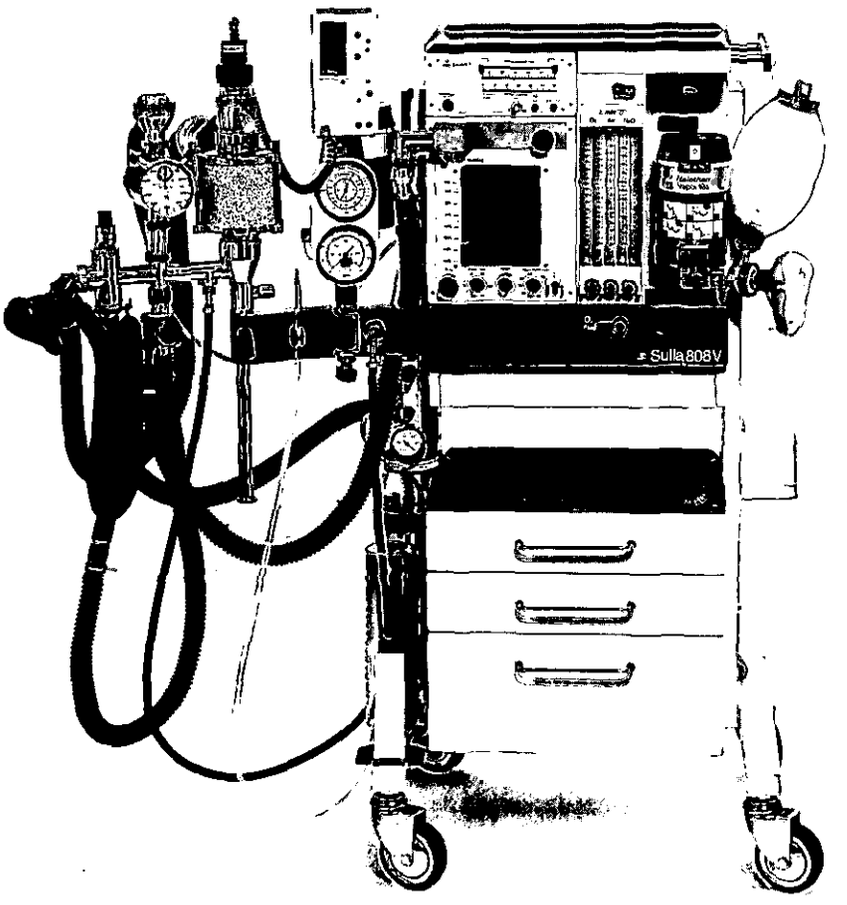
Dräger

Sulla 808 M/V/MV

Inhalation Anaesthesia Apparatus

Instructions for use



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For Your Safety and that of Your Patients[1)]

For correct and effective use of the apparatus and to avoid hazards it is essential to read the following recommendations and to act accordingly:

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.

[1)] *Insofar as reference is made to laws, regulations or standards, these are based on the legal system of the Federal Republic of Germany.*

Maintenance[2)]

The apparatus must be inspected[2)] *and serviced*[2)] *by experts at regular 6 month intervals (and a record kept). We recommend obtaining a service contract with DrägerService. Repairs*[2)] *and general overhaul of the apparatus may only be carried out by DrägerService. General overhaul by DrägerService of pressure reducers should occur every 6 years, and of oxygen blenders every 4 years. Only original Dräger spare parts may be used for maintenance.*

[2)] In accordance with DIN 31051:

Inspection	*= examination of actual condition*
Service	*= measures to maintain specified condition*
Repair	*= measures to restore specified condition*
Maintenance	*= inspection, service and, if applicable, repair*

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 has been serviced or repaired by personnel not employed or authorized by DrägerService or when the apparatus was used in a manner not conforming to its intended use.

Drägerwerk Aktiengesellschaft 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 Drägerwerk Aktiengesellschaft are likewise not modified by the recommendations given above.

Drägerwerk Aktiengesellschaft

Contents

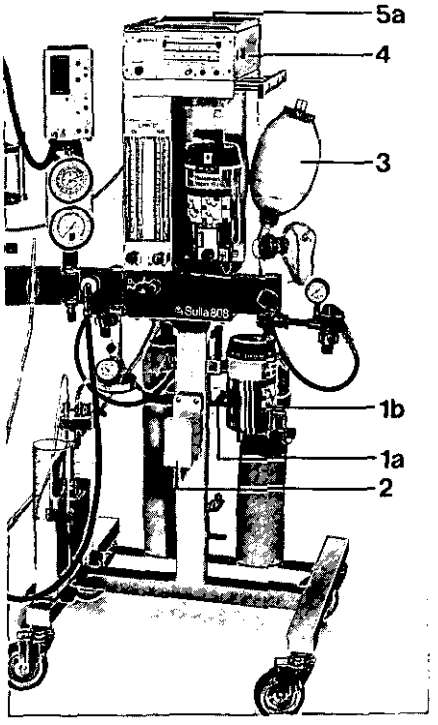

Fig. 1 Sulla 808 on trolley with central column

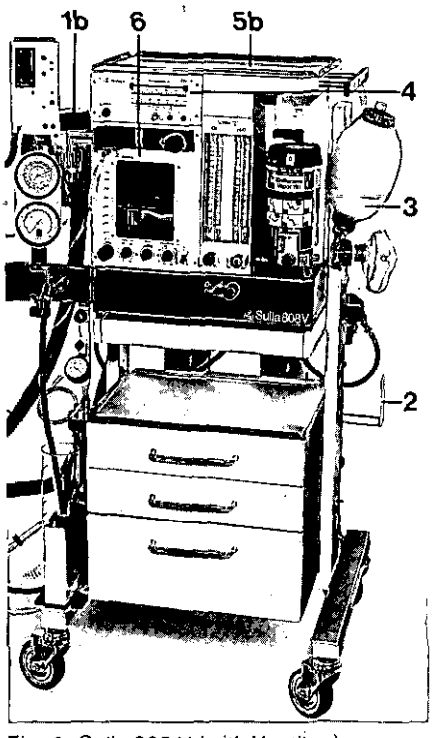

Fig. 2 Sulla 808 V (with Ventilog) on trolley with cabinet

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1
Intended Use

Sulla 808 (all models, see table) are inhalation anaesthesia machines featuring a continuous fresh gas flow.

The 808 V models are equipped with an integrated automatic ventilator (Ventilog®), which, however, can be detached;
the 808 M models feature an integrated gas blender (instead of the flowmeter unit).

All models are compact, mobile units which can be used in operating theatres, induction rooms and wake-up areas.

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.

Knurled connections are intended only for manual loosening/tightening.

The apparatus satisfies the requirements of DIN 13252

Applicable model designation: _____
(see plate on front of apparatus)

Explanation of model designations

Sulla Model	Gas blending by means of an integrated ...	Ventilog ventilator	Additional operating information
808	Flowmeter unit[1]	attachment possible	
808 M	Gas blender[2]	attachment possible	see section 11
808 »Air«[3]	Flowmeter unit[1] Operating with third gas (air), can be switched to mixture $N_2O + O_2$ or O_2 + air	attachment possible	see section 12
808 + ORC[4]	Flowmeter unit[1]	attachment possible	see section 3.2
808 »Air«[3] **+ ORC**[4]	Flowmeter unit[1]	attachment possible	see section 12+3.2
808 V	Flowmeter unit[1]	integrated	
808 MV	Gas blender[2]	integrated	see section 11
808 V »Air«[3]	Flowmeter unit[1] Operating with third gas (air), can be switched to mixture $N_2O + O_2$ or O_2 + air	integrated	see section 12
808 V + ORC[4]	Flowmeter unit[1]	integrated	see section 3.2
808V»Air«[3]**+ORC**[4]	Flowmeter unit	integrated	see section 12+3.2

[1] **Setting of gas flows in L/min**
[2] **Setting of desired O_2 concentration in vol. % (see section 11)**
[3] **»Air« denotes the Sulla 808 and 808 V models with ancillary compressed-air unit (see section 12)** (externally recognizable by 5 flowmeters in the flowmeter unit and by the selector switch above the flowmeters)
[4] **ORC = Oxygen Ratio Controller (see section 3.2)** (externally recognizable by a label »ORC« on the flowmeter unit)

Key to Figs. 1 and 2

1 a Standby holder for Vapor 19.1 or 19.3
1 b[+)] Vapor 19.1 or 19.3 in standby holder
2 Hose holder
3[+)] Manual ventilation bag
4[+)] Barolog A (airway pressure monitor)
5 a Instrument tray 0.5 B
5 b Instrument tray 1.0 B
6[+)] Ventilog (anaesthesia lung ventilator)

[+)] Device or accessory with individual instructions for use

B 7 B6

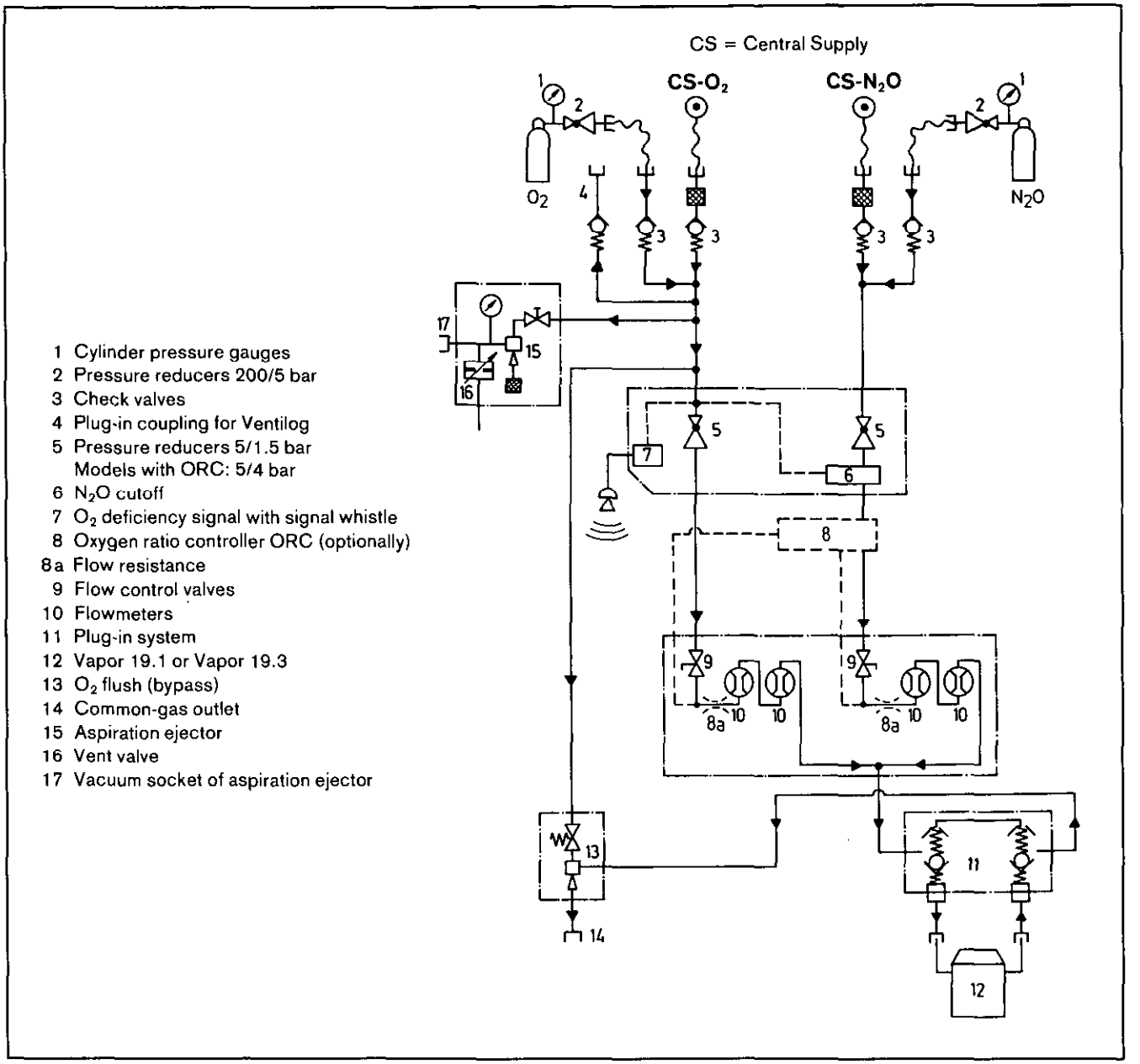

Fig. 3 Functional schematic (Sulla 808, optionally equipped with ORC)

2
Design and Function
(Fig. 3)

All models run on oxygen (O_2) and *nitrous oxide* (N_2O). *Supply can either* be effected from a central gas supply unit (referred to in the following as CS) or from gas cylinders.

When using gas cylinders, the cylinder pressure is indicated on the pressure gauges 1 and reduced to 5 bar at the pressure reducing valves **2**. The check valves **3** prevent overflow from the gas cylinder into the CS or vice versa.

The oxygen pressure is monitored by the O_2 deficiency signal **7** with audible alarm which sounds at an O_2 pressure of less than 2.2 bar. Should the pressure drop still further, the supply of N_2O is interrupted by the N_2O cutoff **6**.

The pressure reducers **5** reduce the *oxygen and nitrous-oxide* pressure to 1.5 bar,
to 4.0 bar, however, if the model is equipped with ORC (see chapter 3.2).

The flow control valves **9** make it possible to meter the two gas flows, which can be read off in each case at 2 series-connected flowmeters **10** of the flowmeter unit. The two gases converge and are routed via the plug-in system **11** where the anaesthetic is metered-in if an anaesthetic vaporizer **12** (Vapor 19.3 or 19.1) is connected. The flow of gas from the flowmeter unit to the common gas outlet **14** is still possible even if no Vapor is connected.

Using the O_2 flush **13**, an O_2 flow of approximately 55 L/min (depending on CS-pressure) can be added to the fresh gas without affecting the pressure ratios (ejector system). The O_2-flush lever resets automatically.

If fitted, the aspiration ejector **15** is used to generate a vacuum for operating the bronchial aspirator. The vacuum (max. –0.9 bar) can be reduced by way of the vent valve **16**.

The self-closing plug-in coupling **4** is intended for driving a Ventilog with oxygen.

3 Warning Devices and Safety Features

3.1 O_2 deficiency signal, N_2O cutoff

The apparatus is provided with an O_2 deficiency signal and an N_2O cutoff.

The O_2 deficiency signal is designed such that an audio alarm, which cannot be deactivated, sounds if the minimum O_2 supply pressure is dropped below. Should the O_2 pressure continue to drop, the N_2O supply is reduced – until it is cut off – such that the preselected O_2 concentration is not dropped below.

Note:
Prior to initial operation of the anaesthetic apparatus, 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, O_2 flush or bronchial aspirator. This also applies to renewed start-up following the failure of one or more gases.

The possible gas supply statuses are indicated in Table 1.

			Operating readiness		
Status	O_2 supply	N_2O supply	O_2 deficiency alarm	N_2 cutoff	Apparatus operable
1	●	●	ready for operation	ready for operation	**yes**
2	○	●	alarm (at $O_2 \leq 2.2$ bar)	N_2O reduction (at $O_2 \leq 1.6$ bar)*) N_2O cutoff (at $O_2 \leq 0.6$ bar)*)	**no,** O_2 failure
3	●	○	ready for operation	ready for operation, no effect	**no,** N_2O-failure, **no** alarm
4	○	○	alarm (at $O_2 \leq 2.2$ bar)	N_2O cutoff (at $O_2 \leq 0.6$ bar)*)	**no,** O_2 and N_2O failure

○ ≙ not adequate
● ≙ adequate

*) with ORC (see section 3.2): flow dependent reduction

Table 1: Switching and alarm functions of Sulla 808/808 V

Explanatory notes on Table 1

Status 1
Normal operation
Oxygen and nitrous oxide are available at the prescribed pressure (see Technical Data). The O_2 deficiency signal and nitrous-oxide cutoff are ready for operation.

Status 2
O_2 deficiency and failure
Models without ORC:
Should the O_2 supply pressure drop below 2.2 bar, the audio O_2 deficiency alarm sounds for at least 7 seconds. If the O_2 pressure drops below roughly 1.6 bar, the N_2O supply is reduced. At an O_2 pressure of less than approximately 0.6 bar, the N_2O supply is cut off completely. O_2 and N_2O metering can be effected again when the O_2 pressure in the system has increased to at least 2.7 bar; at this pressure the N_2O cutoff is ready for operation again. The O_2 deficiency alarm is ready for operation again when the O_2 pressure in the system has increased to at least 2.7 bar.

Models with ORC:
see section 3.2.

Status 3
N_2O failure
In the event of N_2O failure, O_2 can still be metered and the O_2 deficiency signal is ready for operation. **No** audio alarm is given. N_2O metering can be effected again when the N_2O supply pressure has increased to at least 2.7 bar.

Status 4
O_2 and N_2O failure
Should both gases fail, the apparatus reacts as described under status 2.

If a malfunction occurs and/or the supply pressure fluctuates outside the range of prescribed values, operation of the apparatus must be interrupted as soon as possible and only recommenced when the compressed-gas supply has been fully re-established (see section 6.5).

3.2 Functional component for minimum O_2 concentration

ORC »Oxygen Ratio Controller«
(optionally for 808 and 808 »Air« 808 V and 808 V »Air«.

The ORC is a functional component which, in the case of insufficient O_2 metering, limits the N_2O portion of blended gas such that the O_2 concentration of the blended gas will not drop **below 22 vol. %.**

Should O_2 supply be interrupted or switched off, N_2O flow is likewise cut off.

In the case of small blended-gas volumes (< 1 L/min) the minimum O_2 concentration increases to values above 22 vol. %.

ORC is not effective in the O_2/Air mixture.

Required supply pressures:
O_2 4 to 5.5 bar
N_2O 4 to 5.5 bar

Measure O_2 concentration!
Measuring of O_2 concentration in inspiratory gas is stipulated by DIN 13252 (e. g. using Dräger Oxydig).

B 9 B8

3.3
Other safety features

The adjustment knobs of the flow control valves are integrated into the flowmeter unit and are thus protected against unintentional adjustment and damage. The colour and shape of the knobs are such that they are clearly assigned to the respective gases.

The apparatus is fitted with an O_2 flush. Turning the self-resetting lever causes an O_2 flow of roughly 55 L/min (depending on O_2 supply pressure) to be added to the fresh-gas flow.

The following applies to users in the Federal Republic of Germany:

Monitoring of the following parameters is mandatory in order to ensure ventilation and pressure monitoring as per DIN 13252:
- 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 condition
- Faults in the apparatus, e. g. leaks, component failure
- Failure of power of gas supply
- Operator errors.

Suitable monitoring equipment is indicated in the Order List under »Accessories required for monitoring«.

If use is made of other monitoring equipment, the user is advised to check whether such equipment satisfies legal requirements and whether it is suitable for reliably monitoring the effectiveness of the anaesthesia ventilator.

Attention is drawn to DIN 13252 which stipulates that a manual ventilation unit independent of the ventilator/anaesthetic apparatus must be provided to ensure ventilation of the patient with abient air. If malfunctioning of the anaesthesia lung ventilator is detected, and should this 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.

4
Initial Preparation

4.1
Gas supply

The Sulla 808 models can be supplied with gas in the following ways:

- Connection of 3 L cylinders (for Sulla 808, see Fig. 4; for Sulla 808 V, see Fig. 6).
  Insert O_2 cylinder and N_2O cylinder into cylinder holders **4** and secure. Mount O_2 pressure reducer **5** and N_2O pressure reducer **6** and secure using spanner **3** located on back of device. Route connection hoses **7** for O_2 and **8** for N_2O from pressure reducers to connections **9** for O_2 and **10** for N_2O and screw on.
- Connection of 11 L cylinders (for Sulla 808, see Fig. 5; for Sulla 808 V, see Fig. 7).
  Connect O_2 cylinder and N_2O cylinder as described above, secure with cylinder holders **4**.
- CS[1]-connection (for Sulla 808, see Figs. 4 and 5; for Sulla 808 V, see Figs. 6 and 7).
  First connect CS-hoses **13, 14** to vertical connections **11** for O_2 and **12** for N_2O. Then press CS-connectors into appropriate CS-outlet valves.

See section 11 for **Sulla 808 M ... models** (with blender).

See section 12 for **Sulla 808 ... »Air« models** (with air as third gas).

Ventilog
(Sulla 808 V, Figs. 6 and 7)

The Ventilog can be driven either with compressed air or oxygen (supply pressure: 2 to 6 bar). The use of oxygen is permitted if there is no compressed-air facility.

Operation with O_2 (Fig. 6):
Screw connection hose **16** to »Air/O_2« connection **15** on back of Ventilog and insert other end of hose into coupling **17** (at anaesthesia apparatus).

The O_2 deficiency signal in the anaesthesia apparatus sounds in the event of O_2 failure.

Operation with compressed air:
The compressed air can be taken either from the central supply system or from a breathing-air compressor. The appropriate connecting hose is to be screwed to the connection (»Air/O_2«) on the back of the Ventilog, and connection to the central supply system is to be made by way of the plug connector.
No alarm is given in the event of compressed-air failure.

Caution: Even if the apparatus is being operated from a central supply unit the cylinders should remain in position as a standby supply. It is then only necessary to open the cylinder valves in order to switch rapidly to cylinder supply in the event of CS-failure. Check valves prevent the backflow of gas out of the cylinders into the CS.

[1] CS = Central supply system

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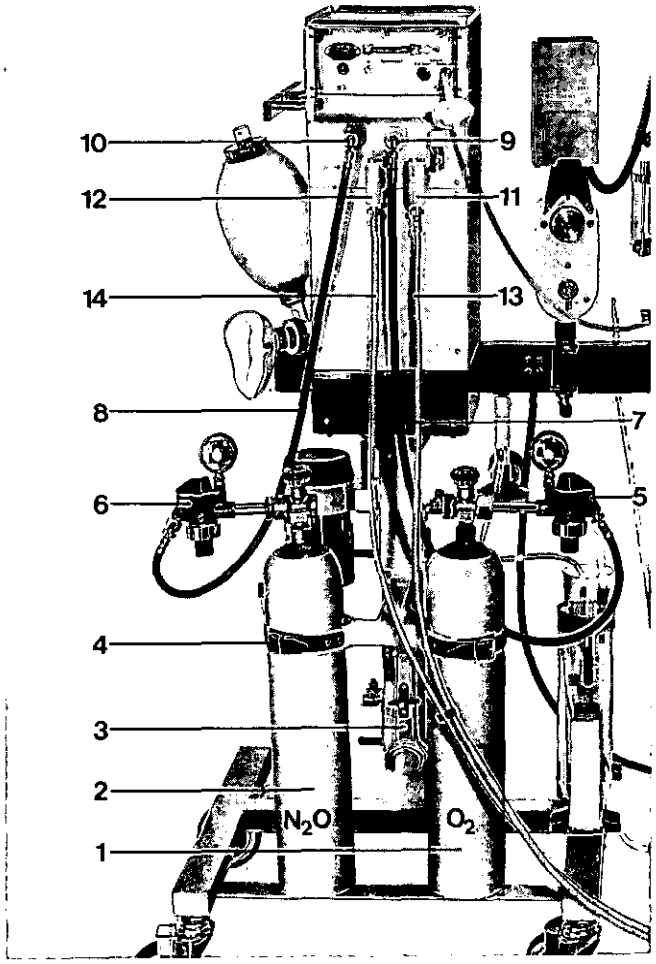

Fig. 4 Sulla 808: Back view, with small cylinders

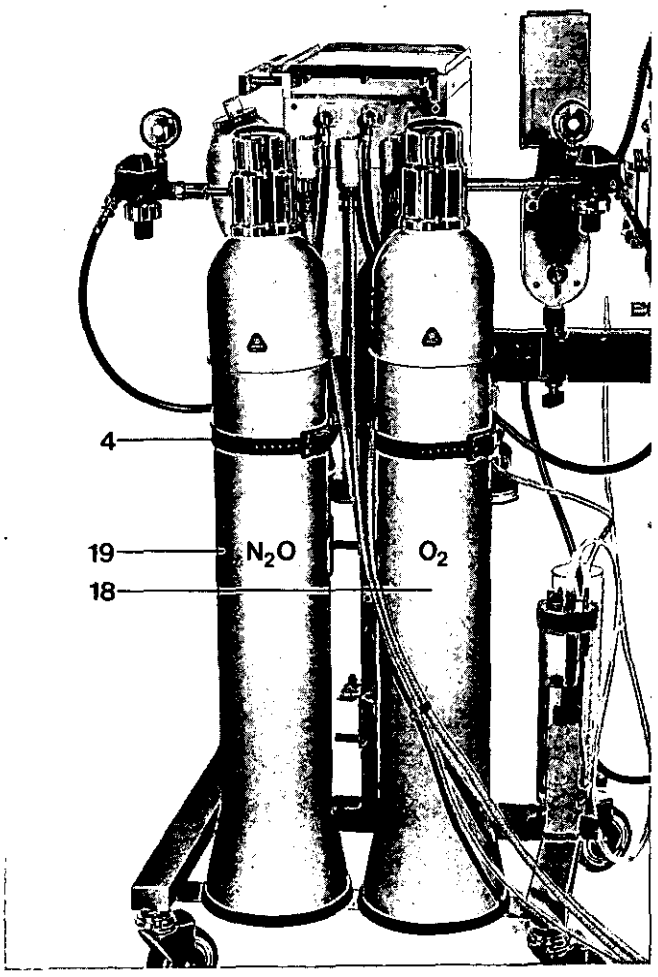

Fig. 5 Sulla 808: Back view, with large cylinders

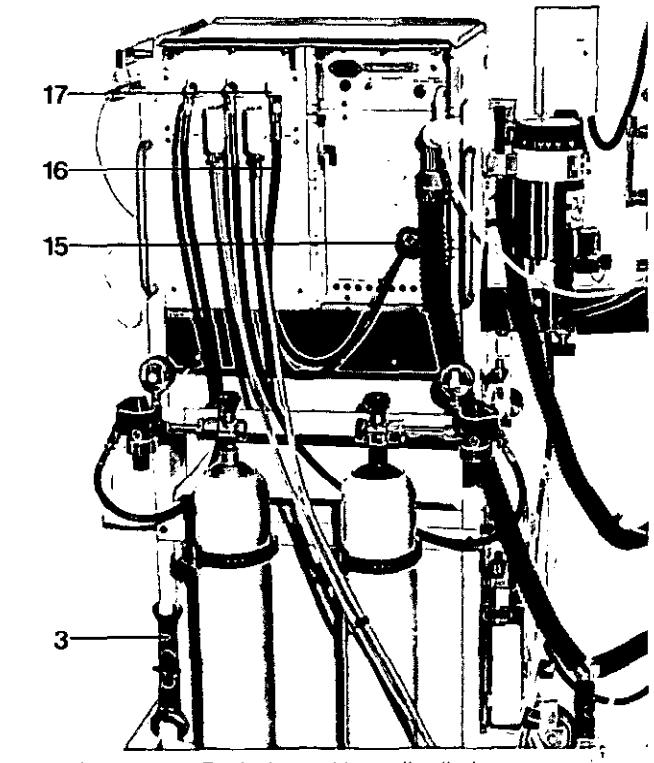

Fig. 6 Sulla 808 V: Back view, with small cylinders

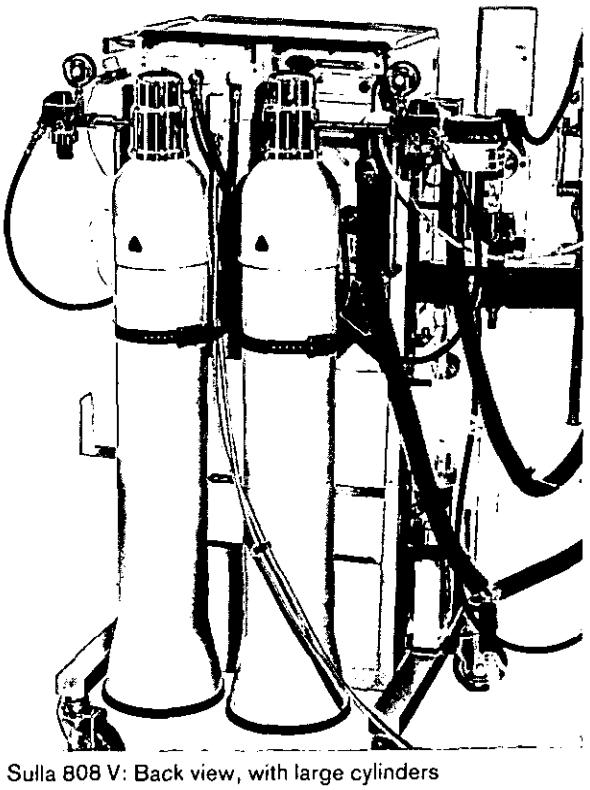

Fig. 7 Sulla 808 V: Back view, with large cylinders

Key to Figs. 4–7

1 O_2 cylinder, 3 litres
2 N_2O cylinder, 3 litres
3 Spanner
4 Holder for cylinders
5 O_2 pressure reducer
6 N_2O pressure reducer
7 O_2 connection hose
8 N_2O connection hose
9 O_2 connection (for O_2 cylinder)
10 N_2O connection (for N_2O cylinder)
11 O_2 connection (for CS)
12 N_2O connection (for CS)
13 O_2 connecting hose (from CS)
14 N_2O connecting hose (from CS)
15 O_2/Air connection on Ventilog
16 O_2 connection hose (to Ventilog)
17 O_2 plug-in coupling (for O_2 supply of Ventilog from anaesthetic apparatus)
18 O_2 cylinder, 11 litres
19 N_2O cylinder, 11 litres

B 11 ~~B 10~~

4.2
Circle system 8 ISO/7a

(Figs. 8 and 9)
(Cycle system 8 ISO as per DIN 13252)

Attach circle-system mount **1** to hinged arm **2** and secure in position.

Sulla 808 (without Ventilog):
Items **3, 4, 5** and **9** are inapplicable. Connect fresh-gas hose **6** according to Fig. 8.

Either attach reservoir bag **8** directly to circle system 1 or use corrugated hose **7** (as shown in Fig. 8).

Sulla 808 V (with Ventilog):
Screw pneumatic switching valve **9** (Ventilog accessory) to circle-system mount.

Connect control hose **4**, connection hose **5** and fresh-gas hose **6** in accordance with Fig. 8.

Either attach reservoir bag **8** directly to pneumatic switching valve **9** or use corrugated hose **7** (as shown in Fig. 8).

[1] Re Fig. 8: specific instructions for use apply to these components

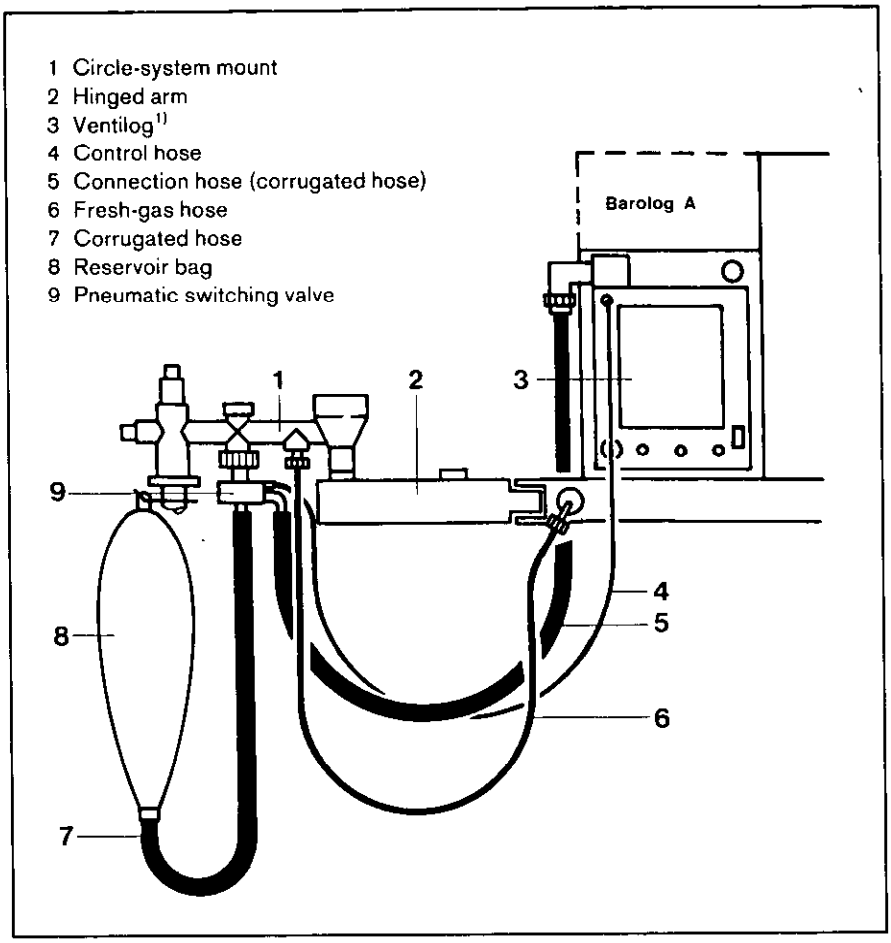

Fig. 8 Sulla 808 V: Front view – hose connections between Sulla 808 V and circle system

Equipping circle system in accordance with Fig. 9

For users in the FRG:
DIN 13252 stipulates the monitoring of the following ventilation parameters (see also Section 3.3):

- Airway pressure
  Recommendation: An alarm facility for disconnection and obstruction should be available for automatic ventilation, e. g. Dräger Barolog A
- Expiratory volume
  (e. g. with Dräger Volumeter 3000).
- Inspiratory oxygen concentration
  (e. g. with Dräger Oxydig).

[1] Re Fig. 9: specific instructions for use apply to these components

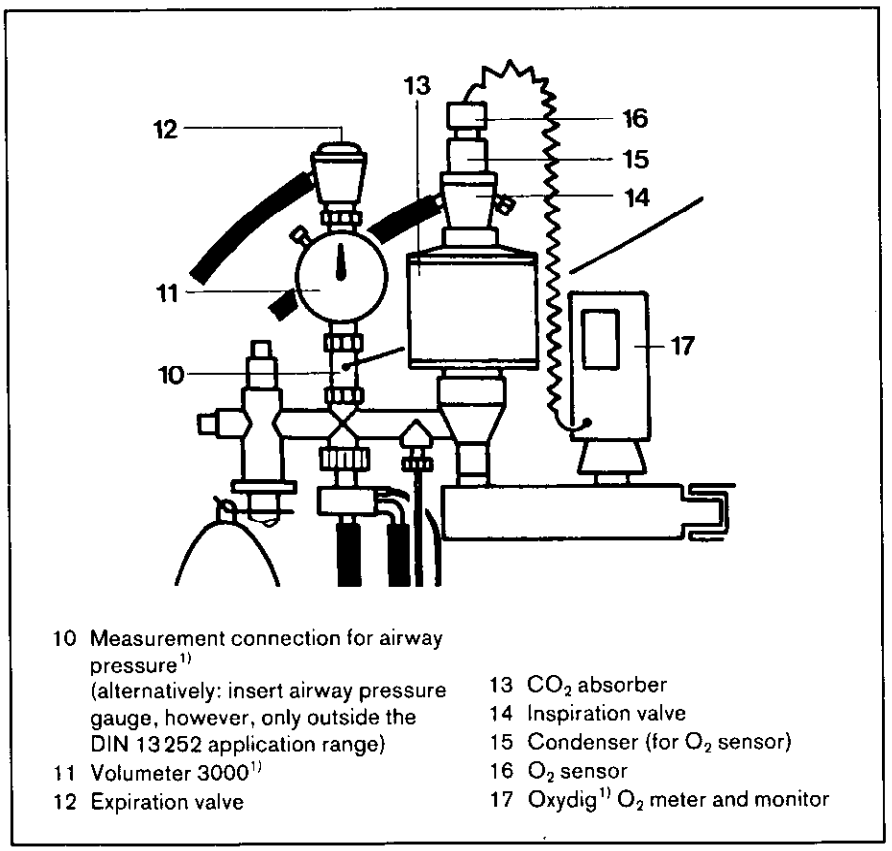

Fig. 9 Circle system 8 ISO/7a[1]

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4.3
Bronchial aspirator (Fig. 10)

The bronchial aspirator is equipped for either vacuum or ejector operation.

When using the vacuum-driven bronchial aspirator:
Attach connecting hose **7** (with plug) to the drive unit **4** and insert plug into vacuum outlet valve of central supply.

When using the ejector-driven bronchial aspirator:
Attach bacteria filter **5** to drive-gas outlet of ejector.
The drive gas (O_2) for the ejector flows from the anaesthesia apparatus directly into drive unit **4**.

Position secretion jar set 1 on bolt provided for this purpose on base of trolley (left hand side of apparatus).

Connect hoses **6**, **7** and **8** in accordance with Fig. 10.

Attach secretion sight glass **9** to end of aspiration hose **8** and press hose into clamp at hinged arm. Fill rinsing jar **3** with rinsing liquid (for flushing catheter).

1 Jar holder
2 Secretion jar
3 Rinsing jar
4 Drive unit
5 Bacteria filter (for ejector model only)
6 Vacuum hose
7 Vacuum connection hose (for vacuum-driven model only)
8 Aspiration hose
9 Secretion sight glass

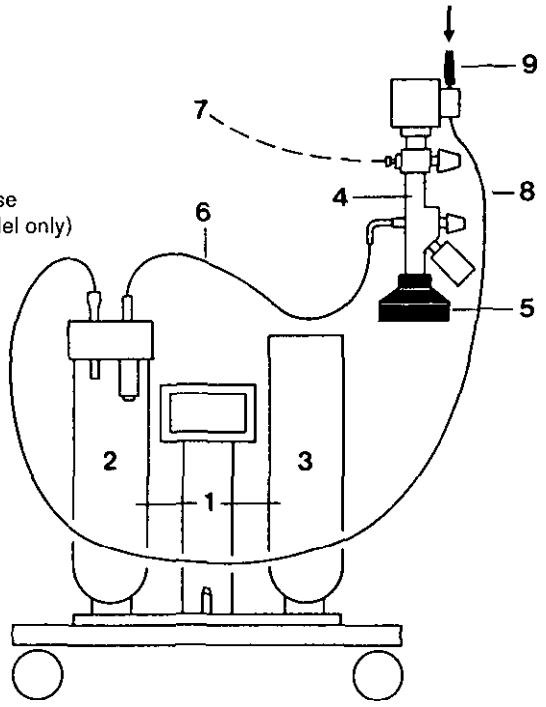

Fig. 10 Bronchial aspirator (see individual instructions for use)

4.4
Microbe filter (Fig. 11)

The microbe filter 644 St (or 654 St) can be fitted to protect the patient against bacterial contamination. This *filter is inserted between the inspiration* valve (on the absorber) and the inspiration hose of the circle system.

Important

Due, for example, to the influence of condensate, filters may increase flow resistance considerably and thus have an adverse effect on ventilation.
The microbe filter must therefore not be positioned on the expiration end of *the circle system.*
Please pay attention to the appropriate instructions for use »Microbe Filter«.

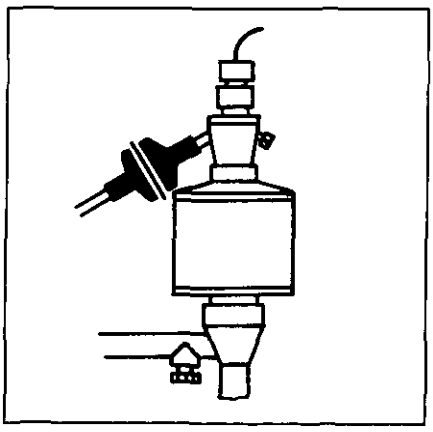

Fig. 11 Microbe filter in inspiration section

4.5
Vapor 19.1 or 19.3 (Fig. 12)

Before mounting the Vapor, it must be ensured that the sealing rings **4** have been fitted and that they are in perfect condition. Attach Vapor by means of its plug-in adapter **2** to the mount **5**; the locking lever 1 must face forwards.

Gas leakage at the plug connection is prevented by the sealing rings being pressed together by the weight of the *Vapor. After mounting the Vapor, the* locking lever **1** must be moved to the **left** until it engages, in order to ensure secure attachment to the anaesthetic apparatus.

If no Vapor is fitted, the valves in the plug-in elements **3** form a leakproof seal and connect the flowmeter unit with the common-gas outlet so that blends of O_2 and N_2O can also be metered without inhalation anaesthetic.

Important: When transporting and mounting/removing the Vapor, it is to be ensured that the maximum permissible angle of tilt (45°) is not exceeded.

The relevant »Instructions for use« describe filling of the Vapor and provide further information.

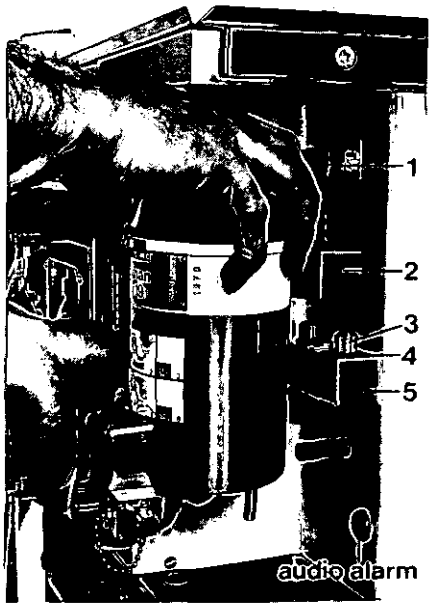

Fig. 12 Fitting Vapor

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In the event of faulty anaesthetic metering:
Anaesthetic Monitor Dräger IRIS

Should a device error lead to faulty metering of inhalation anaesthetics (halothanes, enfluranes, isofluranes) it is recommended to make use of the anaesthetic monitor Dräger IRIS. For further information: see appropriate operating instructions.

4.6 Anaesthetic-gas scavenging (Fig. 13)

For the Federal Republic of Germany, the DIN standard 13252 demands

- anaesthetic-gas scavenging
  or
- elimination by filter.

Anaesthetic-gas scavenging
is only possible, if the central supply system (CS) is fitted with a scavenging system.

Depending on the equipment of the anaesthesia apparatus (Figs. 13a, b, c) attach hoses **1**, **2** and **3** to the waste-gas sockets of the circle system and the Ventilog, and connect to Y-piece **4**.

The plug of the anaesthetics waste-gas hose 1 should be inserted into the anaesthetic-gas exhaust coupling of the CS only, once the anaesthesia apparatus is operated.

Elimination by filters
is applicable if no scavenging system is available.
Attach anaesthetic filters **5** with hoses (= anaesthetic filter equipment) to the appropriate waste-gas sockets as per Fig. 13a, b or c (depending on the equipment of the anaesthesia apparatus).

4.7 Manual ventilation bag

The following applies to users in the Federal Republic of Germany:

In accordance with DIN 13252 a manual ventilation bag (Resuscitator 21 04 792 or Dräger Bag Resutator M 11900) is to be suspended from the anaesthetic apparatus (on rail on right-hand side of anaesthetic apparatus, see Figs. 1 and 2).

4.8 Potential equalization

If potential equalization is required (e. g. on non-conductive floors or when monitors are latched on), this is to be established by means of the cable 83 01 349 between the contact (pin at the bottom of the trolley) and the appropriate room contact.

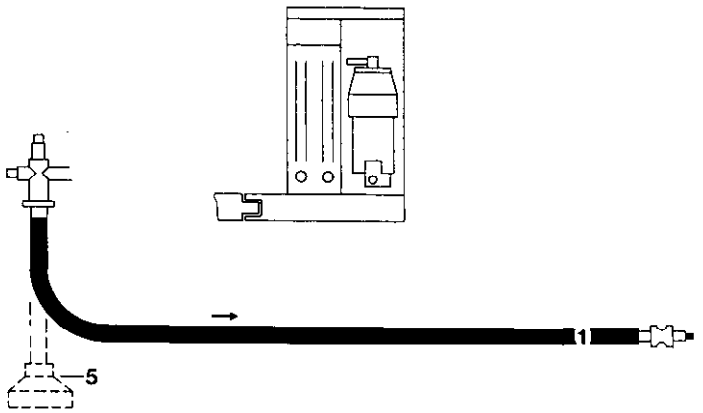

Fig. 13a Sulla 808 This only requires anaesthetic waste-gas hose **1** with connector; alternatively: filter **5** with hose

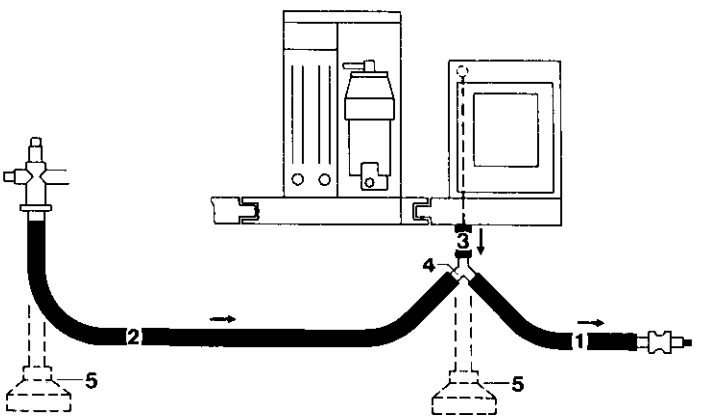

Fig. 13b Sulla 808 with Ventilog (Ventilog separately)
Anaesthetic-gas scavenging system 16 comprises **2**, **3** and **4**

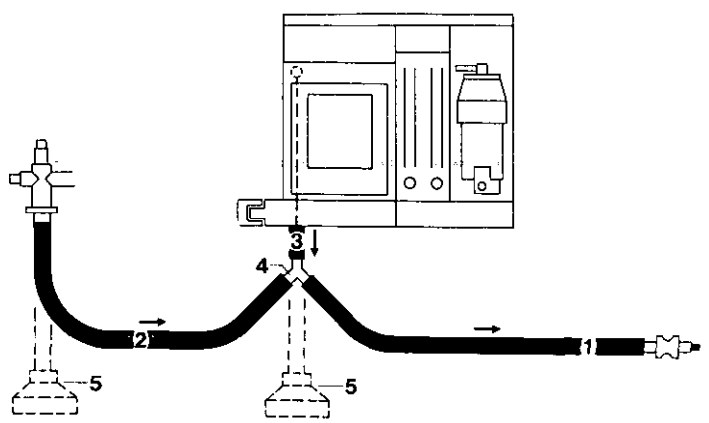

Fig. 13c Sulla 808 V (Ventilog integrated)
Anaesthetic-gas scavenging system 16 comprises **2**, **3** and **4**

1 Anaesthetic waste-gas hose (length 3 or 5 m) with waste-gas connector
2 Hose M 7258 (100 cm length)
3 Hose M 21269 (35 cm length)
4 Y-piece M 22144
5 Anaesthetic filter equipment (alternatively, instead of 1 to 4)

Fig. 13 Anaesthetic-gas scavenging for all models with flowmeter unit – front view (for models with gas blender: see Fig. 20)

B14 B15

5
Testing Readiness for Operation

After care (cleaning, disinfection and sterilization as per section 8) the apparatus is always to be checked for completeness and proper operation.

All models of the Sulla 808 M ... (with blender) must be additionally tested as per section 11,
all Sulla models 808 ... »Air« must be additionaly tested as per Section 12.

5.1
Gas supply, flowmeter unit

Check all connections for O_2 and N_2O gas supply (from cylinders and from CS) on back of apparatus for tightness and freedom from leaks.

Ensure that all supply hoses are in perfect condition (visual inspection).

5.1.1
O_2 supply (Fig. 14)

- Slowly open O_2 cylinder valve. Check O_2 supply on pressure gauge of pressure reducer.[1)]
- With N_2O supply shut off (cylinder and CS) open O_2 flow control valve 1 and check whether the entire flow range can be set on the O_2 flowmeters **2**.
- Check freedom of movement of O_2 flowmeter floats.
- Close O_2 flow control valve and O_2 cylinder valve.
- Insert O_2-CS connector and repeat the same flow test.

For the following test 5.1.2 the O_2 flow control valve must be closed where apparatus **without ORC** are concerned, in the case of apparatus **with ORC**, the O_2 flow-control valve must be kept open to allow oxygen to flow (without O_2 flow, the ORC blocks the N_2O flow).

[1)] The O_2 cylinders are completely full if the O_2 pressure gauge indicates 200 bar. At this pressure 11 litre cylinders and 3 litre cylinders contain 2200 or 600 litres of depressurized gas.

5.1.2
N_2O supply (Fig. 14)

- Slowly open N_2O cylinder valve. Check N_2O supply on pressure gauge of pressure reducer.[2)]
- Open N_2O flow control valve **3** and check whether the entire flow range can be set on the N_2O flowmeters **4**.
- *Check freedom of movement of* N_2O flowmeter floats.
- Close N_2O flow control valve and N_2O cylinder valve.
- Insert N_2O-CS connector and repeat the same flow test.

[2)] The N_2O pressure is roughly 50 bar as long as there is liquid nitrous oxide in the cylinder. When gas is extracted and the temperature drops as a result, the cylinder pressure may occasionally drop below 50 bar. The liquid nitrous oxide content of N_2O cylinders can only be determined by weighing the cylinders. A full 11 litre cylinder (8 kg of nitrous oxide) contains roughly 4000 litres of depressurized nitrous oxide, whereas a 3 litre cylinder (2.25 kg of nitrous oxide) contains approximately 1,125 litres.

5.2
Checking type of gas (Fig. 14)

- Hold O_2 sensor of O_2 measuring instrument underneath opened common-gas outlet of anaesthetic apparatus, thus allowing gas to flow over the sensor.
- Open O_2 flow control valve 1 until flow-rate is approximately 3 L/min.
- O_2 concentration must clearly increase towards 100 % O_2.
- Open N_2O flow control valve **3** until flow-rate is approximately 3 L/min.
- O_2 concentration must clearly decrease towards 50 % O_2.
- Close both flow control valves again.

If the anaesthetic apparatus is fitted with a compressed-air ancillary device (air being third gas), check type of gas *for compressed air (cf. section 12.4)*. Keep common-gas outlet **5** open for the following test.

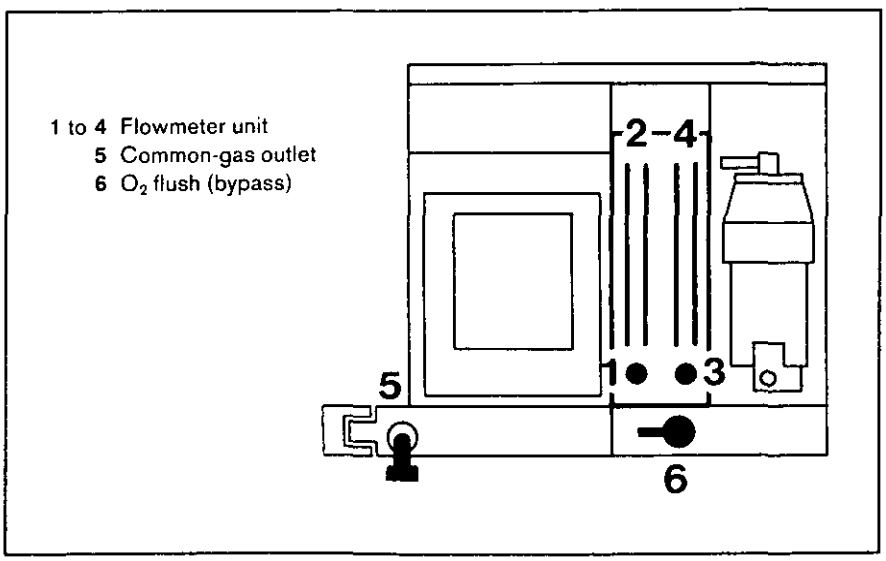

Fig. 14 Sulla 808 V

5.3
Checking low-pressure system for leaks

Accessories required (see Fig. 15):
Airway pressure gauge .....E 11 830
Test set .....M 29 043

- Assemble parts **a–f** according to Fig. 15.
- Open O_2 flow control valve **1** until flowrate is 0.1 L/min.
- Connect screw sleeve **f** to the common-gas outlet **5**.
- The pressure in the system increases and must reach at least 70 mbar. The O_2 flow control valve must be closed at the latest once 100 mbar are reached, in order to protect the pressure gauge.

This test should be performed twice:
1) **with Vapor** attached (handwheel set to »0«),
2) **without Vapor** (detach it).

- Remove pressure gauge and reconnect fresh-gas hose to common-gas outlet **5**.

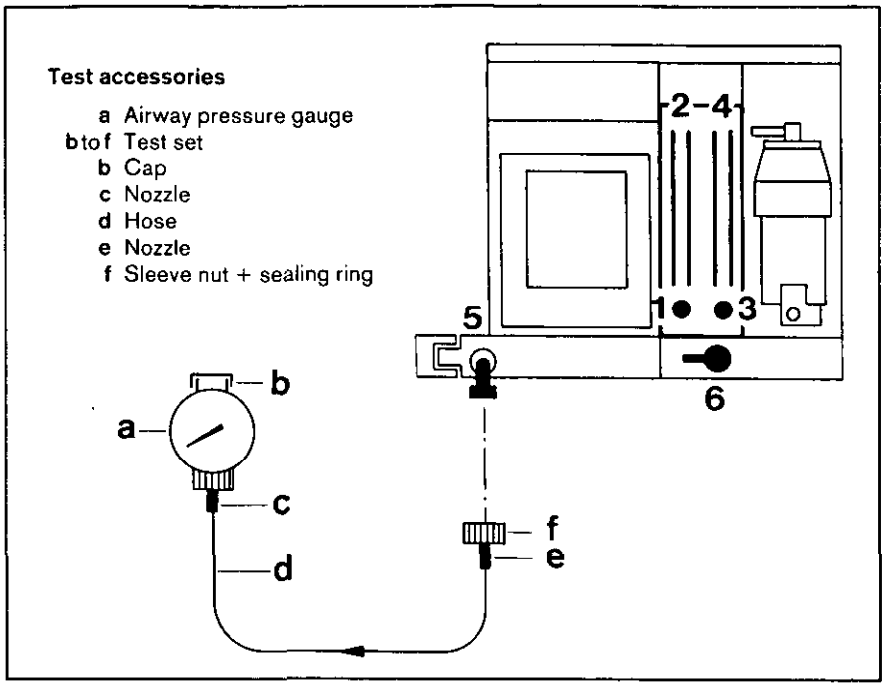

Fig. 15 Sulla 808 V

5.4
O_2 deficiency signal/ N_2O cutoff

Set O_2 flow to 1 L/min and N_2O flow to 2 L/min. Close O_2 cylinder valve or pull O_2 CS-connector. After a brief period, the O_2 deficiency signal must sound and continue to sound for at least 7 seconds. The N_2O flow must also drop to 0.
Close flow control valves. Re-establish gas supply.

5.5
O_2 flush (bypass)

When the O_2-flush lever **6** (Fig. 15) is actuated, a steady flow of gas from the Y-piece of the circle system must be perceptible. Do not seal Y-piece. When released, lever must return to its initial position.

5.6
Circle system 8 ISO/7a

(Circle system 8 ISO as per DIN 13252)

Check that fresh-gas hose has been properly connected; check that hose is in perfect condition (visual inspection). Perform functional check of circle system in accordance with appropriate operating instructions.

5.7
Ventilog (if available)

- Check connection between Ventilog and compressed-gas supply.
- Check tightness of all connections between Ventilog, pneumatic switching valve, circle system and reservoir bag in accordance with Fig. 8.
- Perform functional check of Ventilog as per appropriate operating instructions.

5.8
Bronchial aspirator

Perform functional check of bronchial aspirator in accordance with appropriate operating instructions.

5.9
Microbe filter (Fig. 11)

Check condition and installation of filter in accordance with recommendations given in appropriate instructions for use.

5.10
Vapor 19.1 or 19.3 (Fig. 12)

- Check whether Vapor plug-in adapter **2 is in contact with mount 5** of plug-in system (at anaesthetic apparatus).
- Check level in Vapor and top up if necessary.
- Perform functional check of Vapor in accordance with appropriate operating instructions.

5.11
Anaesthetic-gas scavenging (Fig. 13)

Check whether anaesthetic-gas extraction hoses are connected to circle system and – if available – to Ventilog. Insert connector of anaesthetic-gas exhaust hose into scavenging socket of central supply system: this starts up the system and the indicator at the scavenging socket must be »green«.

If use is not being made of an anaesthetic-gas scavenging system, the anaesthetic filters with hoses must be connected to the appropriate sockets at the circle system and at the Ventilog.

Check whether filters have been renewed; the filters must be firmly seated in the rubber collar.

5.12
Manual ventilation bag

In accordance with DIN 13252 the anaesthetic apparatus must be provided with a manual ventilation bag[1]. Check functioning of bag by pumping manually: when the bag is squeezed, there must be an audible and perceptible stream of air out of the mask taper.

When released, the bag must rapidly reassume its original shape. If the mask taper is sealed (e. g. with a finger), it must only be possible to squeeze the bag slightly by hand.

[1] Applies to users in the Federal Republic of Germany

5.13
Checking the Apparatus
– directly before each use –

In the Federal Republic of Germany, testing of the aneasthetic apparatus in accordance with the Check List on page 14 is mandatory. Please observe the recommendations or regulations in force in your country.

For users in the Federal Republic of Germany, use of this Check List is described in the following.

»The Check List for inhalation anaesthesia apparatus« must, on the basis of the corresponding operating instructions (for the anaesthetic apparatus and ancillary equipment), be brought into line with the type and configuration of the respective apparatus by means of deletions and/or additions. The Check List then contains the tests which are always to be performed on the respective model prior to start-up The model designation and serial number of the apparatus in question are also to be entered.

The above-mentioned entries are to be transferred to the Check List (plastic) included with the anaesthetic apparatus using a waterproof felt-tip pen. The plastic Check List is to be attached to the anesthetic apparatus by means of the bead chain.

Entries in the ACTUAL column and in the space provided for the date and signature are intended as an indication of performance of the respective tests. These entries are to be made in **pencil** and rubbed out again when the next set of tests is performed.

The plastic Check List must not be wiped over with cleaning agents and disinfectants, alcohol or similar solvents, since the entries made with a waterproof felt-tip pen are not resistant to such substances. Disinfection in the Aseptor is however permitted.

l 3

Dräger Model _____ Serial No. _____	**Check list for inhalation anaesthesia apparatus** ● Knowledge of valid operating manuals is an absolute prerequisite ● Delete where not applicable; make additions where necessary	Date _____ _____ Signature

Checking prior to each use

What?	How?	Desired	Actual (tick off if okay)
Anaesthetic gas			
Cylinder supply	Open valves	Pressure $O_2 > 50$, $N_2O > 30$ bar	.....
Central supply	Insert plug-in coupling	Indicator green	.....
	Open flow control valves: first O_2 (keep O_2 open) and then N_2O	Flow present	.....
Anaesthetic gas scavenging system	Insert plug-in coupling	Indicator green	.....
Anaesthetic filter	Condition of filter	Filter replaced	.....
O_2-flush (bypass)	Actuate switch	Flow present	.....
Vapor	Zero setting	Locked	.....
	Level	Adequate	.....
	Selector switch	Switch setting correct	.....
Plug-in system	Connection	Plug-in system locked	.....
Ventilator	Connections to circle system	Tight	.....
	Switch on, check settings, seal Y-piece during inspiration	Airway pressure present	.....
Circle system	Hoses Reservoir bag Absorber Volumeter Volumeter heating Airway pressure gauge Measurement connections Valve discs (insp. and exp.) Mixed-gas hose	Completeness and tight fit	.....
Soda lime	Condition of lime	Lime renewed, no colour change	.....
O_2 meter	Functional check, calibration	Functional	.....
Monitors	Functional check, calibration	Functional	.....
Freedom from leaks for non-rebreathing and modified circle system	Seal relief valve and Y-piece, set flow 0.2 L/min (use O_2 flush if deemed necessary for the start)	Pressure ≥ 20 mbar for for 10 seconds	.....
Relief valve	Relief valve 20 mbar, seal Y-piece, flow 10 L/min	Constant pressure 20 ± 5 mbar	.....
System Non-rebreathing system/ circle system	Selector switch	Switch setting correct	.....
Secretion aspirator	Switch on, seal aspiration hose	Vacuum present	.....
Bag for manual ventilation, for emergency ventilation	Check completeness Check bag	Complete Functioning properly	....
Additions			

e4 e3

6
Operation

– after successfully carrying out checklist checks (page 14) –

6.1
Possible ventilation modes

Prior to connection of the circle system to the patient, the desired gas flow and blending ratio are to be set by means of the O_2 and N_2O flow control valves.

The following modes are possible: **automatic ventilation, spontaneous breathing** and **manual ventilation.**

Automatic ventilation (Fig. 16a)
Set lever of switching valve **2** to horizontal position (»automatic ventilation«). The relief valve **1** and check valve **3** are inoperative. Inspiration and expiration are effected only via the Ventilog. The selector switch **5** of the Ventilog must be in the »1« setting. The Ventilog is set in accordance with the appropriate operating instructions. For further information, see operating instructions for »Ventilog« and »Circle System 8 ISO/7 a«.

Spontaneous breathing (Fig. 16b)
Set lever of switching valve **2** such that it faces vertically downwards (»spontaneous breathing«). The patient can thus exhale freely via the check valve **3**. The relief valve **1** is inoperative. The selector switch **5** at the Ventilog must be in the »0« setting (Ventilog switched off). Adequate filling of the reservoir bag **4** is to be ensured by supplying sufficient fresh gas.

Manual ventilation (Fig. 16c)
Set lever of switching valve such that it faces vertically upwards (»manual ventilation«). The air exhaled by the patient can escape via the relief valve **1** and the check valve **3**. The airway pressure must be set at the relief valve **1**. The selector switch **5** at the Ventilog must be in the »0« setting (Ventilog switched off). Ventilation is effected manually via the breathing bag **4** with care being taken to ensure that the bag is adequately filled.

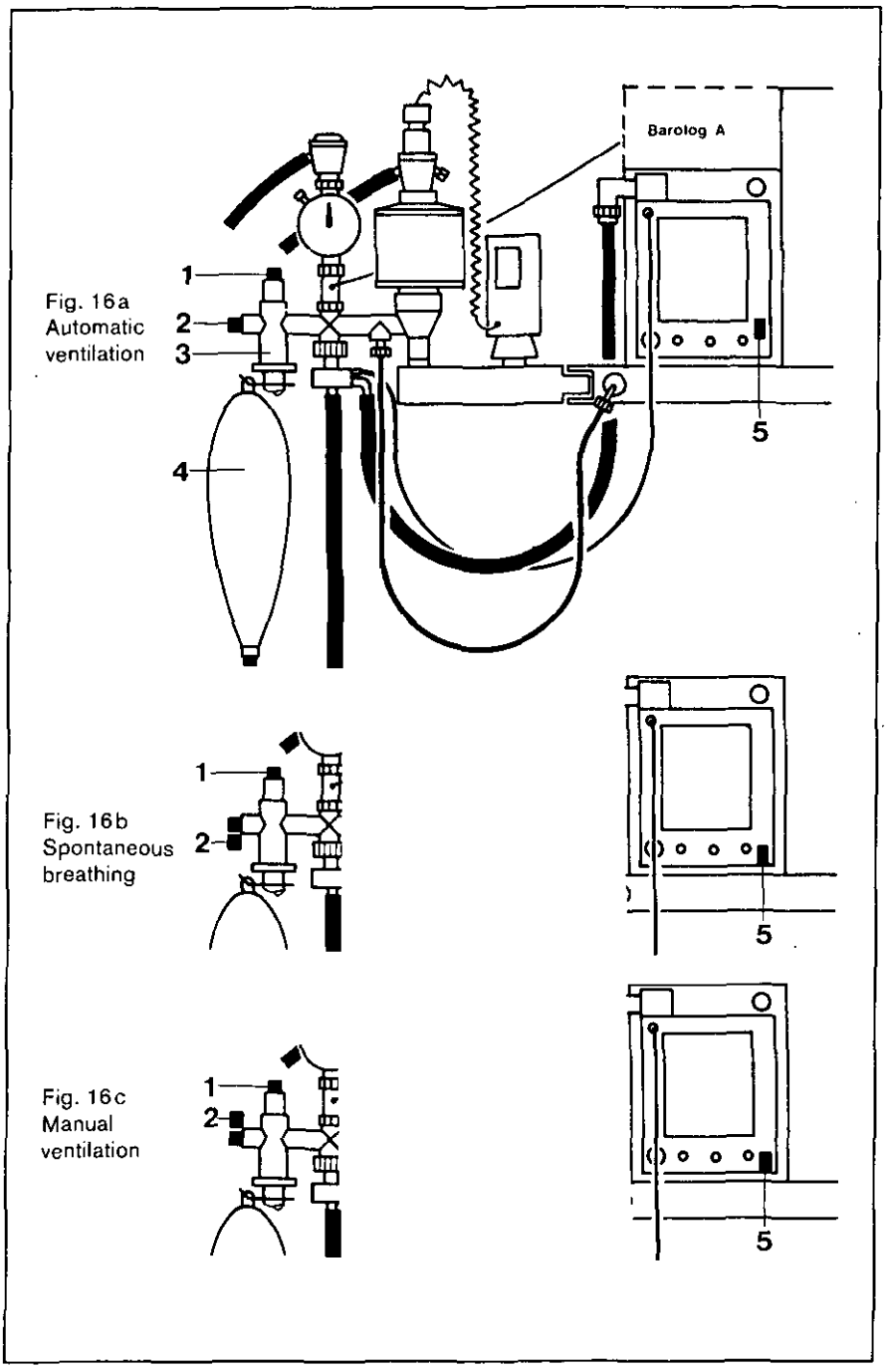

Fig. 16 Ventilation modes with Sulla 808 V

6.2
Bronchial aspirator (Fig. 17)

Attach aspiration catheter to secretion sight glass **1**. Open shut-off valve **2**.

Set vacuum at vent valve **3** and extract secretion. Following aspiration, suck rinsing liquid through system. Close shut-off valve.

The secretion jar must be emptied at the latest when the 600 mL mark is reached. Overfilling is prevented by means of an overflow safeguard.

See appropriate operating instructions for further information.

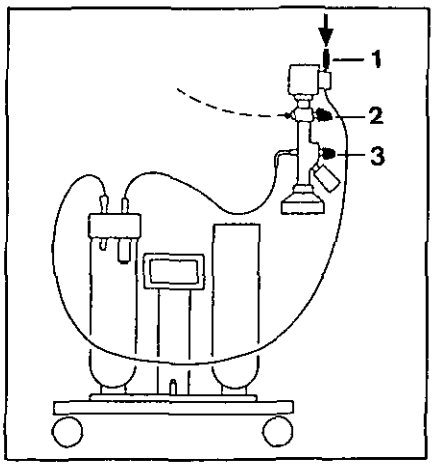

Fig. 17 Bronchial aspirator

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6.3
Vapor 19.1 or 19.3

Switch on Vapor by pressing locking button »0« on handwheel; set desired concentration by turning handwheel. *See appropriate operating instructions for further information.*

6.4
O_2 flush (bypass) (Fig. 14)

Actuation of the O_2 flush **6** causes roughly 55 L/min of O_2 to flow into the circle system bypassing the flowmeter unit and Vapor.

Important: Observe pressure in *breathing system! If the O_2 flush is* actuated in an uncontrolled manner, impermissibly high airway pressures may be encountered, in particular in conjunction with automatic ventilation.

6.5
O_2 deficiency signal

when the O_2 deficiency signal sounds, the O_2 supply is to be immediately re-established:

- In the case of CS-operation the O_2 cylinder valve is to be opened. It is often sufficient to re-insert the CS-connector.
- When operating from cylinders, a rapid cylinder change is necessary in the event of O_2 deficiency.

Note: As an emergency gas supply, *we recommend procuring the Dräger* cylinder battery O_2/N_2O (for ordering data, see Prospectus 5303e).

6.6
N_2O deficiency

An audible alarm is not given in the event of N_2O deficiency. It can however be seen from the flowmeter. *The situation can be remedied in a* similar fashion to that described in section 6.5.

6.7
Manual ventilation bag

The manual ventilation bag suspended from the anaesthetic apparatus in accordance with DIN 13252 is intended for emergency ventilation. See operating instructions »Bag Resutator« or »Dräger-Laerdal Resuscitator«.

7
Shut-Down Actions

- Switch off Vapor 19.1/19.3 (handwheel in setting »0«);
- *Close shut-off valve of bronchial* aspirator;
- Move Ventilog switch to »0« setting.
- Close cylinder valves and pull CS connectors or leave in standby position.

To prevent the O_2 deficiency signal from sounding when shutdown is effected, the system is to be depressurized – by opening the flow control valves – until the flowmeter floats have dropped to their lowest position. Open N_2O flow control valve first and then flow control valve for O_2. After venting close the flow-control valves.

8
Care

8.1
Stripping down

- Pull all CS connectors out of wall outlet points. The CS-hoses can remain in position on the apparatus, but the CS-connectors must not be left lying on the floor (in particular during disinfection in the Aseptor).
- Unscrew fresh-gas hose from circle system.
- Sulla 808 V: Unscrew pneumatic switching valve from circle system. Detach hoses leading to Ventilog at Ventilog.
- Remove anaesthetic-gas scavenging hoses or anaesthetic filter equipment from waste-gas sockets.
- Remove circle system.
- Remove ancillary equipment, insofar as it is not to be disinfected in the Dräger Aseptor (observe appropriate operating instructions).
- Detach supply hose of bronchial aspirator and remove secretion jar set.
- Remove secretion jar (with secretion aspirator hose) and rinsing jar from holder and empty.
- Sulla 808 V: Remove patient system from Ventilog (see »Ventilog« operating instructions).
- The Vapor remains in position on the apparatus.

8.2
Hygiene

The upkeep of ancillary equipment must be carried out in accordance with the specifications given in the respective operating instructions. This applies, for example, to the circle system, Vapor, Ventilog and secretion jar set.

The measures described in the following apply to upkeep of the anaesthetic apparatus.

8.2.1
Cleaning

Dirt on the anaesthetic apparatus is to be removed using a damp cloth soaked in standard detergent (wetting agent). Care is also to be taken to ensure that drawers, pull-out surfaces and the like are not forgotten.

After cleaning, the anaesthetic apparatus and its component parts are to be allowed to dry.

e6 ~~e8~~

8.2.2
Disinfection

Disinfection in Dräger Aseptor®
The anaesthetic apparatus is to be disinfected in accordance with the »Guidelines for disinfection in the Aseptor«.

Prior to disinfection, the Vapor must be in the zero setting (handwheel on »0«).

The disinfection measures to be employed for ancillary equipment, the Ventilog and the circle system are listed in the respective operating instructions.

Wiping or spraying with liquid disinfectant
Wiping or spraying with disinfectant should only be employed if there is no possibility of using the Dräger Aseptor for disinfection purposes. Such methods only serve to reduce the number of bacteria on the surface of the apparatus and thus cannot be unreservedly recommended. Spraying may also lead to controls (switches, rotary knobs etc.) sticking.

Disinfection in Dräger Purfactor®
Breathing hoses, reservoir bags, circle systems, tubes, masks, secretion jars, jar caps (not including *ping-pong ball*) *and aspiration hoses* etc. are placed on the Purfactor washing frame. All anaesthesia materials are cleaned, disinfected and dried using »Program I«. Thermally *instable materials, such as those* made of PVC, are treated using »Program II«.

8.2.3
Sterilization
Only the following items are suitable for sterilization in steam at temperatures up to 120°C:
The parts of the *circle system and* Ventilog which carry breathing air, the secretion jar cap and the aspiration hoses.

Maximum temperature for secretion sight glass: 134°C.

The permissible sterilization temperature for secretion jars and rinsing jars is printed on them.

Important: Sterilization in steam accelerates the natural aging of rubber parts. They must therfore be checked at regular intervals for leaks and tightness.

8.3 Assembly

The disassembled parts are assembled in reverse order of stripping down (see section 8.1).

A functional check as per sections 5.1–5.12 »*Testing Readiness for* Operation« is then to be performed.

9 Servicing

To ensure that the components of the anaesthetic apparatus satisfy the requirements of their designated application and to guarantee that the apparatus is always ready for use and fully functional, we recommend concluding a servicing agreement with DrägerService.

This guarantees thorough and regular checking, as well as the necessary adjustments and spare part replace*ment. The apparatus should be serviced* twice a year by DrägerService.

Attention is also drawn in this respect to the section headed »For your safety and that of your patients« on page 2.

10 Technical Data

For Sulla 808 and 808 V models

The data marked with [+)] refer (additionally) to the special versions Sulla 808 ... »Air« described in section 12. The technical data for the gas blender of the Sulla 808 M ... models are listed separately in section 11.

Ambient temperature

15 to 35°C for operation of the apparatus. The apparatus temperature must be adapted to the ambient temperature.

Gas supply

– From central supply system (CS) with following requirements:

	Pressure	with ORC
O_2:	2.7 to 5.5 bar	4 to 5.5 bar
N_2O:	2.7 to 5.5 bar	4 to 5.5 bar
[+)]Air:	2.7 to 5.5 bar	

Flowrates

O_2: max.	20 L/min for O_2 metering
max.	29 L/min for ejector of bronchial 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 (80^{+10} L/min peak flow)
N_2O: max.	15 L/min for N_2O metering
[+)]Air max.	15 L/min (not including Ventilog)

Screw connections on apparatus end (as per DIN 13252)

for O_2:	M 12 x 1 mm, female
for N_2O:	M 14 x 1 mm, female
[+)]for »Air«:	M 20 x 1.5 mm, male

– Additionally, cylinder supply option with following possibilities:
  a) One 11 litre cylinder each for O_2 and N_2O
  b) One 3 litre cylinder each for O_2 *and* N_2O

  Pressure reduction:
  via pressure reducers at cylinders, delivery pressure 5 bar.
  Requirements as regards gas purity in accordance with European pharma-copoeia.
– Plug-in coupling (self-closing) for driving Ventilog with oxygen from anaesthetic apparatus; delivery pressure same as O_2 supply pressure.

(continued page 18)

Technical Data (continued)

Gas metering units

- Gas metering with flow control valves Different knurling of adjustment knobs and different colour Range of adjustment: approx. 5 turns.
- [+)]selector switch »Air/N_2O« (manually operated)
- 2 O_2 flowmeters (connected in series)
  Measuring range: 0.1 to 2 L/min
  2.5 to 15 L/min
- 2 N_2O flowmeters (connected in series)
  Measuring range: 0.05 to 1 L/min
  1.25 to 10 L/min
- [+)]1 air flowmeter
  Measuring range: 0.8 to 15 L/min
- Measurement accuracy of flowmeters (at 20°C and 1013 mbar)
  ± 10 % of displayed value,
  ± 15/–5 % with smallest scale value of O_2 flowmeter,
  –15/+5 % with smallest scale value of N_2O flowmeter,
  [+)]15/–5 % with smallest scale value of »Air« flowmeter

Anaesthetic metering

- Rapid replacement system for Vapor 19.1 or 19.3:
  The connections are bridged automatically and sealed off with respect to the atmosphere when the Vapor is removed.
- Vapor for halothane,
  range of adjustment 0.2 to 4 vol. %
  or
  Vapor for enflurane,
  range of adjustment 0.2 to 5 vol. %
  or
  Vapor for isoflurane,
  range of adjustment 0.2 to 5 vol. %.
- Standby holder for accommodating Vapors not in use.
- Technical data of Vapor:
  see appropriate operating instructions »Vapor 19.n«.

Safety features

- O_2 deficiency signal
  If an O_2 supply pressure of 2.2 ± 0.2 bar is dropped below, an audio alarm, which cannot be deactivated, sounds for at least 7 seconds. Readiness for operation is established again as of 2.7 bar.

  This minimum pressure must be applied for at least 20 seconds. During this period there must be no gas extraction (see also section 3.1).
  [+)]In contrast to the Sulla 808 and 808 V models, the air supply to the »Air« flowmeter is released automatically with the models 808 ... »Air« and 808 M ... (with gas blender), should the O_2 pressure drop below 1 bar (in the system).
- N_2O cutoff
  If an O_2 supply pressure of approximately 1.6 bar is dropped below, the N_2O supply is throttled and then cut off completely at approximately 0.6 bar O_2.

O_2 flush (bypass)

Approximately 55 L/min O_2 at 5 bar O_2 supply pressure, approx. 35 L/min O_2 at 2.7 bar O_2 supply pressure, self-resetting, no increase in pressure at Vapor.

Circle system

- For example modified circle systems, such as circle system 8 ISO or 7a.
- Connection for fresh-gas hose: male thread M 16 x 1.5 mm (as per DIN 13252).
- See Operating Instructions »Circle System 8 ISO/7 a« for equipment and technical data.

Bronchial aspirator

- Drive:
  By means of O_2 (ejector model) from anaesthesia apparatus
  or
  by means of vacuum (vacuum model) from central supply system (CS).
  Connection via male thread ISO 228 G 1/4 A.
- Vacuum setting:
  By way of vent valve 0 to approx. –0.9 bar, vacuum reading at drive by way of pressure gauge, measuring range 0 to –1 bar.
- Effective capacity of secretion and rinsing jars: 700 mL
- Overflow safeguard, relief valve
- Rapid vent valve (only for vacuum drive)
- Bacteria filter (only for ejector drive)
- See corresponding operating instructions for technical data.

Ventilog anaesthesia lung ventilator

- Supply by means of
  O_2 plug system at anaesthesia apparatus
  or
  O_2 central supply 2 to 6 bar,
  or
  compressed-air central supply 2 to 6 bar
- Drive gas must be dry and oil-free.
- Drive-gas consumption 30 L/min, peak flow 80^{+10} L/min O_2 or compressed air.
- See corresponding operating instructions for equipment and technical data.

Dimensions (not including circle system)
All models: Width: 600 mm
Height: 1200 mm
Depth: 580 mm

Weight (not including circle system and cylinders)
Sulla 808 (as per Fig. 1)
approx. 40 kg
Sulla 808 V (as per Fig. 2)
approx. 55 kg

11
Sulla 808 M/808 MV

This section contains additional information necessary for operation of the Sulla models with built-in gas blender. Operation of these apparatus does, however, presuppose knowledge of the preceding sections of the instructions for use for the Sulla 808/808 V models.

A gas blender is installed instead of the flowmeter unit and generates the desired O_2 concentration (% by volume) for an anesthetic-gas mixture ($N_2O + O_2$), or alternatively, for a breathing-gas mixture (O_2 + air). The volume is controlled by a flow control valve and downstream connected flowmeter.

Do **not** use the gas blender for calibration of O_2 measuring instruments.

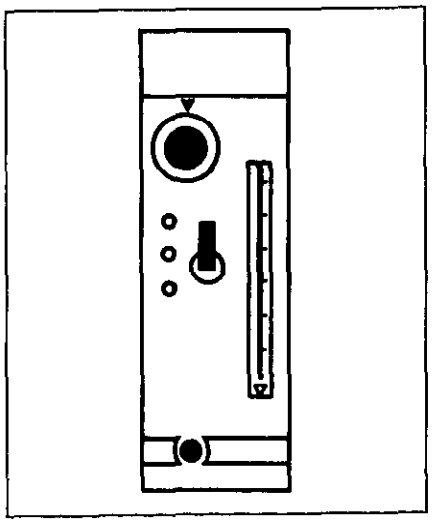


Fig. 18 Gas blender in models Sulla 808 M and 808 MV (instead of flowmeter unit)

11.1 Warning devices and safety features

If the O_2 or N_2O operating pressure drops below 2.5 bar, the gas deficiency alarm sounds for at least 7 seconds; if the air operating pressure drops below 2.5 bar, the gas deficiency alarm sounds only in the O_2 + Air mode. The gas deficiency alarm cannot be deactivated.

In the $N_2O + O_2$ mode, a drop in O_2 pressure to below 2.5 bar automatically blocks the N_2O supply and switches in a supply of air to act as an emergency supply.

The various operating statuses in the event of a malfunction and the corresponding alarm functions are summarized in Table 2 on page 18 and described as follows:

$N_2O + O_2$ mode: Selector switch flap up

Status 1 (normal operation)
N_2O is mixed with O_2
The O_2 concentration can be set between 30 and 100 vol. % O_2. Readiness for operation is shown by green O_2, N_2O and air indicators. The supply of air is blocked automatically.

Status 2
Failure of O_2 supply
Should the O_2 pressure drop below 2.5 bar, the gas deficiency alarm sounds. At the same time, the N_2O supply is blocked automatically and air is switched in to act as an emergency supply. If the air supply also fails, ventilation is to be ensured with a separate manual ventilation unit. The gas deficiency alarm is only ready for operation again when the O_2 pressure in the system is at least 3 bar. At this pressure the N_2O supply is automatically released again and the supply of air is blocked.

Status 3
Failure of N_2O supply
If the N_2O pressure drops to below 2.5 bar, the gas deficiency alarm sounds. O_2 can still metered.

Switchting can be effected to the O_2 + Air mode (selector switch down). The gas deficiency alarm cannot be deactivated and is only silenced when the N_2O pressure in the system is at least 3 bar again.

Status 4
Failure of air supply
Should the air pressure drop below 2.5 bar, the gas deficiency alarm does **not** sound in the $N_2O + O_2$ mode. Do **not** switch to O_2 + Air mode!

O_2 + Air mode: Selector switch flap down

Status 5 (normal operation)
O_2, N_2O and air supply present
O_2 is mixed with air. The O_2 concentration can be set between 45 and 100 vol. % O_2. Readiness for operation is shown by green O_2, N_2O and air indicators. The supply of N_2O is blocked automatically; no mixing of air and N_2O.

Status 6
Failure of O_2 supply
If the O_2 pressure drops below 2.5 bar, the gas deficiency alarm sounds. Should the O_2 supply fail during operation, air can still be metered. Readiness for operation of the gas deficiency alarm is only re-established when the O_2 pressure in the system is at least 3 bar.

Status 7
Failure of N_2O supply
If the N_2O pressure drops below 2.5 bar, the gas deficiency alarm sounds. O_2 and air can still be metered. Do **not** switch to $N_2O + O_2$ mode! The gas deficiency alarm cannot be deactivated and is only silenced when the N_2O pressure in the system is at least 3 bar again.

Status 8
Failure of air supply
If the air pressure drops below 2.5 bar, the gas deficiency alarm sounds. O_2 can still be metered. If necessary, switching can be effected to the $N_2O + O_2$ mode (selector switch up). The gas deficiency alarm cannot be deactivated and is only silenced when the air pressure in the system is at least 3 bar again and readiness for operation has thus been re-established or if switching is effected to the $N_2O + O_2$ mode.

Status	Selector switch in setting	O_2 supply	AIR supply	N_2O supply	Indicator O_2	Indicator AIR	Indicator N_2O	Operational readiness: Audio gas deficiency alarm	Operational readiness: N_2O cutoff	Operational readiness: Apparatus operable
1	$N_2O + O_2$	●	●	●	*green*	*green*	*green*	*ready for* operation	*ready for* operation	**yes,** $N_2O + O_2$ mode
2		○	●	●	no *indication*	green	green	audio alarm (at $O_2 < 2.5$ bar)	automatic blocking of N_2O (at $O_2 < 2.5$ bar)	**no,** O_2 failure; automatic switching to AIR
3		●	●	○	green	green	no indication	audio alarm (at $N_2O < 2.5$ bar)	ready for operation, no effect	**no,** N_2O failure; switching can be effected to O_2 + AIR mode
4		●	○	●	green	no indica-	green	**no** alarm	ready for operation	AIR failure; **apparatus inoperable in O_2 + AIR mode**
5	O_2 + AIR	●	●	●	green	green	green	ready for operation	no effect, N_2O blocked automatically on account of O_2 + AIR mode	**yes,** O_2 + AIR mode
6		○	●	●	no *indication*	green	green	audio alarm (at $O_2 < 2.5$ *bar*)	no effect, N_2O blocked *automatically* on account of O_2 + AIR mode	**no,** O_2 failure; *emergency* supply with AIR
7		●	●	○	green	green	no indication	audio alarm (at $N_2O < 2.5$ bar)	no effect, N_2O blocked automatically on account of O_2 + AIR mode	N_2O failure; **apparatus inoperable in $N_2O + O_2$ mode**
8		●	○	●	green	no indication	green	audio alarm (at AIR < 2.5 bar)	no effect, N_2O blocked automatically on account of O_2 + AIR	**no,** AIR failure; switching can be effected to $N_2O + O_2$ mode

○ ≙ not adequate
● ≙ adequate

Table 2: Switching and alarm functions of Sulla 808 M/808 MV

11.2 Initial preparation

Additionally screw air connecting hose 1 to socket 2 (Fig. 19) and insert connector into compressed-air outlet valve of CS.

Ensure that supply pressure for O_2, N_2O and air are at least 3 bar.

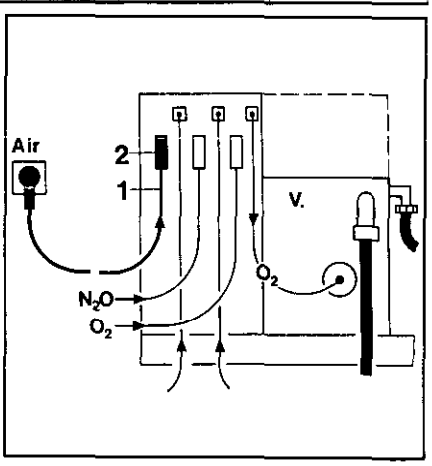


Fig. 19 Sulla 808 MV: gas supply (rear of unit)

Depending on the equipment of the anaesthesia apparatus, attach anaesthetic-gas scavenging in accordance with Fig. 20a, b or c. Please refer to instructions given under Section 4.6.

11.3 Testing readiness for operation

11.3.1
Checking N_2O cut-off and gas deficiency signals (Fig. 21)

Open O_2, N_2O cylinder valves and/or insert connector for O_2, N_2O and Air.

Insert connectors for O_2, N_2O and air.
Set selector switch **2** to $N_2O + O_2$ mode (flap up)
Set rotary knob **1** to 50 vol. % O_2 (outer scale).
Set blended-gas flowrate of 6 L/min on metering valve **7**.

- Pull O_2 connector or close O_2 cylinder valve:
  Gas deficiency alarm sounds after approx. 3 s.
  There must still be a gas-flow reading on the flowmeter (N_2O is blocked automatically and replaced by air).

  If air is not connected as third gas, there must be no recognizable gas flow on the flowmeter, since N_2O is blocked automatically.
- Re-insert O_2 connector or open O_2 cylinder valve again:
  Indicator **4** O_2 is green again.
  Blended-gas flowrate is approx. 6 L/min again.
- Pull N_2O connector or close N_2O cylinder valve:
  Gas deficiency alarm sounds after roughly 3 s:
  There must still be a gas-flow reading on the flowmeter.
- Re-insert N_2O connector or open N_2O cylinder valve again:
  Indicator **3** N_2O is green again.
  Blended-gas flowrate is approx. 6 L/min again.

Move selector switch **2** to O_2 + Air mode (flap down).
Rotary knob to 50 vol. % (inner scale).
Retain blended-gas flowrate of 6 L/min.

- Pull O_2 connector or close O_2 cylinder valve:
  Gas deficiency alarm sounds after approx. 3 s.
  There must still be a gas-flow reading on the flowmeter.

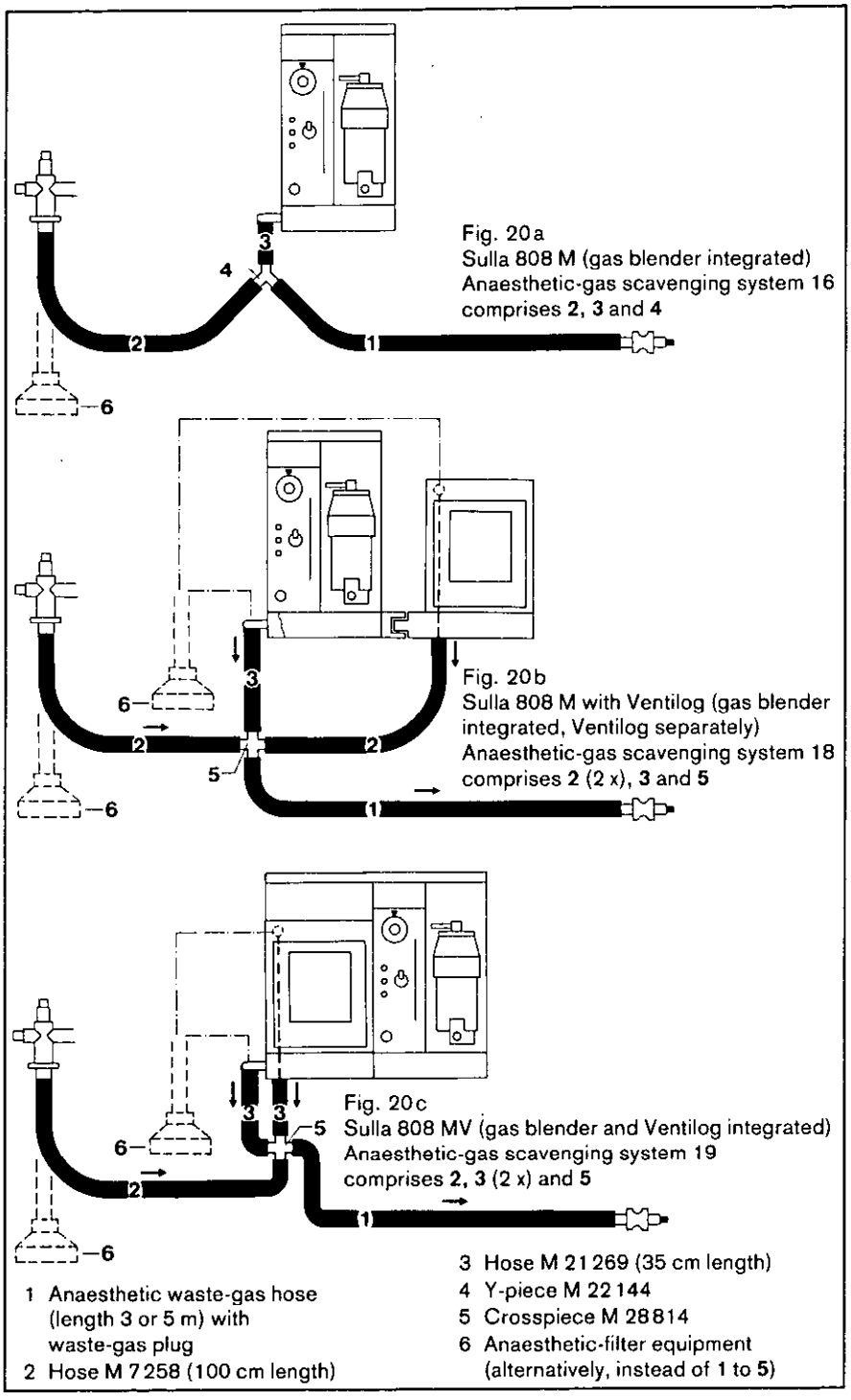


Fig. 20 Anaesthetic-gas scavenging for all models with gas blender – front view

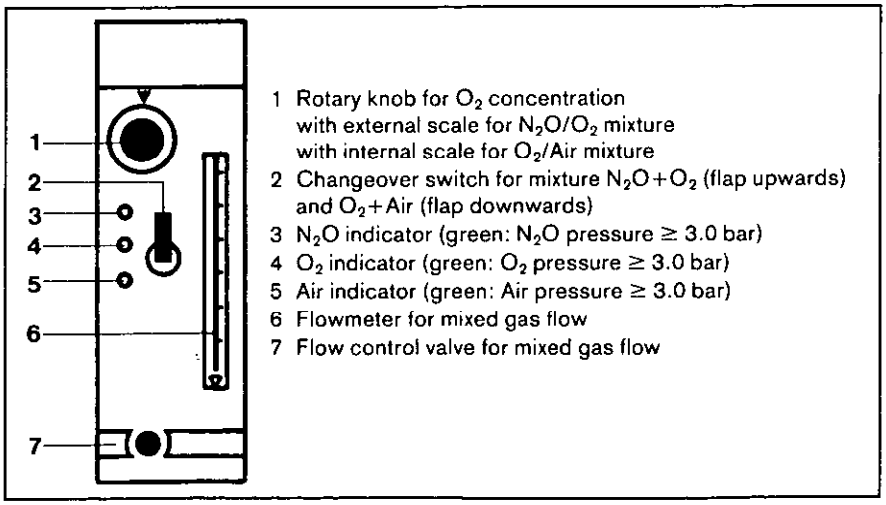


Fig. 21 Gas blender

– Re-insert O_2 connector or open O_2 cylinder valve again:
Indicator O_2 is green again.
Blended-gas flowrate is approx. 6 L/min again.

– Pull air connector:
Gas deficiency alarm sounds after approx. 8 s.
There must still be a gas-flow reading on the flowmeter.

– Re-insert air connector again:
Air indicator is green again.
Blended-gas flowrate is 6 L/min again.

Close flow control valve, move selector switch to N_2O + O_2 mode (flap up).

11.3.2
Leak test of low-pressure system

Accessories requird (see Fig. 22):
Airway pressure gauge ..... E 11 830
Test set ..... M 29 043
O_2 flowmeter unit 2M80810

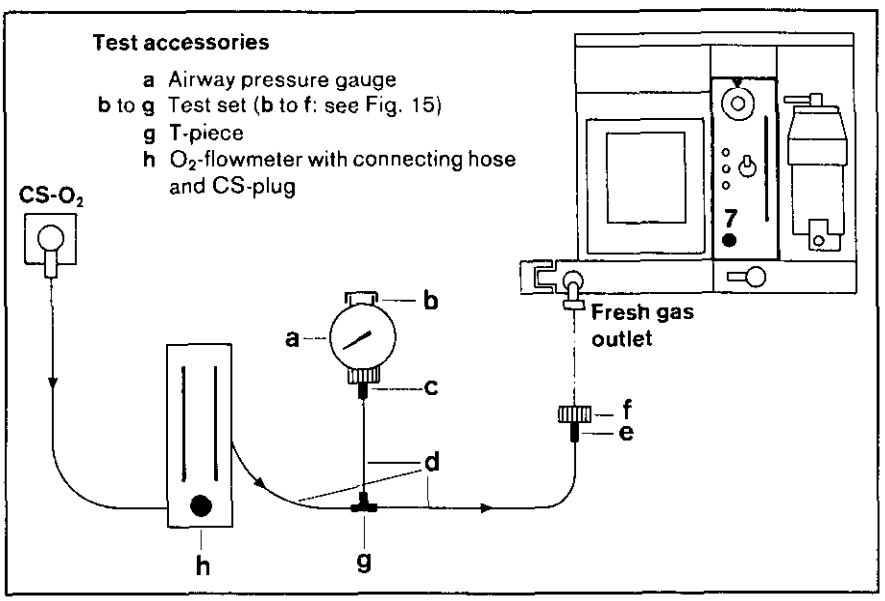


Fig. 22 Test assembly

– Assemble parts **a–h** according to Fig. 22.
– Close flow control valve **7** of the gas blender.
– Connect sleeve nut **f** to the common-gas outlet of anaesthesia apparatus.
– Close flow control valve of flowmeter unit **h**; insert O_2 connector into CS.
– Slowly open flow control valve at flowmeter unit **h** and establish a constant pressure (at pressure gauge) between 70 and max. 100 mbar (should the pressure rise above 100 mbar, close flow control valve to protect pressure gauge).

Given a pressure between 70 and 100 mbar, the leak rate (flow at the flowmeter unit) may not exceed 0.1 L/min.

11.4 Operational use

– Check whether all 3 indicators are green.
– Set flap to desired mode:
N_2O + O_2 = flap up,
O_2 + Air = flap down.
– Set rotary knob to desired concentration:
For N_2O + O_2 mode = outer scale,
for O_2 + Air mode = inner scale.
– Set blended-gas flowrate with flow control valve and flowmeter.

11.5 Technical data (gas blender)

Supply pressure O_2, N_2O, Air:	3 to 5.5 bar
Blending mode:	N_2O + O_2 or O_2 + Air (selector switch)
O_2 concentration range for N_2O + O_2 mode:	30 to 100 vol. % O_2
Accuracy:	± 5 vol. % O_2 or ± 15 vol. % of setting (greater value in each case) cf. diagram Fig. 23
For O_2 + Air mode:	45 to 100 vol. % O_2
Accuracy:	± 15 vol. % of setting
Blended-gas metering:	1 to 17 L/min
Display range of flowmeter:	1 to 20 L/min
Measurement accuracy of flowmeter at 20 °C and 1013 mbar:	± 10 % of measured value for 30 vol. % O_2[1] and 70 vol. % N_2O ± 15 % with lowest scale value, irrespective of gas composition

[1] Upon transition to 100 % O_2, there is a systematic deviation of max. +15 % from the measured value as a function of flow; i. e. the actual flowrate is greater by up to 15 % than that indicated. This systematic deviation is negligibly small at a flowrate of 2 L/min.

e12 e11

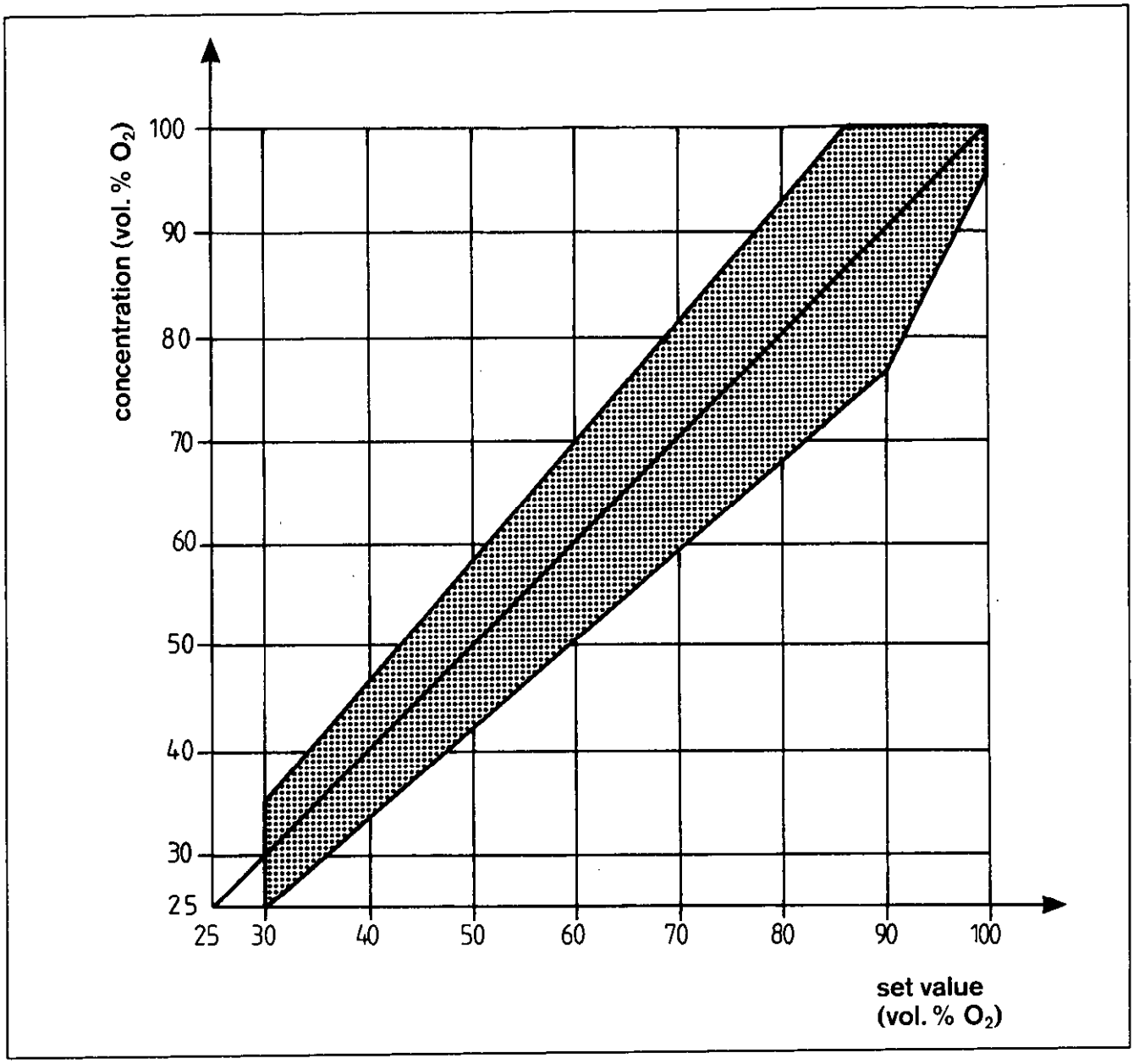


Fig. 23 Gas blender in the blending mode N_2O+O_2:
Blending accuracy and reproducibility. The blending range for O_2+Air is 45 to 100 vol. % O_2.

e13 e12

12
Sulla 808 ... »Air«

This section contains additional information necessary for operation of the Sulla models with ancillary compressed-air facility. Operation of these apparatus does, however, presuppose knowledge of the preceding sections of the instructions for use for the Sulla 808/808 V models.

The »Air« models differ from the standard versions in that they have an additional gas supply (compressed air from CS) and a flowmeter unit extended to include compressed air with a selector switch for »Air« and »N_2O« (Fig. 24).

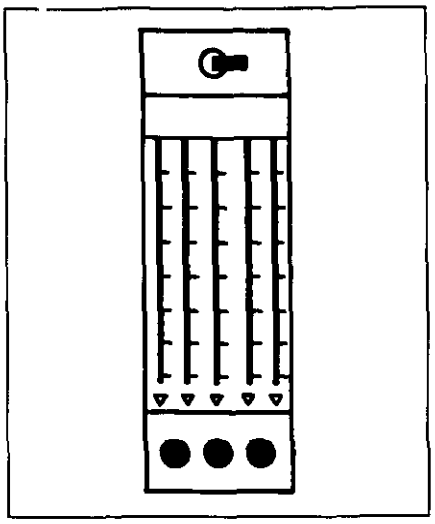


Fig. 24 Sulla 808 ... »Air«: Flowmeter unit for O_2, N_2O and Air as a third gas

12.1
Design and function (Fig. 25)

When effecting O_2 and N_2O supply from gas cylinders, the cylinder pressure is indicated on the pressure gauges **1** and reduced to 5 bar at the pressure reducers **2**. The check valves **3** prevent overflow from the cylinders into CS.

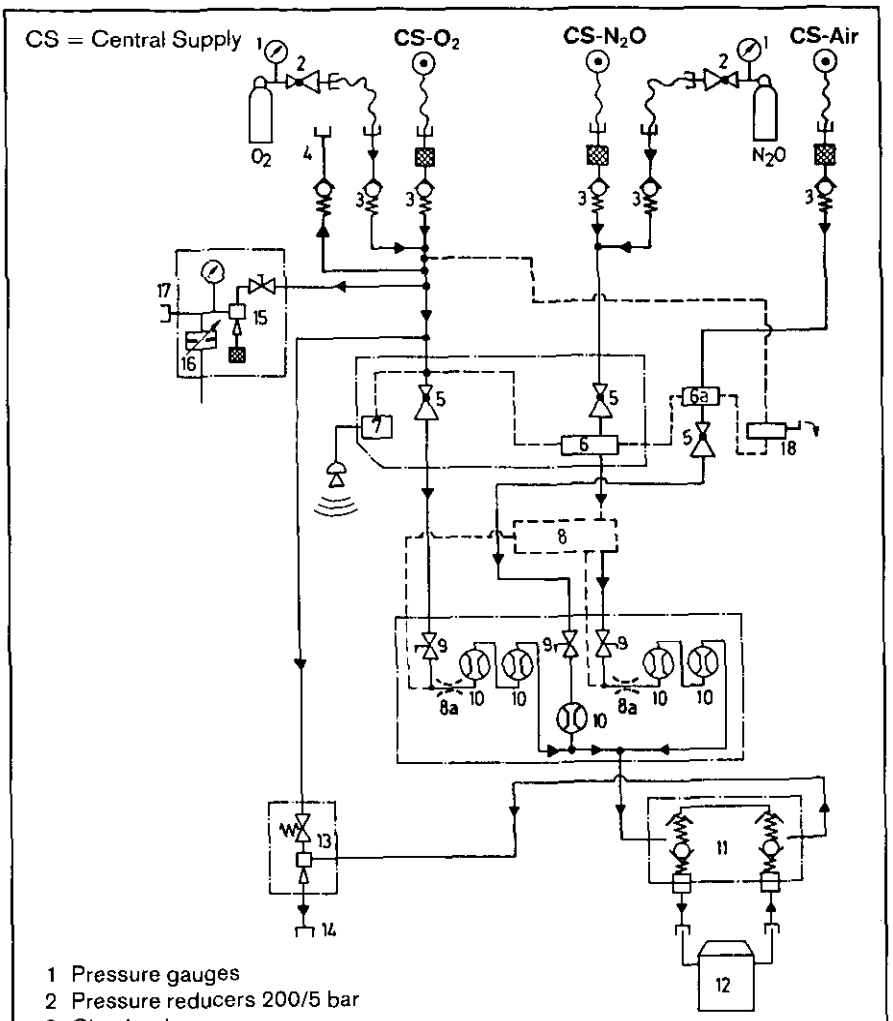
As regards N_2O and compressed air, it is only possible to meter one gas or the other. For this purpose the selector switch **18** is to be moved to the corresponding setting »N_2O« or »Air«.

The oxygen pressure is monitored by the O_2 deficiency signal **7** with audio alarm which sounds if the O_2 pressure drops below 2.2 bar.

Should the O_2 pressure continue to drop, the N_2O supply is interrupted by the N_2O cutoff **6** irrespective of the setting of the selector switch **15**; the apparatus switches automatically (at the compressed-air valve **6a**) to »Air«. If the selector switch **18** is in the »Air« setting, compressed air remains connected even in the event of lack of oxygen.

The pressure reducers **5** reduce the pressure of the oxygen and nitrous oxide to 1.5 bar,
in the case of apparatus with ORC to 4.0 bar (cf. section 3.2).

The flow control valves **9** make it possible to meter the two gas flows (O_2 and N_2O) and the flowrates can be read off in each case on two series-connected flowmeters **10** of the flowmeter unit. As an alternative to N_2O, air can be metered via an individual flowmeter. The gases converge and are routed via the plug-in system **11** to the anaesthetic vapourizer **12** (Vapor 19.3 or 19.1). If no Vapor is connected, gas can flow from the flowmeter unit to the common-gas outlet **14**.



1 Pressure gauges
2 Pressure reducers 200/5 bar
3 Check valves
4 Plug-coupling for Ventilog
5 Pressure reducers 5/1.5 bar
Models with ORC: 5/4 bar
6 N_2O cutoff
6a Compressed-air valve
7 O_2 deficiency signal with signal whistle
8 Oxygen ratio controller ORC (optionally)
8a Flow resistance
9 Flow control valves
10 Flowmeter
11 Plug-in system
12 Vapor 19.1 or 19.3
13 O_2 flush (bypass)
14 Common-gas outlet
15 Aspirator ejector
16 Vent valve
17 Vacuum socket of aspirator ejector
18 Changeover switch »Air/N_2O«

Fig. 25 Functional diagram (Model Sulla 808 »Air«, optionally with ORC)

The O_2 flush **13** (bypass) enables an O_2 flow of roughly 55 L/min (depending on supply pressure) to be added to the fresh-gas without affecting the pressure ratios (ejector system). The lever of the O_2 flush resets automatically.

12.2 Warning devices and safety features

The O_2 deficiency signal is designed in the same manner as for the 808 and 808 V models:
If an O_2 supply pressure of 2.2 bar is dropped below, an audio alarm, which cannot be reset, is triggered. Should the O_2 pressure drop below roughly 1 bar, the N_2O supply is blocked with the »Air« model and the supply of air is released so that air can be metered-in as emergency supply.

Important:
Prior to start-up of the anaesthetic apparatus, a supply pressure of 2.7 bar must have been applied for at least 20 seconds, in order to make the gas deficiency alarm ready for operation.
During this period there must be no gas extraction, e. g. via flow control valves, ventilator, O_2 flush or bronchial aspirator. This also applies to renewed start-up following failure of one or more gases.

The various switching functions of the apparatus with air as third gas and the associated alarm functions are outlined in Table 3.

Switch setting »Air«
(Metering of O_2 and air)

Status 1 (normal operation)
In the switch setting »Air« air can be metered in combination with O_2. The supply of gas to the N_2O metering branch is automatically blocked.
The O_2 deficiency alarm is ready for operation.

Status 2
In the event of O_2 failure during operation, air can still be metered. Should the O_2 pressure drop to below 2.2 bar, the O_2 deficiency alarm sounds for at least 7 seconds.

The O_2 deficiency alarm is only ready for operation again when there is an O_2 pressure of at least 2.7 bar in the system.

Status 3
In the event of air failure during operation, O_2 can still be metered. The O_2 deficiency alarm remains ready for operation. **No** audio alarm is given.
Air can only be metered again when there is in air pressure of at least 2.7 bar in the system.

Switch setting »N_2O«
(Metering of O_2 and N_2O)

Status 4 (normal operation)
In the switch setting »N_2O«, N_2O can be metered in combination with O_2.
The supply of gas to the air metering branch is blocked automatically. Mixtures of N_2O and air are not possible.
The O_2 deficiency signal and N_2O cutoff are ready for operation.

Status 5
Apparatus without ORC:
Should the O_2 pressure drop to below 2.2 bar, the O_2 deficiency alarm sounds for at least 7 seconds.
If the O_2 pressure drops below approximately 1.6 bar, the N_2O supply is reduced – until it is shut off completely – in such a manner that the preselected O_2 concentration is not dropped below. At an O_2 pressure 0.6 bar, the supply of N_2O is shut off completely.
The supply of air is released at an O_2 pressure below approx. 1 bar: air can be metered via the »Air« flow control valve. Irrespective of this, the selector switch remains in the »N_2O« setting.
The O_2 deficiency alarm and N_2O cutoff are only ready for operation again when there is an O_2 pressure of at least 2.7 bar in the system. At this pressure the supply of N_2O is also released again and the air supply is blocked.

Apparatus with ORC:
see section 3.2

Status 6
In the event of N_2O failure, O_2 can still be metered. The O_2 deficiency alarm continues to be ready for operation. **No** audio alarm is given.
N_2O metering can only be effected again when there is an N_2O pressure of at least 2.7 bar in the system.

					Operating readiness		
Status	Selector switch in setting	O_2 supply	AIR supply	N_2O supply	O_2 deficiency signal	N_2O cutoff	Apparatus operable
1	»AIR«	●	●	automatic. blocked	ready for operation	ready for operation, no effect	**yes**
2		○	●	automatic. blocked	audio alarm (at $O_2 \leq 2.2$ bar)	ready for operation, no effect	**no,** O_2 failure
3		●	○	automatic. blocked	ready for operation	ready for operation, no effect	**no,** AIR failure, **no** alarm
4	»N_2O«	●	no effect	●	ready for operation	ready for operation	**yes**
5		○	automatic switching to AIR	●	audio alarm (at $O_2 \leq 2.2$ bar)	automatic blocking of N_2O (at $O_2 \leq 0.6$ bar)*)	**no,** O_2 failure
6		●	no effect	○	ready for operation	ready for operation no effect	**no,** N_2O failure, **no** alarm

○ ≙ not adequate
● ≙ adequate

*) with ORC (see section 3.2): flow dependent reduction

Table 3: Switching and alarm functions of Sulla 808 »Air«/808 V »Air«

D1

12.3 Initial preparation

In addition, screw Air connecting hose 1 into socket 2 (Fig. 26), and insert connector into compressed-air outlet valve of CS.

Ensure that the supply pressures for O_2, N_2O and air are at least 2.7 bar (where apparatus with ORC are concerned O_2 and N_2O pressures must be at least 4 bar – see section 3.2).

Depending on the equipment of the Sulla 808 ... »Air« attach anaesthetic-gas scavenging as per Fig. 13a, b, or c (page 10).

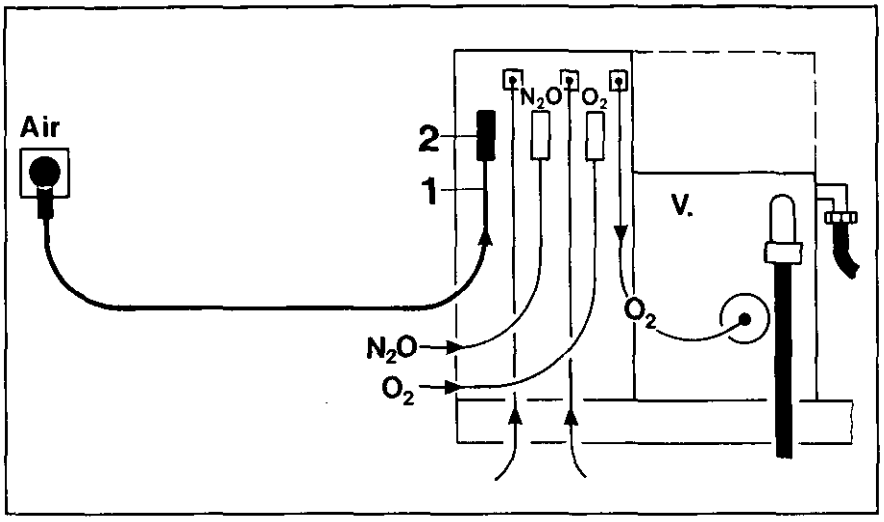


Fig. 26 Sulla 808 V »Air«: gas supply – rear of unit

12.4 Testing readiness for operation

Following cleaning, disinfection and sterilization the apparatus in always to be checked for completeness and proper functioning.

O_2 supply
As for Sulla 808/808 V (see section 5.1).

N_2O supply
As for Sulla 808/808 V (see section 5.1).

Compressed-air supply (Fig. 26)

- Check tightness of CS-screw connection. Move selector switch **7** to »Air« setting. Check whether the full flow range can be set with the aid of the »Air« flow control valve **3** at the air flowmeter **4**.
- Check that air flowmeter float moves freely.
- Open N_2O flow control valve **5**: There must be no N_2O flow.
- Close N_2O and air flow control valves.

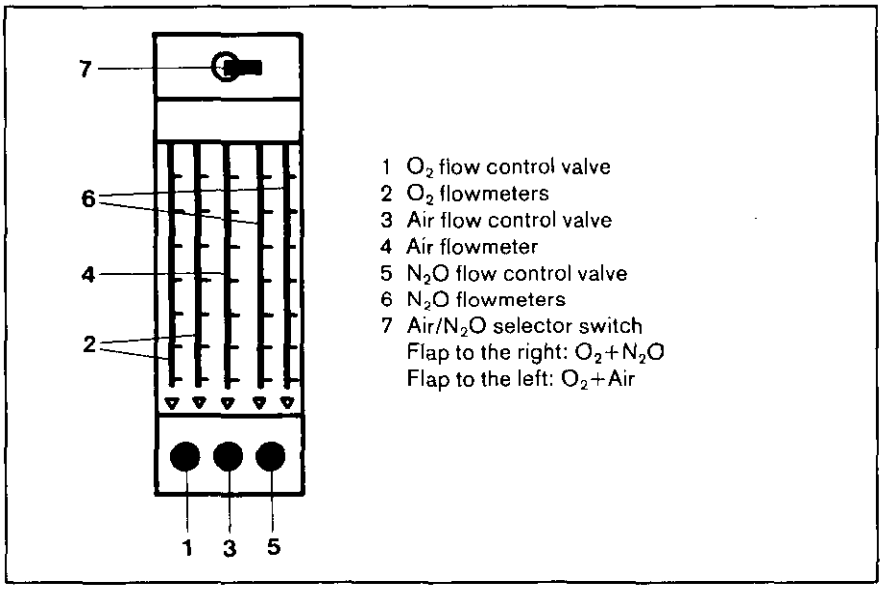


Fig. 27 Flowmeter unit at Sulla 808 »Air«/808 V »Air«

O_2 deficiency signal/N_2O cutoff/ switchover test

- At first move selector switch **7** to »Air« setting. Set air flow to 3 L/min.
- Then switch over to »N_2O« setting; the Air flow must drop to zero now. Set O_2 flow to 1 L/min and N_2O flow to 2 L/min.
- Pull CS-connector O_2 or close O_2 cylinder valve. After a brief period the O_2 deficiency alarm must sound and continue to sound for at least 7 seconds. The N_2O flow must also drop to zero and the air flow must increase to 3 L/min again.
- Re-establish O_2 gas supply. Air flow must be blocked automatically; N_2O flow must be 2 L/min again.
- Move slector switch to »Air« setting. The N_2O flow must be blocked now.
- Pull CS-connector O_2 or close O_2 cylinder valve. After a brief period the O_2 deficiency alarm must sound and continue to sound for at least 7 seconds. The air flow must not change (3 L/min) and the N_2O flow must remain on zero.
  Re-establish gas supply.
  Close flow control valves.

Checking type of gas
(in addition to section 5.2)

- Hold O_2 sensor of measuring instrument underneath common-gas outlet **6** of anaesthetic apparatus, thus allowing gas to flow over the sensor.
- Move selector switch to »Air«.
- Open flow control valve for air until flowrate is approx. 3 L/min.
- O_2 concentration must drop to 21 ± 3 vol. % O_2.

The checking of all other functions is to be performed in accordance with the description given for the Sulla 808/808 V models (see section 5).

12.5
Operational use (Fig. 27)

The compressed air is metered at the flow control valve **3**. The metered quantity is read off from the flowmeter **4**.

Air and O_2 can only be metered when the selector switch **7** is in the »Air« setting. Only N_2O and O_2 can be metered in the »N_2O« setting.

Reference values for the O_2 concentration in blends of O_2 and air in the flow range between 2 and 24 L/min are given in the following Table 4.

Variable O_2 concentrations optainable by mixing air and oxygen

Vol.-% O_2	Flow in L/min (Air+O_2)													
	2		4		6		8		10		12		14	
	Air	O_2	Air	O_2	Air	O_2	Air	O_2	Air	O_2	Air	O_2	Air	O_2
21	2.0	–	4.0	–	6.0	–	8.0	–	10.0	–	12.0	–	14.0	–
30	1.8	0.2	3.5	0.5	5.3	0.7	7.1	0.9	8.9	1.1	10.2	1.8	12.4	1.6
40	1.5	0.5	3.0	1.0	4.6	1.4	6.1	1.9	7.6	2.4	9.1	2.9	10.6	3.4
50	1.3	0.7	2.5	1.5	3.8	2.2	5.1	2.9	6.3	3.7	7.6	4.4	8.9	5.1
60	1.0	1.0	2.0	2.0	3.0	3.0	4.0	4.0	5.0	5.0	6.0	6.0	7.0	7.0
70	0.8	1.2	1.5	2.5	2.3	3.7	3.0	5.0	3.8	6.2	4.6	7.4	5.3	8.7
80	0.5	1.5	1.0	3.0	1.5	4.5	2.0	6.0	2.5	7.5	3.0	9.0	3.5	10.5
90	0.3	1.7	0.5	3.5	0.8	5.2	1.0	7.0	1.3	8.7	1.5	10.5	1.8	12.2
100	–	2.0	–	4.0	–	6.0	–	8.0	–	10.0	–	12.0	–	14.0

Table 4: Gas composition – Air/O_2 (average values)

D3 ~~D2~~

13
Order List

Basic versions	without O_2 flush (bypass) (subsequent fitting is possible)		with O_2-flush (bypass)	O_2 flush (bypass)	Trolley with central column	Trolley for a cabinet and Ventilog[1]	Equipped for CS gas supply	Holder for 11 litre cylinders	Holder for 3 litre cylinders alternatively:	Pressure reducers[2] + connection hoses	Flowmeter unit O_2 and N_2O	Gas blender N_2O/O_2 and O_2/Air	Hinged arm (on rt. hand side) for Ventilog	Ancillary device »Air«	ORC (oxygen ratio controller)
Name	Code No.		**Code No.**												
Sulla 808 basic version 1	M 27 203	○	**M 28 887**	●	●		●	○	○	○	●		○	○	○
Sulla 808 basic version 2	M 27 206	○	**M 28 888**	●	●		●	●		●	●		○	○	○
Sulla 808 basic version 3	M 27 208	○	**M 28 889**	●	●		●		●	●	●		○	○	○
Sulla 808 V basic version 4	M 27 205	○	**M 28 890**	●		●	●	○	○	○	●			○	○
Sulla 808 V basic version 5	M 27 210	○	**M 28 891**	●		●	●	●		●	●			○	○
Sulla 808 V basic version 6	M 27 211	○	**M 28 892**	●		●	●		●	●	●			○	○
Sulla 808 M basic version 1			**M 28 457**	●	●		●	○	○	○		●	○		
Sulla 808 M basic version 2			**M 28 468**	●	●		●	●		●		●	○		
Sulla 808 M basic version 3			**M 28 469**	●	●		●		●	●		●	○		
Sulla 808 MV basic version 4			**M 28 458**	●		●	●	○	○	○		●			
Sulla 808 MV basic version 5			**M 28 470**	●		●	●	●		●		●			
Sulla 808 MV basic version 6			**M 28 471**	●		●	●		●	●		●			

● = Scope of delivery
○ = On special request; also a subsequent fitting is possible

[1] Ventilog is *required for* these basic *versions*

[2] O_2 and N_2O-*pressure reducers* for connection to the cylinders

Scope of delivery of all basic versions
Hose holder on trolley
Latch-on plate with rail
Hinged arm with rod for accommodating the circle system
O_2 deficiency signal and N_2O cutoff
Socket for 1 Vapor 19.3 (or 19.1) with plug-in system
Common-gas hose

D4 D3

Items such as masks, Y-pieces, currugates hoses and connectors preceded by a (▶) symbol, correspond in terms of their connection dimensions to **DIN 13252** and the ISO Standard Draft ISO DP 5356. In addition there are a number of items which can be used both ISO and standard Dräger connecting elements.

Name and description	**Code No.**
Accessories required for operation (according to DIN 13252)	
Circle system 8 ISO *With 2 carbon-dioxide absorbers, inhalation and exhalation valve, relief valve-infinitely adjustable between 5 and 40 mbar, 3 corrugated hoses 1 m, reservoir bag 2.3 L, soda-lime filler funnel, 1 set of valve discs and sealing rings*	▶**M 25 690**
Circle system 8 isoclic same as circle system 8 ISO but with additional isoclic safeguard to prevent hoses from disconnecting	**M 28 211**
Circle system 7a With 2 carbon-dioxide absorbers, inhalation and exhalation valve. Relief valve-infinitely adjustable between 5 and 40 mbar, 3 corrugated hoses 1 m, reservoir bag 2.3 L, soda-line filler funnel, 1 set of valve discs and sealing rings	**M 23 074**
For operation from cylinders:	
O_2 cylinder 11/200, G 3/4, filled, 200 bar	[1] **B 02 710**
N_2O cylinder 11/8, G 3/8, filled (on loan)	[1] **B 02 660**
O_2 cylinder 3/200, G 3/4, filled, 200 bar	[1] **B 02 533**
N_2O cylinder 3/2,25, G 3/4 female, filled (on loan)	[1] **B 02 540**
[1] The Code No. is altered at the factory in line with the version for the respective country.	
Cylinder jacket for 11 L cylinder with valve cap and base ring	**M 27 664**
Cylinder jacket 3 L	**M 08 035**
For operation from a central supply system (CS), option of:	
O_2 connecting hose, 3 m	**M 22 344**
O_2 connecting hose, 5 m	**M 22 345**
N_2O connecting hose, 3 m	**M 22 350**
N_2O connecting hose, 5 m	**M 22 351**
Compr.-air connecting hose, 3 m	**M 23 193**
Compr.-air connecting hose, 5 m	**M 23 235**
Required for basic version 4, 5, 6:	
Ventilog Automatic anaesthesia lung ventilator for controlled ventilation of adults and children. I:E = 1:2 (fixed)	**84 04 500**
alternatively:	
Ventilog 2 as Ventilog, but with adjustable I:E ratio: 1:1, 1:2, 1:3	**M 27 760**
For operation from Sulla 808 V:	
Connecting hose 0.6 m	**M 25 050**
Alternatively (for operation from CS), option of:	
O_2/compr.-air connecting hose 3 m	**M 22 494**
O_2/compr.-air connecting hose 5 m	**M 22 495**
Accessories required for connection of Ventilog/ Ventilog 2:	
a) Switching valves to be screwed to circle system, option of:	
Pneumatic switching valve – ISO including control hose 2 m, plug-in nipple and 4 hose clamps	▶**M 27 240**
Pneumatic switching valve including control hose 2 m, plug-in nipple and 4 hose clamps	**M 27 235**
Manual switching valve – ISO	▶**84 05 295**
Manual switching valve	**84 05 305**

Name and description	**Code No.**
b) *for connection between* Ventilog/Ventilog 2 and switching valve	
Connection hose 2/1 m	**84 04 758**
Anaesthetic-gas scavenging: Facilities for simultaneous removal of anaesthetic vapours from the circle system, the Ventilog and the gas blender	
1. *Via an ejector system:*	
a) **Anaesthetic-gas scavenging system 16** for models with Ventilog **or** gas blender.	**M 26 095**
b) **Anaesthetic-gas scavenging system 18** for model 808 M (with gas blender **and** Ventilog on swivel arm on the right of anaesthesia apparatus).	**M 28 812**
c) **Anaesthetic-gas scavenging system 19** for model 808 MV (with gas blender and integrated Ventilog)	**M 28 813**
Additional accessories for all models:	
Anaesthetic waste-gas hose 3 m	**G 60 447**
or	
Anaesthetic waste-gas hose 5 m	**G 60 448**
Anaesthetic waste-gas connector 45°	**G 60 440**
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 circle system, Ventilog and gas blender	**M 21 262**
Manual ventilation equipment:	
Bag Resutator A in cardboard box, comprising: Breathing bag with intake valve, non-rebreathing valve, 1 gag, 1 Dräger mask size 3	**M 11 900**
or	
Resu Bag, basic equipment, silicone	**21 09 832**
Hook for breathing bag	**M 26 349**
Anaesthetic vapourizers:	
I-Vapor 19.3/5 % pin safety Isoflurane-Vapor 19.3 with safety filling system (as per DIN 13252) and plug-type connection	**DB01098**
E-Vapor 19.3/5 % pin safety Enflurane-Vapor 19.3 with safety filling system (as per DIN 13252) and plug-type connection	**DB01073**
H-Vapor 19.3/4 % pin safety Halothan-Vapor 19.3 with safety filling system (as per DIN 13252) and plug-type connection	**DB01072**
Accessories for safety filling system (as per DIN 13252):	
Filler hose, isoflurane	**M 26 993**
Filler hose, enflurane	**M 26 299**
Filler hose, halothane	**M 26 297**
Outside the DIN 13252 range of application: Vapor with filling spout	
I-Vapor 19.3/5 % Isoflurane Vapor 19.3 with plug-type connection	**DB01105**
E-Vapor 19.3/5 % Enflurane Vapor 19.3 with plug-type connection	**DB01089**
H-Vapor 19.3/4 % Halothane Vapor 19.3 with plug-type connection	**DB01088**
Holder for standby position Standby holder for attachment to trolley for 1 Vapor with plug-type connection	**M 25 102**

D5

Name and description	Code No.
Accessories required for monitoring (as per DIN 13252)	
1. For continuous measurement and monitoring of O_2 gas inhaled:	
Oxydig, complete Oxydig oxygen meter and monitor with cable, sensor housing and sensor capsule for continuous monitoring of oxygen content in the gas inhaled. Measuring range 0–100 % O_2. With upper and lower alarm thresholds for visual and audible indication, as well as battery discharge alarm and Inop alarm in the event of sensor defects.	83 04 411
Connection elements required for Oxydig:	
a) For use with sphygmomanometer, anaesthesia timer or combination thereof:	
O_2 meter holder 11	M 27 669
b) For screwing directly to threaded connection of hinged arm:	
O_2 meter holder 10	M 27 670
2. For continuous measurement and monitoring of airway pressure in circle system:	
a) **Barolog A** The Barolog A is used to measure and monitor the airway pressure in breathing systems as well as to determine the ventilation frequency. With visual and audible alarm in the event of disconnection or obstruction. Also equipped with digital output jack for recorder connection as well as central-alarm connection facility. The Barolog A is in line with VDE 0750/IEC 601/1	83 02 930
Connection accessories required:	
Measurement connection	M 25 638
b) **Precom airway pressure gauge** Gives audible alarm if set pressure is not attained within 15 seconds. The device runs off batteries and is thus independent of the mains.	E 11 431
c) **Airway pressure gauge**	72 64 325
3. For measurement and monitoring of minute volume and tidal volume:	
a) **Spirolog 1 N** Measurement and patient monitoring device for establishing the following ventilation parameters: Minute volume, tidal volume and frequency for use in anaesthesia. With visual and audible alarm in the event of set limits being exceeded or dropped below. With data output jack for recorder connection as well as central-alarm connection facility. The device is in line with VDE 0750/IEC 601/1	83 02 760
Connection accessories required:	
Spirolog sensor housing	M 26 844
E-set: sensor, set of 5	84 03 735
b) **Volumeter 3000** for continuous measurement of minute volume and tidal volume	2M 18250
For measurement and monitoring of tidal volume, oxygen content, airway pressure and temperature in gas inhaled:	
Anemone, cpl. with accessories The compact unit measures continuously the airway pressure, the expiratory flow, the O_2 concentration and temperature of gas inhaled, and calculates 9 ventilation parameters. Minute volume, airway pressure and O_2 concentration are monitored by adjustable upper and lower alarm thresholds (visual and audible alarm). Anemone satisfies all requirements involved in anaesthesia monitoring as per DIN 13252.	43 30 502

Name and description	Code No.
For measurement and monitoring of anaesthetic concentrations:	
IRIS (220 V) Microprocessor-controlled device for monitoring the concentration of Halothane, Enflurane and Isoflurane vapours. Measurement of the concentration in the fresh-gas line or in the outlet line of anaesthetic vapourizer.	82 00 301
Required for Iris:	
Iris sensor Sulla/Trajan 808	82 90 032
Special accessories for expanding basic version	
Anaesthesia cabinets for basic versions 4, 5 and 6, option of:	
Cabinet 4 H Cabinet module with one drawer and stainless-steel instrument tray, 420 mm wide, 347 mm deep, drawer running on telescopic rails.	2M 18093
Cabinet 8 H as cabinet 4 H but with 3 drawers	2M 18095
Drawer insert 2, 2 compartments	G 12 101
Drawer insert 4, 4 compartments	G 12 102
Drawer insert 6, 6 compartments	G 12 103
For basic versions 4, 5 and 6 only:	
Writing surface Running on telescopic rails, 390 mm wide, 293 mm deep	2M 18260
Monitor support (rack), for Sulla 808 V	M 27 415
Instrument tray 0.5 B Stainless-steel instrument tray 207 mm wide, 297 mm deep	2M 17680
Instrument tray 1 B Stainless-steel instrument tray 420 mm wide, 297 mm deep	84 07 025
Empty housing 2 H 0.5 B can be latched on for height equalization purposes	M 25 625
Bronchial aspirator, ejector type Portable secretion jar set with separate ejector for mounting on anaesthetic apparatus	M 27 271
alternatively:	
Bronchial aspirator, vacuum type	M 26 137
required connecting hose, option of:	
Vacuum connecting hose, 1.5 m	M 23 342
Vacuum connecting hose, 3 m	M 22 353
Vacuum connecting hose, 5 m	M 22 354
For extension of the basic versions with flowmeter unit to version Sulla 808 ... »Air« (air for third gas):	
Compressed-air ancillary device	M 27 213
Connecting hose required, option of:	
Compressed-air connecting hose, 1.5 m	M 24 572
Compressed-air connecting hose, 3 m	M 23 193
Compressed-air connecting hose, 5 m	M 23 235
For basic version with flowmeter unit only:	
Ancillary O_2 flush (bypass) for basic version 1, 2 and 3	M 27 293
Ancillary O_2 flush (bypass) for basic version 4, 5 and 6	M 27 214
Special accessories	
Anaesthesia timer/sphygmomanometer Combined	M 14 626
Anaesthesia timer	M 14 692
Sphygmomanometer	M 14 691

D6

Name and description	Code No.
Blood pressure cuff for adults (Size 3)	M 13 790
Blood pressure cuff for children (Size 2)	M 20 139
Blood pressure cuff for infants (Size 1)	M 20 140
Non-rebreathing system 2.1 – ISO Non-rebreathing system for spirometry. Connection facilities for airway pressure gauge, Volumeter and anaesthetic-gas scavenging system	▶M 26 125
Non-rebreathing 2.1 Non-rebreathing system for spirometry. Connection facilities for airway pressure gauge, Volumeter and *anaesthetic-gas scavenging system*	M 23 210
Infants' anaesthesia set as per Kuhn – ISO	▶M 25 634
Infant's anaesthesia set as per Kuhn	M 14 832
Anaesthetic gas extraction unit – ISO (Kuhn)	▶M 25 838
Anaesthetic gas extraction unit – ISO	M 23 190
Set of Rendell Baker masks, sizes 0-3	M 24 526
Conversion kit for infants' circle system **– ISO** comprising 3 spiral tubes, reservoir bag 0.5 L, socket, Y-piece 90°, straight Y-piece	▶M 27 542
Conversion kit for infants' circle system *comprising 3 spiral tubes, reservoir* bag 0.5 L, socket, Y-piece 90°, straight Y-piece	M 26 702
Measurement connections for gas analysis for continuous CO_2- and O_2 measurement during anaesthesia	M 18 074
Set of microbe filters 644 St for insertion between inhalation valve and inhalation *hose in circle system 7a* 5 per pack. Can be sterilized 20 times	67 27 260
Set of microbe filters 644 St, suitable for circle system 8 ISO, comprising:	
Set of microbe filters 644 St for insertion between inhalation valve and inhalation hose in circle system 5 per pack. Can be sterilized 20 times	67 27 260
and	
ISO set for microbe filters	▶84 07 563
For attachment of Ventilog/Ventilog 2 on the right hand side of the anaesthesia apparatus:	
Mounting plate	M 28 306
Swivel arm	M 28 224
For operation from Sulla 808/808 M:	
Connecting hose 1.2 m	M 25 518
For connection between Ventilog/Ventilog 2 and switching valve:	
Connection hose 2/1 m	84 04 758
See page 29 for Ventilog/Ventilog 2 *and accessories required.*	
Ventilog/Ventilog 2, for latching onto upper latch-on plate (with basic versions 1, 2 and 3 only):	
Ventilog with latching elements	84 05 200
alternatively:	
Ventilog 2 with latching elements *(see page 29 for description).*	M 27 917
For operation from Sulla 808/808 M:	
Connecting hose 1.2 m	M 25 518
For connection between Ventilog/Ventilog 2 and switching valve:	
Connecting hose 2/1.5 m	84 04 732
Accessories required: see page 29	

Name and description	Code No.
Oxygen ratio controller – functional component for minumum O_2 concentration (for basic versions without gas blender):	
ORC supplementary kit	M 27 479
Dust cover 60 x 60 x 80 cm	2M 06 832
Earth cable 3.2 m	83 01 349
Cylinder holder for 11 litre cylinders (for basic version 1)	M 27 169
Wearing and replacement parts for sterilization:	
Circle system 8 ISO	▶M 25 690
Circle system 8-isoclic	M 28 211
Circle system 7a Scope of delivery as described on page 29	M 23 074
For circle system:	
Corrugated hose 1.0 m – ISO	▶M 25 724
Corrugated hose 1.0 m, isoclic	M 28 195
Corrugated hose 1.0 m	M 04 147
Set isoclic (2 x)	M 28 212
Socket – ISO for reservoir bag	▶M 25 647
Socket for reservoir bag	M 09 177
Set of Dräger masks sizes 1-3	M 24 524
Circle-system inhalation valve – ISO	▶M 24 469
Circle-system inhalation valve	M 19 603
Circle-system exhalation valve – ISO	▶M 24 509
Circle-system exhalation valve	M 19 617
Reservoir bag, 23–2.3 L	M 12 963
Set of valve discs, *ceramic* (3 x)	M 23 249
Set of valve discs, mica (4 x)	M 19 265
Set of 5 sight glasses (M 09 230)	M 22 171
Set of 5 sealing rings (M 09 231)	M 22 155
Absorber (2 required)	M 13 230
Set of 2 absorber jackets	M 22 157
Set of 4 sealing rings	M 22 158
For conversion kit infants' circle system:	
Spiral tube 1.1 m (for infants)	M 25 120
Spiral tube 1.1 m, complete *(1 sleeve and 1 socket)*	M 26 772
Spiral tube 1.1 m, complete (2 sleeves and 2 sockets)	M 26 879
Y-piece for infants 90°	M 26 700
Y-piece for infants, straight electrically conductive	M 27 076
Reservoir bag, 23–0.5 L	M 09 111
Socket – ISO	▶M 25 647
Socket	M 09 177
For Ventilog/Ventilog 2:	
Patient set including waste-gas socket	84 05 040
Pneumatic switching valve – ISO including 2 m control hose, plug-in nipple and *4 hose clamps*	▶M 27 240
Pneumatic switching valve including 2 m control hose, plug-in nipple and 4 hose clamps	M 27 235
Manual switching valve – ISO	▶84 05 295
Manual switching valve	84 05 305
Connection hose 2/1 m	84 04 758
Connection hose 2/1.5 m	84 04 732
Bellows (adults)	*2M 08 138*
Bellows (infants)	84 00 179
Hose 2 x 1.5 mm (running metre)	12 03 622

D7

14
Parts List (Fig. 28)

Name and description	Code No.
For Oxydig:	
O_2 sensor capsule	**68 50 645**
Oxydig sensor housing	**68 50 250**
Battery (alkaline manganese) (4 x required)	**13 35 804**
For Barolog A:	
Pressure measuring line	**83 02 841**
Bacteria filter	**84 02 868**
For Anemone:	
O_2 sensor capsule	**68 50 645**
S-set sensor (set of 5)	**84 03 735**
Pressure measuring line	**83 02 841**
Bacteria filter	**84 02 868**
For Precom E 11431:	
Airway pressure gauge Pressure-gauge front section for Precom E 11431	**E 11 430**
For Volumeter 3000:	
Service set for Volumeter 3000	**2M 18 180**
For anaesthetic filter equipment 2:	
Set of 5 anaesthetic filters 633	**67 24 492**
For bronchial aspirator (ejector and vacuum):	
Jar set for replacement during sterilization The scope of delivery includes: carrying frame with 1 secretion jar and 1 rinsing jar with a volume of 0.7 L, 1 cap with overflow safeguard and relief valve, 1 aspiration hose and 1 secretion sight glass	**M 26 355**
Jar cap (valve)	**M 26 010**
Jar, 0.7 L	**M 20 091**
Set of 5 secretion sight glasses	**M 22 150**
Aspiration hose 1.5 m	**M 25 780**
For bronchial aspirator, ejector:	
Set of 5 bacteria filters	**67 23 976**
Miscellaneous:	
Set of microbe filters 644 St for insertion between inhalation valve and inhalation hose in circle system 5 per pack. Can be sterilized 20 times	**67 27 260**
ISO set for microbe filters	**▶M 26 930**

No. in Fig. 28	Name and description	Code No.
2	**T-screw**	**M 25 336**
3	**O-ring** (set of 10)	**U 15 314**
4	**Spanner** 22–32	**M 12 401**
5	**Screw** (set of 10)	**2M 17 568**
6 7	**Fresh-gas hose** with 2 x sealing rings	**M 17 734**
7	**Sealing ring** (set of 10)	**M 23 454**
8	**Extension arm**	**M 25 410**
9	**T-screw** (set of 2)	**M 22 191**
10	**Screw**	**M 14 075**
11	**Washer**	**M 25 419**
12	**T-screw**	**M 19 816**
13 14	**O_2 pressure reducer** with 4 x profile sealing rings	**D 19 808**
14	**Profile sealing ring** (set of 10)	**R 23 096**
15 14	**O_2 pressure reducer** with 4 x profile sealing rings	**D 40 050**
16 14	**N_2O pressure reducer** with 4 x profile sealing rings	**D 19 809**
16 14	**N_2O pressure reducer** with 4 x profile sealing rings	**D 19 977**
17 18	**O_2 connecting hose, 1 m** with 2 x sealing rings	**M 27 279**
18	**Sealing ring** (set of 10)	**M 22 164**
19 18	**N_2O connecting hose, 0.8 m** with 2 x sealing rings	**M 26 458**

DP

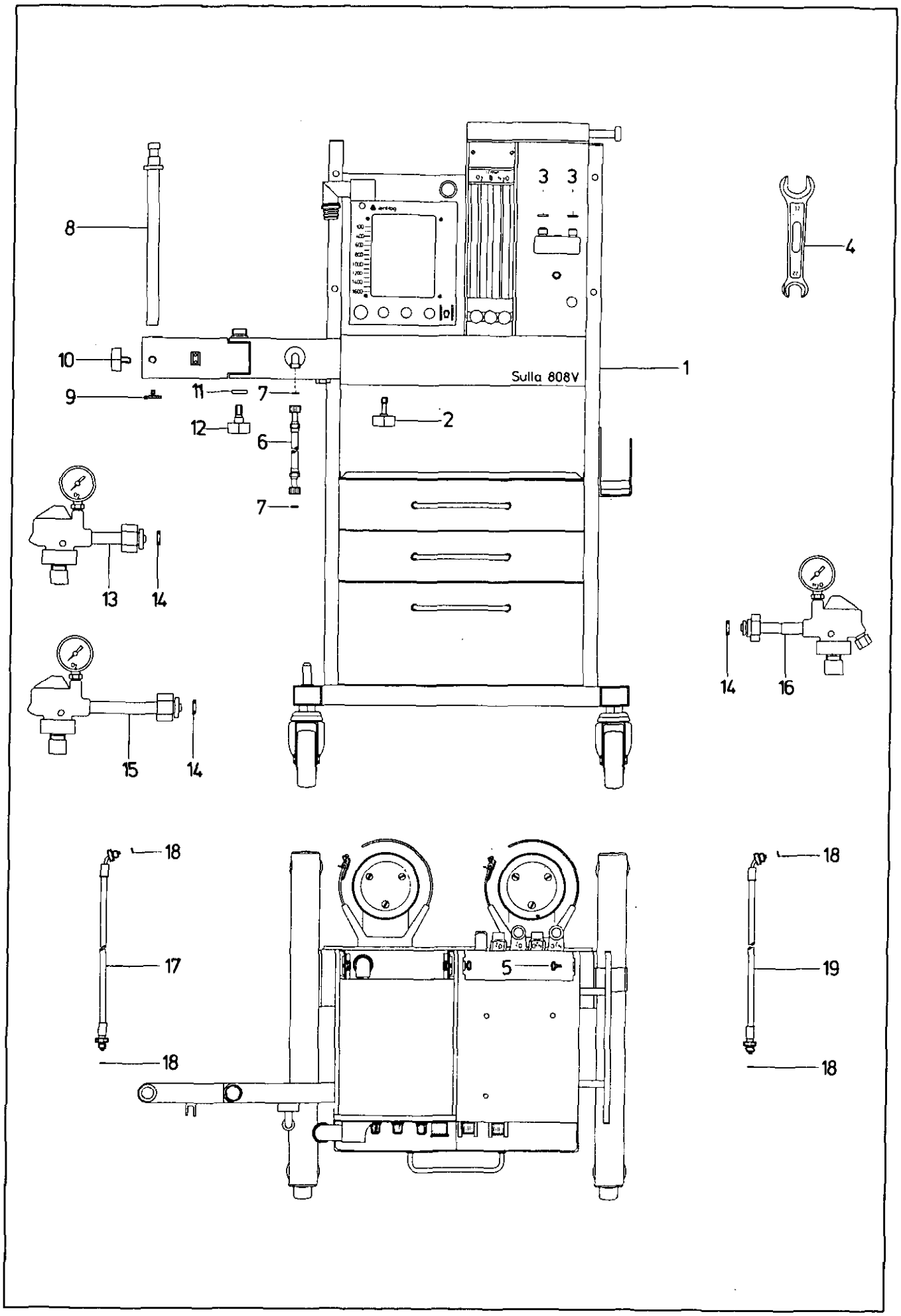


Fig. 28 Component parts of Sulla 808 V (see Parts List)

D9

These instructions for use apply only to
Sulla model (x)
with Serial-No.:

see entry
on the opposite page

Without entry of Serial-No. by Dräger these instructions for use are provided for general information only and are not destinated to be used with a *specific device!*

Drägerwerk
Aktiengesellschaft Lübeck
Federal Republic of Germany
✉ Postfach 13 39
☎ Moislinger Allee 53/55
D-2400 Lübeck 1
☎ (4 51) 8 82-0
Tx 2 6 807-0
FAX (4 51) 8 82-20 80

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Subject to modifications

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D10

Supplement to Instructions for Use
- Sulla 808 V (GA 5191.3e)
- Sulla 808 V-D (GA 5191.31e)

Ref.: Facility for the metering of minor fresh-gas volumes

Dräger

In addition to the Instructions for Use, the following must be observed with respect to this modified unit.

Intended Use

This inhalation anaesthesia apparatus with its specific O_2 and N_2O flowmeters facilitates the metering of minor fresh-gas volumes. This makes it possible for the anaesthetic machine to be used in the normal flow range as well as in the low-flow range. Where the low-flow range is concerned, the fresh-gas flow will only be slightly above the gas volume that is consumed by the patient.

Measuring ranges of the O_2 and N_2O flowmeters

1st Flowmeter 0.02 to 0.5 L/min
2nd Flowmeter 0.55 to 10 L/min

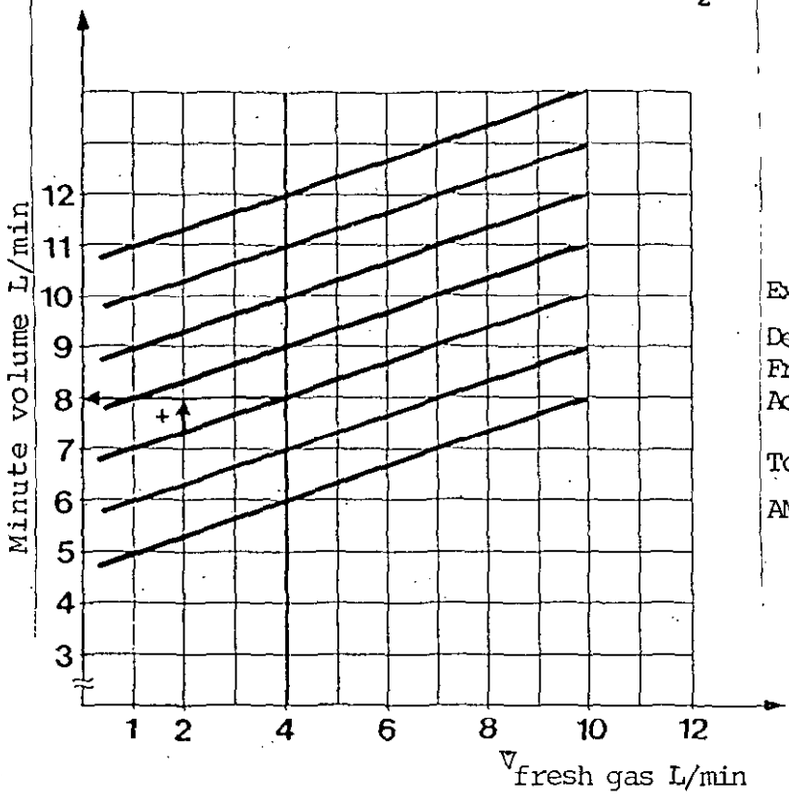
Accessories required

In addition to the monitoring equipment defined in the type approval, an inspiratory monitoring of the anaesthetics concentration must be provided for, e.g. by means of the Dräger Irina anaesthetics monitor. In addition, it is recommended to make use of a CO_2 monitor, such as the Capnolog D for instance. The measurements must not be performed with equipment which extracts breathing gas from the system.
In order to provide appropriate leakproofness for the low-flow range, it is recommended to make use of Dräger isoclic connections at the inspiration and expiration hoses.

Operational Use

Special care must be taken during operation that the bellows of the Ventilog expands to its full extent (lower stop) during exhalation. Only in this manner can the preselected tidal volume be attained.

The scale graduation at the Ventilog for the tidal volume V_T refers to a fresh-gas flow of 4 L/min with an I:E ≈ 1:2. Given a lower fresh-gas flow, the minute volume (MV) applied will be reduced, so that a higher MV must be set at the Ventilog in order to achieve the desired volume. The correlations are demonstrated in the diagram overleaf.
The minute volume must be monitored, e.g. by means of the Spirolog 1 N or the Minute-Volumeter 3000.



Example:

Desired MV: 8 L/min
Fresh-gas flow: 2 L/min
Actual MV: approx.7.3 L/min

To be set at the Ventilog:

AMV = 8 + approx. 0.7 L/min
≈ 8.7 L/min

Leak Test of the Circle System

- following servicing -

To this end, observe the Instructions for Use of "Circle System 8 ISO (7a)". The procedure described under "Testing in the closed system" (Chapter 10.3) must be applied. Where the low-flow range is concerned, the leak rate must not exceed 0.2 L/min at 40 mbar.
If required, the cock of the switching valve as well as the cones at the CO_2 absorber should be slightly lubricated with silicone grease (e.g. Oxygenoex S 4).

DrägerService

Sulla 808

vm-pb-br-3132

Mappen-Nr. 5191.3

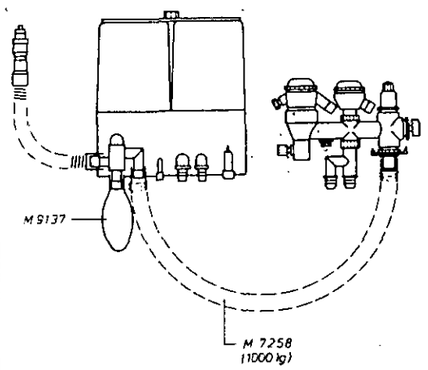
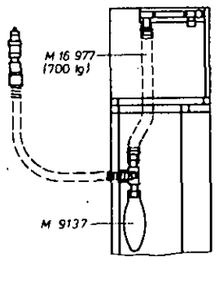
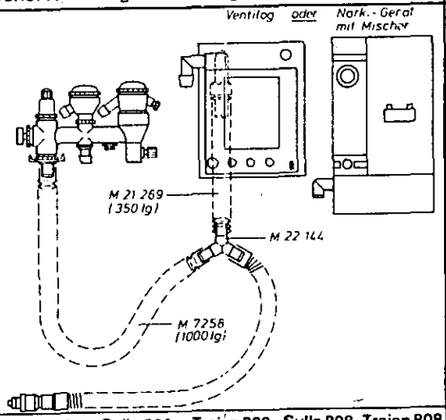
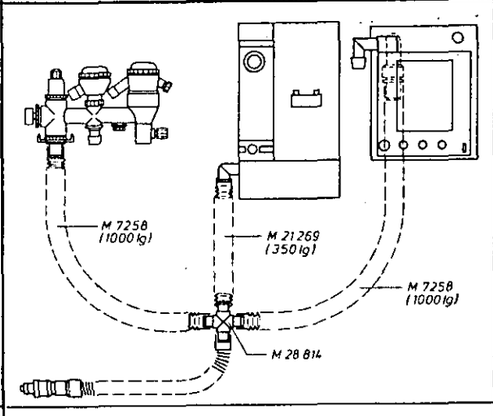
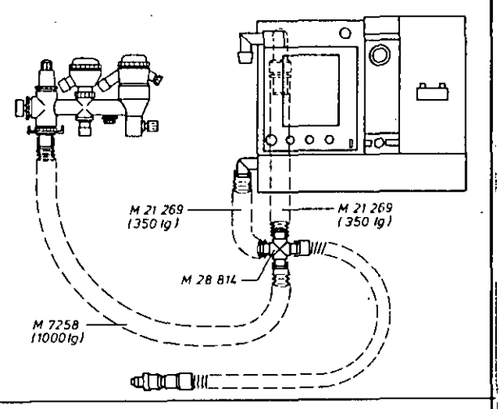
Ausgabe 10.86

Narkosegasfortleitung

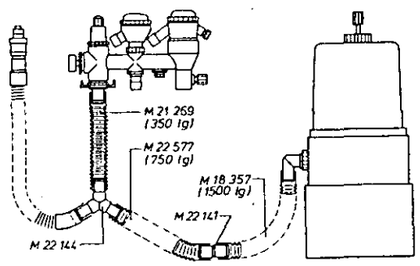
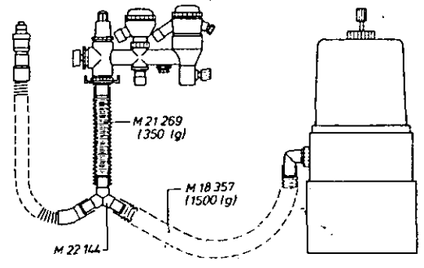
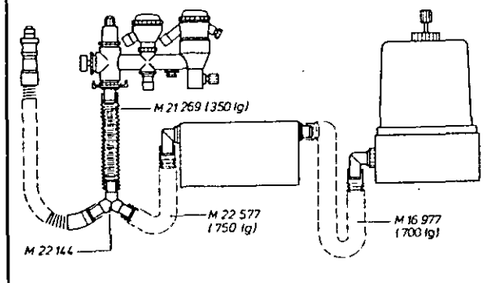
Dräger

Narkosegasfortleitung anesthesia gas conduction

Anschlußschemata für Patientensysteme connecting scheme for patient systems

Zubehör Narkosegasfortleitung 84 03 180	Zubehör Narkosegasfortleitung 84 05 628	Zubehör Narkosegasfortleitung 16 M 26 095	Zubehör Narkosegasfortleitung 18 M 28 812	Zubehör Narkosegasfortleitung 19 M 28 813
				
Narkosespiromat 656	Anaesthesie-Ventilator AV 1	Romulus 800 Sulla 800 Trajan 800 Sulla 808 Trajan 808 Romulus 800 M Sulla 800 V Sulla 808 V Romulus 800 V Sulla 808 V-D	Sulla 808 M (Stativ) mit Ventilog Trajan 808 M mit Ventilog	Sulla 808 MV Sulla 808 MV-D

Für ältere Dräger-Narkosegeräte

Zubehör Narkosegasfortleitung 1 M 23 301	Zubehör Narkosegasfortleitung 3 M 23 303	Zubehör Narkosegasfortleitung 14 M 24 055
		
Romulus Tiberius Romulus 19 Tiberius 19	Sulla Kleinnarkosegerät Sulla 19 Trajan	Narkomix 19

mounting instruction
Montageanleitung 5343.20 · 90 27 492
Ausgabe Juli 1986

E1/E2