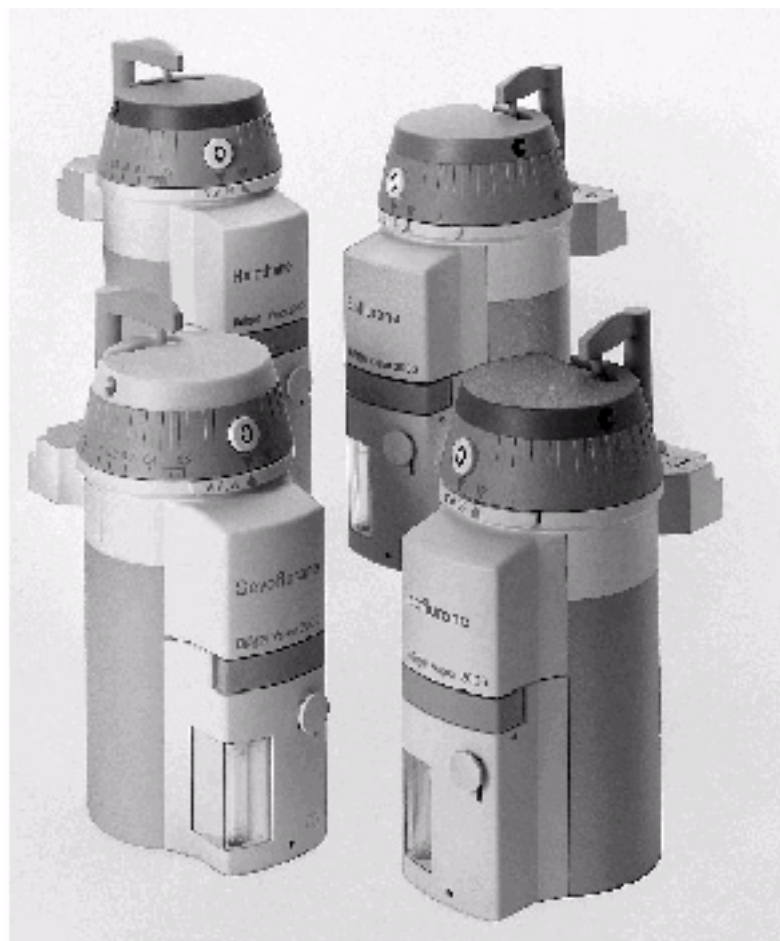


# Dräger-Vapor® 2000

Technical  
Documentation



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No replacement in event of modification.

Attention is to be paid to the Operating Manual.

This technical documentation does not replace the Operating Manual.

The warranty and liability conditions of the general terms and conditions for business transactions of Dräger Medical AG & Co. KGaA are not extended by this technical documentation.

**Safety Regulations:**

Reference is hereby made to the observance of the relevant safety provisions, such as the Medical Equipment Ordinance (Medizingeräteverordnung), the Pressure Container Ordinance (Druckbehälterverordnung), the Technical Rules for Pressurised Gases (Technische Regeln Druckgase) or the Occupational Health and Safety Provisions (Unfallverhütungsvorschriften).

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

Follow your local laws and regulations.

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## General

This Service Manual conforms to the International Standard IEC 60601-1.

Read each step in every procedure thoroughly before beginning any test. Always use the proper tools and specified test equipment. If you deviate from the instructions and/or recommendations in this Service Manual, the equipment may operate improperly or unsafely, or the equipment could be damaged.

Use only original Dräger parts and supplies.

The maintenance procedures described in this Service Manual may be performed by qualified service personnel only. These maintenance procedures do not replace inspections and servicing by Dräger Medical AG & Co. KGaA.



**Strictly follow the Instructions for Use.**

**This Service Manual does not replace the Instructions for Use. Any use of the product requires full understanding and strict observation of the product-specific Instructions for Use.**



Unless otherwise stated, reference is made to laws, regulations or standards (as amended) applicable in the Federal Republic of Germany.

## 1 Symbols and Definitions

- A dash (–) is used to identify items on a list.
- A bullet (•) is used to identify a sentence that contains direct work instructions.



This symbol is used to provide important information that, if ignored, could lead directly to a patient's or operator's injury. It is also used to provide important information that, if ignored, could lead directly to equipment damage and, indirectly, to a patient's injury.



This symbol is used to provide additional information, operating tips, or maintenance suggestions.

Definitions according to German standard DIN 31051:

Inspection	=	examination of actual condition
Servicing	=	measures to maintain specified condition
Repair	=	measures to restore specified condition
Maintenance	=	inspection, servicing, and repair

## Function Description

### 1 Handwheel settings

#### 1.1 Handwheel set to “0” (off)

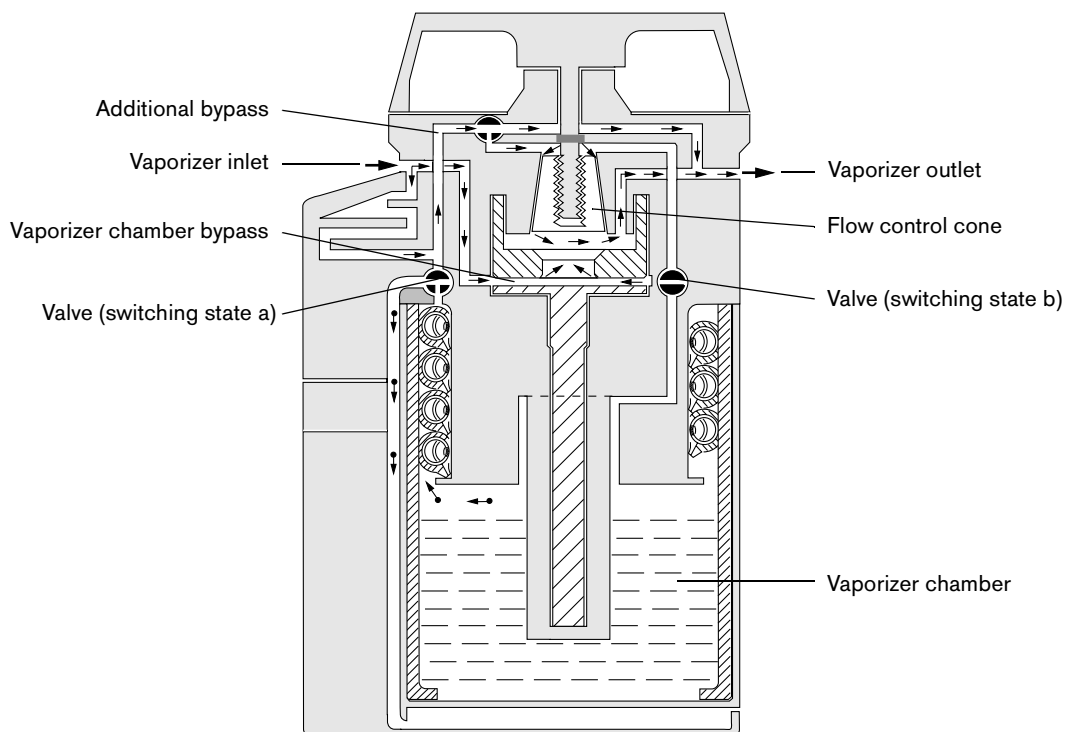
The fresh gas (→) flows from the vaporizer inlet to the vaporizer chamber bypass and through the vaporizer chamber bypass from the outside to the inside. In parallel, a portion of the fresh gas flows by way of an additional bypass and the flow control cone to the vaporizer outlet.

The vaporizer chamber is completely isolated from the gas flow by the valve (switching state a and b). No anaesthetic can enter the flow control valves or the fresh gas.

A small hole in the valve (switching state a) vents the vaporizer chamber to prevent pressure from building up.

As a result of temperature and pressure fluctuations, diffusion and pressure compensation may cause small amount of anaesthetic vapour to escape. Ducts and buffer volume delay this process.

If the Vapor 2000 is positioned at a tilt, anaesthetic may leak out of the vaporizer chamber through the vent hole.



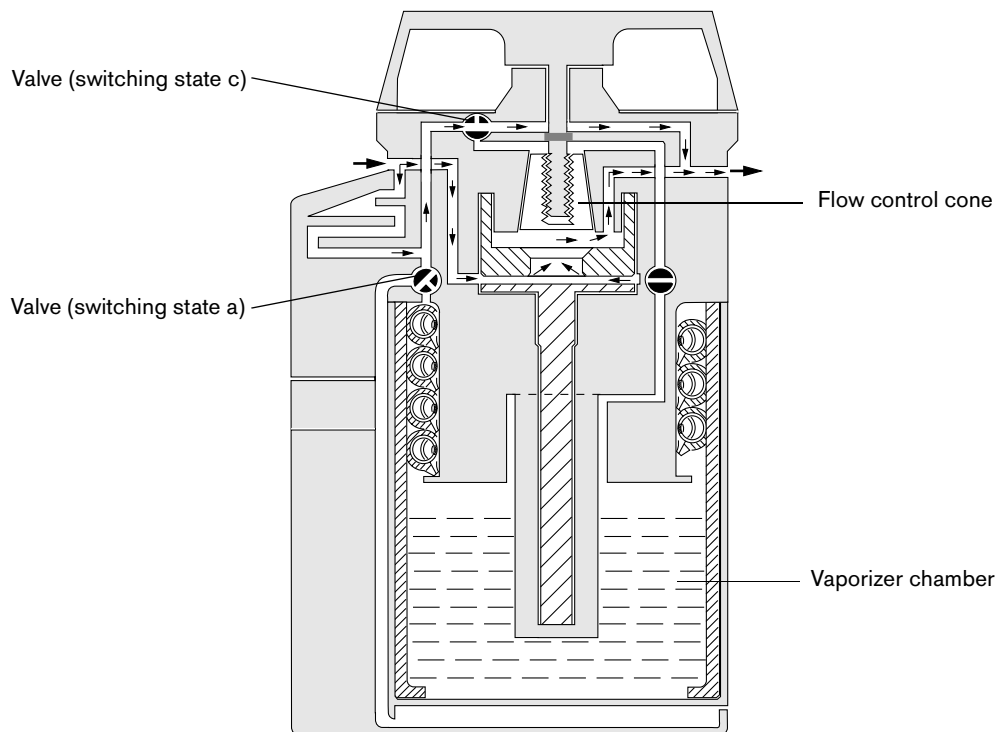
**Fig. 1:** Handwheel set to “0” (off)



## 1.2 Handwheel set to “T” (Transport)

When the handwheel is turned to “T” no fresh gas flows through the valve (switching state c) to the flow control cone. The vent hole in the valve (switching state a) is closed. No anaesthetic vapour can escape. The Vapor 2000 is safe from leakage even when tilted, and so can be transported in any desired position.

Closing off the vaporizer chamber may lead to slight positive or negative pressure in the event of ambient temperature and pressure fluctuations. As the temperature rises and/or the air pressure falls (e.g. during transportation in direct sunlight or at high altitudes), a higher pressure may build up. This pressure is adjusted to the ambient pressure by setting the handwheel to “0” or by opening the filling system. Small amounts of anaesthetic vapour may escape in the process.



**Fig. 2:** Handwheel set to “T” (Transport)

### 1.3 Handwheel set to “ON” or higher

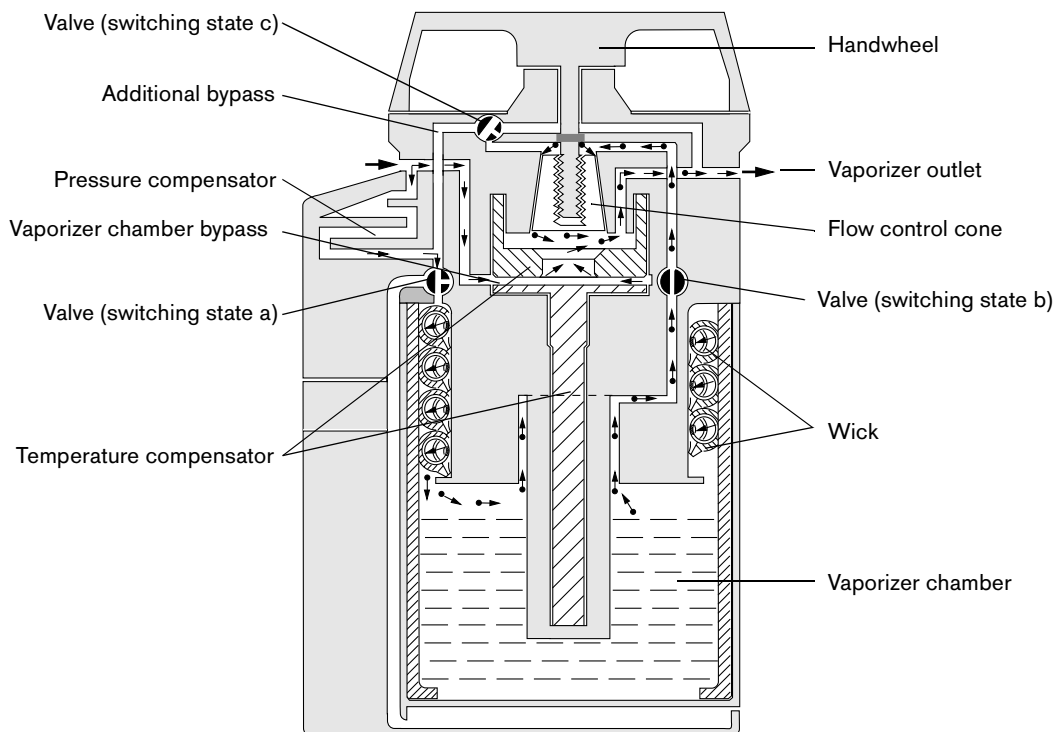
Between “0” and “ON” no concentration is defined in this range.

If the handwheel is turned to “ON” the fresh gas flows through the valve coupled to the handwheel (switching states a and b) in the vaporizer chamber. The valve (switching state c) closes the additional bypass.

Part of the fresh gas flows through the wick and is enriched with anaesthetic vapour (→). The other part of the fresh gas bypasses the vaporizer chamber through the vaporizer chamber bypass.

The two part-flows are combined downstream of the flow control slots and fed to the outlet. The concentration is produced by the split of the gas and the saturation concentration of the anaesthetic. The split is also influenced by the temperature compensation (thermal expansion of different materials). When the temperature compensator heats up it opens the vaporizer chamber bypass. When the temperature compensator cools down it narrows the vaporizer chamber bypass. This compensates for the influence of temperature on the saturation concentration.

The pressure compensation effectively reduces the pumping effect (see “Dependency on alternating pressure during ventilation” on page 13).



**Fig. 3:** Handwheel set to “ON” or higher

## 2 Calibration

Each Vapor 2000 is individually calibrated to 22 °C and with continuous air flow (2.5 L/min) with no ventilation pressure. At 22 °C and at 30 °C with 2.5 L/min air and 8 L/min each Vapor 2000 is tested.

The calibration is carried out in percentage partial pressure (% of 1013 hPa), as the anaesthesia depth is determined by the partial pressure and the uptake by the patient dependent upon it.

At normal pressure (1013 hPa), concentrations in percentage partial pressure are identical to the percent by volume figures. That is what the “vol.%” figure on the Vapor 2000 relates to.

If the air pressure values change, the percent by volume (vol.%) also changes (see “Dependency on air pressure” on page 11). The partial pressure remains constant (refer also to “Dependency on gas composition” on page 10).

Settings on the Vapor 2000 and in the Function Description are abbreviated as vol.%. They refer to percent by volume at 1013 hPa and to percentage partial pressure respectively.

The scale values on the handwheel indicate the concentration of the gases at 22 °C with dry air (see technical specifications of the machine in the Instructions for Use).

### 3 Dependencies of the Vapor 2000

#### 3.1 Dependency on temperature

The Vapor 2000 is temperature-compensated. As the temperature rises the saturation concentration of the anaesthetic is automatically compensated by routing a large portion of the gas flow through the vaporizer chamber bypass.

The linear expansion of the temperature compensator produces flow changes at the vaporizer chamber bypass. The linear expansion does not correspond precisely to the curvature of the vapour pressure curve over the entire temperature range. Consequently, a slight dependency of the concentration delivered on the temperature remains.

The diagrams show the typical dependency in operation with air (2.5 L/min). At temperatures outside this range the deviations increase in spite of compensation.

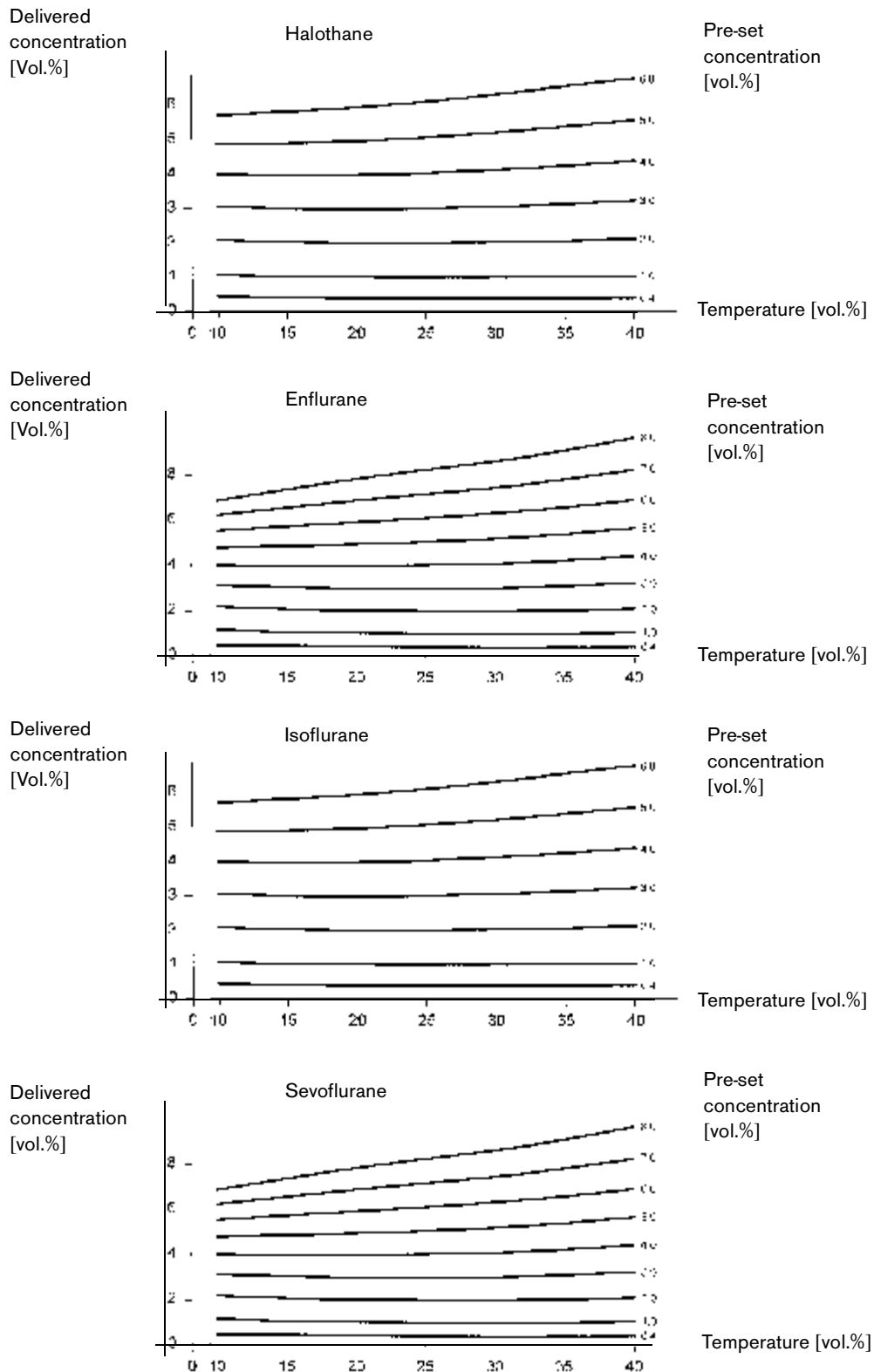
As the altitude increases the boiling point of the anaesthetic decreases:

**Table 1: Boiling point of anaesthetic**

Air pressure (hPa)/ Altitude (m)	Boiling point of anaesthetic in °C			
	1013 hPa/ 0 m	900 hPa/ 1000 m	800 hPa/ 2000 m	700 hPa/ 3000 m
Halothane	50.2	46.8	43.4 <sup>1</sup>	39.8 <sup>1</sup>
Enflurane	56.5	53.4	50.3	46.8
Isoflurane	48.5	45.4	42.2 <sup>1</sup>	38.9 <sup>1</sup>
Sevoflurane	58.6	53.4	52.1	48.7

1. Impermissible operating ranges

The diagrams show the typical dependency in operation with 2.5 L/min air.



**Fig. 4:** Dependency on temperature in operation with 2.5 L/min Air

The operating range of the Vapor 2000 on Dräger anaesthetic machines is adjusted so that, under super-critical conditions of 700 hPa, 40 °C (or 850 hPa at 35 to 40 °C) and maximum negative pressure of –100 mbar on the Vapor 2000, the boiling point of the anaesthetic is not reached.

The temperature compensation is free of ageing and hysteresis effects. The large vaporizer mass additionally compensates for temperature differences. Temperature differences between the Vapor 2000 and its surroundings are equalised within the operating range. If the ambient temperature of the Vapor 2000 is outside a range of 10 to 40 °C prior to use, a temperature equalisation time of 15 min/°C must be allowed in order to maintain the concentration within the specified accuracy.

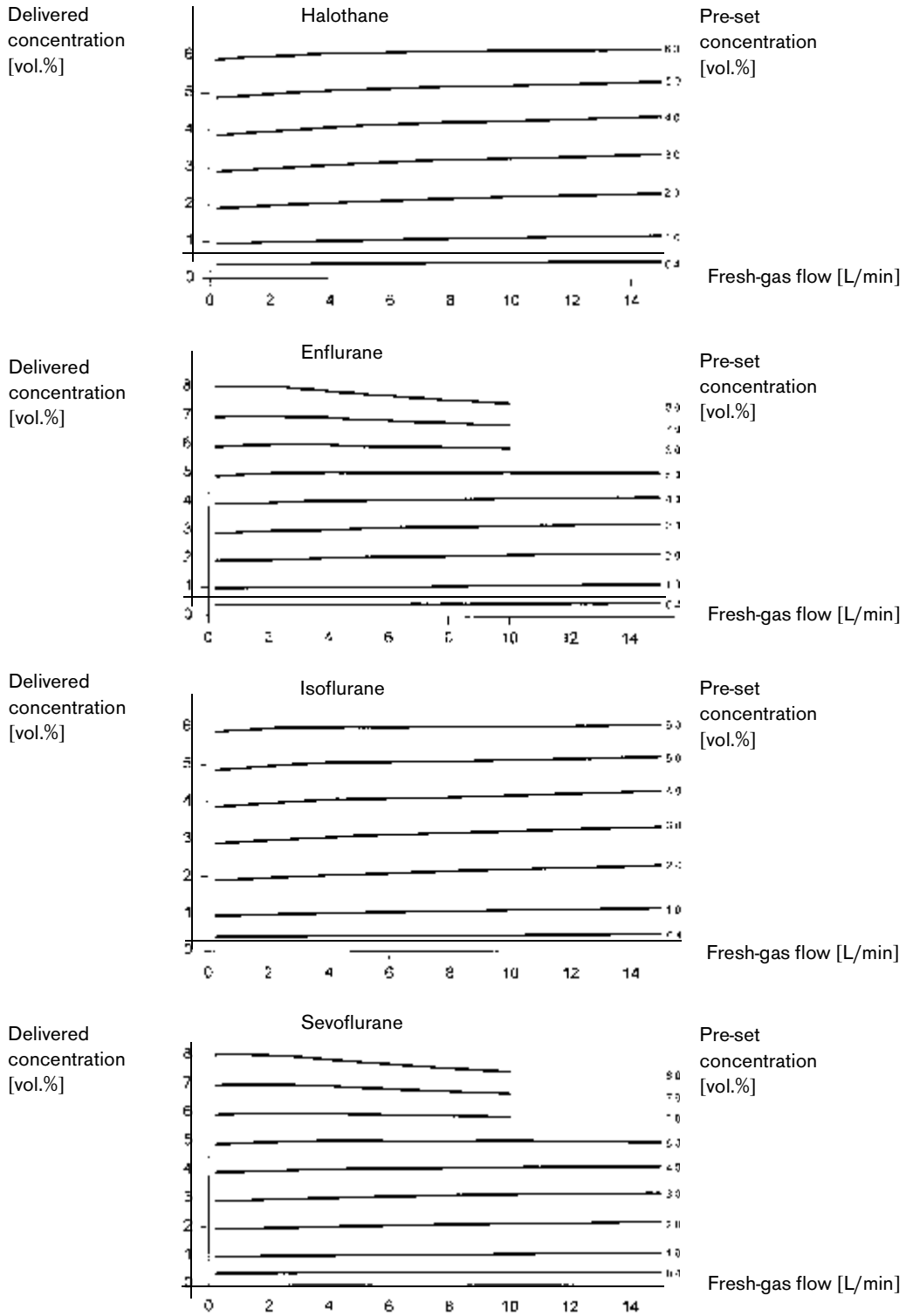
In operation with high fresh-gas flow and high concentrations, the Vapor 2000 cools down as a result of vaporization (see “Dependency on time in use” on page 14).

### **3.2 Dependency on flow rate**

The delivered concentration of the Vapor 2000 in the specified flow range is to a minor degree dependent on the fresh-gas flow.

If high concentrations are set and in the presence of a high fresh-gas flow as a result of increasing pressure, a minor reduction of the pre-set concentration in the Vapor 2000 occurs. As a result the cooling during vaporization of the anaesthetic is no longer fully compensated (see “Dependency on time in use” on page 14).

The diagrams show the typical dependency of the delivered concentration in operation with air (at 22 °C, 1013 hPa after 1 minute).



**Fig. 5:** Dependency on flow rate

### 3.3 Dependency on gas composition

The concentration delivered by the Vapor 2000 is dependent on the composition of the fresh gas. The viscosity and density of the gas changes with the type and composition of the fresh gas. The Vapor 2000 is calibrated with air, because the delivered concentration is then just in the middle of the range of common anaesthetic gas mixtures.

In operation with pure oxygen (100% O<sub>2</sub>), the delivered concentration rises relative to air by a maximum of 10% (but by max. 0.4 vol.%). In operation with 30% O<sub>2</sub> and 70% N<sub>2</sub>O, the delivered concentration decreases relatively by a maximum of 10% (but by max. 0.4 vol.%).

The effects of the gas composition are rather different for the various anaesthetic agents, and consequently the maximum effects are given here.

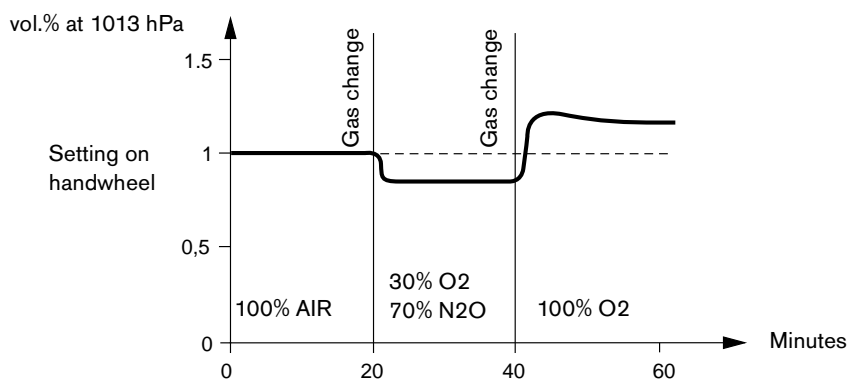
When gas mixtures change a dynamic effect may also occur. Until the previous fresh gas is flushed out of the vaporizer chamber an additional deviation in concentration may occur.

These deviations and their duration are all the greater:

- the less anaesthetic there is in the Vapor 2000
- the higher the pre-set concentration and
- the more extreme the change of gas type
- the lower the gas flow.

The degree of dynamic deviation increases as the gas flow increases, whereas its duration decreases.

Dependency of delivered concentration on carrier gas at a setting of 1 vol.%.



**Fig. 6:** Dependency on gas composition

Gases which contain a higher level of humidity than specified in the technical specifications of the device (see Instructions for Use) may influence the delivered concentration to a minor degree.



### 3.4 Dependency on air pressure

The anaesthetic partial pressure delivered by the Vapor 2000 (see "Calibration" on page 5) is virtually independent of the air pressure. Weather-related fluctuations are therefore negligible. Altitude-related pressure changes between 700 and 1100 hPa, too, result in minor deviations within the specified accuracy range (see technical specifications in Instructions for Use). Consequently the physiological effect – the anaesthesia depth – of a specific vaporizer setting is also independent of the air pressure.

When measuring the delivered concentration of the Vapor 2000 in partial pressure (e.g. Dräger-IRIS or PM 8030/8035), no dependency on the ambient pressure occurs. However, on measuring devices which give indications in percent by volume (e.g. Dräger-PM 8020 or PM 8050) the measured values change with the air pressure. The measured values increase when the air pressure falls below 1013 hPa.

Conversion formula:

$$\text{Concentration [\% partial pressure]} = \frac{\text{Measured value [vol.\%]} \cdot \text{Air pressure [hPa]}}{1013 \text{ hPa}}$$

Example:

At 4% partial pressure at an altitude of 1000 metres, 4.5 vol.% is displayed at 900 hPa (at 2000 metres 5.1 vol.% at 795 hPa).

Dependency of the boiling point of the anaesthetic on the air pressure (see "Boiling point of anaesthetic" on page 6).

### **3.5 Dependency of positive/negative pressure on ambient pressure and backpressure**

The operating range of the Vapor 2000 is limited between –100 and 200 hPa referred to the ambient air pressure at the vaporizer outlet.

The pressure in the Vapor 2000 is somewhat higher than the ambient pressure, because the fresh-gas flow at the flow control elements builds up backpressures of up to 150 mbar.

The Vapor 2000 cannot differentiate between a permanent backpressure and an ambient pressure affected by altitude. Consequently, the influence on the delivered concentration corresponds to the data quoted (see “Dependency on air pressure” on page 11).

With effective O<sub>2</sub> flushing on Dräger anaesthetic machines, a negative pressure of up to 100 mbar is created at the vaporizer outlet. 100 mbar of negative pressure has the same effect as a 1000 metre rise in altitude or a lowering of the boiling point by around 3.5 °C (cf. “Dependency on temperature” on page 6).

To protect against excessive pressure (e.g. when the fresh gas hose is kinked), the Vapor 2000 has a self-resetting pressure relief mechanism. At high pressures, fresh gas is vented to atmosphere.

### 3.6 Dependency on alternating pressure during ventilation

Alternating pressures to which an anaesthetic vaporizer is subject during ventilation without fresh gas decoupling may cause a higher concentration to be delivered than is set on the handwheel.

When the pressure increases the vapour in the vaporizer chamber is compressed. When the pressure decreases the vapour expands again. If this pumping effect becomes strong enough, it pumps small amounts of saturated vapour backwards through the inlet of the vaporizer chamber into the fresh gas.

This pumping effect becomes all the more pronounced:

- the higher the ventilation pressure and frequency
- the faster the decrease in pressure during exhalation
- the lower the fresh-gas flow
- the lower the pre-set concentration
- the less anaesthetic there is in the vaporizer.

The compensation device of the Vapor 2000 effectively reduces these effects.

When used on anaesthetic machines without fresh gas decoupling and at ventilation pressures higher than 30 mbar, with concentration settings < 1 vol.% and/or fresh-gas flow < 1 L/min the Vapor 2000 should be fully filled, in order to minimise deviations resulting from alternating pressure.

### 3.7 Dependency on time in use

The vaporization of the anaesthetic during operation causes the Vapor 2000 to cool slowly.

The saturation concentration of the anaesthetic in the Vapor 2000 decreases more the longer the machine is in operation, the higher the pre-set concentration and the higher the selected fresh-gas flow – that is, the greater the vaporized quantity of anaesthetic per time period.

The temperature compensation effectively counteracts this, and limits the deviations in the delivered concentration. After a certain time in use the Vapor 2000 stabilizes to a somewhat lower temperature and a concentration deviating slightly from the initial value.

The accuracy quoted in the technical specifications of the machine (see Instructions for Use) is maintained as long as the vaporizer temperature does not decrease below the lower limit of the operating range.

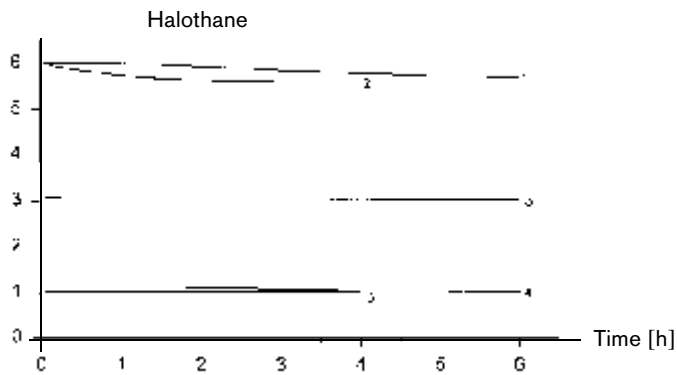
The diagrams show typical concentration characteristics over 4 and 6 hours time in use respectively, measured at 22 °C and 1013 hPa.

The figures on the curves indicated the operating conditions applied:

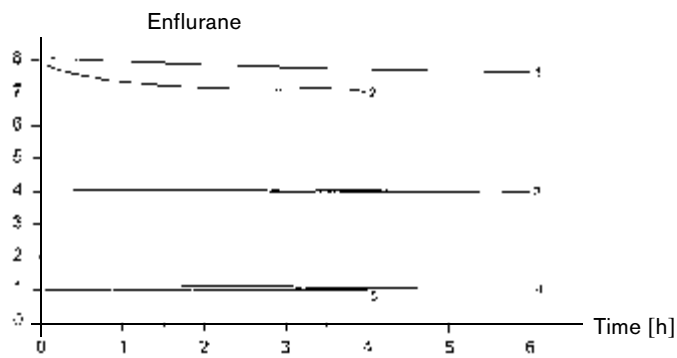
1. 6/8 vol.%, at 1 L/min
2. 6/8 vol.%, at 4 L/min
3. 3/4 vol.%, at 4 L/min
4. 1 vol.%, at 10 L/min
5. 1 vol.%, at 4 L/min

Interruptions in the curves are operating breaks to top up anaesthetic.

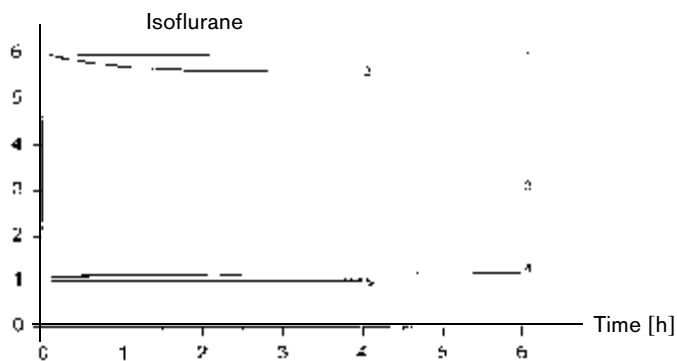
Delivered  
Concentration  
[vol.%]



Delivered  
Concentration  
[vol.%]



Delivered  
concentration  
[vol.%]



Delivered  
Concentration  
[vol.%]

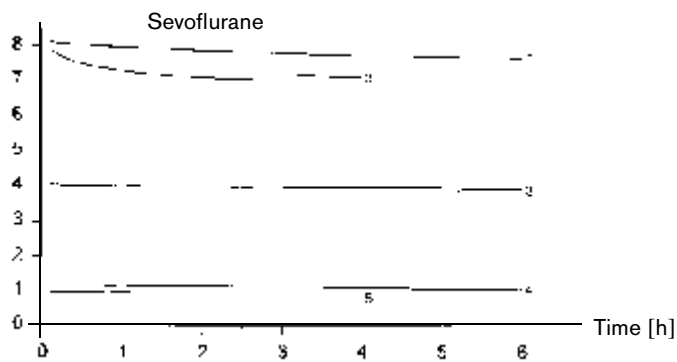


Fig. 7: Dependency on time in use

## 4 Differences between Vapor 19.n and Vapor 2000

	Vapor 19.n	Vapor 2000
<b>Filling volume</b>	approx. 140 mL with damp wick	approx. 300 mL with damp wick
<b>Permitted tilt</b>	Up to 45°	Any in "T" setting and up to 30° in operation
<b>Logistics</b>	70 variants 70 part numbers	4 part numbers for all variants
<b>Temperature range</b>	15 to 35 °C	10 to 40 °C
<b>Flow control range</b>	0.2 to 5 vol.% <sup>1 2</sup> 0.2 to 7 vol.% <sup>3</sup> 0.2 to 8 vol.% <sup>4</sup>	H 1 and I 2 0.2 to 6 vol.% E 3 and S 4 0.2 to 8 vol.%
<b>Draining of anaesthetic prior to transportation</b>	Yes	No
<b>Low-flow suitability</b>	Good	Very good
<b>Vaporizer can be switched on without locking plug-in system</b>	Possible	Not possible
<b>Control dial cap</b>	Neutral	Coloured
<b>Stability</b>	3-leg	Flat, so very good
<b>Sightglass screen</b>	Not provided	Fitted
<b>Vaporizer removable when switched on</b>	Yes	No

1. Halothane
2. Isoflurane
3. Enflurane
4. Sevoflurane

## Test list

### Vapor 2000

Serial no.: \_\_\_\_\_

Folder no.:  
5327.400

Installation site: \_\_\_\_\_

Issue:  
04.99

---



## 1 Test list equipment

Service equipment	Measuring range	Accuracy class
Pressure gauge	-30 to +120 mbar	1
Irina or Iria		
Flowmeter	0 to 10 L	



## 2 General



Test the relevant anaesthetic vaporizer, type Dräger-Vapor 2000 (from now on referred to as the "Vapor") before testing the associated anaesthetic machine.



If you use a Dräger Irina or Iria unit for anaesthetic concentration measurement, allow for the warm-up phase of the sensors. Switch on the relevant unit before making the check.

## 3 Anaesthetic

### 3.1 Test anaesthetic for extraneous liquids



If there is water or any other liquid in the vaporizer chamber, the vaporizer must be subjected to a general overhaul at the manufacturers.

- Make sure the vaporizer chamber contains only the intended anaesthetic.
- Make sure the anaesthetic is not intermixed with water or any other liquid.

### 3.2 Test anaesthetic properties

- Make sure the anaesthetic is not contaminated (by particles or suspensions) or discoloured.
- If necessary, flush out the vaporizer with the specified anaesthetic.

## 4 Housing, labels and functions

### 4.1 Test housing and labels

- Check that the following vaporizer components are complete and undamaged:
  - The plug-in adapter
  - The vaporizer housing
  - The handwheel with adjuster cap
  - The sightglass with its cover
  - The front caps
- Check that the labelling of the vaporizer is complete and legible.

### 4.2 Test distinguishing features of anaesthetic

- Check that the handwheel cap is seated firmly on the handwheel.
- If an interlock system 2 is fitted on the vaporizer:  
Check that the lugs in both openings are present and undamaged.
- Check that the anaesthetic-specific labelling on the upper front cap corresponds to the typeplate:

Vaporizer type	<input type="checkbox"/>
Halothane	<input type="checkbox"/>
Enflurane	<input type="checkbox"/>
Isoflurane	<input type="checkbox"/>
Sevoflurane	<input type="checkbox"/>

- Check that the colour code of the handwheel cap and the handwheel match the anaesthetic designation on the typeplate:

Vaporizer type	Colour code	<input type="checkbox"/>
Halothane	red	<input type="checkbox"/>
Enflurane	orange	<input type="checkbox"/>
Isoflurane	purple	<input type="checkbox"/>
Sevoflurane	yellow	<input type="checkbox"/>

### 4.3 Test handwheel

- Check that the transport locking element and the zero locking element are functioning precisely.
- Check that the handwheel is easily moved over the following ranges:

Ranges:	T...0	<input type="checkbox"/>
	0...0.2	<input type="checkbox"/>
	0.2...full-scale value	<input type="checkbox"/>

### 4.4 Test keyed filling system

- Check that the button on the lock catch and the keyed filler adapter are colour-coded in accordance with the anaesthetic:

Vaporizer type	Colour code	<input type="checkbox"/>
Halothane	red	<input type="checkbox"/>
Enflurane	orange	<input type="checkbox"/>
Isoflurane	purple	<input type="checkbox"/>
Sevoflurane	yellow	<input type="checkbox"/>

### 4.5 Test “Quick Fil” filling system

- Check that the O-ring or the sealing ring is present in the cap and undamaged.

### 4.6 Test funnel filling system



**The funnel filling system is not permitted in the European Economic Area and in EU member states. Vaporizers with funnel filling systems have no CE mark!**

- Check that the O-ring or the sealing ring is present in the cap and undamaged.

## 4.7 Test keyed filler adapter

- Check that the relevant keyed filler adapter has no defects:

Keyed filler adapter:	Part number
h for halothane	M 30288
e for enflurane	M 30289
i for isoflurane	M 30290
s for sevoflurane	M 31930

- Check that the keyed filler adapter is coded to the specified anaesthetic at both ends.
- Check that the relevant filling system is fitted with the necessary ball valve.
- Check that the O-ring in the cylinder port is present and undamaged.
- Check that the keyed filler adapter fits in the intended filling opening.

## 5 Plug-in adapter



No Dräger plug-in adapter from Vapor 19.n (colour: silver) or Selectatec plug-in adapter (colour: grey) may be fitted to the Vapor 2000 !



No Dräger 2000 plug-in adapter with milled corners or S 2000 plug-in adapter may be fitted to the Vapor 2000 with handwheel cap NMD (control dial cap 1)!

Either the DW-2000 plug-in adapter (white version) or the S-2000 plug-in adapter (Selectatec, white version) may be fitted. Select the relevant test for your plug-in adapter.

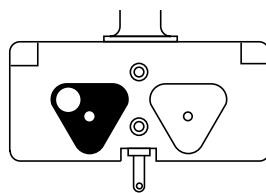
### 5.1 Plug-in adapter DW-2000 (white version)

#### 5.1.1 Test code ID

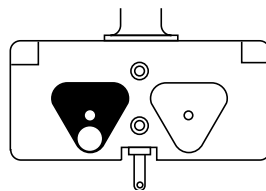
- Check that the code ID of the fitted plug-in adapter matches the anaesthetic used (see following four diagrams):

Plug-in adapter DW 2000

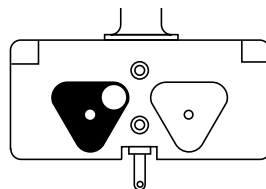
Code ID:



h for halothane



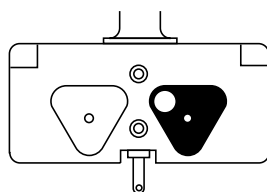
e for enflurane



i for isoflurane

Plug-in adapter DW 2000

Code ID:



s for sevoflurane

### 5.1.2 Test plug-in adapter locking lever

- Remove the vaporizer from the anaesthetic machine.
- Check that the plug-in adapter locking lever jumps back automatically.
- Check that the locking pin on the locking lever is undamaged (firm and straight).
- Check that both valve operating pins are present.
- Check that the sealing surfaces are undamaged.

## 5.2 Plug-in adapter S-2000 (Selectatec, white version)

### 5.2.1 Test plug-in adapter locking lever

- Remove the vaporizer from the anaesthetic machine.
- Check that the plug-in adapter locking lever jumps back automatically.
- Check that the locking pin on the locking lever is undamaged (firm and straight).
- Check that the interlock pins move freely.
- Check that both valve operating pins are present.
- Check that the sealing surfaces are undamaged.

## 6 Interlock system

Either interlock system 1, interlock system 2 or the ISO connector can be fitted to the vaporizer. Select the relevant test for your component.

### 6.1 Test interlock system 1 for built-on vaporizers

- Check that the interlock works properly and that two-way operation with the vaporizers is safeguarded. Can you only activate one vaporizer at a time?

### 6.2 Test interlock system 2 for plug-in vaporizers

- Check that the interlock works properly and that two-way operation with plugged-in vaporizers is safeguarded. Can you only activate one vaporizer at a time?
- Exchange the vaporizers and repeat the test.
- Check that you can only activate one vaporizer at a time.

## 7 Test ISO connector for vaporizers

- Check that the male cone at the vaporizer inlet and the female cone at the vaporizer outlet are connected.

## 8 Leak test

### 8.1 Test vaporizer on associated anaesthetic machine

- Lock the lock catch or cap.
- Switch on the vaporizer (> 0.2 vol.%).
- Depressurise the AIR system and the N<sub>2</sub>O system.
- Close all flow control valves.
- Connect the mixed gas socket to the pressure gauge.
- Set the O<sub>2</sub> flow control valve such that a pressure of 30 mbar is indicated on the pressure gauge.
- Check that the gas flow is < 0.12 L/min.



## 9 Check concentration



A concentration measurement to check compliance with the accuracy specified in the technical data set out in the Dräger Vapor 2000 Instructions for Use can only be carried out at the manufacturer's facility under precisely calibrated conditions.

In order to obtain comparable, reproducible values, the following test steps are necessary.

### 9.1 Prepare concentration measurement

The vaporizer is not connected.

- Flush out the Irina sensor or the Iria sensor with O<sub>2</sub> or AIR (\* = 4 L/min +0.5 L/min) for 1 minute.
- Perform a zero calibration on the Irina.
- On the sightglass, check that the vaporizer is at least half full of the specified anaesthetic. .
- Stabilise the filled vaporizer to a temperature of 20 - 24 °C. Wait for the temperature to equalise in accordance with the temperature difference  $\Delta T$  (see following table): .

$\Delta T$	to $\pm 2$ °C	$\pm 6$ °C	$\pm 10$ °C	$\pm 20$ °C
Waiting time	1 hour	3 hours	4 hours	5 hours

- Connect the Irina or Iria to the fresh gas outlet and make sure the connection is leak-tight.

### 9.2 Settings for concentration measurement

- If you use an Irina, adjust it to the relevant anaesthetic.
- For the concentration measurement you can use either AIR or O<sub>2</sub> as the carrier gas. Set a carrier gas flow of 2.5 to 4 L/min. Select the relevant test for your carrier gas.

### 9.2.1 Test values with carrier gas AIR

- Check that the following target concentrations are reached:

Vaporizer handwheel setting	Target concentration
0 vol.%	0 vol.% .
1 vol.%	0.80 - 1.20 vol.%
2 vol.%	1.65 - 2.35 vol.%
3 vol.%	2.48 - 3.52 vol.%
4 vol.%	3.30 - 4.70 vol.%
5 vol.%	4.20 - 5.80 vol.%
6 vol.%	5.00 - 7.00 vol.%
8 vol.% (if present)	6.80 - 9.60 vol.%


### 9.2.2 Test values with carrier gas O<sub>2</sub>

- Check that the following target concentrations are reached:

Vaporizer handwheel setting	Target concentration
0 vol.%	0 vol.% .
1 vol.%	0.90- 1.30 vol.%
2 vol.%	1.75 - 2.45 vol.%. .
3 vol.%	2.70 - 3.70 vol.%
4 vol.%	3.50 - 4.90 vol.%
5 vol.%	4.40 - 6.00 vol.%
6 vol.%	5.20 - 7.20 vol.%
8 vol.% (if present)	6.80 - 9.60 vol.%

## 10 Vaporizer connecting tubes

- If present, check that the connecting tubes are connected to the right vaporizer connector for inlet and outlet.

### 10.1 Sealing rings

- Check that the sealing rings on the connecting tubes are present and undamaged.

## 11 Place fully functional vaporizer at the user's/owner's disposal.

## 12 Tested

Date:\_\_\_\_\_

Name:\_\_\_\_\_

## Fault – Cause – Remedy

### 1 Fault-Cause-Remedy

Fault	Cause	Remedy
<b>Operation:</b>		
No delivered concentration or delivered concentration too high/too low.	Vaporizer not filled, vaporizer empty.	Fill vaporizer, check concentration.
	Handwheel set to "0" or "T"	Set handwheel to $\geq 0.2$ vol.%.
	No vaporizer connected or one of several ports unoccupied and open	Connect vaporizer or close off open port with vaporizer or direct gas connection
	Vaporizer tilted during or before operation while handwheel was not set to "T". This may cause liquid anaesthetic to enter the flow control valve.	Prior to operation: Flush and check concentration.
	Vaporizer filled with wrong anaesthetic or anaesthetic mixture.	Drain and blow out vaporizer.
	Gas flowing through vaporizer in wrong direction.	Check connecting system.
	Leakage, e.g. because plug-in adapter not tight on seals.	Remove vaporizer, check plug-in connector interlock and sealing rings, refit. Leak test with vaporizer in handwheel position "0" or $\geq 0.2$ vol.%.
	Leakage at port, e.g. because vaporizer connected to SA2 or Titus not converted for Vapor 2000 use.	Conversion by DrägerService.

Fault	Cause	Remedy
<b>Operation:</b>		
No delivered concentration or delivered concentration too high/too low	Valves in plug-in connector damaged	Repair (only by trained specialists).
	Vaporizer temperature outside specified operating range, e.g. because filled with very cold anaesthetic or operated over a lengthy period at high flow rate in conjunction with high concentrations.	Temperature-stabilize vaporizer, at least 15 minutes per °C deviation from specified range.
	Operate vaporizer with carrier gas other than air.	Concentration changes due to carrier gas.
	Gauge indicates percent by volume, not partial pressure.	Convert measured value to partial pressure.
	Vaporizer or anaesthetic monitor defective.	Use another vaporizer to check whether the vaporizer or the anaesthetic monitor is defective. Repair (only by trained specialists).
The vaporizer detection system (if fitted) of anaesthetic machine indicates a different anaesthetic to the vaporizer.	Coding of plug-in adapter or vaporizer damaged, faulty or incorrectly assembled.	Check coding, re-assemble as necessary. Repair (only by trained specialists).
Gauge indicates different anaesthetic to one shown on vaporizer (applicable only to monitors with anaesthetic detection system).	A different anaesthetic was used previously. There is still a major concentration of that anaesthetic in the breathing system.	Flush out breathing system or wait for gas change.
	Gauge not yet switched after anaesthetic change.	Switch gauge.
	Wrong anaesthetic or anaesthetic mixture in vaporizer.	Check, drain and blow out vaporizer. Repair (only by trained specialists).

<b>Fault</b>	<b>Cause</b>	<b>Remedy</b>
<b>Operation:</b>		
Handwheel cannot be set to concentration.	"0" key not pressed.	Press "0" key.
	Interlock not switched. Interlock sticking or other vaporizer still switched on.	Switch off other vaporizer and switch over interlock. Repair (only by trained specialists).
Handwheel can be moved out of "0" and "T" without pressing the key.	"0" key defective.	Repair (only by trained specialists).
Odour of anaesthetic, leakage of anaesthetic vapour, excessive leakage detected in leak test.	Plug-in adapter not fitted.	Check plug-in connector sealing rings and sealing surfaces or locking lever not locked - twisted prior to fitting.
	Leakage at port, e.g. because vaporizer connected to SA2 or Titus not converted for Vapor 2000 use.	Conversion by DrägerService.
	Filling system cap not on tight, or seal defective.	Tighten filling system cap and check seal. Replace or repair as necessary (trained specialists only).
	Drain plug not closed.	Tighten drain plug.
	Lever of keyed filling system moves too freely, so seal is not pressed on tight enough.	Have lever adjusted. Repair (only by trained specialists).
	Lock catch of filling system not fully inserted.	Release lever, press lock catch in fully, tighten lever.

Fault	Cause	Remedy
<b>Operation:</b>		
Filling level not visible on sightglass.	Vaporizer completely empty.	Top up vaporizer.
	Vaporizer overfull.	Drain vaporizer down to maximum mark. Check concentration.
	Sightglass indicator defective.	Repair (only by trained specialists).
Anaesthetic in sightglass discoloured.	Halothane contains thymol, which is enriched in the vaporizer.	Drain off discoloured anaesthetic and clean vaporizer.

Fault	Cause	Remedy
<b>Response to tilting during transportation:</b>		
Anaesthetic runs out.	Handwheel not locked at "T" and vaporizer tilted beyond 30°.	Set vaporizer upright. Lock handwheel at "T". <ul style="list-style-type: none"> <li>– Flush vaporizer for 2 hours at 10 L/min or for 8 hours at 4 L/min.</li> <li>– Flush vaporizer at maximum concentration for 5 minutes at 10 L/min.</li> <li>– Check concentration at handwheel position "0" at 0.5 L/min air flow. The concentration must be less than 0.1 vol.%. Otherwise flush - see above. Check concentration. If the delivered concentration is not within the permitted range, do not operate the vaporizer. Repair (only by trained specialists).</li> </ul>
Vaporizer not set to "T" even though not connected to anaesthetic machine.	The vaporizer may have been tilted beyond 30° the last time it was handled. This may have caused liquid anaesthetic to run out or enter the flow control valve, and so produced incorrect concentrations.	Before start-up, flush and check concentration; see above.
Odour of anaesthetic during or after transportation.	Due to an extreme increase in temperature and/or a decrease in air pressure, anaesthetic vapour may escape in the vaporizer.	<b>Do not inhale anaesthetic vapour. Ventilate the room.</b> Temperature-stabilize the vaporizer. Keep to the operating range for the filled vaporizer in handwheel position "T". Check concentration.



Fault	Cause	Remedy
<b>Filling and draining the vaporizer:</b>		
Anaesthetic runs out of drain opening.	Drain valve not closed.	Close drain valve.
Vaporizer accidentally filled with wrong anaesthetic.		Drain vaporizer completely and blow it out. Repair (only by trained specialists).
Anaesthetic not running into vaporizer.	Filling adapter without non-return valve used.	Use/convert filling adapter with non-return valve.
Anaesthetic escaping from cylinder thread.	Filling adapter not screwed tight onto cylinder.	Screw filling adapter on tight.
	Seal in screw cap of filling adapter missing or damaged.	Check seal. Repair (only by trained specialists).
Anaesthetic escaping from filling system.	Filling adapter not fully inserted or lever not tightened.	Release lever, insert filling adapter fully, tighten lever.
	Lever not pressing firmly enough on filling adapter.	Have lever adjusted. Repair (only by trained specialists).
	Filling adapter damaged.	Use a different filling adapter. Repair (only by trained specialists).
	Seal of filling system damaged.	Leak test the vaporizer in handwheel position $\geq 0.2$ vol.%. Repair (only by trained specialists).
Anaesthetic escaping from overflow hole.	Vaporizer filled beyond maximum.	Drain vaporizer down to maximum mark, check concentration.
Lock catch does not slide forward when lever is opened.	Lever not open far enough or incorrectly set.	Open lever further or adjust as necessary (only by trained specialists).
Anaesthetic does not run out when draining.	In handwheel position "T" the vaporizer chamber is hermetically sealed.	When draining in handwheel position "T" open filling cap. Close off filling opening again after draining.

Fault	Cause	Remedy
<b>Filling and draining the vaporizer:</b>		
Quik Fil™ drain funnel overflowing.	Drain valve open too far.	Open drain valve less.
	Bottle not fully fitted or incorrectly fitted, so bottle valve does not open.	Unscrew bottle from drain funnel and refit.
	Bottle full.	Unscrew drain funnel and fit onto a different matching bottle. Resume draining.

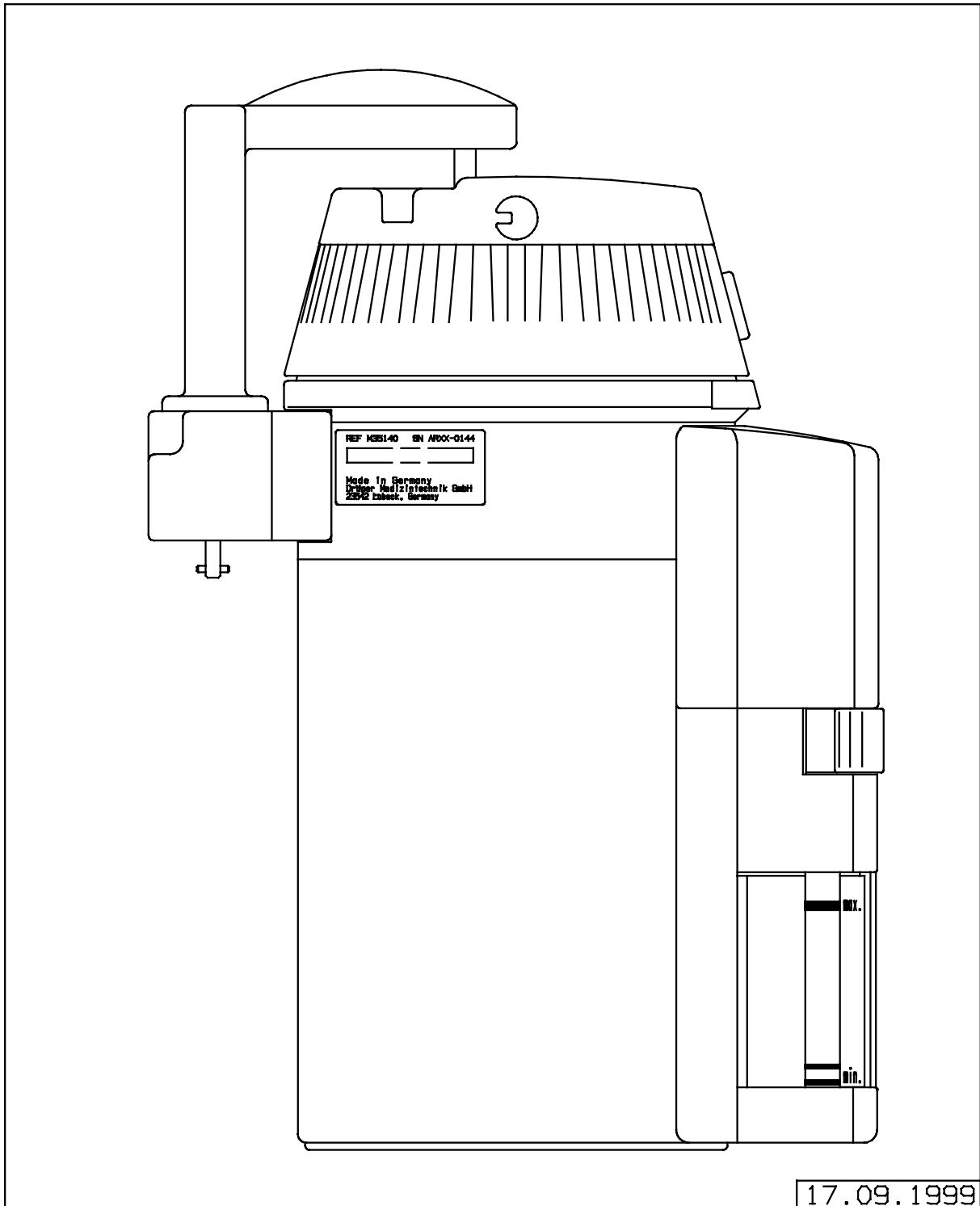
Fault	Cause	Remedy
<b>Plug-in adapter:</b>		
Locking lever does not engage in handwheel during removal.	Handwheel still set to "0".	Lock handwheel at "T".
Locking lever cannot be swung out of handwheel.	Handwheel set to "0" or $\geq 0.2$ vol.%. During the earlier transportation the handwheel may have been set to "0" or $\geq 0.2$ vol.%. As a result, liquid anaesthetic may enter the flow control valves and produce incorrect concentrations.	Lock handwheel at "T". <b>Prior to start-up, flush and check concentration:</b> see "Response to tilting during transportation: page 38".
Vaporizer cannot be removed.	Handwheel not set to "T".	Lock handwheel at "T".
	Interlock still engaged.	Disengage interlock.
	Locking lever cannot be swung back into handwheel. Interlock between plug-in adapter and plug-in connection sticking.	Remove cap on top of locking lever shaft. Loosen screw connection in shaft using a 3 mm hexagon socket wrench. Vaporizer can then be removed. Repair (only by trained specialists).

Fault	Cause	Remedy
<b>Plug-in adapter:</b>		
Plug-in adapter not fully contacting plug-in connector seal. Leakage from machine.	Locking lever not engaged in handwheel because handwheel set to "0" or $\geq 0.2$ vol.%.	Lock handwheel at "T", lock locking lever with pin into groove on handwheel.
	Locking mechanism of plug-in adapter/plug-in connector damaged.	Use of excessive force when locking can cause sticking and make detachment difficult. Repair (only by trained specialists).
	Locking lever rotated counter-clockwise before being connected.	Detach vaporizer (handwheel set to "T"), engage locking lever in handwheel, reconnect vaporizer.
	O-rings on plug-in connector missing.	Fit O-rings.
	Surplus O-rings on a pin on the plug-in connector or foreign body between plug-in connector and plug-in adapter.	Remove O-rings or foreign body.
With plug-in adapter S-2000: Handwheel cannot be turned.	Interlock pins not in their starting positions.	Check whether handwheel turns when adjoining vaporizers have been removed. Press the two interlock pins inwards by hand and release them again one after the other. If the malfunction still occurs: repair (only by trained specialists).



## Appendix

### 1 Spare parts list



**Diese Ersatzartikelliste gilt für Sachnummer:**

This spare parts list is valid for part no.:

<b>Sach-Nr. Part No.</b>	<b>Benennung Description</b>
<b>DA01131</b>	VAPOR 2000 GRUNDEINHEIT-I I-VAPOR 2000 BASIC UNIT
<b>DA01132</b>	VAPOR 2000 GRUNDEINHEIT-H H-VAPOR 2000 BASIC UNIT
<b>DA01149</b>	VAPOR 2000 GRUNDEINHEIT-S VAPOR 2000 BASIC UNIT S
<b>DA01150</b>	VAPOR 2000 GRUNDEINHEIT-E VAPOR 2000 BASIC UNIT E

**Inhaltsverzeichnis der Bilder**

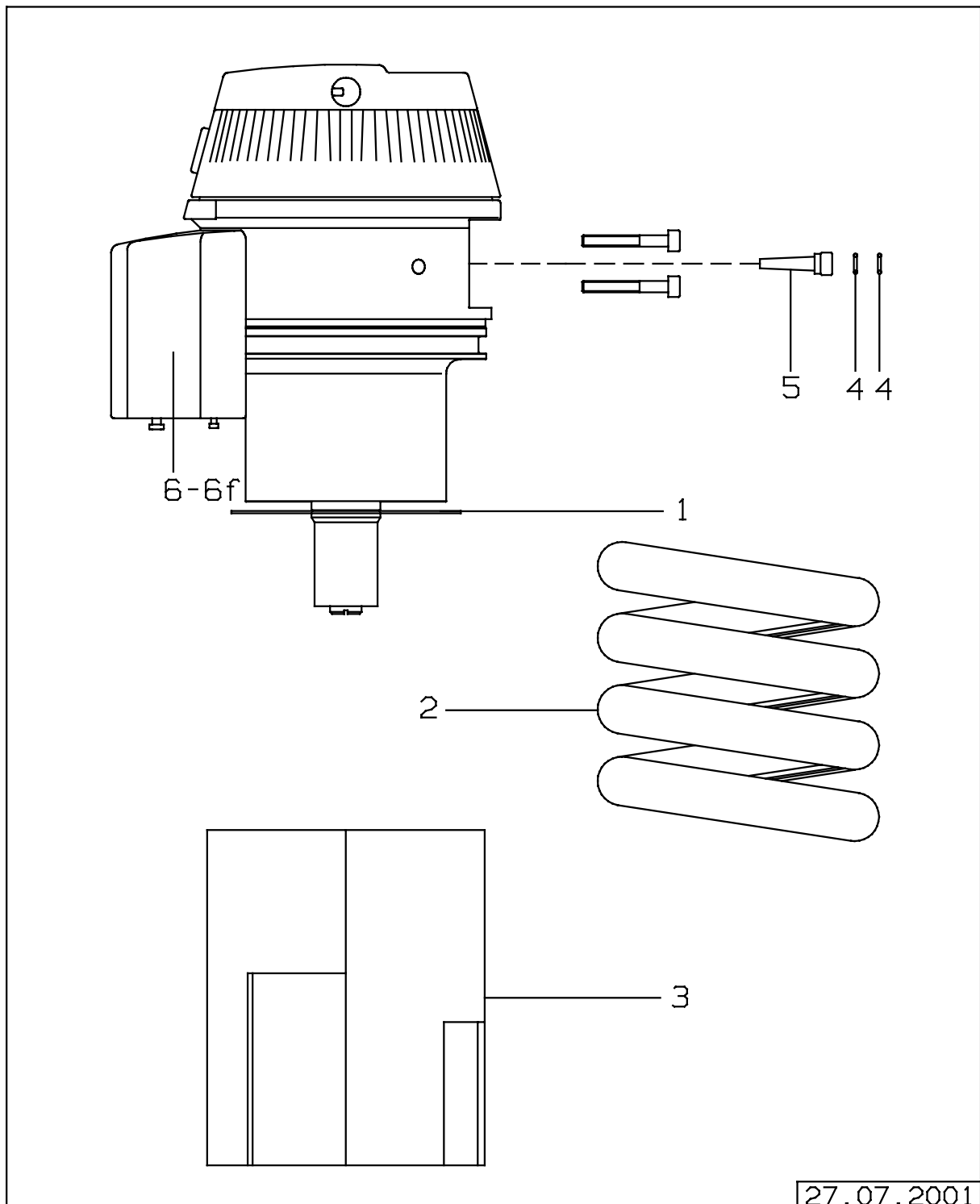
Summary of pictures

<b>Bild Picture</b>	<b>Bezeichnung Description</b>	<b>Sach-Nr. Part No .</b>	<b>E-Liste Spare parts list</b>
1	VAPOR 2000 H,E,I,S VAPOR 2000 H,E,I,S		
2	EINSTELLRAD- KAPPE INT 2 CONTROL DIAL CAP INT 2		
3	TOPE, KOMPLETT POT, CPL.		
4	SCHALTER SWITCH	M35100	
5	SICHERHEITSFUELLVORRICHTUNG H KEYED FILLING SYSTEM H	M34621	
6	SCHALENFUELLVORRICHTUNG FUNNEL FILLING SYSTEM	M34690	
7	QUIK FIL FÜLLVORRICHTUNG QUIK FILLING SYSTEM	M34697	
8	STECKADAPTER DW-2000 PLUG-IN ADAPTER DW-2000	M34725	
9	STECKADAPTER S 2000 PLUG IN ADAPTER S 2000	M34821	
10	SCHLAUCHANSCHLUSS HOSE CONNECTION	M23150	
11	SCHLAUCHANSCHLUSS HOSE CONNECTION	M23779	
12	KONUSADAPTER ISO CAGEMOUNT	M35059	



**VAPOR 2000 H,E,I,S**  
VAPOR 2000 H,E,I,S

**Bild/Picture 1**



27.07.2001

**Ersatzartikelliste 5327.400**

Spare parts list

Ausgabe/Edition

27.08.01

**VAPOR 2000**

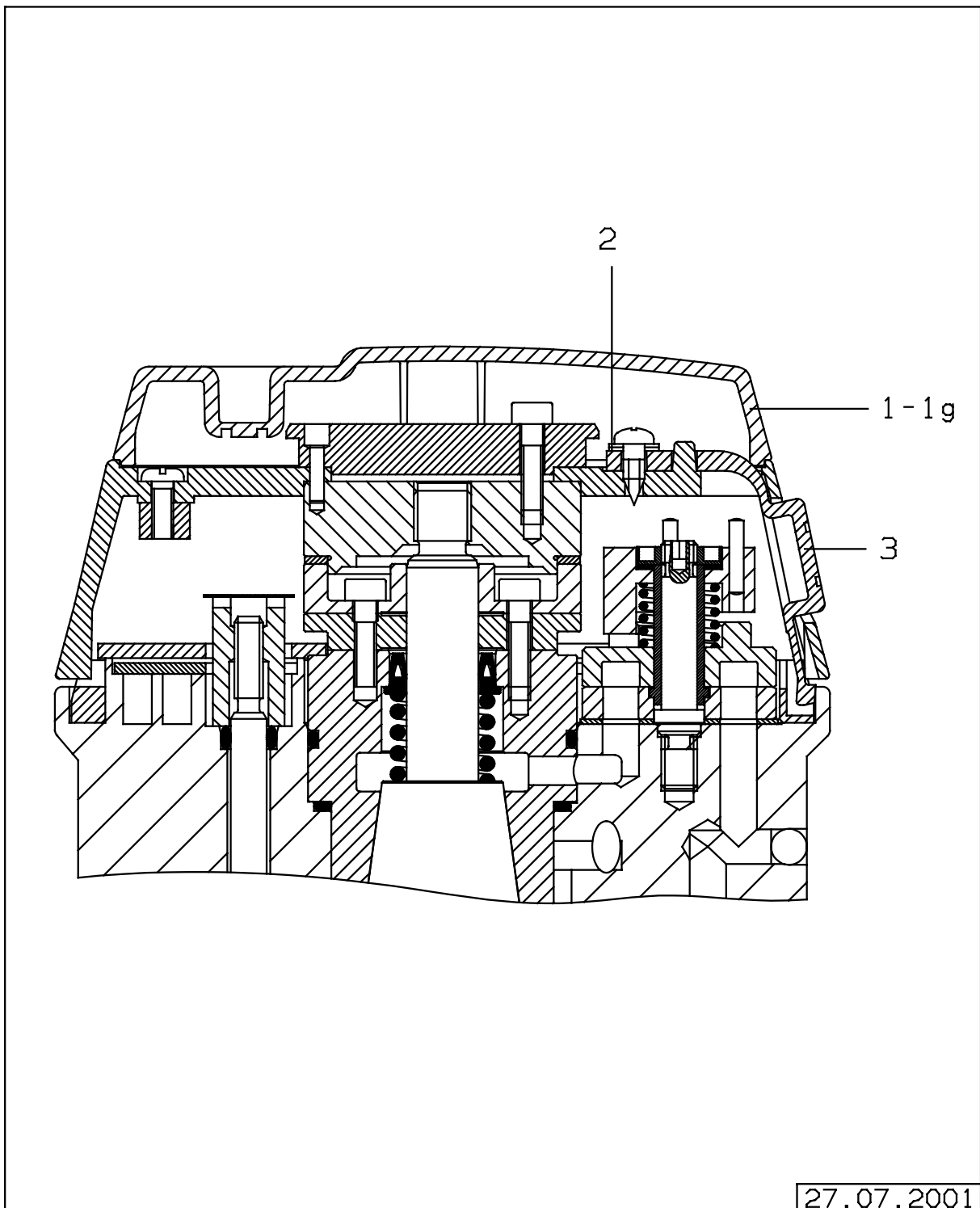
VAPOR 2000

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<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1-6	VAPOR 2000 GRUNDEINHEIT-H H-VAPOR 2000 BASIC UNIT		DA01132	
1-6	VAPOR 2000 GRUNDEINHEIT-E VAPOR 2000 BASIC UNIT E		DA01150	
1-6	VAPOR 2000 GRUNDEINHEIT-I I-VAPOR 2000 BASIC UNIT		DA01131	
1-6	VAPOR 2000 GRUNDEINHEIT-S VAPOR 2000 BASIC UNIT S		DA01149	
1	DOCHTSCHLEIBE WICK PLATE	M34220		
2-3	E-SET DOCHTE REP.SET WICKS		M34904	
2	DOCHTSCHLAUCH, KOMPL. WICK TUBE, CPL.	M34735		
3	DOCHTMANTEL WICK JACKET	M34234		
4	O-RING O-RING SEAL		M21929	
5	SIEBEINSATZ MESH BOTTOM		D18440	
6	FRONTKAPPE STD H FRONT CAP STD H		M34721	
6a	FRONTKAPPE STD E FRONT CAP STD E		M34722	
6b	FRONTKAPPE STD I FRONT CAP STD I		M34723	
6c	FRONTKAPPE STD S FRONT CAP STD S		M34724	
6d	FRONTKAPPE ABBOTT ULTANE FRONT CAP ABBOTT ULTANE		M35135	
6e	FRONTKAPPE ABBOTT FORENE FRONT CAP ABBOTT FORENE		M34733	
6f	FRONTKAPPE ABBOTT SEVORANE FRONT CAP ABBOTT SEVORANE		M34734	

**EINSTELLRAD- KAPPE INT 2**  
CONTROL DIAL CAP INT 2

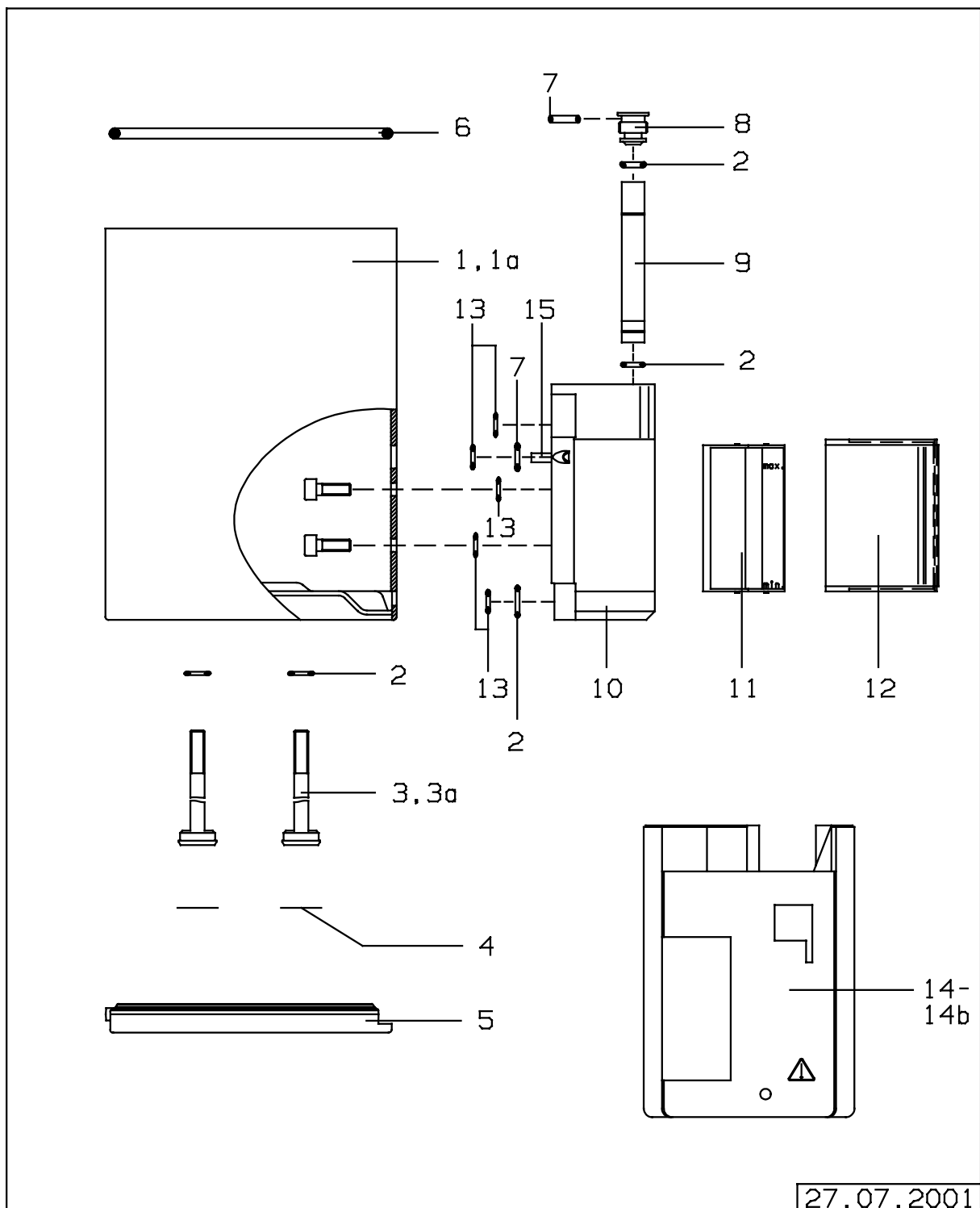
**Bild/Picture 2**



<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1	EINSTELLRAD-KAPPE INT 2H CONTROL DIAL CAP INT 2 H		M34682	
1a	EINSTELLRAD-KAPPE INT 2 E CONTROL DIAL CAP INT 2 E		M34683	
1b	EINSTELLRAD-KAPPE INT 2 I CONTROL DIAL CAP INT 2 I		M34684	
1c	EINSTELLKAPPE INT 2 S CONTROL DIAL CAP INT 2 S		M34685	
1d	EINSTELLRAD-KAPPE NMD H CONTROL DIAL CAP NMD H		M34870	
1e	EINSTELLRAD-KAPPE NMD E CONTROL DIAL CAP NMD E		M34871	
1f	EINSTELLRAD-KAPPE NMD I CONTROL DIAL CAP NMD I		M34872	
1g	EINSTELLRAD-KAPPE NMD S CONTROL DIAL CAP NMD S		M34873	
2	SCHEIBE A 3,2 DIN 125 (2 STUECK ERFORDERLICH) WASHER A 3,2 DIN 125 (2 PIECES NECESSARY)		1330233	
3	TASTE CALIPERS		M34738	

**TOPF, KOMPLETT**  
POT, CPL.

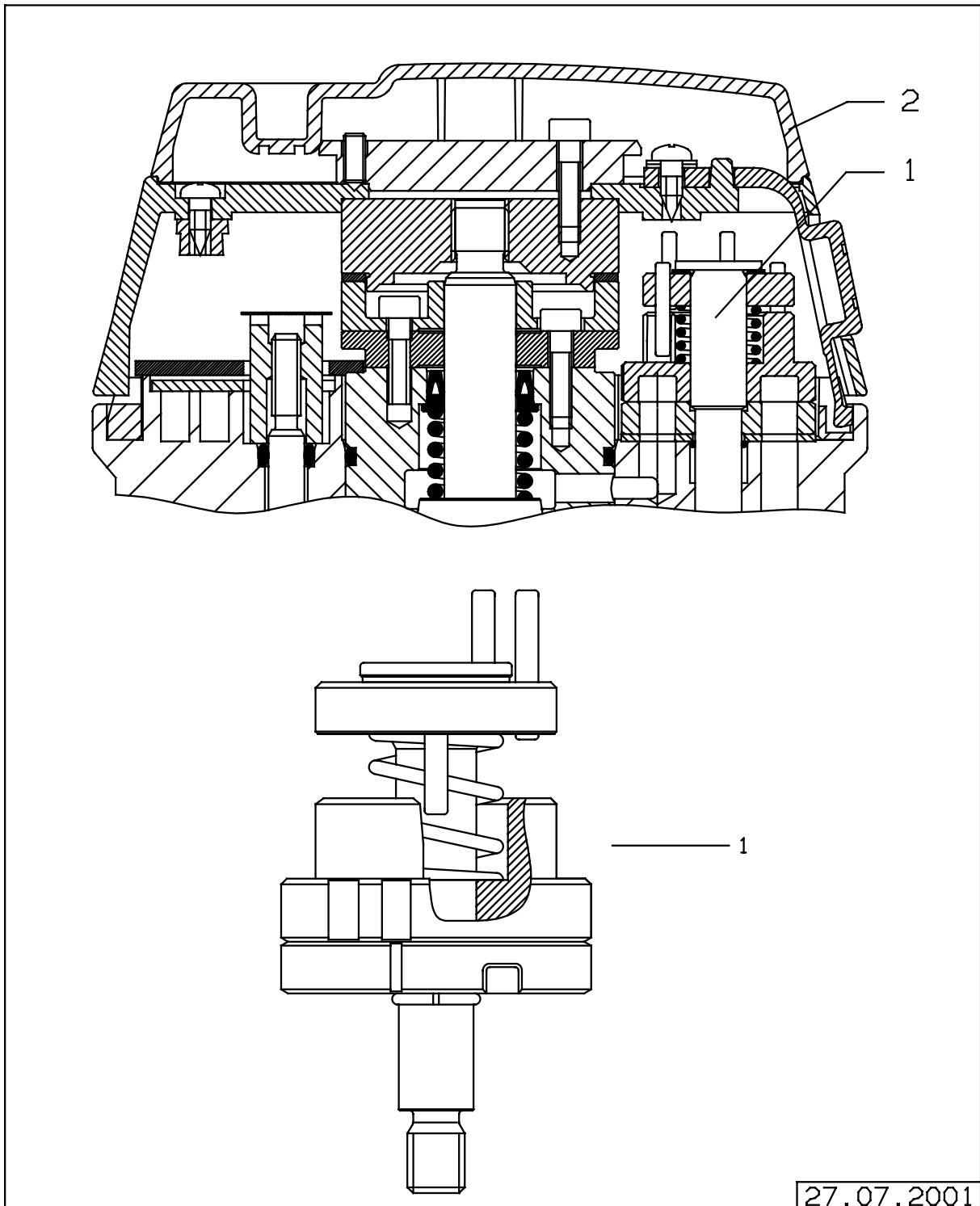
**Bild/Picture 3**



Position Item No.	Benennung Description	Sach-Nr. Part No.	Bestell-Nr. Order-Code	Packung Quantity
1	TOPF POT		M34527	
1a	TOPF MS POT MS		M35075	
2	O-RING O-RING SEAL		D18238	
3	TOPFSCHRAUBE SCREW		M34773	
3a	TOPFSCHRAUBE POT SCREW	M34775		
2, 4-6	E-SET TOPFMONTAGE REP.SET POT MOUNTING		M34905	
4	AUFKLEBER ADHESIVE LABEL		M34749	
5	VAPORFUSS VAPOR BASE	M34515		
6	O-RING O-RING SEAL		M22714	
7	O-RING O-RING SEAL		M22755	
8	SCHAUGLASSCHRAUBE CONTROL GLASS SCREW	M34901		
9	ROHR TUBE		M34248	
10	SCHAUGGLASMODUL CONTROL GLASS MODULE	M34242		
11	BLLENDE SCREEN		M34699	
12	SCHAUGGLASABDECKUNG CONTROL GLASS COVER		M34251	
13	O-RING O-RING SEAL		M22717	
14	UNTERE SCHNAPPKAPPE (SIFÜ) LOWER SNAP CAP SI-FUE (KEYED FILLING SYSTEM)		M34680	
14a	UNTERE SCHNAPPKAPPE (QUIK FIL) LOWER SNAP CAP,QUIK FIL		M34759	
14b	UNTERE ABDECKKAPPE SCHALE LOWER SNAP CAP, TRAY		M34760	

**SCHALTER**  
SWITCH

**Bild/Picture 4**



27.07.2001

**Ersatzartikelliste 5327.400**

Spare parts list

Ausgabe/Edition

27.08.01

**VAPOR 2000**

VAPOR 2000

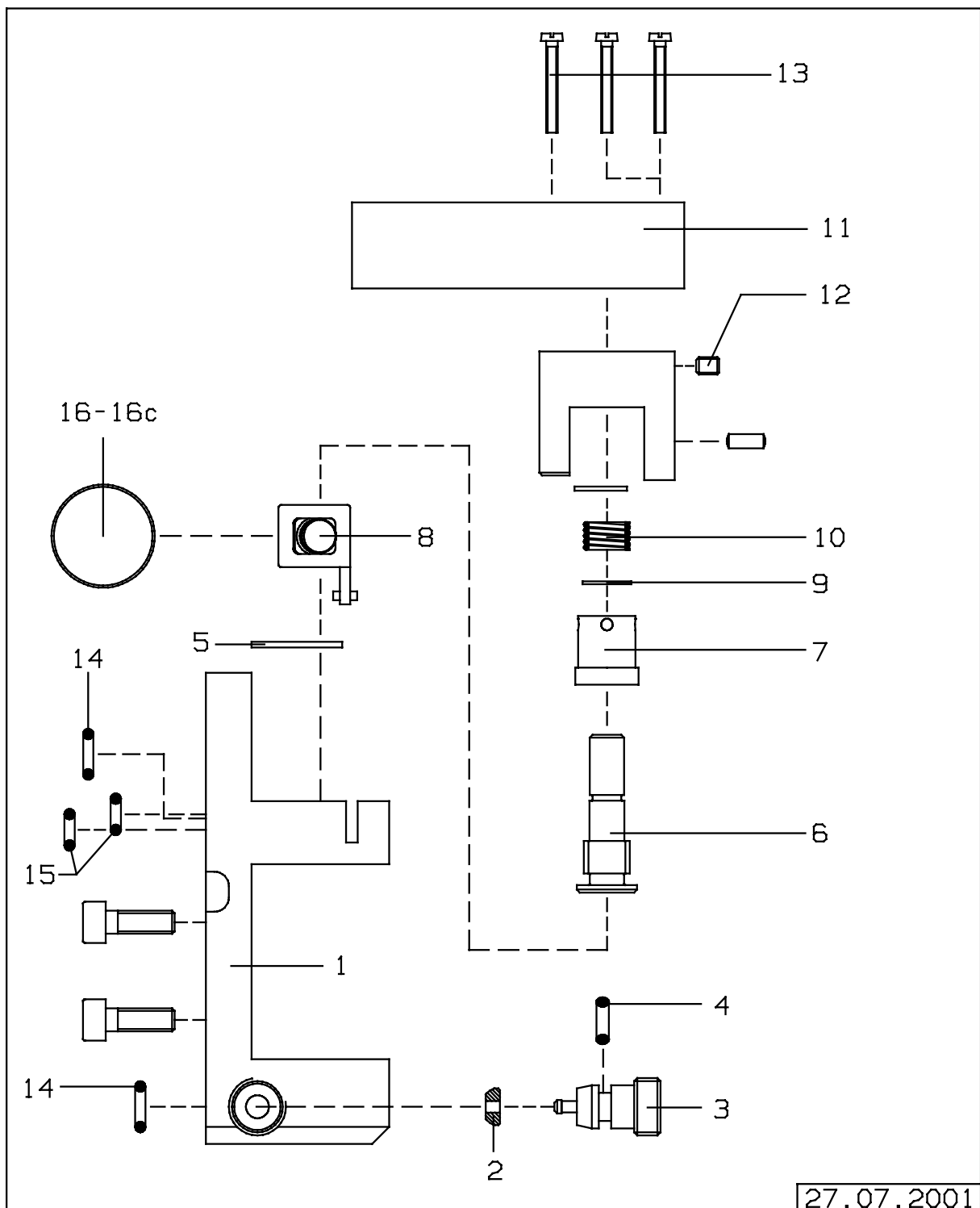
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<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1	SCHALTER SWITCH		M35100	
2	EINSTELLRAD-KAPPE INT 2 H CONTROL DIAL CAP INT 2 H		M34682	
2	EINSTELLRAD-KAPPE INT 2 E CONTROL DIAL CAP INT 2 E		M34683	
2	EINSTELLRAD-KAPPE INT 2 I CONTROL DIAL CAP INT 2 I		M34684	
2	EINSTELLKAPPE INT 2 S CONTROL DIAL CAP INT 2 S		M34685	
2	EINSTELLRAD-KAPPE NMD H CONTROL DIAL CAP NMD H		M34870	
2	EINSTELLRAD-KAPPE NMD E CONTROL DIAL CAP NMD E		M34871	
2	EINSTELLRAD-KAPPE NMD I CONTROL DIAL CAP NMD I		M34872	
2	EINSTELLRAD-KAPPE NMD S CONTROL DIAL CAP NMD S		M34873	



**SICHERHEITSFUELLVORRICHTUNG H**  
KEYED FILLING SYSTEM H

**Bild/Picture 5**



Position Item No.	Benennung Description	Sach-Nr. Part No.	Bestell-Nr. Order-Code	Packung Quantity
1-16	SICHERHEITSFUELLVORRICHTUNG H KEYED FILLING SYSTEM H		M34621	
1-16	SICHERHEITSFUELLVORRICHTUNG E KEYED FILLING SYSTEM E		M34622	
1-16	SICHERHEITSFUELLVORRICHTUNG I KEYED FILLING SYSTEM I		M34623	
1-16	SICHERHEITSFUELLVORRICHTUNG S KEYED FILLING SYSTEM S		M34624	
1	EINFUELLVORRICHTUNG (SIFÜ) FILLING DEVICE (KEYED FILLING SYSTEM)	M35162		
2	DICHTRING PACKING RING		M34636	
3	SCHRAUBE SCREW		M34245	
4	O-RING O-RING SEAL		M22717	
5	DICHTPLATTE SEALING PLATE		M35161	
6	RAENDEL-SCHRAUBE KNURLED SCREW		M34246	
7	GEWINDEEINSATZ THREAD INSERT		M35149	
8	VERSCHLUSZSCHIEBER INTERLOCKING BAR		M35163	
9	GLEITRING WASHER BUSHING	T04212		
10	FEDER SPRING	M35107		
11	KNEBEL TOGGLE		M34244	
12	GEWINDESTIFT M3X4 DIN916 M3X4 DIN 916		1323253	30
13	SCHRAUBE AM2X16 DIN84 SCREW AM 2X16 DIN 84-A4		1333763	
14	O-RING O-RING SEAL		D18238	
15	O-RING O-RING SEAL		M28479	

**Ersatzartikelliste 5327.400**

Spare parts list

Ausgabe/Edition  
27.08.01**VAPOR 2000**

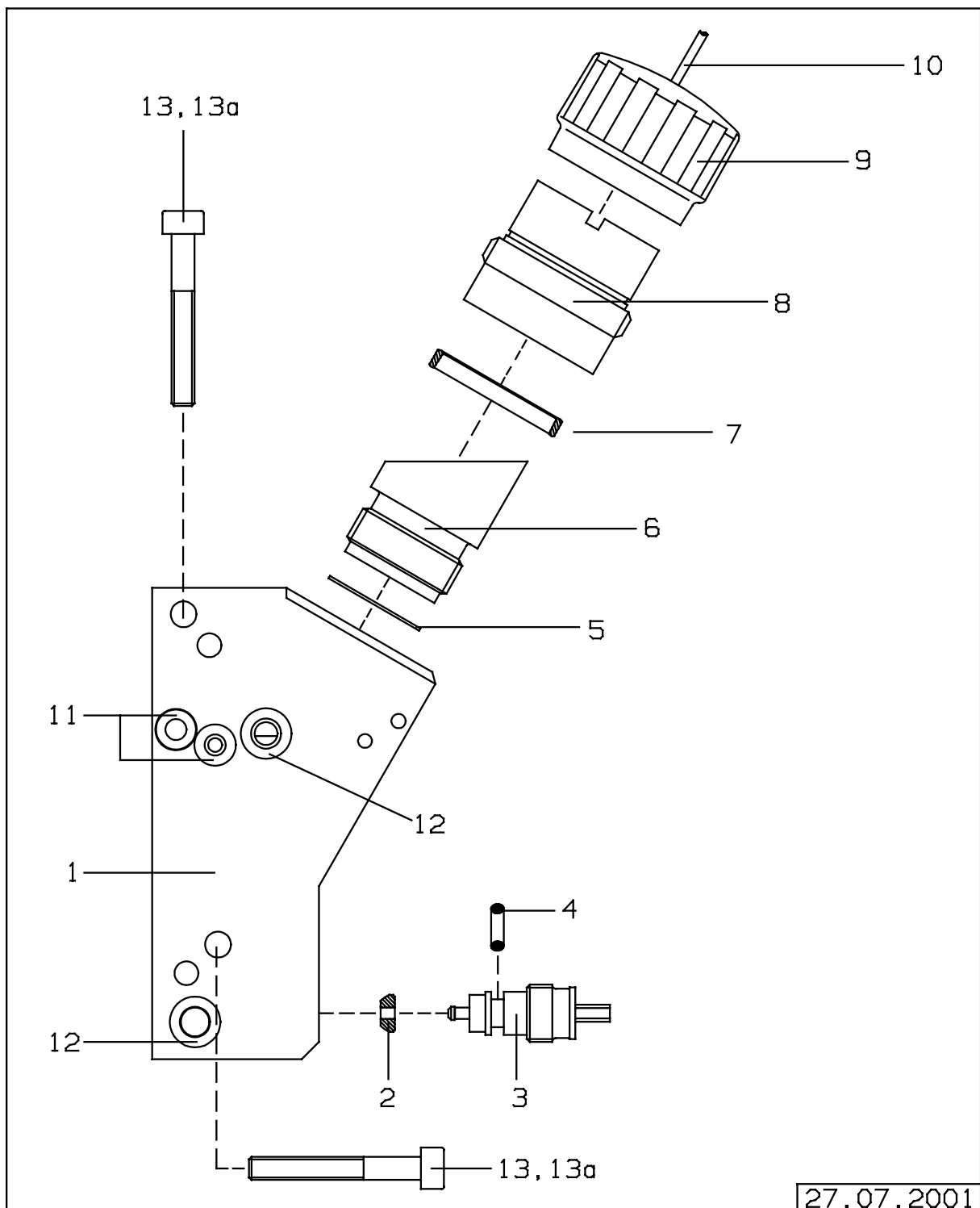
VAPOR 2000

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<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
16	KNOPF H BUTTON H		M35102	
16a	KNOPF E BUTTON E		M35103	
16b	KNOPF I BUTTON I		M35104	
16c	KNOPF S BUTTON S		M35105	
	UNTERE SCHNAPPKAPPE OHNE ABBILDUNG LOWER SNAP CAP SI-FUE WITHOUT ILLUSTRATION		M34680	

**SCHALENFUELLVORRICHTUNG**  
FUNNEL FILLING SYSTEM

**Bild/Picture 6**



**Ersatzartikelliste 5327.400**

Spare parts list

Ausgabe/Edition

27.08.01

**VAPOR 2000**

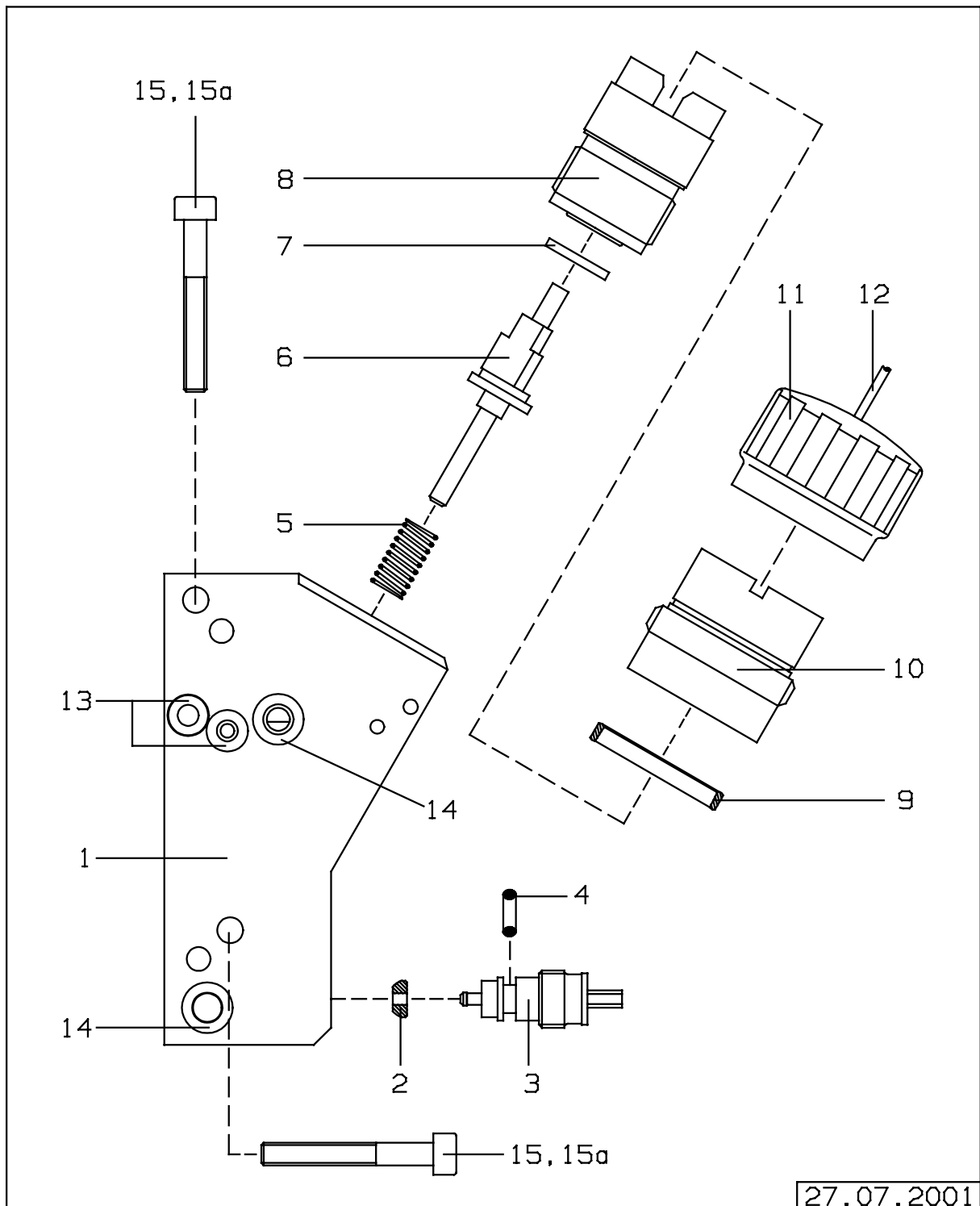
VAPOR 2000

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<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1-13	SCHALENFUELLVORRICHTUNG FUNNEL FILLING SYSTEM		M34690	
1	GEHAEUSE HOUSING	M34659		
2	DICHTRING PACKING RING		M34636	
3	ABLASZSCHRAUBE RS-DRAIV SCREW, MILITARY		M34757	
4	O-RING O-RING SEAL		M22717	
5	RUNDLOCHBLECH ROUND-HOLE PLATE		M34649	
6	SCHALE SHELL	M34668		
7	DICHTRING PACKING RING		M35134	
8	DECKEL COVER	M34658		
9	KAPPE CAP		M34678	
10	RD 1,5 POLYESTER SW RD 1,5 POLYESTER SW	1212060		
11	O-RING O-RING SEAL		M28479	
12	O-RING O-RING SEAL		D18238	
13	ZYLINDERSCHRAUBE M4X30 DIN912 SCREW M4X30 DIN912	1328778		
13a	ZYLINDERSCHRAUBE M4X30 DIN912 SCREW M4X30 DIN912		1343904	
	UNTERE ABDECKKAPPE SCHALE LOWER SNAP CAP, TRAY		M34760	

**QUIK FIL FÜLLVORRICHTUNG**  
QUIK FILLING SYSTEM

**Bild/Picture 7**



**Ersatzartikelliste 5327.400**

Spare parts list

Ausgabe/Edition

27.08.01

**VAPOR 2000**

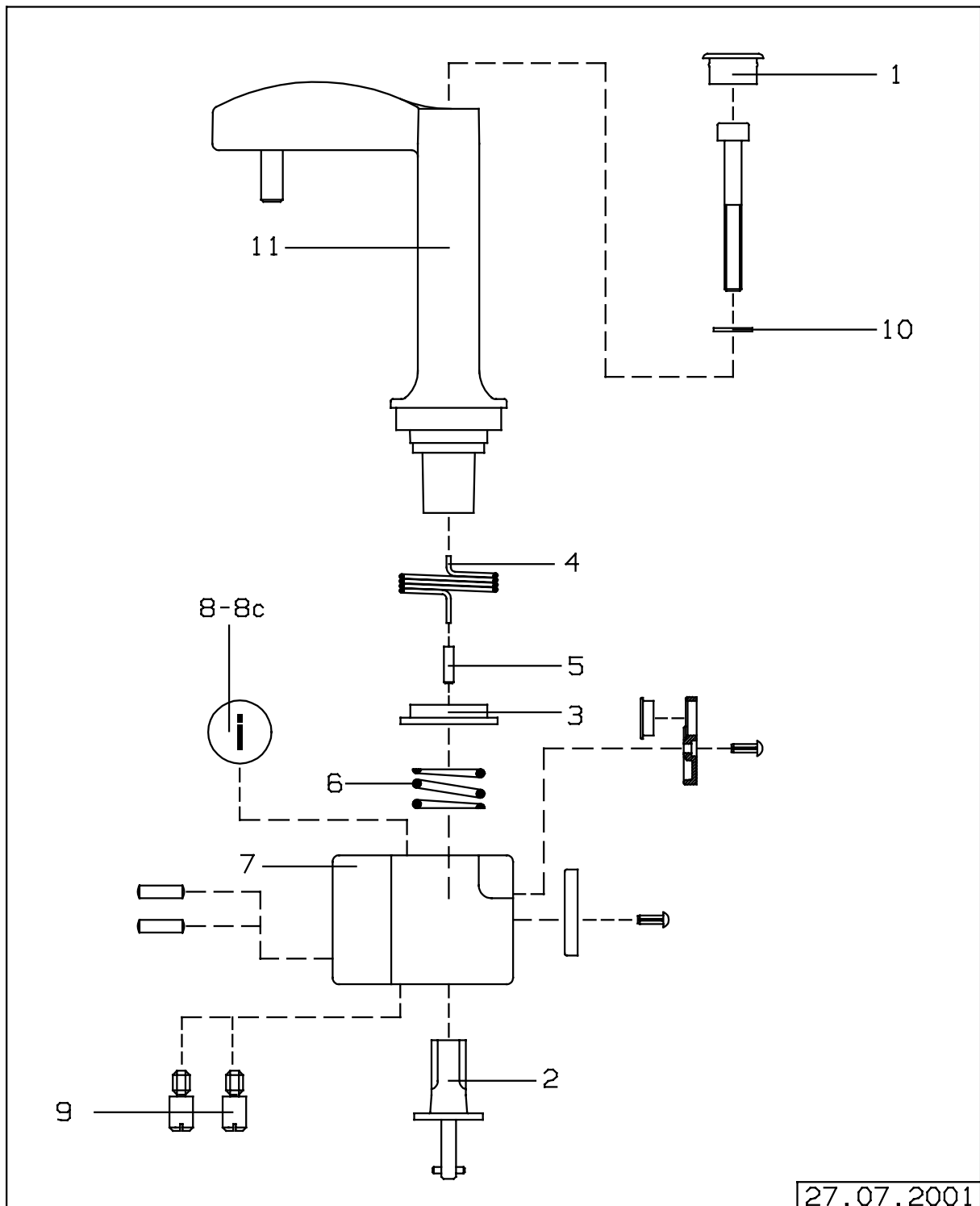
VAPOR 2000

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<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1-15	QUIK FIL FUELLVORRICHTUNG QUIK FIL FILLING SYSTEM		M34697	
1	GEHAEUSE HOUSING	M34659		
2	DICHTRING PACKING RING		M34636	
3	SCHRAUBE SCREW		M34245	
4	O-RING O-RING SEAL		M22717	
5	FEDER SPRING		E24539	
6	STOESSEL TAPPET	M34655		
7	DICHTUNG GASKET		M34657	
8	BUCHSE CONNECTOR	M34660		
9	DICHTRING PACKING RING		M35134	
10	DECKEL COVER	M34658		
11	KAPPE CAP		M34678	
12	RD 1,5 POLYESTER SW RD 1,5 POLYESTER SW	1212060		
13	O-RING O-RING SEAL		M28479	
14	O-RING O-RING SEAL		D18238	
15	ZYLINDERSCHRAUBE M4X30 DIN912 SCREW M4X30 DIN912	1328778		
15a	ZYLINDERSCHRAUBE M4X30 DIN912 SCREW M4X30 DIN912		1343904	
	UNTERE SCHNAPPKAPPE (QUIK FIL) OHNE ABBILDUNG LOWER SNAP CAP,QUIK FIL WITHOUT ILLUSTRATION		M34759	

**STECKADAPTER DW-2000**  
PLUG-IN ADAPTER DW-2000

**Bild/Picture 8**





**Ersatzartikelliste 5327.400**

Spare parts list

Ausgabe/Edition

27.08.01

**VAPOR 2000**

VAPOR 2000

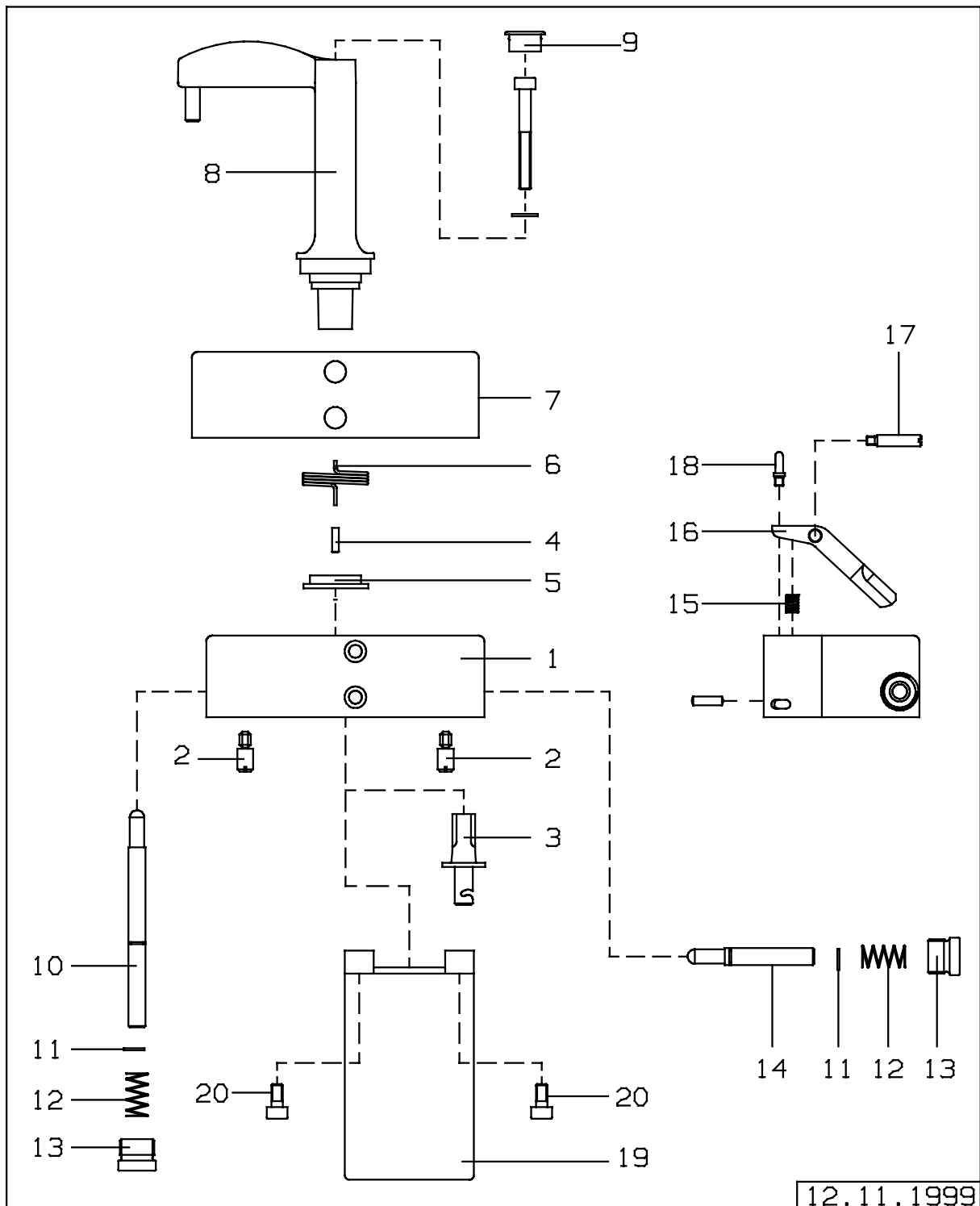
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<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1-11	STECKADAPTER DW-2000 H PLUG-IN ADAPTER DW-2000 H		M34725	
1-11	STECKADAPTER DW-2000 E PLUG-IN ADAPTER DW-2000 E		M34726	
1-11	STECKADAPTER DW-2000 I PLUG-IN ADAPTER DW-2000 I		M34727	
1-11	STECKADAPTER DW-2000 S PLUG-IN ADAPTER DW-2000 S		M34728	
1,2,4,5	E-SET STECKSYSTEM REP.SET PLUG-IN SYSTEM		M34907	
1	KAPPE FUER HANDHEBEL CAP FOR HANDLE		M34677	
2	BOLZEN BOLT		M34662	
3	SCHEIBE WASHER	M34611		
4	SCHENKELFEDER SPIRAL SPRING	M34532		
5	HUELSE BUSH	M34612		
6	FEDER SPRING	M34531		
7	GEHAEUSE (STECKSYST. DRAEGER) HOUSING (CONNECTING SYST. DW)	M34664		
8	AUFKLEBER H LABEL H	M30667		
8a	AUFKLEBER E LABEL E	M30668		
8b	AUFKLEBER I LABEL I	M30669		
8c	AUFKLEBER "S" LABEL "S"	M32379		
9	ZAPFENSCHRAUBE M4X8 DIN 927 SCREW M 4X8 DIN 927-A2/051		1329405	
10	SCHEIBE A 4,3 DIN 125 WASHER A 4,3 DIN 125-A4		1327542	
11	HANDHEBEL(STECKSYSTEM DW) HANDLE (PLUG-IN SYSTEM DW)		M34676	
	ZYLINDERSCHRAUBE M4X12 DIN912 OHNE ABBILDUNG SCREW M4X12 DIN912		1343866	

<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
	WITHOUT ILLUSTRATION			

**STECKADAPTER S 2000**  
PLUG IN ADAPTER S 2000

**Bild/Picture 9**



**Ersatzartikelliste 5327.400**

Spare parts list

Ausgabe/Edition  
27.08.01**VAPOR 2000**

VAPOR 2000

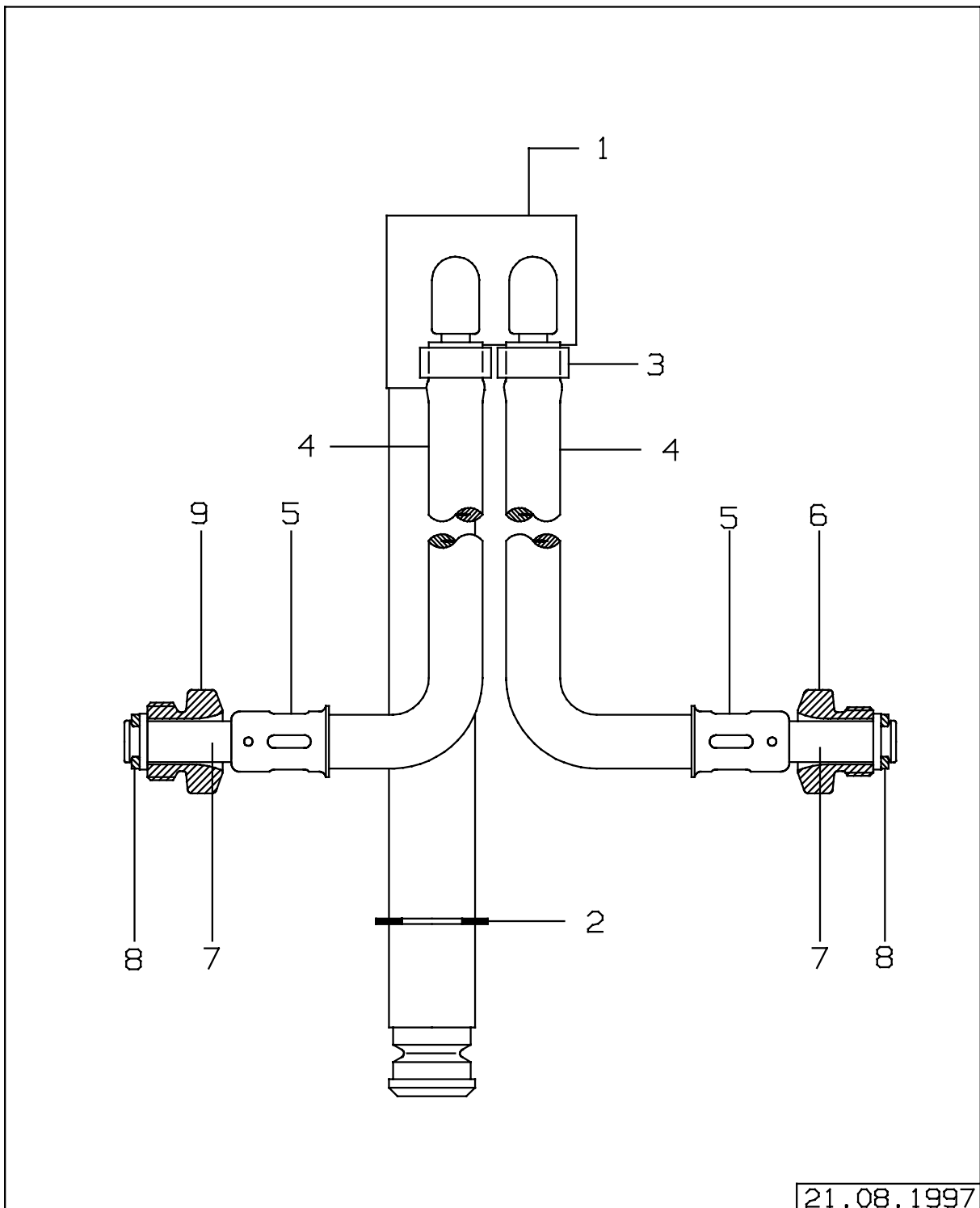
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<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1-20	STECKADAPTER S-2000 PLUG-IN ADAPTER S-2000		M34821	
1	GEHAEUSE HOUSING	M34813		
2	ZAPFENSCHRAUBE M4X8 DIN 927 SCREW M 4X8 DIN 927-A2/051		1329405	
3	BOLZEN BOLT		M34817	
4	HUELSE BUSH	M34612		
5	SCHEIBE WASHER	M34611		
6	SCHENKELFEDER SPIRAL SPRING	M34532		
7	BLLENDE SCREEN		M34815	
8	HANDHEBEL S (SELECTATEC) HANDLE S (SELECTATEC)		M34758	
9	KAPPE FUER HANDHEBEL CAP FOR HANDLE		M34677	
10	STIFT, LANG PIN, LONG		M34811	
11	SICHERUNGSSCHEIBE 4 DIN 6799 THRUST WASHER 4 DIN 6799		1328999	50
12	FEDER SPRING		M34816	
13	MUTTER NUT	M34814		
14	STIFT, KURZ PIN, SHORT	M34812		
15	FEDER P SPRING P		E21205	
16	HEBEL LEVER		M34819	
17	SCHAFTSCHRAUBE SET SCREW		M34818	
18	STIFT PIN		M34820	
19	PLATTE PLATE	M35065		

<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
20	ZYLINDERSCHRAUBE M4X8 DIN 912 SCREW M4X8 DIN912		1263056	
	ZYLINDERSCHRAUBE M4X12 DIN912 OHNE ABBILDUNG SCREW M4X12 DIN912 WITHOUT ILLUSTRATION		1343866	

**SCHLAUCHANSCHLUSS**  
HOSE CONNECTION

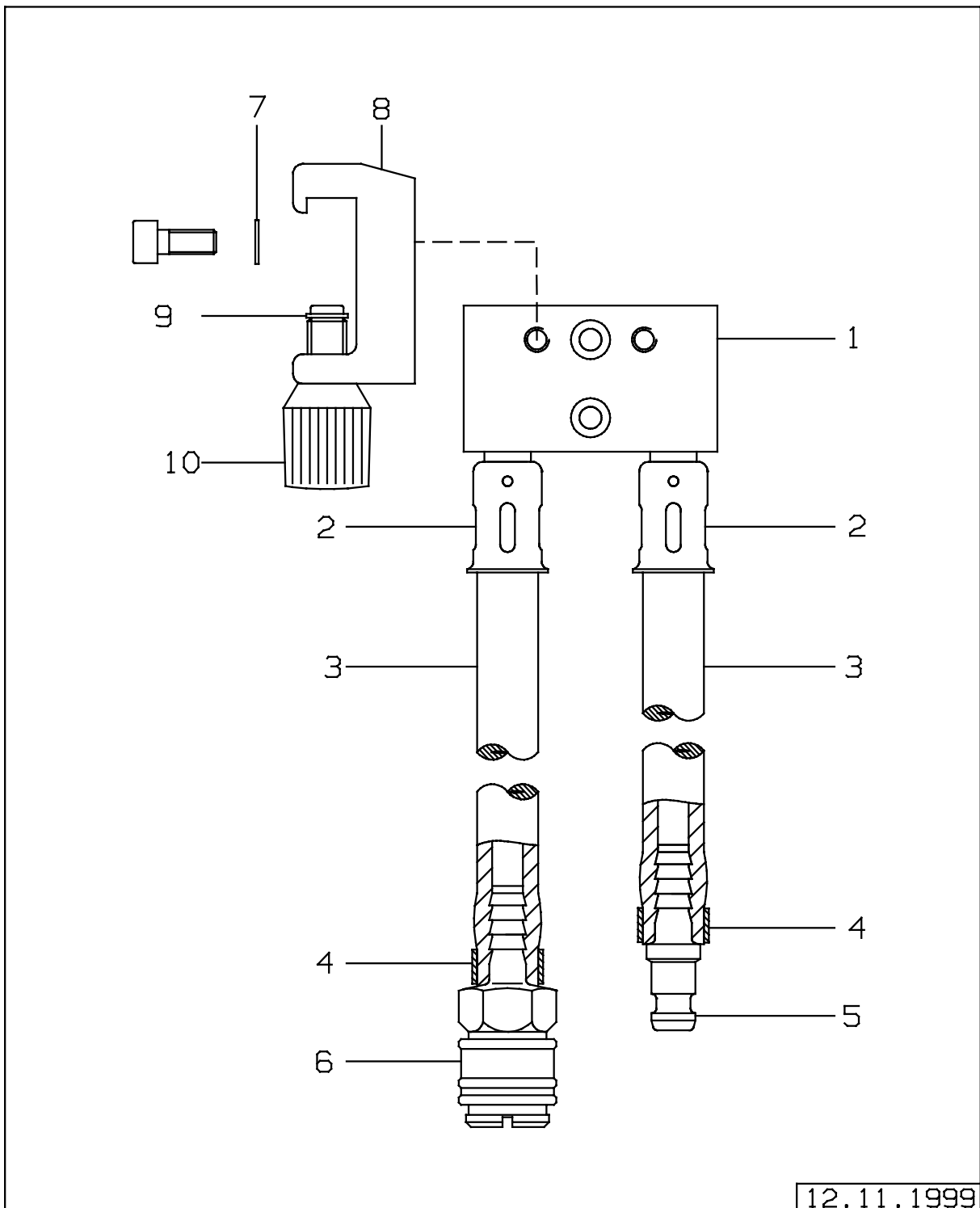
**Bild/Picture 10**



<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1-9	SCHLAUCHANSCHLUSS HOSE CONNECTION		M23150	
1-2	ANSCHLUSSTUECK CONNECTION	M22907		
2	SCHLIESSRING CLOSING RING	2M10789		
3	SCHLAUCHSCHELLE HOSE CLIP		RM08365	
4	SCHLAUCH 6,3X3 CR EINL.SW HOSE 6,3X3 CR INSERT SW		1207989	
5	FASSUNG *SCHLAUCHHUELSE* HOLDER FOR HOSE SOCKET		M26950	
6-8	E-SET SCHRAUBANSCHLUSS REP.SET THREADED TERMINAL END		M31487	
6	UEBERWURFSCHRAUBE UNION SCREW	M30501		
7-9	E-SET SCHRAUBANSCHLUSS FRISCH. REP.SET THREADED TERMINAL END		M30655	
7	TUELLE SOCKET	M29186		
8	DICHTRING PACKING RING		M05128	
9	UEBERWURFMUTTER UNION NUT	M29187		

**SCHLAUCHANSCHLUSS**  
HOSE CONNECTION

**Bild/Picture 11**



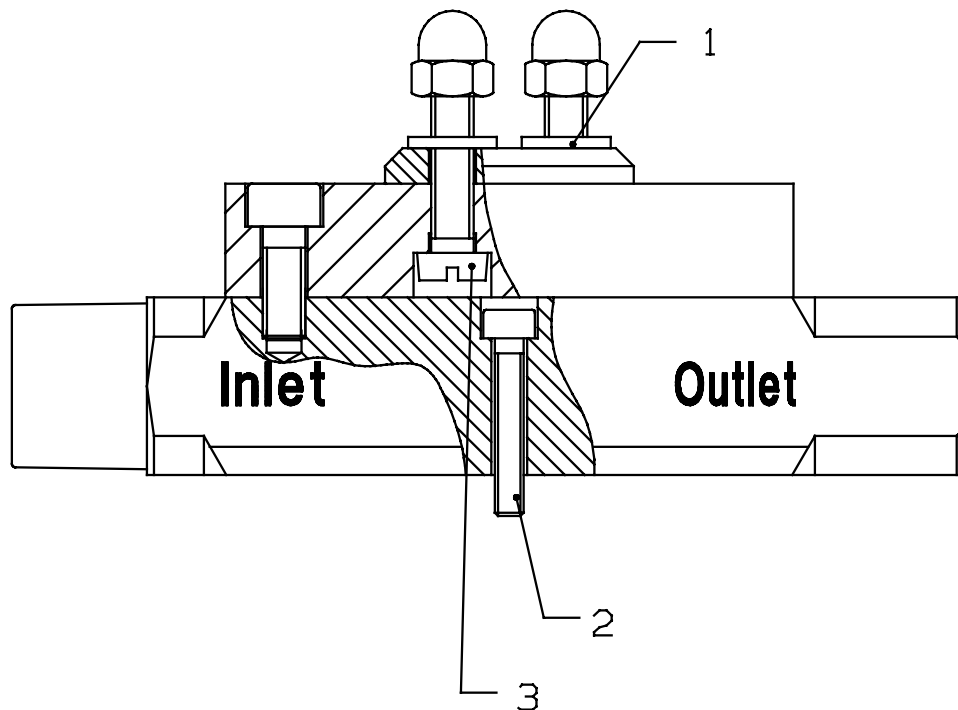
12.11.1999



<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1-7	SCHLAUCHANSCHLUSS HOSE CONNECTION		M23779	
1	ANSCHLUSSGEHAEUSE DISTRIBUTOR		M23778	
2	FASSUNG *SCHLAUCHHUELSE* HOLDER FOR HOSE SOCKET		M26950	
3	SCHLAUCH 6,3X3 CR EINL.SW HOSE 6,3X3 CR INSERT SW		1207989	
4	SCHLAUCHSCHELLE HOSE CLIP		RM08365	
5-6	E-SET STECKKUPPLUNG REP.SET COUPLER PLUG		M23641	
5	SCHLAUCHSTECKNIPPEL HOSE PLUG-NIPPLE	M22687		
6	KUPPLUNG M.SCHLAUCHANSCHLUSS COUPLING W. HOSE CONNECTION	M17972		
7	FÄCHERSCHEIBE A5,3 DIN6798 SERR.LOCK WASHER A5,3 DIN6798	1335960		
8-10	SCHIENENKLAUE SCREW-TYPE CLAMP		M20650	
8	HALTER SUPPORT	2M85190		
9	SICHERUNGSSCHEIBE 5 DIN 6799 THRUST WASHER 5 DIN 6799	1326406		50
10	KLEMMSCHRAUBE,UGR. ADJUSTING SCREW		M20647	

**KONUSADAPTER ISO**  
CAGEMOUNT

**Bild/Picture 12**



27.08.2001

<b>Position Item No.</b>	<b>Benennung Description</b>	<b>Sach-Nr. Part No.</b>	<b>Bestell-Nr. Order-Code</b>	<b>Packung Quantity</b>
1-3	KONUSADAPTER ISO CAGEMOUNT		M35059	
1	SCHEIBE B 6,4 DIN 125-A4 WASHER B 6,4 DIN 125-A4		1330705	
2	ZYLINDERSCHRAUBE M4X25 DIN912 SCREW M4X25 DIN 912		1343947	
3	SCHRAUBE AM6X30 DIN84 SCREW AM6X30 DIN84		1333887	25

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Subject to modification.

Will not be replaced in the event of modifications.