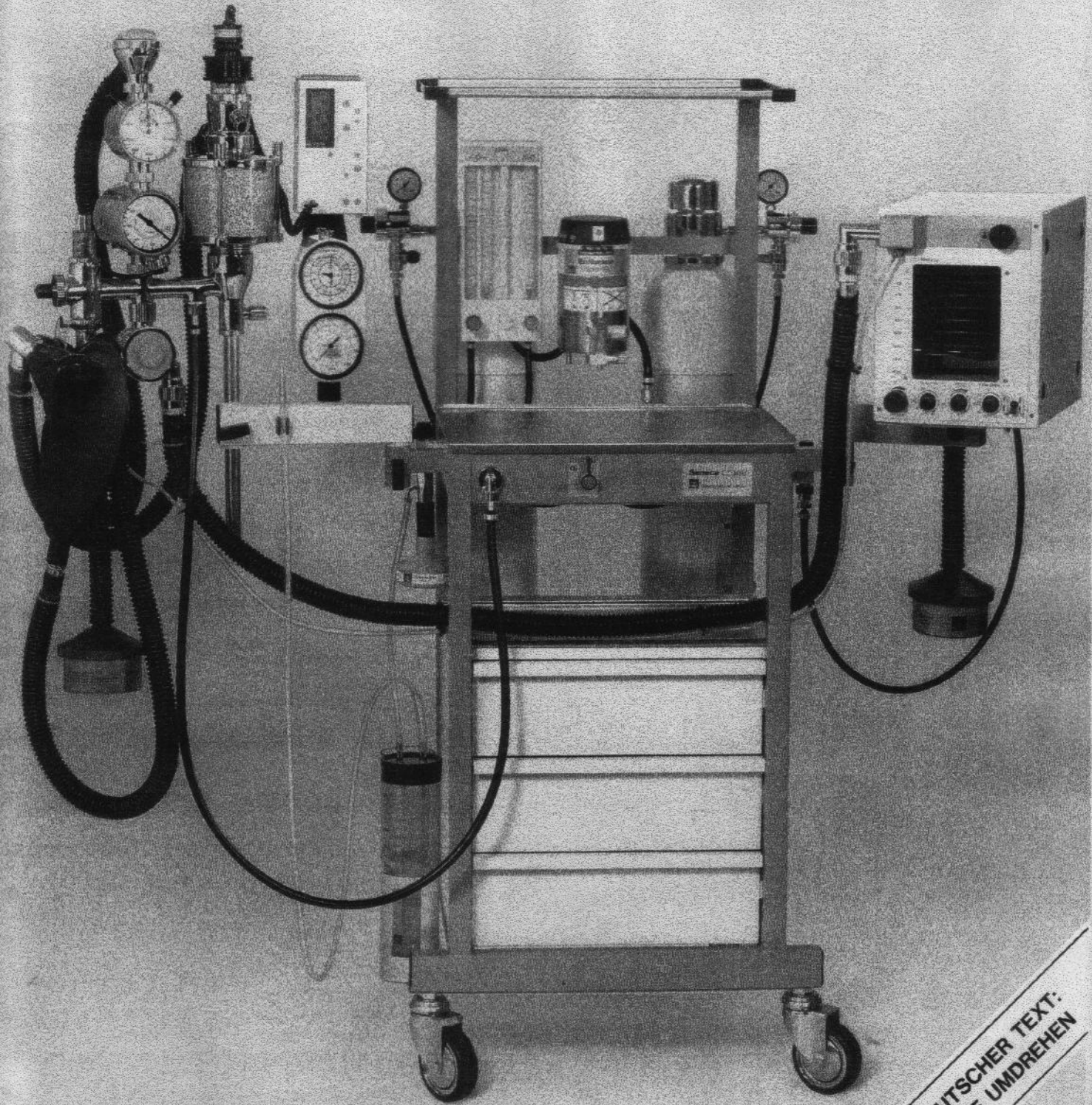


Dräger



DEUTSCHER TEXT:
BITTE UMDREHEN

From Dräger: Anaesthetic Apparatus Seneca

OPERATING INSTRUCTIONS

◀ Figs. 1 and 2:
please fold out

Important Notice

For correct and effective use of the apparatus, and to avoid hazards, we would point out the following:

- 1 Any use of the apparatus requires precise knowledge and observation of these operating instructions.
- 2 The apparatus is intended only for the purposes specified in the Operating Manual or for purposes confirmed in writing by Drägerwerk AG.
- 3 The apparatus should be inspected by experts at regular intervals (twice a year).
An official record of inspections should be kept.
- 4 Only genuine Dräger spare parts must be used when carrying out maintenance or repairs.
- 5 We recommend that inspections, maintenance and repair work be carried out by Drägerwerk AG. Regular inspections and servicing are best ensured by concluding a Service Contract with your Dräger subsidiary or distributor.
- 6 Responsibility for reliable functioning of the device is transferred to the owner or operator in all cases where the device has not been properly maintained or repaired by persons not employed by the Dräger subsidiary or distributor in question or if it has been used in a manner which does not conform to the specified conditions of use.
- 7 For reasons of safety, pressure reducers should be overhauled at least every 6 years.

We also wish to point out that the national recommendations, regulations and laws governing the use of technical equipment should be observed.

Drägerwerk AG, its subsidiaries and distributors are not liable for damage which arises as a result of non-observation of this Important Notice. Warranty and liability stated or implied in the sales and delivery conditions of Drägerwerk AG, its subsidiaries or distributors are not extended by the above Important Notice.

DRÄGERWERK AG LÜBECK

Ref. O₂ deficiency signal

The following advice is applicable if the anaesthetic apparatus is equipped with an oxygen deficiency signal.

Owing to an international agreement (ISO TC 121) and in accordance with the recommendations made by the "Deutsche Gesellschaft für Anaesthesie und Intensivmedizin" (DGAI) (German Association of Anaesthesiology and

Intensive Care Medicine), the oxygen deficiency signal may no longer be capable of being cut off by the user, except by the reestablishing of the O₂ supply pressure >2,2 bar.

This is the reason why Drägerwerk AG will in future dispense with the interrupter button for the O₂ deficiency signal of anaesthetic

apparatus. The alarm which is triggered when the pressure limit of 2,2 bar is dropped below will thus sound until the pressure of the O₂ supply has dropped to a value no longer sufficient to operate the alarm. A minimum warning period of 7 seconds (as per ISO) is guaranteed for cases of malfunction (sudden disconnection of O₂ supply line).

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What's what?

(Refer to Figs. 1 and 2 and to Figs. 6 and 7 on the fold-out page 14)

- 1 Left mounting for patient system
- 2 Hinged arm for patient system
- *3 Switching valve for manual ventilation (accessory to Ventilog or Ventilog 2)
- *4 Circle system 7a/8 ISO with breathing attachments (Y-piece, masks, catheters, tubes, etc.)
- *5 Combined blood-pressure gauge/ anaesthetic clock
- *6 Airway pressure gauge
- *7 Minute Volumeter 3000
- *8 O₂ meter Oxydig
- 9 O₂ fine flow-control valve
- 10 O₂ flowmeters
- 11 C₃H₆ flowmeter or CO₂ flowmeter
- 12 C₃H₆ or CO₂ fine flow-control valve
- 13 N₂O flowmeter
- 14 N₂O fine flow-control valve
- *15 Dräger Vapor 19.3 (vaporiser)
- *16 Ventilator "Ventilog" or "Ventilog 2"
- 17 O₂ flush valve
- 18 Mixed-gas outlet
- 19 Mixed-gas hose
- *20 Secretion aspirator
- *21 Secretion jar cap
- 22 Anaesthetic filter for excess anaesthetic gas

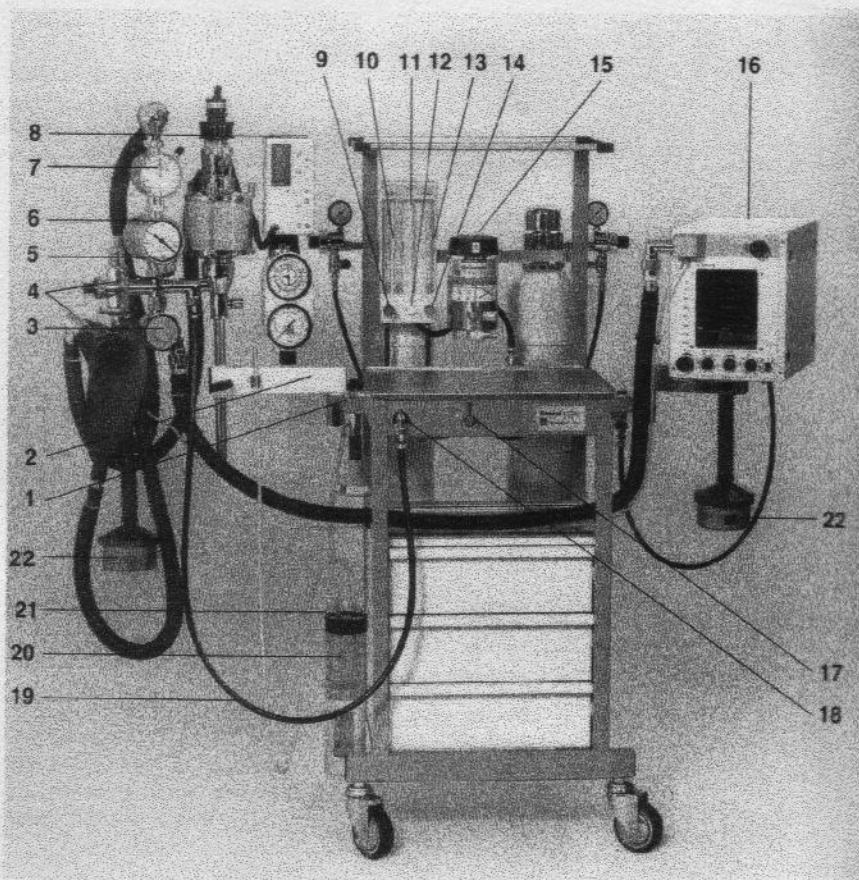


Fig. 1 SENECA with semi-closed patient system (circle system 7a/8 ISO)

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- *23 Dräger semi-open patient system
- 24 Monitor support
- *25 Ether bubbler
- 26 Right mounting for Ventilog/Ventilog 2
- 27 Ventilog connecting valve
- 28 Shelf panel
- 29 Cabinet, optional with 1 or 3 drawers
- 30 C₃H₆ or CO₂ cylinder

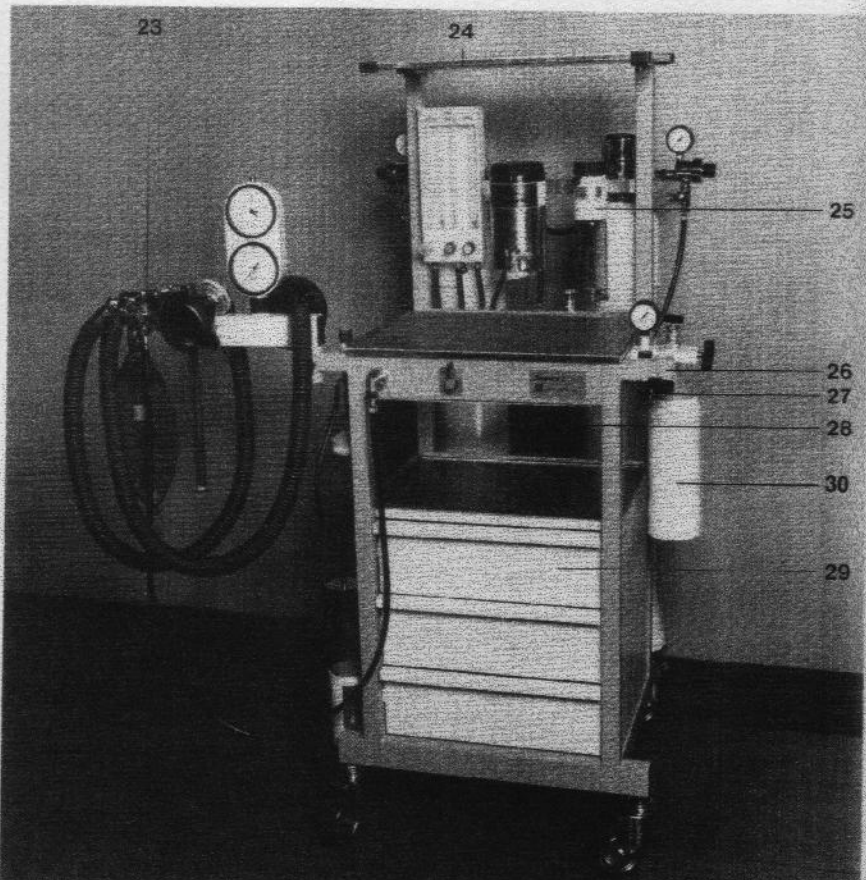


Fig. 2 SENSCA with semi-open (non-rebreathing) patient system

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Continued page 14 (please fold out)

* Parts not covered in this operating manual. For further information see operating manuals in question.

Intended Use

The SENECA anaesthetic machine is so designed that it can be used in conjunction with many different types of supplementary apparatus, enabling it to be readily adapted to a variety of requirements. The machine is suitable, depending on how it is equipped, for use in operating theatres as

well as in induction and recovery rooms. It is designed for anaesthesia using semi-closed and semi-open systems. In conjunction with the Ventilog or Ventilog 2 ventilator, the SENECA can be employed for automatic, assisted and controlled anaesthetic ventilation.

For aspiration of secretions, there is a choice of two types of suction equipment, one for attachment to a central vacuum supply system, and the other an ejector-type aspirator powered by oxygen from the machine's own O₂ supply.

Construction and Mode of Operation

The SENECA is in essence a trolley-mounted anaesthetic gas flow control unit, supplied with oxygen and nitrous oxide either from a central supply system (CS) or from O₂ and N₂O cylinders carried on the machine.

The SENECA comprises the following equipment:

Gas supply

The SENECA is fitted with O₂ and N₂O connecting sockets 46, 47 for attachment to the central supply system (CS) or for connection to cylinders. Sintered filters are built into the connecting sockets 46, 47 to prevent contaminants from entering the machine's conducting system.

There are three basic types of apparatus, distinguished by their gas supply, as follows:

SENECA/Basic machine 1

For operation only from a central supply system, with O₂ and N₂O connecting sockets (inlet pressure 2.7 to 5.5 bar).

SENECA/Basic machine 2

As for Basic machine 1, but with additional fittings for one 3-litre reserve cylinder each of O₂ and N₂O.

SENECA/Basic machine 3

As for Basic machine 1, but with additional fittings for one 11-litre cylinder each of O₂ and N₂O.

Cylinder capacities:

- 11-litre O₂ cylinder
2200 L O₂ at 200 bar filling pressure
- 3-litre O₂ cylinder
600 L O₂ at 200 bar filling pressure
- 11-litre N₂O cylinder
4000 L N₂O at 8 kg filled weight
- 3-litre N₂O cylinder
1125 L N₂O at 2.25 kg filled weight.

The pressure reducers (necessary for operation from cylinders) are adjusted to a downstream-pressure of 5 bar.

Supplementary gas supply

The SENECA anaesthetic machine can be additionally equipped with a 1-litre C₃H₆ cylinder or a 1-litre CO₂ cylinder. The C₃H₆ cylinder is secured by means of a metal clamp, and the CO₂ cylinder by a clamp or screw connector, as desired.

Cylinder capacities:

1-litre C₃H₆ cylinder:
200 L C₃H₆ at 0.4 kg filled weight

1-litre CO₂ cylinder:
375 L CO₂ at 0.75 kg filled weight.

Flowmeter unit for gas dosage

The flow rates set by means of the fine flow-control valves 9, 12, 14 can be read on the flowmeters 10, 11, 13. The flowmeters are graduated as follows:

O ₂	0.1 to 2 L/min and 2.5 to 15 L/min (operating successively)
N ₂ O	0.5 to 12 L/min
*1Air	0.8 to 15 L/min (with »Air« model only)
*1CO ₂	0.05 to 1.4 L/min
*1C ₃ H ₆	0.05 to 1 L/min

The flow rate is read at the upper surface of the bobbin.

*1 Air, CO₂ or C₃H₆, alternatively only

Special Type SENECA »Air«

The »Air« model differs from the standard versions in that it has an additional gas supply (compressed air from a central supply system) and a flowmeter unit variegated to include compressed air with a selector switch for »Air« or »N₂O«.

The selector switch is positioned at the front panel beside the O₂ flush valve 17.

The »Air« model is basically equipped with an O₂ deficiency signal and a cut-off device for N₂O.

Safety equipment

Supplementary equipment recommended by Drägerwerk AG, but supplied only on special order:

In order to ensure ventilation and pressure monitoring as per DIN 13252, monitoring of the following parameters is recommended

- Airway pressure
 - Expiratory volume
 - Inspiratory oxygen concentration.
- Undesirable changes in these parameters can, for example, occur as a result of
- Acute changes in the patient's conditions
 - Faults in the equipment, e.g. leaks, component failure
 - Failure of power or gas supply
 - Operating errors.

Suitable monitoring devices, which can be employed for this purpose, are indicated in the Order List under »Accessories required for monitoring«.

If use is made of other monitoring devices, the user is advised to check whether these devices satisfy legal requirements and whether they are suitable for reliably monitoring the effectiveness of the anaesthetic machine.

Attention is drawn to DIN 13252 which stipulates that a manual ventilation unit independent of the ventilator/anaesthetic machine must be provided to ensure ventilation of the patient with ambient air.

If malfunctioning of the anaesthesia lung ventilator is detected, and should this malfunction be such that the life-support function of the machine can no longer be guaranteed, ventilation of the patient using the independent manual ventilation unit must be initiated immediately.

					Operational readiness		
Case	Selector switch in setting	O ₂ supply	Air supply	N ₂ O supply	O ₂ deficiency signal	N ₂ O cutoff	Device operable
1	»Air«	1	1	Automatic blocked	Ready for operation	Ready for operation No effect	Ready for operation
2		0	1	Automatic blocked	Audible alarm (O ₂ ≤ 2.2 bar)	Ready for operation No effect	No, O ₂ failure
3		1	0	Automatic blocked	Ready for operation	Ready for operation No effect	No Air failed No alarm
4	»N ₂ O«	1	No effect	1	Ready for operation	Ready for operation	Ready for operation
5		0	Automatic switch to air		Audible alarm (O ₂ ≤ 2.2 bar)	Automatic blocking of N ₂ O (O ₂ ≤ 0.6 bar)	No, O ₂ failure
6		1	No effect	0	Ready for operation	Ready for operation No effect	No N ₂ O failure No alarm

Table: Behaviour of SENECA »Air« model with ancillary compressed-air unit in the event of gas failure

0 ≙ not adequate
1 ≙ adequate

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O₂ deficiency signal

(for basic machines 1–3: on special order only; please confer notice on page 2)

The O₂ deficiency signal sounds when the O₂ supply pressure falls below 2.2 bar and is silenced again at less than 1.2 bar. The warning device is operated by the oxygen still available and consumes about 2.2 L/min. The maximal duration of the warning is dependent on the volume of the supply system and the quantity of O₂ withdrawn. So that disconnection of the O₂ supply (resulting in immediate lack of any O₂) can also set off a warning, the warning device contains an emergency reserve of sufficient volume to ensure that a warning is sounded for at least 7 seconds.

Supplementary pressure reducer for O₂ (part of O₂ deficiency signal)

Down to an O₂ supply pressure of 1.5 bar, the O₂ flow rate set on the flowmeter does not change. This is ensured by an additional pressure reducer inserted in front of the O₂ flowmeters. The O₂ deficiency signal therefore sounds before the O₂ flow rate has been reduced by the falling supply pressure.

If, in emergency, it is still necessary to withdraw gas when the O₂ pressure has fallen below 1.5 bar, then the O₂ flow rate set will drop as the supply pressure declines further and should be reset on the fine flow control valve 9, as required.

N₂O cut-off

(for basic machines 1–3: on special order only)

The N₂O cut-off ensures that, if the O₂ pressure falls, the N₂O supply is also reduced. Should the O₂ supply pressure fall to zero, the N₂O flow is automatically cut off.

Since there is no supplementary pressure reducer for N₂O, the N₂O flow rate set on the flowmeter unit will fall if the supply pressure of either N₂O or O₂ decreases.

N.B. N₂O is **not** cut off if O₂ pressure is present but no O₂ is being administered through the O₂ fine flow control valve 9.

Gas limiter for CO₂ or C₃H₆

(for basic machines 1–3: on special order only)

The gas limiter for CO₂ or C₃H₆ is constructed like the N₂O cut-off and functions in the same way.

Oxygen flush valve

(Supplementary equipment)

Operation of the O₂ flush valve 17 releases approx. 50 L/min O₂ to flow into the patient system (circle system 4 or semi-open system 23) without passing through the flowmeters and vaporiser (Vapor) 15 or ether bubbler 25. So as to prevent a reflux

gas flow through the vaporiser, which would inevitably produce an unacceptable rise in concentration of the volatile anaesthetics, the flush flow is fed into the outlet of the breathing gas connector 18 through an injector. On operating the O₂ flush valve, this produces a slight negative pressure at the vaporiser 15 or 25 without altering the concentration.

The O₂ flush valve 17 should, however, only be operated very briefly, since the pressure in the patient system could otherwise increase in a way that endangers the patient. The O₂ flush serves only to fill up the breathing system rapidly with O₂ in emergency.

Vapor 19.3 and Ether Bubbler

The rail 40 is designed to hold a maximum of 2 vaporiser. They are secured by means of rail clamps, fitted to the vaporisers.

The flowmeter unit possesses a connecting port 32 at its upper end on the back, fitted with a rapid-release coupling for attachment to a vaporiser. To this connecting port is attached the inlet hose 33 of the vaporiser to be employed. The outlet hose 34 of the vaporiser is plugged into the socket 48, located at the back of the main housing beneath the rail. The lengths of the hoses are so that the inlets and outlets cannot be confused.

Caution

Employing the vaporisers in series, which would be possibly by means of the plug couplings, is not allowed for safety reasons. Otherwise, simultaneous – possibly unintentional – operation of the vaporisers could lead to anaesthetic from one vaporiser condensing out in the other, and

thus give rise to uncontrollable mixed effects (see Fig. 3c).

Operation without a vaporiser attached is not possible (Fig. 3d).

The vaporisers should be secured to the rail 40 by means of the fixing screws located in the retaining clamps. In this way,

the vaporisers are prevented from falling off and the connecting hoses from becoming kinked.

To avoid incorrect coupling of the hoses, as shown in Fig. 3c, it is advisable to short-circuit the hoses of the Vapor not in use (see Figs. 6 and 7).

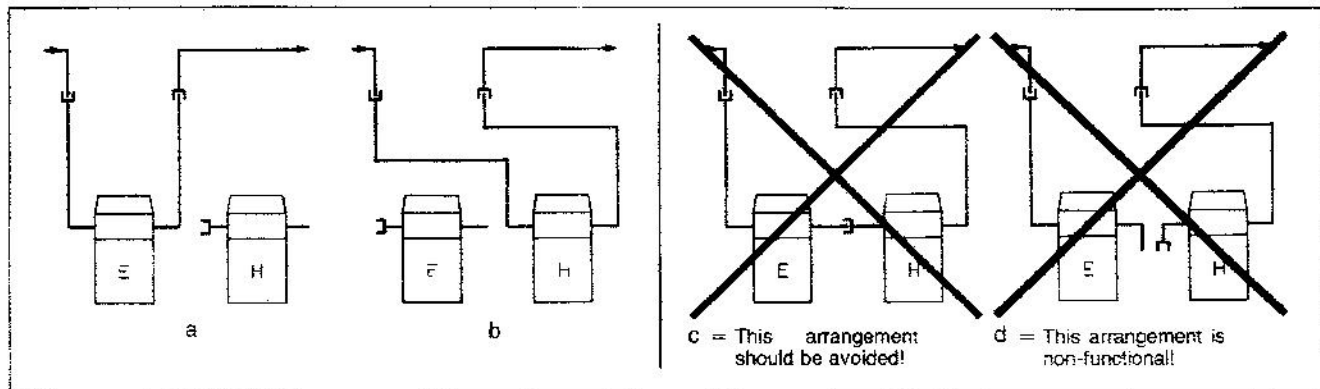


Fig. 3 a = correct connection of Vapor 19.3 for enflurane
b = correct connection of Vapor 19.3 for halothane

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Earthing

The casters of the trolley are fitted with conductive rubber, so that special earthing of the SENECA is not necessary in buildings with conductive floors. However, if electrostatic charges cannot be conducted away through the floor, earthing should be arranged in accordance with the relevant recommendations for averting the risks of electrostatic charges. For this purpose, an earthing terminal is located on the back of the machine at the foot of the trolley. This earthing terminal should not be employed for earthing electro-medical apparatus.

Mounting for patient system

The left mounting assembly 1 on the main housing carries a hinged arm 2 for holding the patient system 4 or 23 and supplementary equipment such as the blood-pressure gauge and/or anaesthetic clock 6 and O₂

meter Oxydig 8. The patient system is fixed to the port on the hinged arm.

Mounting for ventilator

The right mounting assembly 26 on the main housing provides support for a Ventilog or Ventilog 2 (16). With the aid of an additional connecting valve 27, the Ventilog can be operated with oxygen from the SENECA if a separate supply of oxygen or compressed air is not available from the central supply system.

Secretion aspirator

(Supplementary equipment)

An ejector- or vacuum powered secretion aspirator 20 can be secured to the left side of the main housing. The relevant secretion collecting bottle and rinsing bottle are fitted at the foot of the trolley.

Cabinet and shelf

For storage of small components (e.g. anaesthetic accessories), the SENECA can be fitted with a drawer or with a three-drawer cabinet 29. A supplementary, readily-cleaned shelf panel 28 completes the range. This is mounted either at the foot of the trolley or on top of the cabinet, if available.

Monitor support

To accommodate monitors, the SENECA can be equipped with a monitor support 24. This is fitted at a height defined as being 'in the region of occasional explosion risk during the administration of inflammable volatile anaesthetics' (e.g. ether, C₃H₈). When an electrical monitoring apparatus is installed on the monitor support, the relevant recommendations should therefore be observed.

Notes on safety

Valves on oxygen cylinders and pressure reducers for oxygen must not be oiled or greased and they must not be touched with greasy fingers.

Danger of explosion!

Oxygen cylinders must not be stored together with readily flammable materials. Filled steel cylinders must not be directly exposed to heat (store such that there is no

possibility of direct sunlight and ensure that there are no radiators and the like in the immediate vicinity).

Only turn valve handwheels by hand. Never use any tools! Cylinder valves are precision parts which can easily become damaged if force is used. Cylinder valves which leak and which do not move freely

must be repaired in a workmanlike manner.

Never loosen compressed-gas connections when they are charged with pressure! First close cylinder valves, then vent the system by opening the flow control valves.

Knurled connections are intended only for manual loosening/tightening.

Initial Preparation

Setting up the apparatus

- All assembly work requiring the use of special tools (e.g. installation of connecting valve 27 for Ventilog) should be carried out by Drägerwerk AG or an authorised workshop, unless assembly manuals for the purpose are issued by Drägerwerk AG (see "Important Notice" on page 2).
- Fit the SENECA with the appropriate cylinders, for which it is designed, and secure these against falling with the cylinder straps. For mounting the O₂ and N₂O pressure reducers 41, 50 with their screw connectors, a spanner is provided – to be found at the back of the SENECA on the trolley. It should be used to tighten the screws.
- Run the connecting hoses 42, 49 from the pressure reducers to the connecting sockets 46, 47 where they are to be attached.
- If the SENECA anaesthetic machine is to be operated from a central supply system, then – instead of the connecting hoses 42, 49, – the central supply hoses should be attached to the connecting sockets 46, 47 and their plugs inserted in the outlet valves (O₂ and N₂O) of the central supply installation.
- If the SENECA is fitted with accessory equipment for CO₂ or C₃H₆, the CO₂ or C₃H₆ cylinder 30 should be suspended in the metal clamp (pin-index system) and secured with the knurled screw. If the supplementary CO₂ equipment is fitted with a screw connector, the CO₂ cylinder should be fixed to it with the spanner.
- Suspend one or two vaporisers (Vapor 19.3 or other bubbler) on the rail 40, by means of the retaining clamp and secure with its fixing screw.
- Plug the Vapor or bubbler connecting hoses 33, 34 into the appropriate connector couplings 32, 48 – as described on pages 5 and 6.
- Attach the mixed-gas hose 19 to the mixed-gas outlet port 18.
- If the secretion aspirator 20 is fitted, put the secretion collecting jar and the rinsing flask into their appropriate holders. The short hose 44 should be used to connect the vacuum nozzle 43 with the thin nozzle on the secretion jar cap 21.
When employing a vacuum-powered aspirator, attach the connecting hose to the central supply installation by inserting the plug into the system's outlet valve (vacuum).
- Assemble the patient system (circle system 4 or Dräger anaesthetic equipment for the semi-open system 23 or

the anaesthetic fittings designed for babies by Kuhn), connect them as specified in the operating manual for the relevant breathing systems and fit them with the necessary breathing attachments (masks, catheters etc.).

- Should automatic ventilation equipment be required, equip the SENECA with a Ventilog or Ventilog 2 (16), in accordance with the special operating manual.
- Each of the exhaust gas sockets of the circle system and the Ventilog are to be fitted with an anaesthetic filter equipment 22. Excess anaesthetic vapours, but not N₂O, are absorbed by the anaesthetic filter for a period of 6–8 hours.

Functional testing

Before putting the apparatus into operation, it is always advisable to carry out brief functional testing.

Gas supply for operation from cylinders

- Check that the hoses 42, 49 are attached to the connecting sockets 46, 47.
- Close the fine flow-control valves 9, 12, 14 on the flowmeter unit.
- Slowly open the valve of the O₂ and N₂O cylinders. Check the cylinder reserves on the pressure gauges located on the pressure reducers.

The O₂ cylinder is full when the O₂ pressure gauge shows 200 bar.

There is still a sufficient supply of nitrous oxide in the N₂O cylinder when the pointer of the N₂O pressure gauge is in the green zone. When gas is withdrawn, liquid nitrous oxide vaporises and the fluid level slowly sinks. But the surface of the liquid remains constant – provided the temperature does not change – until all the liquid nitrous oxide has been vaporised. Only then does the pressure shown on the pressure gauge fall steadily when further nitrous oxide is withdrawn.

The pressure in the nitrous oxide cylinder amounts to about 50 bar at room temperature. When the pressure falls to only 30 bar, an 11-litre cylinder still contains about 330 litres, and a 3-litre cylinder about 90 litres of gaseous nitrous oxide.

At a pressure of 10 bar, at the latest, the cylinders should be exchanged for full cylinders (O₂ and N₂O).

Safety devices (when fitted)

Note:

Prior to initial operation of the anaesthetic machine it is essential that a supply pressure of ≥ 2.7 bar be applied for at least 20 seconds, in order to ensure that the gas deficiency alarm is ready for operation. During this period there must not be any gas extraction, e.g. via flow control valves, ventilator, O₂ flush or secretion aspirator.

This also applies to renewed start-up following the failure of one or more gases.

- Open the O₂ and N₂O cylinder valves or – for operation from central supply installations – insert the plugs of the central supply connecting hoses attached to the SENECA into the wall outlet valves. If fitted, open the valve of the CO₂ or C₃H₆ cylinder.
- Set the O₂ fine flow-control valve 9 to a flow rate of 1 L/min.
- Set the CO₂ or C₃H₆ fine flow-control valve 12, if fitted, to a flow rate of 0.5 L/min.
- Set the N₂O fine flow-control valve 14 to a flow rate of 2 L/min.
- Close the O₂ cylinder valve, or remove the plug of the central supply connecting hose for oxygen from the wall outlet valve. As this immediately interrupts the O₂ supply, it has the same effect as O₂ disconnection.
- After a short period (the pressure still present in the O₂ conduction system must first fall as a result of O₂ outflow), the warning signal should sound (at 2.2 bar O₂).
- Observe the flowmeters 10, 11, 13 when the O₂ deficiency signal sounds. The O₂ flow rate should remain unchanged up to this point; the N₂O flow rate should gradually decline (as should the flow rate of CO₂ or C₃H₆, if applicable).
- Wait until the oxygen flow rate has fallen to 0 L/min. No further N₂O should then be flowing (and no CO₂ or C₃H₆ either, if applicable).
- Open the O₂ cylinder valve again or reinsert the plug of the central supply connecting hose for oxygen into the wall outlet valve. The flow rates set should then be restored (1 L/min O₂, 2 L/min N₂O, and 0.5 L/min CO₂ or C₃H₆, if applicable).

Operational Use

Normal operation

- If no Ventilog or Ventilog 2 is employed, close the connecting valve 27.
- Set the desired O₂ and N₂O flow rates by means of the fine flow-control valves 9, 14.
- Attach the patient system 4 or 23 to the patient.

Special notices

- Sounding of the O₂ deficiency signal – if fitted – signifies disturbance of the oxygen supply due to disconnection of the O₂ conduction system or a fall of O₂ pressure in the central supply system to 2.2 bar or – when operating from cylinders – exhaustion of the O₂ reserve.
- If the fault cannot be corrected, or not sufficiently quickly, during central supply operation then remove the O₂ connecting hose from the connecting socket 46, attach the O₂ cylinder connecting hose 42 in its place, and open the O₂ cylinder valve.

- When operating from cylinders, pressure drop requires rapid exchange of cylinders.
- Before removing a pressure reducer, the cylinder valve should always be closed and any residual gas removed from the conduction system (open the appropriate fine flow-control valve 9, 12, 14 until the pressure-gauge indicator falls to 0 bar).
- After operating from cylinders, they should be replaced with full ones as a matter of routine, even if they are not completely empty, so that the full cylinder capacity is always available.
- When using the SENECA fitted with supplementary equipment for CO₂ or C₃H₆, the fine flow-control valve 12 of the supplementary gas must not be opened if no CO₂ or C₃H₆ cylinder is attached to the apparatus. Otherwise, fresh gas (O₂ and N₂O) would flow out through this connector into the surrounding air.

- For aspiration of secretions, the on/off valve of the secretion aspirator should be opened. If the catheter is obstructed, a negative pressure of 800 to 900 mbar then develops.

The vacuum-powered secretion aspirator possesses (in contrast to the ejector-powered version) a relief valve at the front, enabling the negative pressure to be limited to as little as 100 mbar. In addition, the vacuum-powered aspirator possesses a rapid relief valve at the front, in case the catheter becomes blocked.

With the ejector-powered aspirator, all that is required in this case is to close the on/off valve briefly.

The secretion collecting jar must be emptied, at the latest, when it is $\frac{3}{4}$ full. Secretions may otherwise be sucked into the apparatus. With ejector operation, check that a bacterial filter is present.

Shut down Actions

- Switch off the Vapor or ether bubbler (handwheel to "zero").
- Close the fine flow-control valves 9, 12, 14.
- Remove the plugs of the central-supply connecting hoses from the wall outlet

valves or close the cylinder valves.

- Some time after cutting off or interrupting the O₂ supply, with the fine flow-control valve 12 closed, the O₂ deficiency warning may sound (when fitted). This can be prevented by immedi-

ate decompression, achieved by briefly opening an O₂ outlet valve (O₂ fine flow-control valve, O₂ flush valve, or Ventilog connecting valve) until the warning is set off.

Care and Maintenance

Dismantling

- Unscrew the mixed-gas hose 19 from the patient system.
- Remove the patient system 4 or 23 and, if relevant, the Ventilog or Ventilog 2 and handle them in accordance with the instructions contained in the special operating manual.
- If present, remove the secretion aspirator hose with the secretion sight-glass and aspiration catheter – after sucking them through with rinsing solution. Remove the secretion collecting jar and the rinsing jar from their holder and empty.
- Unscrew from the apparatus all connecting hoses to the central oxygen, nitrous oxide and vacuum supply installation.
- Remove the anaesthetic filters 22 from their rubber sleeves (disposable after an operation period of 6–8 hours).

Cleaning

- Handle the patient system and, if appropriate, the Ventilog/Ventilog 2 in accordance with the special operating manuals.
- Contamination on the SENECA should be removed with a damp cloth soaked in an ordinary rinsing (or wetting) agent.
- If present, clean the emptied secretion collecting jar and the rinsing jar thoroughly after each use. The secretion jar cap, aspiration hose and catheter must be thoroughly rinsed through.
- The anaesthetic machine cleaned in this way and all other parts of the apparatus should be dried. This largely avoids growth of organisms and corrosion.

Disinfection after cleaning

Disinfection in the Dräger Aseptor

- Disinfection in the Dräger Aseptor should be carried out in accordance with the "Guide for Disinfection in the Dräger-Aseptor" (Operating Manual 6751.10e).
- If an anaesthetic vaporiser (Vapor 19.3) is fitted to the SENECA, check that it is closed (handwheel in position "0", button for zero-point interlock engaged).
- If an ether bubbler is fitted, it should be emptied or removed before disinfection to prevent inflammable mixtures arising in the Aseptor.

Wiping or spray disinfection with disinfectant solutions

- Wiping or spray disinfection should be applied only where there are no facilities available for disinfection in the Dräger Aseptor. Owing to its short

duration of action, this method of disinfection is not optimal.

- If an ether bubbler is fitted, the glass container should be removed during such disinfection. When wetted with alcohol-containing disinfectant agents, the ether glass tends to become crazed. As the bubbler operates under pressure, crazing of this kind could be dangerous.

Superheated steam sterilisation

Superheated steam sterilisation is not possible, except for the secretion collecting jar and the rinsing jar. The secretion jar

cap can be autoclaved at 120°C, the jars at 120°C or 134°C, as marked.

Reassembly

Reassembly of dismantled parts of the apparatus follows logically in reverse order to dismantling, as described under "Dismantling". Insert new anaesthetic filters 22.

Checking readiness for use

Readiness for use should be checked after all care procedures (e.g. cleaning, disinfection), as described under "Functional testing" (page 7).

Inspection

In order to ensure that the SENECA is constantly ready for use and fully functional, conclusion of a service contract with your Dräger subsidiary or distributor is

recommended. This guarantees thorough, regular (sixmonthly) testing and adjustment, with any necessary replacement of parts. In this connection, attention is drawn to the 'Important Notice' on page 2.

Technical Data

Connection to central supply system (CS):

Oxygen operating pressure	2.7 to 5.5 bar
Nitrous oxide operating pressure	2.7 to 5.5 bar
Air operating pressure	2.7 to 5.5 bar

Cylinder supply:

O ₂ cylinder pressure	max. 200 bar
N ₂ O cylinder pressure	vapour pressure, temperature-related
CO ₂ cylinder pressure	vapour pressure, temperature-related
C ₂ H ₆ cylinder pressure	vapour pressure, temperature-related

Flow rates

Oxygen (O ₂)	max. 20 L/min for O ₂ metering max. 29 L/min for aspirator approx. 55 L/min for O ₂ flush at 5 bar approx. 35 L/min for O ₂ flush at 2.7 bar approx. 30 L/min for Ventilog/Ventilog 2 (80 ⁻¹⁰ L/min peak flow)
Nitrous oxide (N ₂ O)	max. 15 L/min for metering
Air	max. 15 L/min (without Ventilog)

Measurement range of flowmeters:

Oxygen (O ₂)	0.1 to 2 and 2.5 to 15 L/min
Nitrous oxide (N ₂ O)	0.5 to 12 L/min
Air	0.8 to 15 L/min
Carbon Dioxide (CO ₂)	0.05 to 1.4 L/min
Cyclopropane (C ₂ H ₆)	0.05 to 1 L/min

Accuracy of flowmeters ± 10% of displayed value

Screw connections apparatus end:

for O ₂	M 12 × 1 mm female thread
for N ₂ O	M 14 × 1 mm female thread
for Air	M 20 × 1.5 mm male thread

Weight (without cylinders) approx. 50 kg

Dimensions see Fig. 4

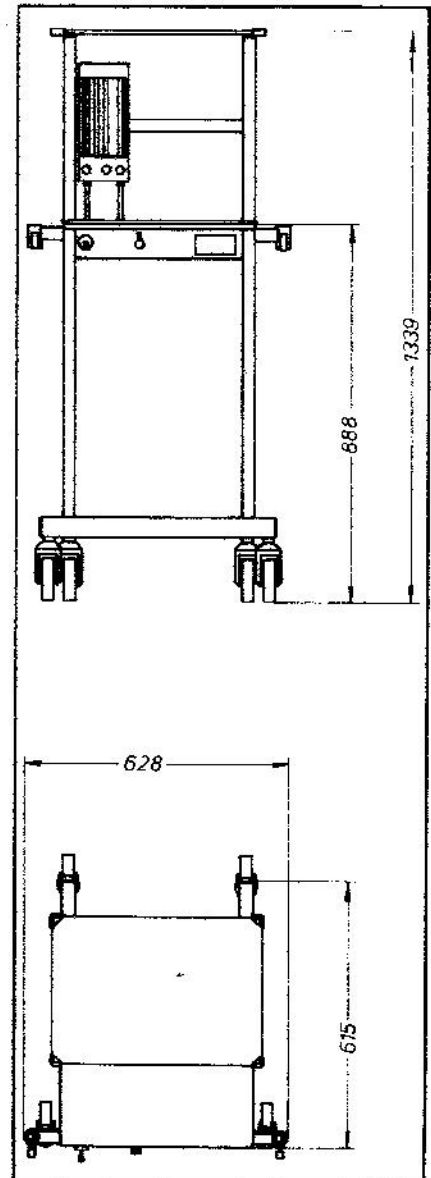


Fig. 4 Dimensions

Parts List

(see Fig. 5)

Item	Description	Set of		
			Order No.	Designation
1-12	SENECA, basic machine		M 24150	SENECA, basic machine
2	Grommet	3	2 M 17163	Set of spare grommets
3	Cap 1, black	5	M 23415	Set of caps
4	Filter insert	2	M 23451	Set of filter inserts
5	Sealing ring	10	M 23450	Set of sealing rings
5	Sealing ring	1	M 23424	Set of sealing parts
6	Screw sealing plug	1		
7	Cap	2	M 23681	Set of spare caps
8	Sealing washer	10	M 22189	Set of sealing washers
8	Sealing washer	2	M 17734	Common gas hose (1.5 m)
9	Common gas hose	1		
10	Protective cap	10	2 M 17388	Set of spare protective caps
11	Sealing plug	2	M 22909	Hinged arm with lifting rod
12	Knurled screw	1		
13	Hinged arm	1		
14	Screw	1		
15	Wedge	1		
16	Extension rod	1		
11	Sealing plug	4		
12	Knurled screw	2	M 22191	Set of knurled screws
14	Screw	1	M 23632	Set of spare lifting rod parts
15	Wedge	1		
16	Extension rod	1		
11	Sealing plug	2	M 23148	Hinged arm
17	Hinged arm	1		
18	Hinge bolt	1	M 23141	Hinge bolt
19	Drawer	1	M 24035	Drawer

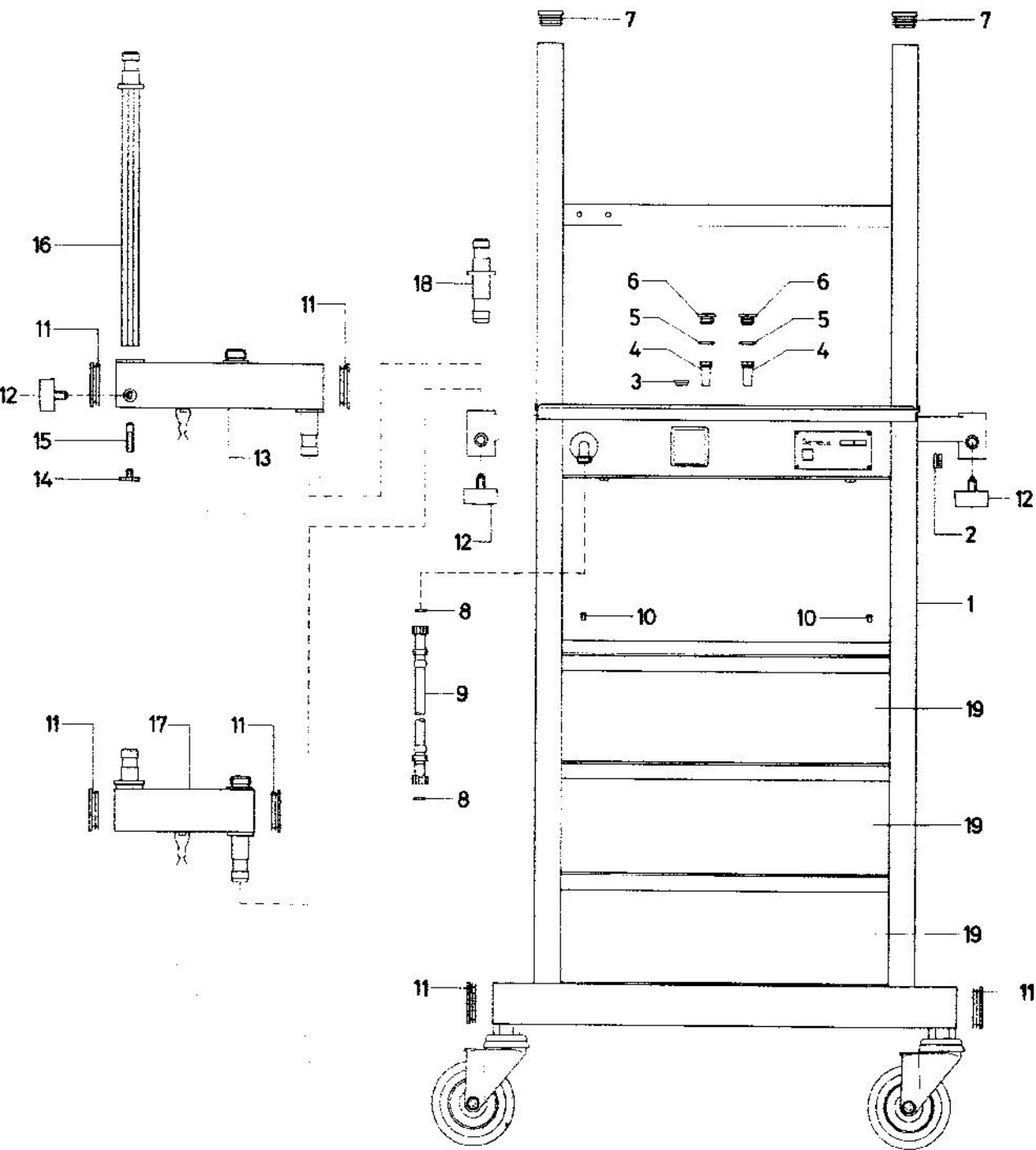


Fig. 5 Component parts of SENECA basic unit (rf. to Parts List on page 10).
The numbers are not identical with the numbering in Figs. 1, 2, 6 and 7

Order List

The articles such as masks, Y-pieces, corrugated hoses and connectors preceded by a (►) symbol correspond in terms of connection dimensions to the ISO draft standard ISO/DP 5356. In addition there are a number of items which can be used both with ISO and with standard Dräger connecting elements.

Name and description	Order-No.
Basic Versions (description see page 4)	
SENECA/Basic unit 1	M 24150
SENECA/Basic unit 2	M 24246
SENECA/Basic unit 3	M 24247
Accessories required for operation	
Option of:	
Circle system 7a with 2 carbon-dioxide absorbers, inhalation and exhalation valve, breathing bag 2.3 L, 3 corrugated hoses 1 m, soda-lime filler funnel, 1 set of valve disks and sealing rings	M 23074
Circle system 7a, but with 1 absorber	59 60 309
Circle system 8 ISO with 2 carbon-dioxide absorbers, inhalation and exhalation valve, relief valve, breathing bag 2.3 L, 3 corrugated hoses 1 m, soda-lime filler funnel, 1 set of valve disks and sealing ring	►M 25690
Circle system 8 ISO, but with 1 absorber	►59 60 313
Required for mounting circle system or other breathing systems, option of:	
Hinged pin (for Magill inhalation device only)	M 23141
Hinged arm or Hinged arm with lifting rod	M 23148
	M 22909
For cylinder operation	
O₂ cylinder, 11 L	B 02710
N₂O cylinder, 11 L	B 02660
O₂ cylinder, 3 L	B 02533
N₂O cylinder, 3 L	B 02540
Cylinder jacket for 11 L cylinder	M 03691
Cylinder jacket for 3 L cylinder	M 08035
For operation from central supply system, option of:	
O₂ connection hose, 3 m	M 22344
O₂ connecting hose, 5 m	M 22345
N₂O connecting hose, 3 m	M 22350
N₂O connecting hose, 5 m	M 22351
For connection of one or several ancillary devices, option of: O ₂ -bypass, oxygen deficiency signal, nitrous oxide cut-off, secretion aspirator, ejector, Ventilog connection valve, required per unit:	
ND-distribution plate (ND: Low pressure)	M 24090
Flowmeter unit for basic units 1-3, option of:	
Flowmeter unit, O₂, N₂O	M 24042
Flowmeter unit, O₂, N₂O, C₂H₆	M 24044
Flowmeter unit, O₂, N₂O, CO₂	M 24043

Name and description	Order No.
Accessories recommended for monitoring	
For continuous measurement and monitoring of O ₂ in inhaled gas:	
1. Oxydig, complete	B4 04 411
Required connecting elements:	
a) If sphygmomanometer, anaesthetic timer or combination is available: O₂ meter holder 11	M 27669
b) To be screwed directly onto thread of hinged arm: O₂ meter holder 10	M 27670
2. For continuous measurement and monitoring of airway pressure in circle system:	
a) Barolog A with visual and audible alarm in case of disconnection or obstruction Erforderliches Anschlußzubehör: Measurement connection	M 25638
alternatively:	
b) Airway pressure gauge with alarm Precom gives audible alarm if a set pressure value is not attained within 15 seconds alternatively:	E 11431
c) Airway pressure gauge, without alarm	72 64 325
3. For measurement of minute volume and tidal volume: Volumeter 3000	2 M 18250
alternatively: Volumeter 2000 K (infants)	2 M 16940
Accessories required for Volumeter 2000 K	
Volumeter heating	2 M 06860
Heating tube	2 M 08548
4. For monitoring of O ₂ supply pressure: Oxygen deficiency signal	M 24107
5. For interruption of N ₂ O supply if O ₂ supply pressure fails: Nitrous oxide cut-off ancillary device	M 24127
Special accessories	
Anaesthetic timer/sphygmomanometer combination	M 14826
Anaesthetic timer	M 14692
Sphygmomanometer	M 14691
Blood pressure cuff, size 3	M 13790
Blood pressure cuff, size 2	M 20139
Blood pressure cuff, size 1	M 20140
Gas analysis measurement connections	M 18074
Set of microbe filters 644 St to insert in the inspiration line at the outlet part of insp. valve	67 27 260
Additionally required for connection to ISO circle system:	
ISO set for microbe filter	►84 07 563

Name and description	Order No.
H-Vapor 19.3/4% Halothane-Vapor 19.3 with hose connection and rail bracket alternatively: H-Vapor 19.3/4% Pin-safety Halothane-Vapor 19.3 with safety filling system, hose connection and rail bracket	DB 01078 DB 01064
Special accessories for safety filling system: Filler hose, halothane	M 26297
E-Vapor 19.3/5% Enflurane-Vapor 19.3 with hose connection and rail bracket alternatively: E-Vapor 19.3/5% Pin-safety Enflurane-Vapor 19.3 with safety filling system, hose connection and rail bracket	DB 01081 DB 01066
Special accessories for safety filling system: Filler hose, enflurane	M 26299
I-Vapor 19.3/5% Isoflurane-Vapor 19.3 with hose connection and rail bracket alternatively: I-Vapor 19.3/5% Pin-safety Isoflurane-Vapor 19.3 with safety filling system, hose connection and rail bracket	DB 01107 DB 01100
Special accessories for safety filling system: Filler hose, isoflurane Ether bubbler	M 26993 M 24698
Possibilities for simultaneous removal of anaesthetic vapours from circle system and anaesthesia ventilator: 1. Via an ejector system, provided an ejector exhaust system is available Accessory set, waste anaesthetic gas exhaust 3 comprising 2 corrugated hoses and y-nozzle Plug 45° Required connecting hoses, option of: Anaesthetic exhaust hose, 3 m Anaesthetic exhaust hose, 5 m	M 23303 G 60440 G 60447 G 60448
2. Via anaesthetic filter: Anaesthetic filter equipment 2 For absorption of harmful anaesthetic vapours. With 5 anaesthetic filters One anaesthetic filter equipment each is required for both circle system and anaesthetic ventilator Ventilog	M 21262
Secretion aspirator, ejector type with 5 bacteria filters Secretion aspirator, vacuum type	M 26179 M 26180
Additionally required for vacuum operated secretion aspirator M 26180, option of: Vacuum connecting hose, 3 m Vacuum connecting hose, 5 m	M 22353 M 22354
Ventilog For controlled ventilation during anaesthesia alternatively: Ventilog 2 Required for operation via SENECA: Connecting valve Connecting hose, 1 m	84 04 500 M 27760 M 24142 M 17670

Name and description	Order No.
alternatively (for operation Ventilog/Ventilog 2 via central supply system), option of: O₂-compressed-air connecting hose, 3 m O₂-compressed air connecting hose, 5 m Accessories required for connection: a) Pneumatic switching valve or Pneumatic switching valve ISO Connection hose 2/1.5 m alternatively: b) Manual switching valve or Manual switching valve ISO Connection hose 2/1.5 m Hinged arm, to mount Ventilog	M 22494 M 22495 84 04 950 ►84 05 276 84 04 732 84 05 305 ►84 05 295 84 04 732 M 26912
Cover plate Cabinet 1 with 1 drawer Cabinet 3 with 3 drawers Monitor mount CO₂ ancillary device¹⁾ (pin index) CO₂ cylinder, 1 L (pin index) CO₂ ancillary device¹⁾ (connecting thread) CO₂ cylinder, 1 L (connecting thread) C₃H₈ ancillary device¹⁾ C₃H₈ cylinder, 1 L	M 24079 M 24075 M 24100 M 24030 M 24129 B 02172 M 24131 B 02171 M 24128 B 02191
¹⁾ If one of the 3 ancillary devices is ordered in connection with an N ₂ O cut-off M 24127, an additional N ₂ O cut-off M 24127 is also required for the ancillary device.	
To extend a basic unit to special type SENECA »Air«: Compressed-air ancillary device Required connection hoses for CS system, option of: Compressed-air connection hose, 3 m Compressed-air connection hose, 5 m	M 27024 M 23193 M 23235
O₂ bypass ancillary device	M 24141
Non-rebreathing anaesthetic system 2.1 Non-rebreathing anaesthetic system for spirometry. Possibilities for connection of airway pressure gauge and waste anaesthetic gas exhaust Non-rebreathing anaesthetic system 2.1 ISO Magill inhalation device Magill inhalation device ISO Required for operation of Magill inhalation device ISO: ISO mixed-gas connection ISO mixed-gas hose Non-rebreathing anaesthetic system 1.1 simple non-rebreathing system Non-rebreathing anaesthetic system 1.1 ISO infants' anaesthetic kit acc. to Kuhn infants' anaesthetic kit acc. to Kuhn ISO Waste anaesthetic gas exhaust for Kuhn kit Waste anaesthetic gas exhaust ISO for Kuhn kit ISO	►M 26125 M 24096 ►M 26130 M 24459 M 25068 M 24113 ►M 25681 M 14832 ►M 25634 M 23190 ►M 25838

What's what?

(refer to Figs. 6 and 7 and to Figs. 1 and 2 on fold-out page 3)

- 31 Safety valve
- 32 Connector coupling for vaporiser inlet hose
- *33 Vaporiser connecting hose (vaporiser inlet)
- *34 Vaporiser connecting hose (vaporiser outlet)
- 35 Connector coupling on vaporiser hose (vaporiser outlet)
- 36 O₂-cylinder
- 37 N₂O cylinder

C₃H₆ or CO₂ cylinder: see item 30 in Fig. 2, page 3)

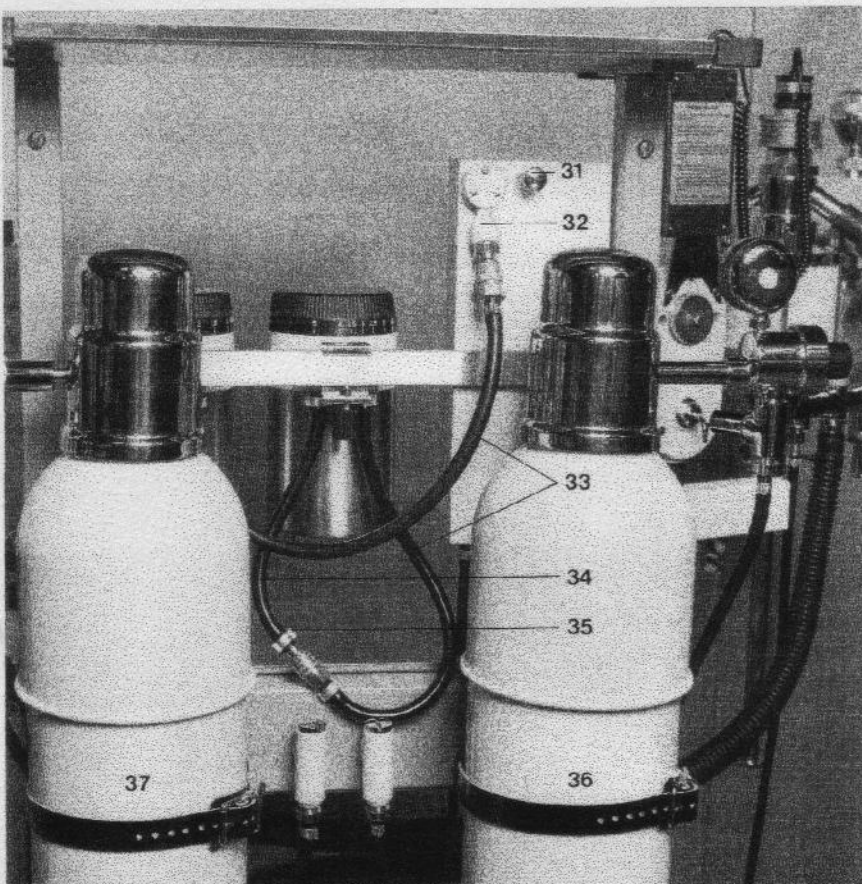


Fig. 6 SENECA rear view.
Gas supply and Vapor 19.3 connecting hoses)

36 291 a

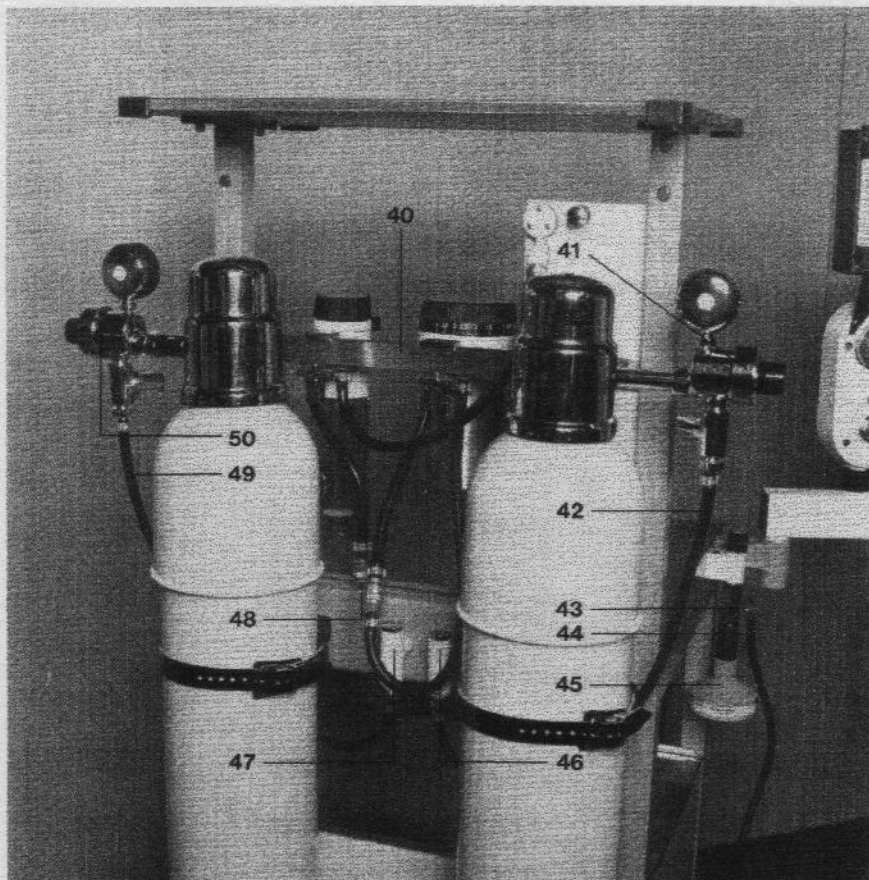


Fig. 7 SENECA rear view.
Gas supply, aspirator ejector and ether bubbler in operation

36 292

- 40 Rail for vaporiser attachment
- 41 Pressure reducer for O₂
- 42 Connecting hose from O₂ pressure reducer to O₂ connecting socket
- *43 Vacuum nozzle
- *44 Vacuum hose
- *45 Bacteria filter (only for ejector-type aspirator)
- 46 O₂ connecting socket
- 47 N₂O connecting socket
- 48 Connector coupling (at SENECA) for vaporiser outlet hose
- 49 Connecting hose from N₂O pressure reducer to N₂O connecting socket
- 50 Pressure reducer for N₂O

* Parts not covered in this operating manual.
For further information see operating manuals in question.

Figs. 6 and 7:
please fold out ►

Name and description	Order No.
Set of Rendell-Baker masks for Kuhn kit (4 ea. one of each size 0-3)	M 24526
Accessory set infants' circle system	M 26702
Accessory set infants' circle system, ISO	M 27542
Bag Resutator	M 11900
Resu Bag, basis equipment	21 09 832
Dust cover	2 M 06835
Earthing cable, 3.2 m	83 01 349

Name and description	Order No.
Wearing and replacement parts for sterilization:	
Circle system 7a	M 23074
Circle system 8 ISO	►M 25690
For circle system:	
Corrugated hose, 1 m	M 04147
Corrugated hose ISO, 1 m	►M 25724
Nozzle	M 09177
Nozzle ISO	►M 25647
Circle-system inhalation valve	M 19603
Circle-system inhalation valve ISO	►M 24469
Circle-system exhalation valve	M 19617
Circle-system exhalation valve ISO	►M 24509
Breathing bag, 2.3 L	M 12963
Set of 3 valve discs, ceramic	M 23249
Set of 4 valve discs, mica	M 19265
Set of 5 sight glasses (for insp./exp. valve)	M 22171
CO₂ absorber	M 13230

Name and description	Order No.
For Ventilog/Ventilog 2:	
Patient set including exhaust-gas nozzle	84 05 040
Pneumatic switching valve	M 27235
Pneumatic switching valve ISO	►M 27240
Manual switching valve	84 05 305
Manual switching valve ISO	►84 05 295
Connection hose 2/1.5 m	84 04 732
Bellows E (adults)	2 M 08138
Bellows K (infants)	84 00 179
Hose 2 × 1.5	12 03 622
Pressure hose for control of pneumatic switching valve	
For Oxydig:	
O₂ sensor capsule	68 03 290
Oxydig sensor housing	68 50 250
Battery (required 4 ea)	13 35 804
For Barolog A:	
Pressure measuring line	83 02 841
Bacteria filter	84 02 868
For Precom E 11431:	
Airway pressure gauge	E 11430
Front part of airway pressure gauge Precom	
For Volumeter 3000:	
Service set	2 M 18180
For aspirator, ejector type:	
Set of 5 bacteria filters (CH 102)	67 23 976
For anaesthetic filter equipment 2:	
Set of 5 anaesthetic filters	67 24 492
Others:	
Set of microbe filters 644 St	67 27 260
ISO set for microbe filters	►84 07 563