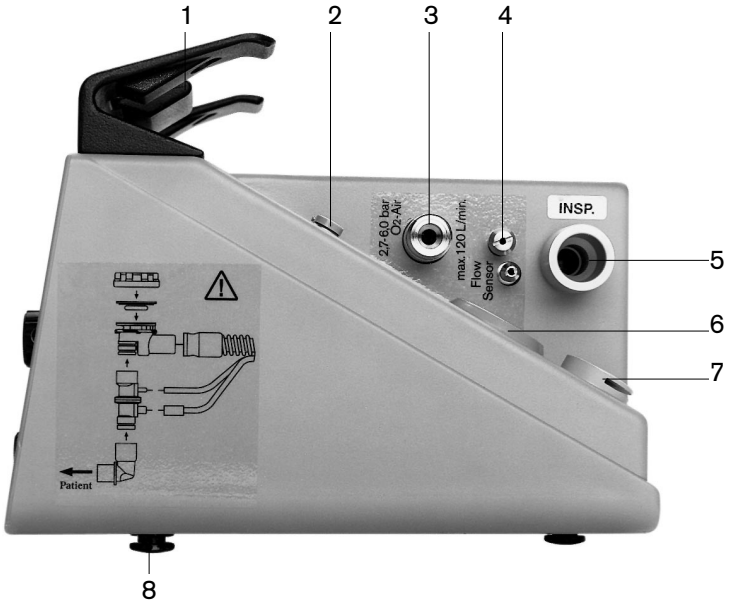
13 Rotary knob for the ventilation frequency »**Freq.**«, nfinitely adjustable from 5 to 40/min.
0/min position for »**CPAP**« ventilation mode.

14 »**Info**« key to display additional settings and measured values, to switch on illumination of the LC display for 30 seconds and to check the displays and alarm tone

## Rear view


1 Compartment for internal power supply: pack of six batteries, either NiCd or alkaline manganese

## Right-hand side view




1 Bracket for mounting unit in vehicles and for hanging unit from wall rails and horizontal tubes up to 38 mm diameter

2 Connector for external power supply (power supply unit or on-board supply with converter)

3 Connector for $O_2$, 2.7 to 6.0 bar

4 Connectors for flow measuring hoses

5 Inspiration connector, 22 mm ISO conical connector

6 Acoustic horn

7 Venting and ventilation – must not be obstructed!

8 Feet, may also be used to secure the carrying strap

# Technical data

### Ambient conditions

| | |
|---|---|
| Operation | |
| Temperature | –18 to 50 °C |
| Atmospheric pressure | 600 to 1200 hPa |
| Humidity | 30 to 95% rel. humidity |
| Storage | |
| Temperature | –18 to 70 °C |
| Atmospheric pressure | 600 to 1200 hPa |
| Humidity | 10 to 95% rel. humidity |

### Performance data

| | |
|---|---|
| Operational parameters | |
| Control principle | Volume flow control, time-cycled, volume-constant, flow chopper (microprocessor-controlled) |
| | Spontaneous breathing with integrated demand valve (also at PEEP level) |
| Ventilation modes | IPPV/SIPPV, SIMV/CPAP |
| Ventilation frequency | 5 to 40/min +1/min, infinitely variable |
| Tidal volume $V_T$ | 0.1 to 1.5 L, infinitely variable |
| Setting accuracy for 10 mbar airway pressure | +10 % of set value, at least 50 mL |
| Ventilation time ratio $T_I : T_E$ | 1 : 3 to 2 : 1 +5%, infinitely variable |
| Inspiratory pressure limitation Pmax | 20 to 60 mbar +10 %, infinitely variable; can also be set to 80 mbar +10 % or at least +3 mbar |
| PEEP | (0 +2) to 15 mbar, infinitely variable |
| Expiratory minute volume MV (at $T_I : T_E$ = 1 : 1.5) | min. 1.0 L/min<br>max. 25.0 L/min |
| with effective flow range | 4 to 60 L/min |
| Spontaneous breathing data | |
| Response pressure of demand valve | approx. –1 mbar |
| Max. delivery at –4 mbar | 100 L/min |
| Sensitivity of synchronization | |
| for SIMV | 4 L/min |
| for SIPPV | 3 L/min |

| | |
|---|---|
| Compliance | |
| with 1.5 m ventilation hose | <1.0 mL/mbar |
| with 3.0 m ventilation hose | <1.2 mL/mbar |
| Inspiratory resistance | <6 mbar/L/s |
| Expiratory resistance | <4 mbar/L/s |
| Dead space volume incl. flow sensor | approx. 28 mL |
| Measuring range | |
| Pressure gauge | –10 to 80 mbar |
| Display accuracy | +2 mbar |
| Flow measuring range | 2 to 120 L/min bidirectional |
| Max. permissible differential pressure for flow measurement | +4 mbar |
| Resistance of flow sensor | 3 mbar at 100 L/min |
| Minute volume measurement | |
| Range | 2 to 40 L/min |
| Accuracy (with $O_2$, at 1013 hPa, 20 °C, 50 % rel. humidity) | |
| for 1 to 5 L/min | +1 L/min |
| for 5 to 40 L/min | ±12 % of measured value, but at least +1 L/min |
| Patient connection | 22 mm ISO conical connector |
| $O_2$ concentration of the ventilation gas (with $O_2$ supply) | |
| Switch set to »Air Mix« | |
| for MV less than 7 L/min | $O_2$ concentration can increase to 90 vol.% |
| for MV greater than 7 L/min | 60 Vol.% $O_2$ ±10 % |
| Switch set to »No Air Mix« | 100 Vol.% $O_2$ |
| Response in extreme conditions: when supply pressure is 10 bar | The applied tidal volume $V_T$ additionally increases by approx. 5% of the set value |
| Warnings | |
| **Supply press. low** | Warning when supply pressure drops below approx. 2.0 bar. |
| **Paw high** | Set via Pmax knob. Warning when set value for Pmax is reached. |
| **Paw low** | Warning when a pressure difference >10mbar is not built up over a time of >20 s in IPPV or SIMV mode. |
| **Leakage** | Warning when the expiratory tidal volume drops below 60 % of the inspiratory tidal volume. The »Leakage« warning is not active in CPAP mode. |

| | |
|---|---|
| **Apnea** | Only active in CPAP mode.<br>Alarm, wenn kein Wechsel der Atemphasen erkannt werden. |
| **Check settings** | Warning when the inspiratory flow due to the combination of $V_T$, Freq., $T_I : T_E$ is above or below the range 4 to 60 L/min.<br>This warning is important for the performance range of the flow valve. It does indicate an operator error and need not be reset. |
| Warnings | are indicated visually and acoustically.<br>The acoustic alarm ceases automatically when the fault has been remedied.<br>The text on the display must be cleared = reset. |
| Self-test | performed automatically at regular intervals during operation and in standby mode. |
| Volume of the alarm tone | 75 dB(A) at a distance of 1 m |
| Supply gas | Oxygen for medical use, mixture of gases, medical air in emergencies |
| Quality of the supply gas | Dry, oil-free and dust-free |
| Supply | From a pipeline system<br>or<br>from medical gas cylinders |
| Supply pressure | 2.7 to 6.0 bar at 80 L/min |
| Gas cylinders and pressure reducers | must comply with national regulations and be officially approved |
| Pressure reducers | must have a vent valve on the output side to limit the delivery pressure to approx. 5 bar in the event of a fault. |
| Connection | M 15 x 1 male thread, designed for $O_2$,<br>in emergencies also for medical air. |
| Gas consumption<br>for internal control<br>for »Air Mix«<br>for »No Air Mix« | <br>Approx. 1.0 L/min<br>Approx. 50 % of the effective minute volume<br>Approx. 100 % of the effective minute volume |
| Typical pneumatic operation time at a minute volume of 10 L/min | |
| 11 L $O_2$ cylinder | Approx. 200 minutes without mixing (No Air Mix)<br>Approx. 400 minutes with mixing (Air Mix) |
| 2,5 L $O_2$ cylinder | Approx. 45 minutes without mixing (No Air Mix)<br>Approx. 90 minutes with mixing (Air Mix) |
| Input voltage for Oxylog 2000 | 12 V ±1 V DC |
| Connection for external power supply 12 V / 24 V / 28 V DC | with DC/DC converter |

| | |
|---|---|
| Fuse<br>(behind the cover of the battery compartment) | Quick-acting 1 A IEC 127-2 |
| Current consumption for high-speed charging of the NiCd battery pack | |
| Ventilator OFF | 300 mA (for 8 hours, then switches automatically to trickle charging) |
| Ventilator ON | 530 mA |
| Current for trickle charging | 30 mA |
| Permissible ambient temperature during charging | 0 to 35 °C |
| Electrical operation time | |
| with internal NiCd battery pack | Max. 6 hours at 5 to 50 °C<br>Max. 3 hours at temperatures below 5 °C |
| Alkaline manganese batteries | Max. 4 hours at 5 to 50 °C<br>Max. 2 hours at temperatures below 5 °C<br>with typical settings |
| Protection class | Type BF  (body floating) |
| Type of protection | IP 54 (splash-proof) |
| Protection class of power supply unit | II  in accordance with DIN IEC 601 |
| Operating noise<br>Sound pressure level | 48 dB(A) at a distance of 1 m |
| Max. height of fall | 0.5 m |
| Dimensions<br>(W x H x D) | 215 x 120 x 205 (without handle) |
| Weight | 4.3 kg |
| $O_2$ cylinder, 2.5 L, full | 4.2 kg |
| $O_2$ cylinder, 2.0 L, full | 3.5 kg |
| Pressure reducer Alduk 1 | 0.9 kg |
| NiCd battery pack | 0.15 kg |

**DC/DC converter**

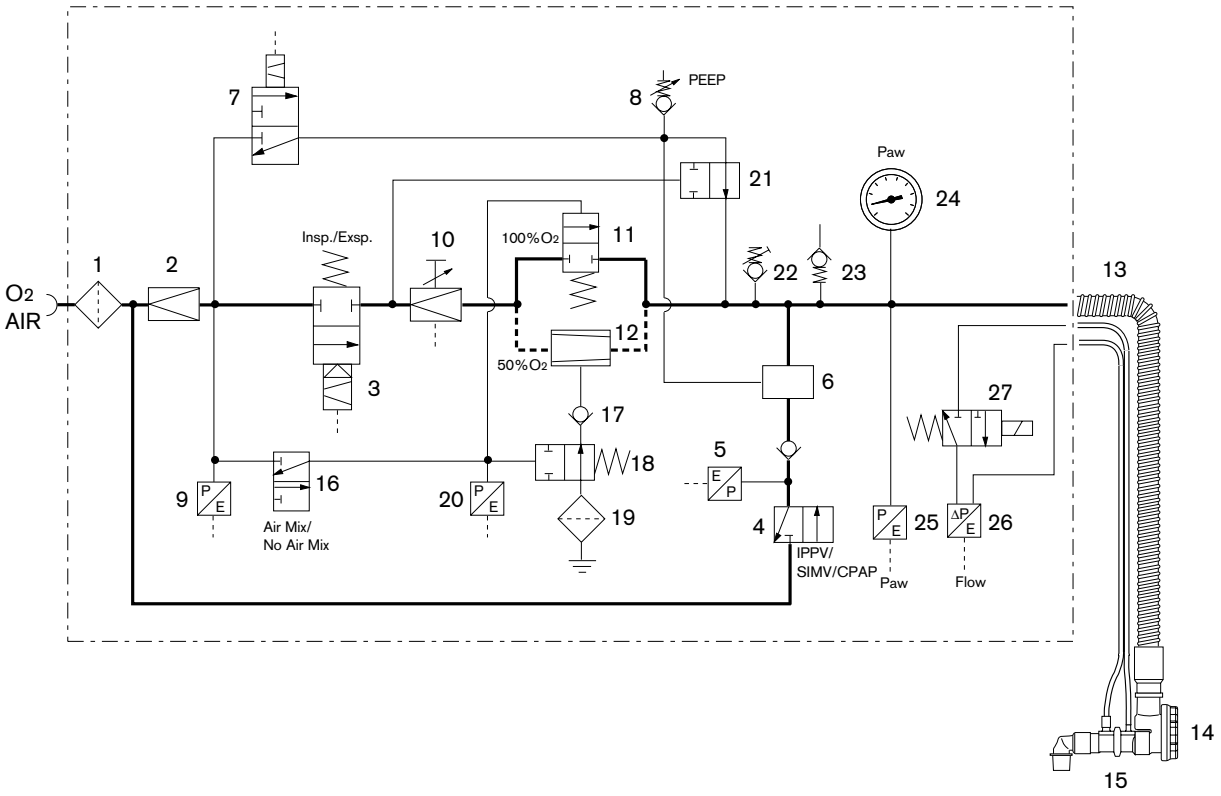
| | |
|---|---|
| Input voltage | 10.5 V DC to 30.0 V DC |
| Output voltage | 12.5 V DC (+0.05 V / –1.0 V) |
| Current consumption | 700 mA to 1600 mA<br>Protected by an internal micro-fuse to DIN 41 571 Part 2.0 |
| Temperature range | – 20 to +50 °C |
| Humidity | 0 to 95 % rel. humidity without condensation |
| Immunity to interference | Immune to interference in accordance with IEC 801-3 and VDE 843T3 |

| | |
|---|---|
| **Electromagnetic compatibility EMC** | Tested to EN 60601-1-2 |

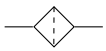
**Materials used**

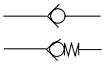
| | |
|---|---|
| Ventilator housing | Impact-proof acrylonitrile butadiene styrene (ABS) |
| Ventilation hose | Silicone rubber |
| Flow measuring hoses | Silicone rubber |
| Flow sensor housing | Polysulphone (PSU) |
| Wind vane in flow sensor | Stainless steel |
| Housing of breathing valve | Polysulphone (PSU) |
| Diaphragms in breathing valve | Silicone rubber |
| Touch-sensitive keypad on ventilator | Polyester film |

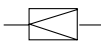
# Description of operating principles

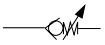


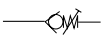

## Symbols for pneumatic components

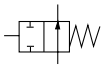

Filter

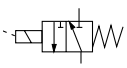

Non-return check valve


Pressure regulator


Pressure limiting valve, variable


Pressure limiting valve, with fixed setting


2/2-way valve, pneumatically controlled


3/2-way valve, electrically controlled

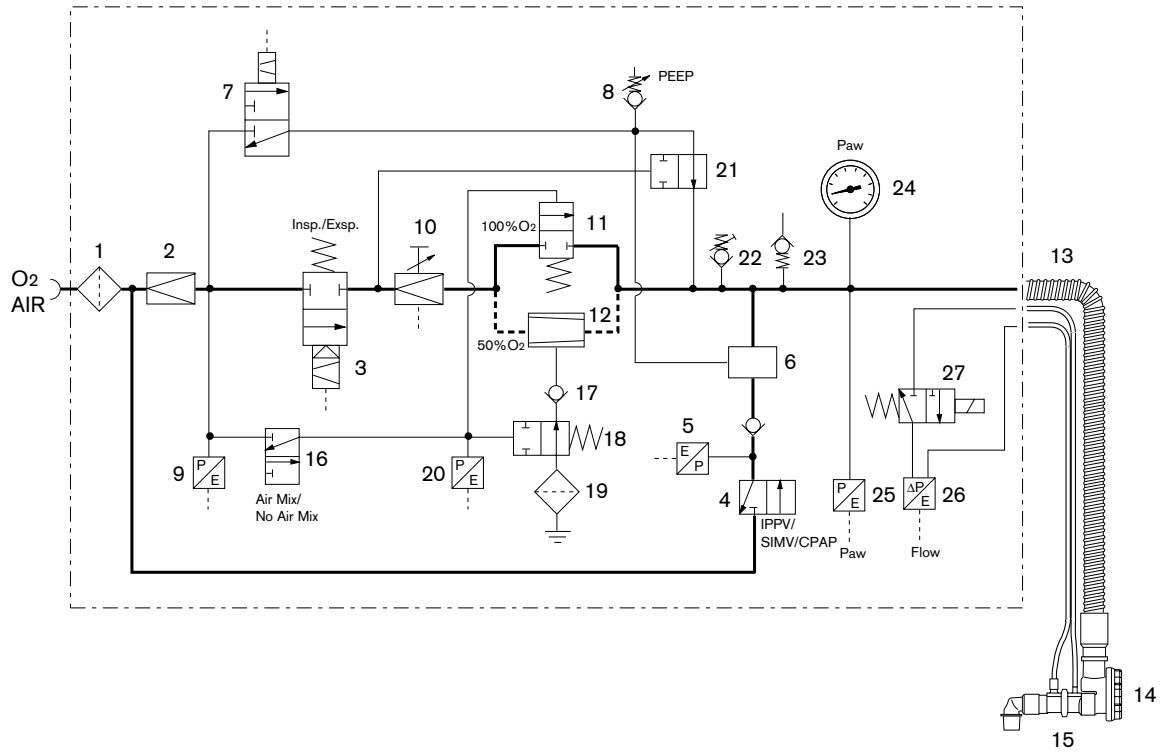

Injector


Pressure gauge


Pressure sensor


Differential pressure sensor

00129035




## Gas supply

The $O_2$ gas supply (or medical gas) is purified by filter **1** and regulated by pressure regulator **2** to a constant pressure. The 3/2-way solenoid valve »Insp./Exp.« **3** releases the inspiratory gas flow in IPPV/SIMV in time with ventilation frequency. Flow is regulated by the electrically controlled flow valve **10**.
The gas supply is routed to the 3/2-way solenoid valve »Insp./Exp.« **3** and to demand valve **6** via the 3/2-way valve "IPPV/CPAP" **4**. The system pressure is routed via solenoid valve **7** to PEEP valve **8** and monitored by pressure sensor **9**.

## IPPV/SIMV / SIMV

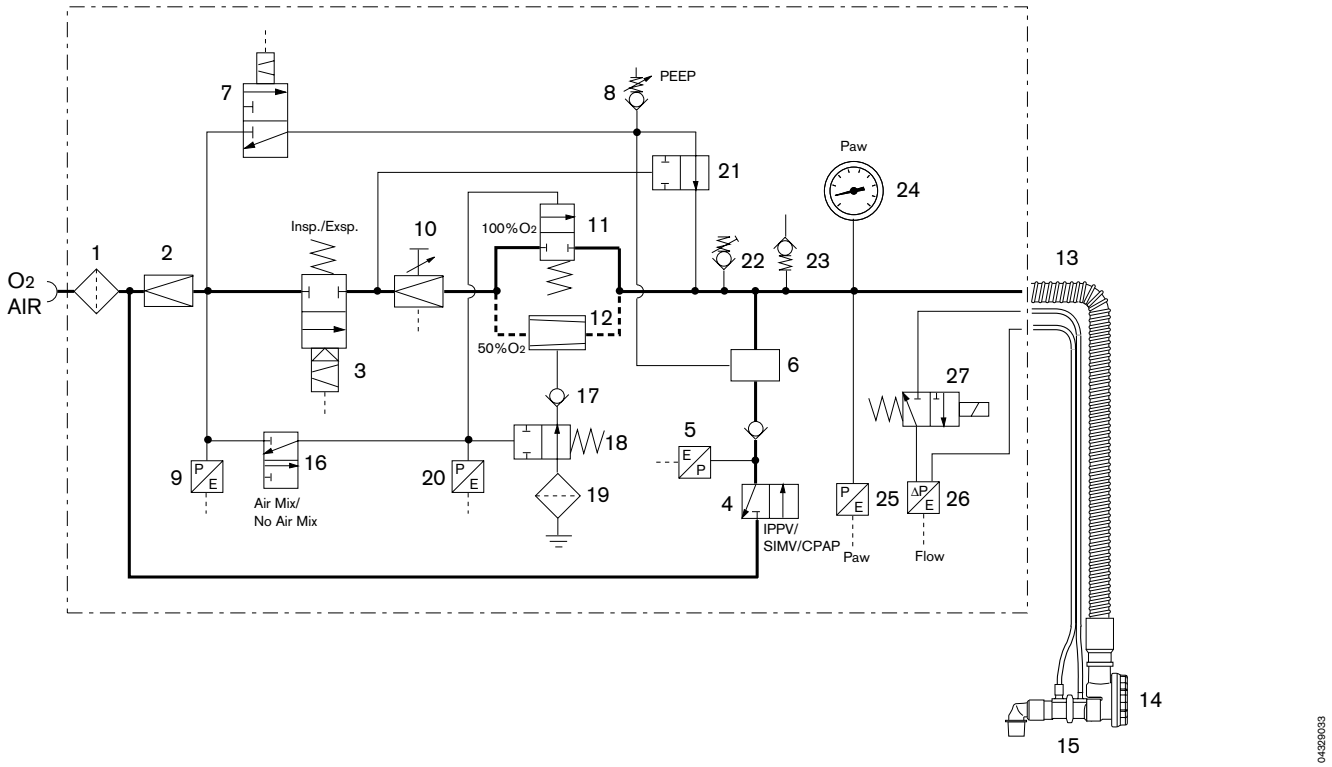
### Inspiration

The 3/2-way solenoid valve »Insp./Exp.« **3** releases the gas flow. Flow is regulated by the electrically controlled flow valve **10** and reaches ventilation hose 13 via the 2/2-way valve **11** or injector **12**, as well as the patient connection via breathing valve **14** and flow sensor **15**.
Depending on the switching position of the 3/2-way valve **16**, 100 % $O_2$ is applied or the gas supply is diluted to 60 % $O_2$. For this purpose, injector **12** takes in ambient air via check valve **17**, the 2/2-way valve **18** and filter **19**.
The position of the »Air Mix / No Air Mix« switch is monitored by pressure sensor **20**.

The controlled 2/2-way valve **21** prevents the inspiratory gas from escaping to the mechanical PEEP valve **8**. The pressure limiting valve **22** limits the inspiratory pressure to a maximum value independently of the Pmax regulating unit.
Ambient air can be drawn in additionally via the extra valve **23** if the gas supply fails. The airway pressure is measured by pressure gauge **24** and pressure sensor **25**.
The expiratory flow generates a proportional differential pressure on flow sensor **15**, which is measured by differential pressure sensor **26** and used to determine the minute volume.
Automatic zero calibration of differential pressure sensor **26** is carried out with 3/2-way valve **27**. The 3/2-way solenoid valve »Insp./Exp.« **3** interrupts the gas flow either time-cycled – at the end of the inspiration time determined by the ventilation frequency and ratio $T_I : T_E$ – or pressure-controlled when the set pressure Pmax is reached.

### Expiration / PEEP

The gas in the ventilation hose **13** is released via the 2/2-way valve **21** to the end expiratory pressure set on the PEEP valve **8**.
The patient can exhale into the ambient air via flow sensor **15** and breathing valve **14**. The PEEP pressure set on PEEP valve **8** is superimposed by the breathing valve **14**.




## CPAP

The gas flow to demand valve **6** is released by the 3/2-way valve **4** and monitored by pressure sensor **5**.

### Inspiration / Expiration

Controlled by the patient's inspiratory effort, demand valve **6** supplies the appropriate volume to the patient. This supply is stopped when the patient wishes to start expiration.
The demand valve generates the desired CPAP pressure in the breathing system using PEEP/CPAP set on the PEEP valve **8**.

# Abbreviations and symbols

| | |
|---|---|
| Air Mix | Mixture of $O_2$ and ambient air<br>(= approx. 60 vol.% $O_2$) |
| CPAP | **C**ontinuous **P**ositive **A**irway **P**ressure<br>– Breathing with positive airway pressure |
| CPR | Cardio-pulmonary resuscitation |
| IPPV | **I**ntermittent **P**ositive **P**ressure **V**entilation |
| KG | Body weight in kg |
| MV | Minute volume, L/min |
| No Air Mix | $O_2$ is not mixed with ambient air (= 100 vol.% $O_2$) |
| Paw | Airway pressure |
| Paw high | Upper alarm limit for airway pressure |
| Paw low | Lower alarm limit for airway pressure |
| PEEP | **P**ositive **E**nd **E**xspiratory **P**ressure |
| Pmax | Setting for upper alarm limit for airway pressure »Paw high« |
| Reset | Reset = clear |
| SIMV | **S**ynchronized **I**ntermittent **M**andatory **V**entilation |
| SIPPV | **S**ynchronized **I**ntermittent **P**ositive **P**ressure **V**entilation |
| $T_I$ : $T_E$ | Ratio of inspiration time to expiration time |
| * | Synchronized ventilation stroke for SIPPV and SIMV |
| ♥ | Setting symbol for ventilation frequency 12/min and Pmax 80 mbar for cardio-pulmonary resuscitation |
| Reset | Key to suppress alarm tone for approx. 2 minutes<br>and to reset the alarm message when the fault has been rectified = clear |
| ○ 🔔 | Alarm indicator, lights up red in the event of an alarm |
| ○ | LED for »external DC power available«, lights up green |
| ⚠ | Observe Instructions for Use |
| | Protection class BF (body floating) |

# Appendix

## Principle of flow measurement

The inspiratory and expiratory flow both stream through the flow sensor positioned at the patient connection of the breathing valve. The flow generates a pressure drop in the sensor which is measured via two pressure measuring hoses in Oxylog 2000. The pressure drop is proportional to the flow.
The expiratory minute volume is calculated from the measured expiratory flow and indicated.
The inspiratory volume supplied is calculated from the measured inspiratory flow and then compared with the expiratory volume to calculate the leakage, which is then displayed.
The inspiratory flow measurement is also used to synchronize the mandatory strokes in SIMV ventilation mode.

## Pressure effect of tidal volume on operation of Air Mix

The air and oxygen are mixed by an injector which additionally takes in air to produce an air/oxygen mixture containing approx. 60 vol.% $O_2$ (Air Mix).
For physical reasons, the suction performance of the injector decreases as the back-pressure increases.
At high airway pressures, the set tidal volume $V_T$ may be reduced and the $O_2$ concentration increased when using the Air Mix function.
At airway pressures between 20 and 30 mbar, the set tidal volume is the same as the applied tidal volume $V_T$. The $O_2$ concentration is around 60 vol.% $O_2$. The set tidal volume $V_T$ must be increased accordingly with the aid of the measured minute volume at higher airway pressures.

# Order List

| Name | Order No. |
|---|---|
| **Oxylog 2000** | 84 13 955 |
| comprising: | |
| Oxylog 2000 basic unit | 84 13 950 |
| NiCd battery pack | 84 11 599 |
| Carrying strap | 84 12 073 |
| with ventilation accessories: | |
| Ventilation hose with measuring hoses (silicone) | 84 12 068 |
| Breathing valve | 84 12 001 |
| Flow sensor | 84 12 034 |
| Angled connector | 84 12 235 |
| **Connector for external power supply** for operation and for charging the ventilator: | |
| Connecting lead with DC/DC converter for on-board vehicle power supply | 84 12 071 |
| or | |
| Power supply unit for stationary operation | 84 12 074 |
| **For function testing** | |
| Test lung | 84 03 201 |
| **Special accessories** | |
| Ventilator holder for use in vehicles | 84 12 069 |
| Corrugated hose | 84 02 041 |
| Set of catheter connectors for adults | 84 03 685 |
| Ventilation hose, 3 m | 84 12 913 |
| $O_2$ cylinder 2.5 L | B 03 580 |
| $O_2$ cylinder 2.0 L | B 02 352 |
| Pressure reducer Alduk 1 | 21 20 208 |
| Battery holder for 6 alkaline manganese batteries | 18 35 505 |
| Connecting lead for battery holder | 84 12 072 |
| Alkaline manganese batteries (set of 6 required) | 13 35 804 |
| Resutator 2000 | 21 20 046 |
| Child Resutator | 21 20 984 |
| Carrying system 2000 | AB 40 461 |
| Bacterial filter (disposable) | 84 09 716 |

| Name | Order No. |
|---|---|
| **Oxylog 2000 rescue units** | |
| **Oxylog 2000 – carrying system 2000, complete** | 84 13 290 |
| To supply the Oxylog 2000 from a central piping system via a distributor and separate connecting hose. | |
| comprising:<br>Oxylog 2000<br>Ventilation hose with measuring hoses<br>Breathing valve<br>Flow sensor<br>Angled connector<br>$O_2$ cylinder 2.5 L<br>$O_2$ pressure reducer<br>Sujektor 2000 – secretion extractor<br>Oxyplate distributor with feed unit<br>Oxyplate hose to piping system (1.5 m)<br>$O_2$ connecting hose 0.5 m | |
| and | |
| Carrying system 2000 (AB 40 461) | |
| comprising:<br>Carrying plate<br>Cylinder holder, long or<br>Cylinder holder, short<br>Bag for accessories<br>Hose holder | |

# Index

These Instructions for Use apply only to
**Oxylog 2000 3.n**
with Serial No.:

If no Serial No. has been filled in by Dräger these Instructions for Use are provided for general information only and are not intended for use with any specific machine or device.

CE 0123
Directive 93/42/EEC
concerning Medical Devices

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**90 29 035** - GA 5503.300 e

1st edition - September 1997
Subject to alteration