Oxylog 2000
Emergency Ventilator
Instructions for Use
Software 3.n
## Contents

For your safety and that of your patients................. 3

Intended medical use............................................. 4

How to operate Oxylog 2000................................. 5

Operation............................................................... 6
  Device check.......................................................... 6
  Using controlled ventilation IPPV............................ 7
  Using SIPPV............................................................... 10
  Using SIMV............................................................... 10
  Using CPAP............................................................... 12
  Displaying settings and measured values................. 13
  In the event of a power failure............................... 14
  Alarms........................................................................ 14
  Electrical operation time....................................... 15
  Shutdown................................................................... 16

Care........................................................................... 17
  Stripping down........................................................ 17
  Cleaning / disinfecting............................................ 18
  Sterilizing................................................................ 19

Preparation.............................................................. 20
  Assembly..................................................................... 20
  Connecting power supply....................................... 21
  Connecting gas supply............................................ 25

Checking readiness for operation.......................... 28
  Checking ventilation................................................. 29
  Checking end expiratory pressure PEEP.................... 30
  Checking "Paw high" alarm....................................... 31
  Checking "Paw low" alarm........................................ 31
  Checking synchronization for SIMV......................... 32
  Checking "Main supply down" alarm.......................... 32

Fault – cause – remedy............................................ 33

Maintenance intervals.......................................... 36
  Disposing of the ventilator...................................... 36
  Fitting/replacing internal NiCd battery pack............... 37
  Replacing the fuse................................................... 37

What's what............................................................. 38

Technical data......................................................... 41

Description of operating principles....................... 46
  Symbols for pneumatic components.......................... 46
  Gas supply............................................................... 47
  IPPV/SIMV / SIMV..................................................... 47
  CPAP......................................................................... 48

Abbreviations and symbols..................................... 49

Appendix................................................................. 50
  Principle of flow measurement................................. 50
  Pressure effect of tidal volume on operation of Air Mix.. 50

Order list................................................................. 51

Index........................................................................ 52
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

* 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 Ti : Te, can be set to approx. 60 or 100 vol.% O2
- 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 O2 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 (T1: Tc), 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. % O2 or approx. 60 vol. % O2 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 Vtexp., 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
O2 from a cylinder with pressure reducer or from the medical gas pipeline system. Supply with medical air or from an optional O2-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.

<table>
<thead>
<tr>
<th>Body weight (kg)</th>
<th>Freq. 1/min</th>
<th>Vt litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green range for infants (7.5 to 20)</td>
<td>30 to 40</td>
<td>0.1 to 0.3</td>
</tr>
<tr>
<td>Blue range for children (20 to 40)</td>
<td>20 to 30</td>
<td>0.3 to 0.8</td>
</tr>
<tr>
<td>Brown range for adults (over 40)</td>
<td>5 to 20</td>
<td>0.8 to 1.5</td>
</tr>
</tbody>
</table>

![Diagram of ventilation machine]
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 O2 concentration:
   Air Mix = 60 Vol.% O2**
   or
   No Air Mix = 100 Vol.% O2

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 Vt in accordance with the measured minute volume MV.
5 ON/OFF switch set to I.

Display:

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!

* 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:

\[
\text{Pmax} = 80 \text{ mbar} \quad \text{CPR}
\]

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:

<table>
<thead>
<tr>
<th>Freq. setting</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No mechanical strokes → CPAP (page 12)</td>
</tr>
<tr>
<td>5 to 18.5/min</td>
<td>Fixed inspiration time = 1.3 s</td>
</tr>
<tr>
<td>18.5 to 40/min</td>
<td>Fixed $T_i : T_e = 1 : 1.5$</td>
</tr>
</tbody>
</table>

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:

\[
T_{\text{insp}} = 1.3 \text{ s}
\]

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:

\[
\text{SIMV MV } = 0
\]
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.% O₂.
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: Frequency = 10/min
  (SIPPV only)

**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 O₂ 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
- Hang from the headboard of a bed.
- 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:

- Push the release catch upwards.

Connecting gas supply

Take care when handling O₂!

Secure O₂ cylinders so they cannot fall over and keep away from excessive heat.

Do not grease or lubricate O₂ 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.

O₂ makes all fires burn more fiercely!
No smoking and no naked lights.
Supply from an O2 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 O2 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 O2 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, VT = 1 L
Minute volume = 10/min x 1 L = 10 L/min

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

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

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 O2 medical gas hose into Oxylog 2000 and plug gas probe into O2 terminal unit until it engages once = parking position.

Supply with Dräger Oxator

- Screw O2 medical gas hose into Oxylog 2000.
- Firmly plug connector into one of the two O2 couplings – until it engages.
- Follow Instructions for Use of Oxator.

Supply from O2-air blender

- Note supply pressures for O2 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, O2 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.
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 

\[
\text{IPPV MV} = 6
\]

with a tolerance of + 1.0 L/min.

Disconnect the test lung.

Display after approx. 25 seconds:

\[
\text{IPPV MV} = 0 \\
\text{Paw low}
\]

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: 
\[
0 \text{ mbar} + 2 \text{ mbar tolerance}
\]

2. Set »PEEP« knob to 10 mbar.

3. Display on pressure gauge at end of expiration: 
\[
10 \text{ mbar} \pm 2 \text{ mbar tolerance}
\]

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 »Réset« 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 »Réset« 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.

<table>
<thead>
<tr>
<th>Fault / Message</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apnea</td>
<td>Spontaneous breathing by patient has failed in CPAP mode.</td>
<td>Change over to IPPV or SIMV.</td>
</tr>
<tr>
<td>Bat. discharged</td>
<td>Battery pack flat, no external power supply.</td>
<td>Replace alkaline manganese battery pack or connect external power supply.</td>
</tr>
<tr>
<td>Change bat.</td>
<td>Battery pack will be flat within a few minutes, external power supply not connected.</td>
<td>Replace alkaline manganese battery pack or connect external power supply.</td>
</tr>
<tr>
<td>Charge NiCd</td>
<td>NiCd battery pack will be completely flat within a few minutes, external power supply not connected.</td>
<td>Replace NiCd battery pack or connect power supply.</td>
</tr>
<tr>
<td>Check settings</td>
<td>Ventilator performance parameters have been exceeded, the effective flow is less than 4 L/min or greater than 60 L/min.</td>
<td>Correct the appropriate setting: e.g. Freq., VT or Ti : Te</td>
</tr>
<tr>
<td>Faulty NiCd</td>
<td>Ventilator connected to external power supply, NiCd battery pack defective.</td>
<td>Replace NiCd battery pack.</td>
</tr>
<tr>
<td>Flow meas. INOP</td>
<td>Flow measurement faulty. The measured values and alarms based on flow measurement are not valid!</td>
<td>Ventilation can be continued. Observe patient carefully! Call DrägerService after shutdown.</td>
</tr>
<tr>
<td>high frequency</td>
<td>Hyperventilation, self-triggering. Measured frequency exceeds set frequency by more than 50 %.</td>
<td>Correct settings, change over to IPPV if necessary.</td>
</tr>
<tr>
<td>Leakage</td>
<td>The measured expiratory minute volume is approx. 40 % lower than the inspiratory value.</td>
<td>Remedy leaks in patient system and possibly in tube.</td>
</tr>
<tr>
<td></td>
<td>Leak in flow measuring hoses.</td>
<td>Use new flow measuring hoses.</td>
</tr>
<tr>
<td>Fault / Message</td>
<td>Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Main power down</td>
<td>Alarm indicator flashes, intermittent tone sounds.</td>
<td>Plug connection to external power supply does not make contact. Power supply unit or DC/DC converter defective. Press » Reset« to confirm. Ventilator continues operation with internal power supply.</td>
</tr>
<tr>
<td>NiCd discharged</td>
<td>Alarm indicator flashes, intermittent tone sounds, ventilation ceases.</td>
<td>NiCd battery pack flat, no external power supply</td>
</tr>
<tr>
<td>No NiCd charge</td>
<td>This message only appears in standby mode.</td>
<td>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 ºC or internal fuse defective.</td>
</tr>
<tr>
<td>No NiCd or bat.</td>
<td>Ventilator connected to external power supply, internal power supply not available.</td>
<td></td>
</tr>
<tr>
<td>Paw high</td>
<td>Alarm indicator flashes, intermittent tone sounds. The minute volume cannot be fully applied.</td>
<td>Stenosis in the airways. Ventilation hose kinked. Reduced lung compliance. The inspiratory flow resulting from the setting for VT, Freq. and Ti : Te is too high. Patient &quot;fights&quot; the machine.</td>
</tr>
<tr>
<td>Single beep</td>
<td>80 mbar set – for cardio-pulmonary resuscitation.</td>
<td>No remedy required.</td>
</tr>
<tr>
<td>Paw low</td>
<td>Alarm indicator flashes, intermittent tone sounds.</td>
<td>Disconnection / leakage in patient connection, breathing valve or ventilation hose. Diaphragm wrongly fitted in breathing valve or damaged. Leak in cuff.</td>
</tr>
<tr>
<td>Fault / Message</td>
<td>Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>Supply press. low</td>
<td>O₂ cylinder empty, cylinder valve closed, probe not plugged into piped medical gas system.</td>
<td>Check gas supply in O₂ cylinder, connect to full O₂ 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.</td>
</tr>
<tr>
<td>XX XX XX XX XX Ventilator INOP</td>
<td>Internal machine fault.</td>
<td>Switch off ventilator and disconnect from external power supply. Switch ventilator on again. If fault recurs: use alternative machine and call DrägerService.</td>
</tr>
<tr>
<td>When switching on: no alarm tones of the same length to be heard.</td>
<td>Internal machine fault.</td>
<td>Switch ventilator off and on again. If fault recurs, use alternative machine and call DrägerService.</td>
</tr>
<tr>
<td>No message. External power supply connected, green LED does not light up.</td>
<td>Output voltage of power supply unit or DC/DC converter outside the range of 11 to 13 V.</td>
<td>Check plug connection or replace power supply unit or converter.</td>
</tr>
<tr>
<td>No message, no alarm, ventilator does not work.</td>
<td>No internal or external power supply available.</td>
<td>Fit fully charged NiCd battery pack or new alkaline manganese battery pack. Use alternative machine if applicable. Replace fuse, page 37.</td>
</tr>
<tr>
<td>No message. Continuous tone sounds for at least 7 seconds.</td>
<td>Sudden failure of the internal power supply when external power supply is not connected.</td>
<td>Patient must immediately be ventilated by hand! Connect external power supply. Check internal power supply.</td>
</tr>
</tbody>
</table>
## 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!

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Maintenance Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal NiCd battery pack</td>
<td>Replace when display shows «Faulty NiCd» during charging, page 37. Replace every 2 years at the latest.</td>
</tr>
<tr>
<td>Internal alkaline manganese battery pack</td>
<td>Replace at the latest when display shows «Bat. discharged» or «Change bat».</td>
</tr>
<tr>
<td>Inspection and maintenance</td>
<td>Every 2 years by trained service personnel.</td>
</tr>
<tr>
<td>Safety inspections</td>
<td>Every 2 years by trained service personnel.</td>
</tr>
<tr>
<td>Pressure reducer</td>
<td>Basic overhaul by trained service personnel after 6 years.</td>
</tr>
</tbody>
</table>

## 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

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 \( \text{Ti} : \text{Te} \), infinitely adjustable from 1 : 3 to 2 : 1
3. Rotary knob for limiting the airway pressure \( \text{Pmax} \), infinitely adjustable from 20 to 60 mbar; can also be set to 80 mbar.
4. Rotary knob for \( \text{PEEP} \), 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 \( 0 / 1 \)
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. \( \text{Ø} \) Reset key to suppress the alarm tone for approx. 2 minutes and to clear the warning messages
11. Rotary knob for tidal volume \( \text{VT} \), 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 \( \text{Freq.} \), infinitely adjustable from 5 to 40/min.
   0/min position for \( \text{CPAP} \) ventilation mode.
14. \( \text{Info} \) 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.
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 O₂, 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: 1 : 3 to 2 : 1 +5%, $T_I : T_E$ infinitely variable

Inspiratory pressure limitation $P_{max}$: 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 $MV$: min. 1.0 L/min 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 O₂, 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

O₂ concentration of the ventilation gas (with O₂ supply)
- Switch set to »Air Mix«
  - for MV less than 7 L/min O₂ concentration can increase to 90 vol. %
  - for MV greater than 7 L/min 60 Vol.% O₂ ±10 %

- Switch set to »No Air Mix« 100 Vol.% O₂

Response in extreme conditions:
- when supply pressure is 10 bar The applied tidal volume Vₜ 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 >10 mbar 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.
Alarm, wenn kein Wechsel der Atemphasen erkannt werden.

Check settings
Warning when the inspiratory flow due to the combination of VT, Freq., Ti : Te is above or below the range 4 to 60 L/min.
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.
The acoustic alarm ceases automatically when the fault has been remedied.
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 or 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 O2, in emergencies also for medical air.

Gas consumption
for internal control
Approx. 1.0 L/min
for »Air Mix«
Approx. 50 % of the effective minute volume
for »No Air Mix«
Approx. 100 % of the effective minute volume

Typical pneumatic operation time at a minute volume of 10 L/min
11 L O2 cylinder
Approx. 200 minutes without mixing (No Air Mix)
Approx. 400 minutes with mixing (Air Mix)
2,5 L O2 cylinder
Approx. 45 minutes without mixing (No Air Mix)
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
Technical data

Fuse (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
- Max. 3 hours at temperatures below 5 °C

Alkaline manganese batteries
- Max. 4 hours at 5 to 50 °C
- Max. 2 hours at temperatures below 5 °C 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
Sound pressure level 48 dB(A) at a distance of 1 m

Max. height of fall
0.5 m

Dimensions (W x H x D)
215 x 120 x 205 (without handle)

Weight
4.3 kg
- O2 cylinder, 2.5 L, full 4.2 kg
- O2 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
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

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilator housing</td>
<td>Impact-proof acrylonitrile butadiene styrene (ABS)</td>
</tr>
<tr>
<td>Ventilation hose</td>
<td>Silicone rubber</td>
</tr>
<tr>
<td>Flow measuring hoses</td>
<td>Silicone rubber</td>
</tr>
<tr>
<td>Flow sensor housing</td>
<td>Polysulphone (PSU)</td>
</tr>
<tr>
<td>Wind vane in flow sensor</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Housing of breathing valve</td>
<td>Polysulphone (PSU)</td>
</tr>
<tr>
<td>Diaphragms in breathing valve</td>
<td>Silicone rubber</td>
</tr>
<tr>
<td>Touch-sensitive keypad on ventilator</td>
<td>Polyester film</td>
</tr>
</tbody>
</table>
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
Gas supply

The O2 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 % O2 is applied or the gas supply is diluted to 60 % O2. 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.

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.

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 Ti : Te – or pressure-controlled when the set pressure Pmax is reached.
Description of operating principles

**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

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Mix</td>
<td>Mixture of O₂ and ambient air (= approx. 60 vol.% O₂)</td>
</tr>
<tr>
<td>CPAP</td>
<td>Continuous Positive Airway Pressure – Breathing with positive airway pressure</td>
</tr>
<tr>
<td>CPR</td>
<td>Cardio-pulmonary resuscitation</td>
</tr>
<tr>
<td>IPPV</td>
<td>Intermittent Positive Pressure Ventilation</td>
</tr>
<tr>
<td>KG</td>
<td>Body weight in kg</td>
</tr>
<tr>
<td>MV</td>
<td>Minute volume, L/min</td>
</tr>
<tr>
<td>No Air Mix</td>
<td>O₂ is not mixed with ambient air (= 100 vol.% O₂)</td>
</tr>
<tr>
<td>Paw</td>
<td>Airway pressure</td>
</tr>
<tr>
<td>Paw high</td>
<td>Upper alarm limit for airway pressure</td>
</tr>
<tr>
<td>Paw low</td>
<td>Lower alarm limit for airway pressure</td>
</tr>
<tr>
<td>PEEP</td>
<td>Positive End Expiratory Pressure</td>
</tr>
<tr>
<td>Pmax</td>
<td>Setting for upper alarm limit for airway pressure »Paw high«</td>
</tr>
<tr>
<td>Reset</td>
<td>Reset = clear</td>
</tr>
<tr>
<td>SIMV</td>
<td>Synchronized Intermittent Mandatory Ventilation</td>
</tr>
<tr>
<td>SIPPV</td>
<td>Synchronized Intermittent Positive Pressure Ventilation</td>
</tr>
<tr>
<td>Ti : Te</td>
<td>Ratio of inspiration time to expiration time</td>
</tr>
</tbody>
</table>

* Synchronized ventilation stroke for SIPPV and SIMV

Setting symbol for ventilation frequency 12/min and Pmax 80 mbar for cardio-pulmonary resuscitation

Key to suppress alarm tone for approx. 2 minutes 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.% O2 (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 VT may be reduced and the O2 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 VT. The O2 concentration is around 60 vol.% O2. The set tidal volume VT must be increased accordingly with the aid of the measured minute volume at higher airway pressures.
## Order List

<table>
<thead>
<tr>
<th>Name</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oxylog 2000</strong></td>
<td>84 13 955</td>
</tr>
<tr>
<td>comprising:</td>
<td></td>
</tr>
<tr>
<td>Oxylog 2000 basic unit</td>
<td>84 13 950</td>
</tr>
<tr>
<td>NiCd battery pack</td>
<td>84 11 599</td>
</tr>
<tr>
<td>Carrying strap</td>
<td>84 12 073</td>
</tr>
<tr>
<td>with ventilation accessories:</td>
<td></td>
</tr>
<tr>
<td>Ventilation hose with measuring hoses</td>
<td>84 12 068</td>
</tr>
<tr>
<td>(silicone)</td>
<td></td>
</tr>
<tr>
<td>Breathing valve</td>
<td>84 12 001</td>
</tr>
<tr>
<td>Flow sensor</td>
<td>84 12 034</td>
</tr>
<tr>
<td>Angled connector</td>
<td>84 12 235</td>
</tr>
</tbody>
</table>

**Connector for external power supply**
for operation and for charging the ventilator:

- Connecting lead with DC/DC converter for on-board vehicle power supply or Power supply unit for stationary operation 84 12 071

- O2 cylinder 2.5 L 84 03 580
- O2 cylinder 2.0 L 84 02 352

**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
- O2 cylinder 2.5 L 21 20 208
- O2 cylinder 2.0 L B 02 352
- Pressure reducer Alduk 1 18 35 505
- Battery holder for 6 alkaline manganese batteries 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

<table>
<thead>
<tr>
<th>Name</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oxylog 2000 rescue units</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Oxylog 2000 – carrying system 2000, complete</strong></td>
<td>84 13 290</td>
</tr>
<tr>
<td>To supply the Oxylog 2000 from a central piping system via a distributor and separate connecting hose. comprising: Oxylog 2000 Ventilation hose with measuring hoses Breathing valve Flow sensor Angled connector O2 cylinder 2.5 L O2 pressure reducer Sujektor 2000 – secretion extractor Oxyplate distributor with feed unit Oxyplant hose to piping system (1.5 m) O2 connecting hose 0.5 m and Carrying system 2000 (AB 40 461) comprising: Carrying plate Cylinder holder, long or Cylinder holder, short Bag for accessories Hose holder</td>
<td></td>
</tr>
</tbody>
</table>
Index

Abbreviations................................................................. 49
Accessories...................................................................... 3
Alarm, "Paw high"............................................................ 31
Alarm, "Paw low".............................................................. 31
Alarms.............................................................................. 14
Alkaline manganese and NiCd batteries, disposal.............. 36
Alkaline manganese batteries, fitting............................... 23
Alkaline manganese battery............................................. 36
Alkaline manganese battery pack..................................... 23
Ambient conditions.......................................................... 41
Angled connector............................................................ 20
Assembly.......................................................................... 20
Bacterial filter.................................................................... 20
Breathing valve, assembly............................................... 20
Breathing valve, disassembly......................................... 18
Cardio-pulmonary resuscitation....................................... 9
Checking readiness for operation..................................... 28
Checklist.......................................................................... 6
Cleaning / disinfecting.................................................... 18
Controlled ventilation IPPV............................................. 7
CPAP, using...................................................................... 12
DC/DC converter............................................................ 22
Device check...................................................................... 6
Disinfecting by wiping.................................................... 19
Disinfection with hot steam............................................. 19
Electrical operation time................................................ 15
Explosion-hazard areas.................................................. 3
Fault – Cause – Remedy.................................................. 33
Front view......................................................................... 38
Fuse.................................................................................. 37
Gas supply........................................................................ 43
Gas supply, connecting................................................... 25
Inspection and service..................................................... 36
Intended medical use....................................................... 4
LC display......................................................................... 36
Maintenance...................................................................... 3
Maintenance intervals.................................................... 36
Manual ventilation equipment......................................... 4
Materials.......................................................................... 45
Medical gas cylinders.................................................... 26
Medical gas supply, calculating....................................... 26
Messages.......................................................................... 33
NiCd battery pack.......................................................... 21, 36
NiCd battery pack, charging......................................... 24
NiCd battery pack, fitting............................................... 37
Operating principles, description.................................... 46
Operation.......................................................................... 5
Operation with alkaline manganese batteries................... 23
Order list........................................................................... 51
PEEP, applying............................................................... 9
PEEP, checking.............................................................. 30
Performance data............................................................ 41
Piped medical gas system.............................................. 27
Pneumatic operation time............................................... 26
Power supply.................................................................... 21
Power supply unit............................................................ 23
Pressure reducer............................................................. 26
Radio interference suppression....................................... 45
Rear view.......................................................................... 39
Shutdown.......................................................................... 16
SIMV, using..................................................................... 10
SIPPV, using................................................................. 10
Sterilizing......................................................................... 19
Stripping down............................................................... 17
Symbols............................................................................ 49
Synchronization for SIMV............................................... 32
Technical data................................................................... 41
Test lung, connecting...................................................... 28
Toxic surroundings.......................................................... 12
Ventilation, checking...................................................... 29
Ventilator holder............................................................. 25
Weight.............................................................................. 44
What’s what...................................................................... 38
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.

Directive 93/42/EEC concerning Medical Devices