

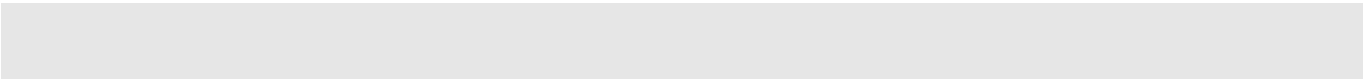
Technical Documentation IPM

Savina Intensive Care Ventilator



Warning

All servicing and/or test procedures on the device require detailed knowledge of this documentation. Use of the device requires detailed knowledge and observance of the relevant Instructions for Use.



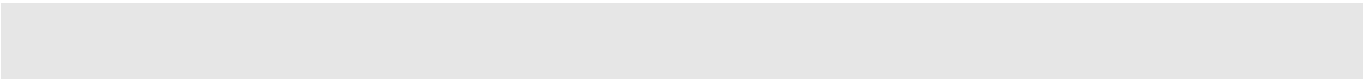
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General

This chapter contains general notes and definitions that are important for the use of this documentation.

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General notes

Notes on use

Read through the following notes thoroughly before applying this documentation.

Dräger reserves the right to make changes to the device and/or to this documentation without prior notice. This documentation is intended solely as an information resource for experts.

Copyright and other protected rights

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Definitions

WARNING!

A WARNING statement provides important information about a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

A CAUTION statement provides important information about a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to the user or patient or in damage to the medical device or other property.

NOTE

A NOTE provides additional information intended to avoid inconvenience during operation and/or servicing.

Inspection	=	Identification of actual condition
Maintenance	=	Measures to maintain the specified condition
Repair	=	Measures to restore specified condition
Servicing	=	Inspection, maintenance, repair

General safety precautions

Read through each section thoroughly before beginning servicing. Always use the correct tools and the specified test equipment. Otherwise the device may not work correctly or may be damaged.

WARNING!

Improper servicing

If the medical product is not properly serviced, the safety of the patient and/or the operator may be put at risk.

- Have the medical product checked and maintained on a regular basis by appropriately qualified experts, otherwise the proper functioning of the device may be compromised.
- Have repairs to the medical product carried out only by personnel who have undergone product-specific Dräger training.

NOTE

Dräger recommends entering into a service contract with DrägerService and having all repairs likewise carried out by DrägerService.

WARNING!

Replacement parts not certified by Dräger standards

Dräger cannot guarantee or confirm the operational safety of third-party replacement parts used on the device.

- Use only replacement parts certified to Dräger standards for servicing of the device, otherwise the proper functioning of the device may be compromised.
- Pay attention to the „Servicing“ section of the Instructions for Use.

WARNING!

Non-conforming test values

If test values do not conform to specifications, the safety of the patient may be put at risk.

- Do not put the device into operation if test values do not conform to specifications.
- Contact your local service organization.

WARNING!

Impermissible modifications to the device

If impermissible modifications are made to the device, the safety of the patient may be put at risk.

- Do not modify the device without Dräger's permission.

WARNING!

Risk of infection

The device may transmit pathogens following use on the patient.

- Before carrying out any servicing, ensure that the device and its components have been handed over by the user cleaned and disinfected.
- Service only cleaned and disinfected devices and device components.

General

General notes

WARNING!

Risk to patients

- Ensure that no patient is connected to the device before starting maintenance or repair work.

NOTE

Where reference is made to legislation, regulations and standards, in respect of devices used and serviced in Germany they are based on the laws of Germany. Users and technicians in other countries must comply with their national laws and/or international standards.

Function descriptions

This chapter contains descriptions of the device's technical functions.

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Function descriptions

Function description

Function description

General information

The Savina is a long-term ventilator unit designed for patients with a tidal volume of 50 mL and above, and for the following applications:

- Intensive care unit,
- Recovery room,
- Secondary transportation from hospital to hospital,
- Patient transfer within the hospital,
- Transfer flights.

Functional principle

The Savina generates the compressed air for ventilation with a blower, which means the Savina is able to ventilate without any connection of compressed air or oxygen. A controllable valve is switched in parallel with the blower to regulate the pre-set ventilation parameters. The valve opens or closes according to the pre-set ventilation parameters.

To increase the oxygen concentration in the ventilatory gas, an oxygen concentrator, e.g. a Permax SilentCare, can be connected. If compressed oxygen is connected to the Savina, the oxygen concentration of the ventilating gas can be precisely metered. The oxygen concentration is then metered internally with sensors, the associated electronics, and a bank of valves.

Monitoring

The Savina has the following monitoring system:

Measured values	Additional information
Airway pressure measurement	
Maximum airway pressure	P _{peak}
Plateau pressure	P _{plat}
Positive end-expiratory pressure	PEEP
Mean airway pressure	P _{mean}
Range	0 to 99mbar
Resolution	1mbar
Accuracy	+/-2mbar

Inspiratory O2 measurement	
Inspiratory O2 concentration	FiO2
Range	18 to 100 Vol.%O2
Resolution	1 Vol.%O2
Accuracy with calibration in "HPO" mode	+/-3Vol.%O2*
Accuracy with calibration in "LPO" mode	+/-8Vol.%O2*
Flow measurement	
Inspiratory peak flow FlowPeak	
Range	0 to 196 L/min
Resolution	1 L/min
Accuracy	+/-8% from measured value or +/- 0.5 L/min, the higher value applies
Minute volume	
Spontaneously breathed minute volume (MVspn)	
Range	0 to 99 L/min, BTPS**
Resolution	0.1 L/min
Accuracy	+/-8% from measured value or +/- 0.3L/min, the higher value applies
T0...90	approx. 35 seconds
Leakage minute volume (MVleak) referred to the inspiratory minute volume (only in Mask/NIV mode)	
Range	0 to 100%
Resolution	1%, leakage of less than 10% cannot be adequately resolved; 0% is displayed.
Accuracy	+/-18% from measured value or +/- 0.3 L/min, the higher value applies

Function descriptions

Function description

Expiratory measured tidal volume (VTe)	
Range	0 to 3999 mL, BTPS**
Resolution	1 mL
Accuracy	+/-8% from measured value or +/- 10 mL, the higher value applies
Leakage-compensated inspiratory measured tidal volume VTpat (only in "Mask/NIV" mode)	
Range	0 to 3999 mL, BTPS**
Resolution	1 mL
Accuracy	+/-18% from measured value or +/- 20 mL, the higher value applies
Frequency measurement	
Spontaneously breathed frequency (fspn)	
Total frequency (ftot)	
Range	0 to 150 L/min
Resolution	1/min
Accuracy	+/-1/min
T0...90	approx. 35 seconds
Inspiratory/expiratory (I:E) time ratio	
Range	1:150 to 150:1
Resolution	0.1
Accuracy	+/-6% from measured value
Inspiration time (Tinsp)	
Range	0 to 15 seconds
Resolution	0.1 second
Accuracy	0.1 second
Plateau time (Tplat)	
Range	0 to 10 seconds
Resolution	0.1 second
Accuracy	0.1 second

Resistance R	
Range	3 to 100 mbar/L/s
Resolution	1 mbar/L/s
Accuracy	+/-2.5 mbar/L/s or +/-20%, the higher value applies
Compliance C	
Range	3 to 200 mL/mbar
Resolution	1 mL/mbar
Accuracy	+/-2 mL/mbar or +/-20%, the higher value applies
Respiratory gas temperature measurement (NTC sensor)	
Range	18 to 48 °C
Resolution	1 °C
Accuracy	+/-1 °C
Curve view	
Airway pressure Paw (t)	-5 to 100 mbar
Flow (t)	-200 to 200 L/min

* Maximum possible basic measurement error of O₂ measurement with a nominal concentration of 100 Vol.%O₂ and assuming the worst-case ambient conditions in the hospital.

** BTPS Body Temperature Pressure Saturated. Measurements referred to conditions of the patient's lung, body temperature 37 °C, ambient pressure, water vapour saturated gas.

Monitoring

Measured values	Additional information
Expiratory minute volume (MV)	
Setting range (alarm upper limit)	If the upper alarm limit has been exceeded. 41 to 2 L/min, in 0.1 L/min increments.
Setting range (alarm lower limit)	If the value has fallen below the lower alarm limit. 0.5 to 40 L/min, in 0.1 L/min increments.

Function descriptions

Function description

<p>Airway pressure (Paw)</p> <p>Setting range (alarm upper limit)</p> <p>Setting range (alarm lower limit)</p> <p>Tdisconnect delay in case of "Paw low" alarm (only in Mask/NIV mode)</p>	<p>If the Paw high value has been exceeded. 10 to 100 mbar.</p> <p>If the value "PEEP +5mbar" (coupled with the setting for PEEP) has not been exceeded for at least 0.1 seconds in two consecutive mandatory breaths.</p> <p>0 to 60 seconds</p>
<p>Inspiratory O2 concentration FiO2 (HPO mode)</p> <p>Alarm upper alarm limit</p> <p>Alarm lower alarm limit</p> <p>Range</p>	<p>If the upper alarm limit has been exceeded for at least 20 seconds.</p> <p>If the value has been below the lower alarm limit for at least 20 seconds.</p> <p>Both alarm limits are automatically assigned to the setting:</p> <p>Below 60 Vol.% with +/-4 Vol.%</p> <p>Above 60 Vol.% with +/-6 Vol.%</p>
<p>Inspiratory O2 concentration FiO2 (LPO mode)</p> <p>Alarm limits</p>	<p>are set manually</p>
<p>Tachypnoea monitoring</p> <p>Alarm</p> <p>Setting range</p>	<p>if the total frequency is exceeded during spontaneous breathing</p> <p>10 to 120 1/min</p>
<p>Apnea alarm time</p> <p>Alarm</p> <p>Setting range</p>	<p>if no breathing activity is detected</p> <p>15 to 60 seconds, adjustable in 1-second increments</p>

Inspiratory tidal volume	
Alarm	if the delivered tidal volume VT exceeds the alarm limit
Setting range	0.06 to 4.0 L

Block diagrams

In the following the block diagrams for „Savina with monochrome display (b/w display)“ and „Savina with TFT colour display“ are described.

Savina with monochrome display (b/w display)

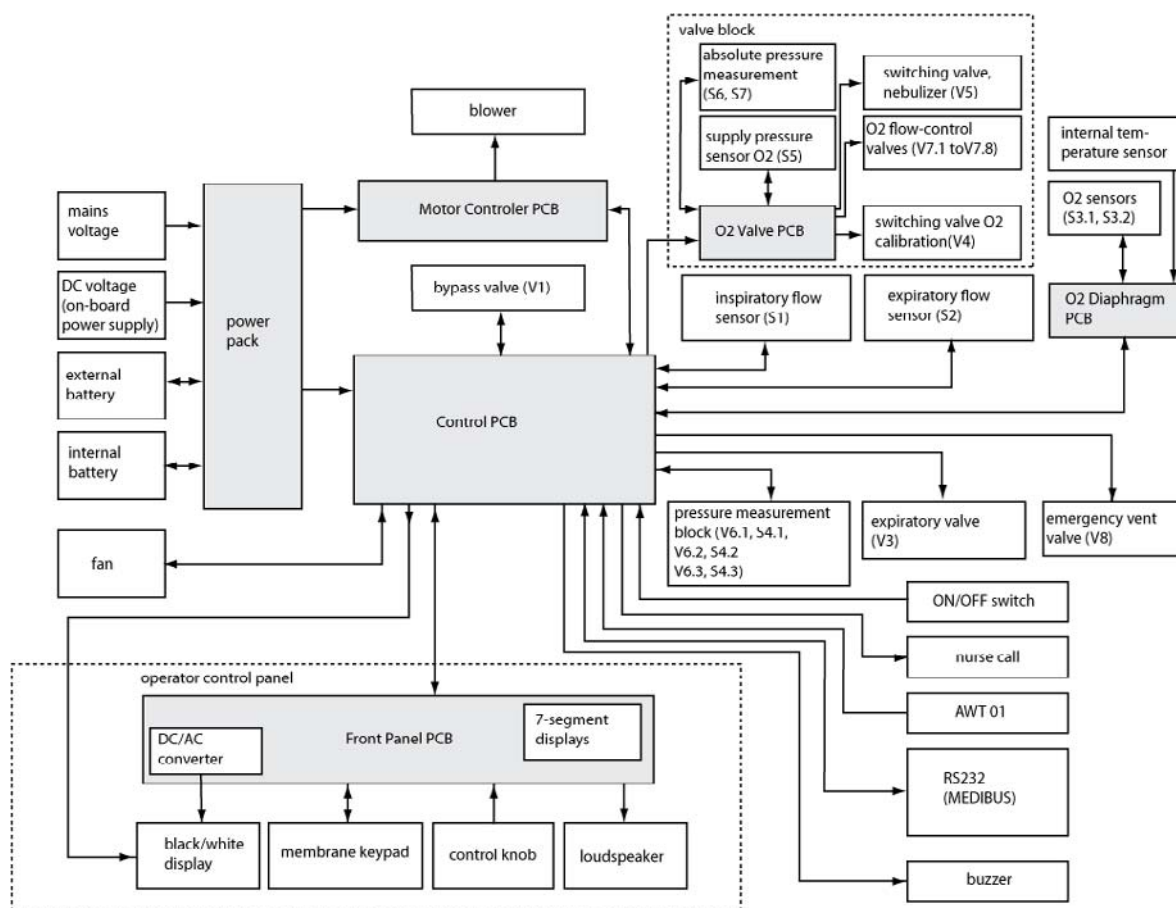


Fig. 1 Block diagram of the electronics with control panel (monochrome display)

Function descriptions

Function description

Savina with TFT colour display

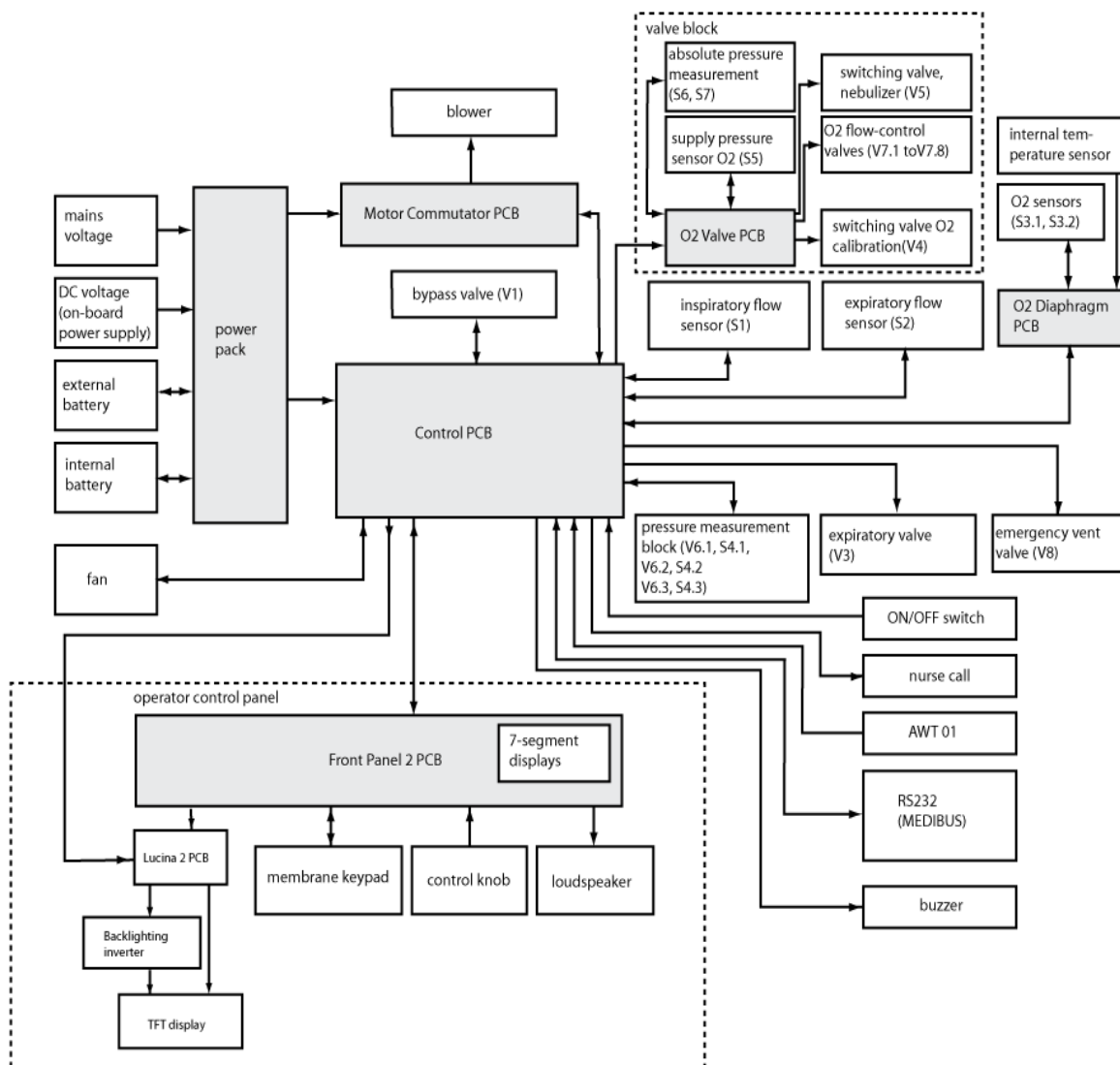


Fig. 2 Block diagram of electronic assembly with control panel (TFT colour display)

Main components

The Savina consists of the electronics, the control panel, and the pneumatic assembly, containing the following principal components:

Electronic assembly

- Power supply unit
- Control PCB
- Motor actuator
- O2 Valve PCB
- O2 Diaphragm PCB

Control panel

- Display (control panel with monochrome display, control panel with TFT colour display)

Pneumatic assembly

- Plug-in unit
- Valve block
- Inspiratory block
- Pressure measuring block
- Patient system
- Flow sensors

Electronic assembly

Power supply unit

The power supply unit delivers the supply voltages for the Savina. The input voltage range of the power supply unit is 100 V to 240 V AC and 50 Hz to 60 Hz. However, the power supply unit can also be operated with an external rechargeable battery (12 V or 24 V) or with an external on-board - ambulance/helicopter - power supply (10.5 V to 36 V).

The connection for the alternating voltage is made by a power cable. The connection for the external rechargeable battery or the external on-board power supply is made by a coded plug.

The power supply unit actuates the three „Mains power“, „External battery or on-board power supply“ and „Internal battery“ LEDs. The LEDs are mounted on the keypad of the control panel, and indicate the current operating status.

The Savina includes 2 internal rechargeable batteries (2 x 12 V) which enable uninterrupted operation in the event of a complete failure of external power. The internal rechargeable batteries supply the O2 sensors with power, even when the Savina is switched off. As a result, valid O2 values are available immediately on power-up.

The power supply unit supplies the following output voltages:

- +5 V
- -15 V
- +15 V
- +24 V
- +48 V

The output voltages are short-circuit-proof and stable at no-load.

The output voltages are generated according to the following priority, dependent on the input voltages:

Input voltage	Priority	Action
AC voltage	1	Charge external and internal batteries, and maintain the charge.
External on-board power supply	2	Charge internal batteries, and maintain the charge.
External battery/batteries	3	Charge internal batteries, and maintain the charge.
Internal batteries	4	-

The fan cools the power pack. The heated air removes excess oxygen from the control panel and warms the patient system.

Control PCB

The Control PCB is the central „control and monitoring unit“ of the Savina. It has two separate processor systems (the master and front processors).

The program memories are flash EPROMs. The flash EPROMs can be programmed with a laptop connected to the serial port of the Savina (software download).

An EEPROM is provided for each processor system for storage of changeable, non-volatile data.

The calibration data of the sensors, fans etc. are stored by the master's EEPROM.

The EEPROM of the front processor stores the software options, device IDs, safety parameters and settings such as contrast, volume etc., as well as a „backup copy“ of the operating hours reading. The EEPROM of the front processor is plugged in and, if the board needs to be replaced, must be mounted on the new board.

The real-time clock generates the time and date information. The real-time clock has an internal battery.

The Control PCB contains the following functions:

- Processing of the signals from the sensors (O₂, flow, pressure, temperature),
- Control of the blower and valves
- Monitoring of the unit functions and the supply voltages
- Actuation of the displays,
- Keypad interpretation,
- Provision of the internal and external interfaces

Function descriptions

Electronic assembly

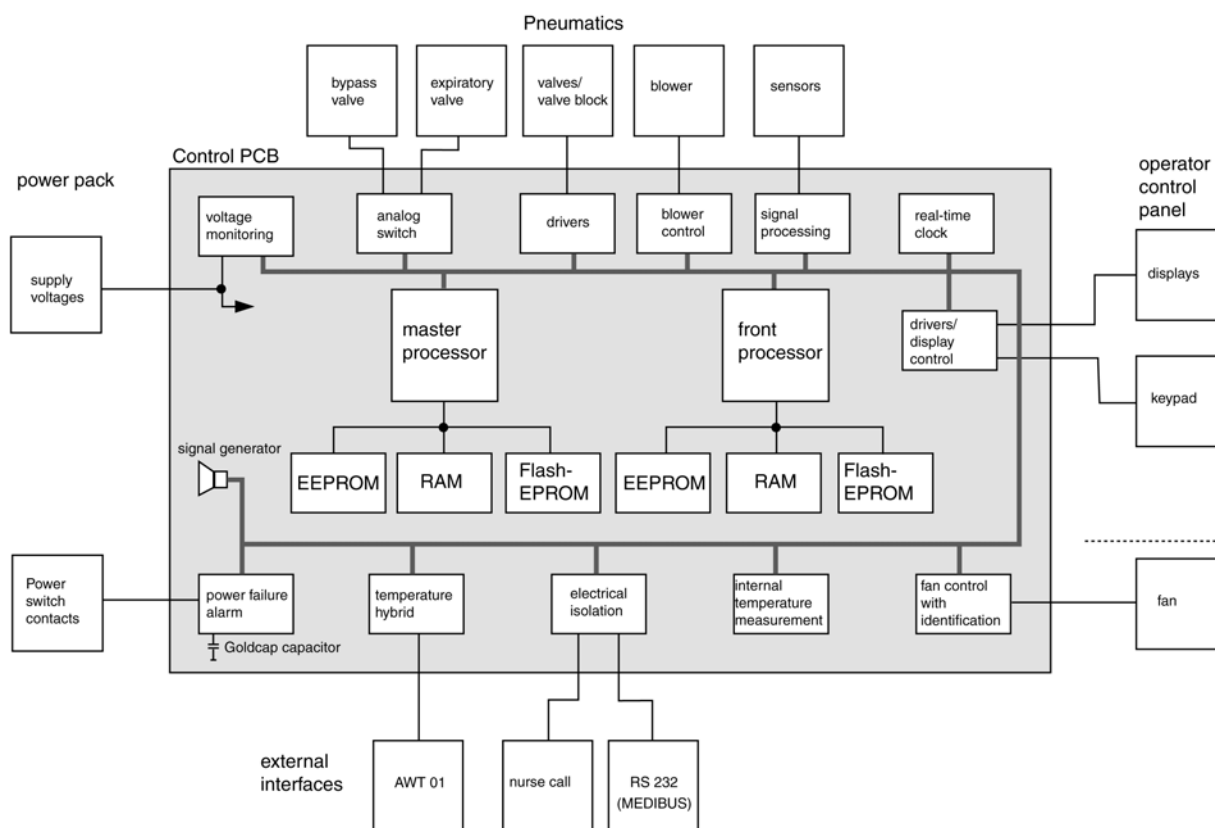


Fig. 3 Control PCB block diagram

Motor actuator

The motor actuator controls the blower motor. The motor actuator is located in a self-contained housing. The supply voltage for the motor actuator is +48 V and is protected by a fuse (6.3AT).

The input voltage range of the motor actuator is 12 to 52.5 V. The rotation speed is set by the Control PCB. The control voltage for the rotation speed is 0 V to +5.00 V, corresponding to a rotation speed of 0 to 12,000 rpm. The rotation speed range is 4,000 to 12,000 rpm.

The motor actuator delivers the „actual speed signal“ and forwards it to the Control PCB. The „actual value signal“ is 6 pulses per rotation. In the event of discrepancies in the rotation speed the Control PCB adjusts the speed according to the deviation.

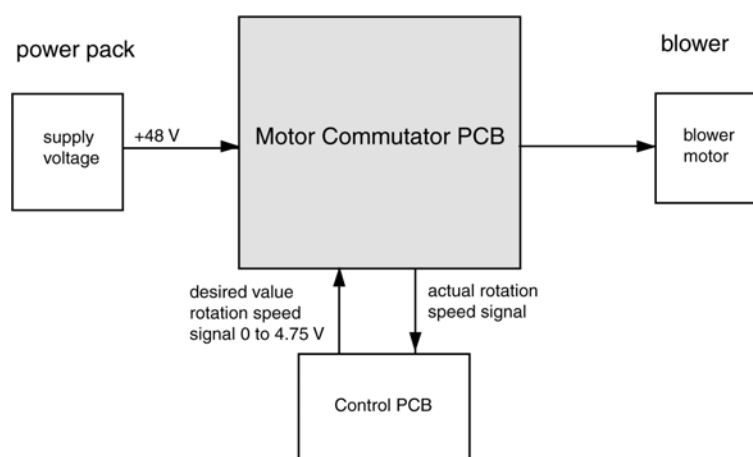


Fig. 4 Block diagram of the motor actuator

O2 Valve PCB

The O2 Valve PCB holds the pressure sensors (absolute pressure S6 and S7 and O2 supply pressure S5), the actuator for the O2 calibrating valve and the nebulizer valve and the actuator for the valve block.

The signals of the pressure sensors are amplified and routed to the Control PCB. The supply voltage (+5 V) for the pressure sensors is generated by the O2 Valve PCB.

The valve block valves, the O2 calibrating valve and the nebulizer valve can be operated separately by an electronic switch. They are actuated by the Control PCB.

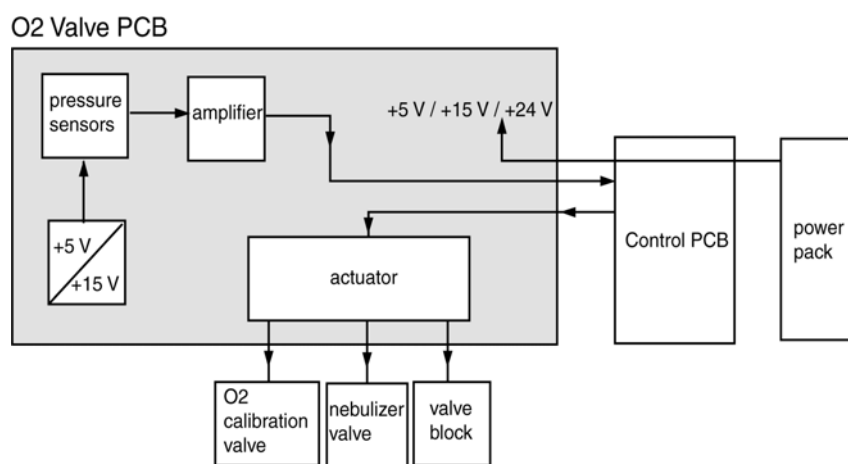


Fig. 5 Block diagram of the O2 Valve PCB

O2 Diaphragm PCB

The O2 Diaphragm PCB amplifies the signals from the O2 sensors and measures the temperature of the O2 sensors and of the respiratory gas in the inspiration block. The temperature of the O2 sensors is required to compensate for the temperature-sensitive O2 measurements. The calibration data from the sensors are stored on the Control PCB in an EEPROM. The reference voltage for the O2 sensors is generated from the voltage of the rechargeable batteries.

The supply voltages for the O2 Diaphragm PCB are +5 V and +15 V.

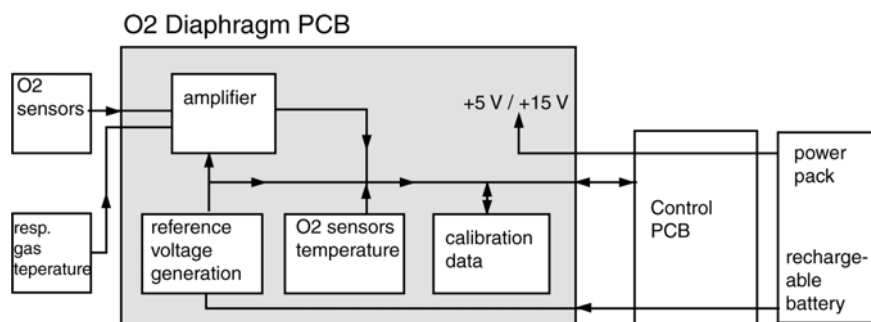


Fig. 6 O2 Diaphragm PCB block diagram

Fan

The fan takes in ambient air through the cooler and cools the blower motor. The air flow removes excess oxygen from the unit.

The supply voltage for the fan is +24 V. The Control PCB regulates the speed of the fan.

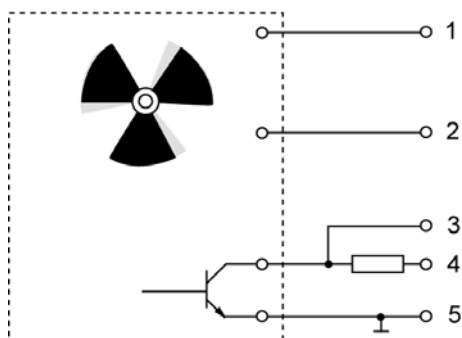


Fig. 7 Fan control

Item	Designation
1	Supply voltage
2	Target speed
3	Speed signal
4	Sensor supply voltage
5	Ground

Control panel with mono-
chrome display

Control panel

The control panel is the interface between the unit and the user. The ventilation parameters are entered via the control panel and displayed on the mono-
chrome display (b/w display).

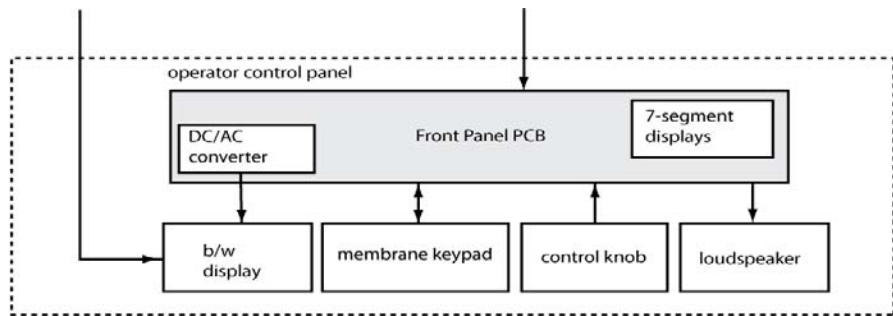


Fig. 8 Block diagram of the control panel with monochrome display

Front Panel PCB

The Front Panel PCB contains the 7-segment displays for the pre-set ventilation parameters, the drivers for the key LEDs, the drivers for interpretation of the keys and the shaft encoder, and the voltage generator for backlighting of the monochrome display. The voltage generation for the backlight can be switched on and off from the Control PCB.

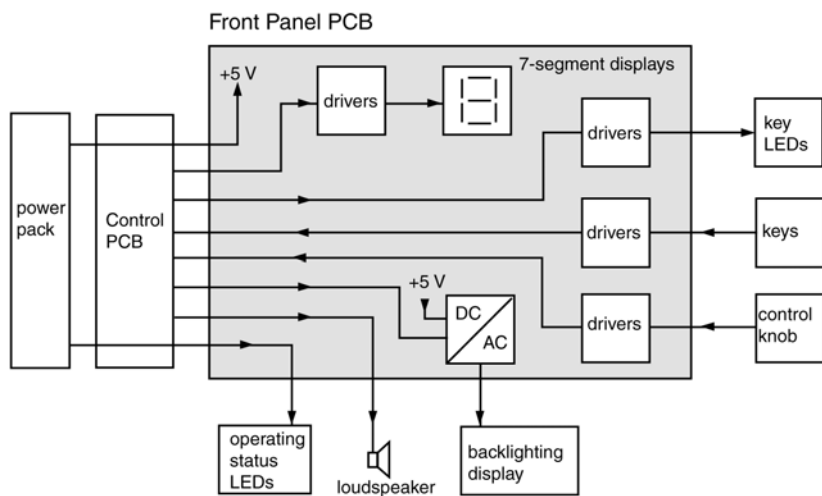


Fig. 9 Block diagram of the Front Panel PCB

Membrane keypad

The keypad features the control keys and the associated LEDs.

Monochrome display

The monochrome display (b/w display) displays the patient parameters and the warning messages. The monochrome display is actuated by the Control PCB; the monochrome display backlight is actuated by the Front Panel PCB. The resolution of the monochrome display is 240x128 pixels. The voltage supply is +5 V and -15 V.

Rotary encoder

The rotary knob is used to set and acknowledge the ventilation parameters. The rotary knob transmits square signals to the Front Panel PCB as it rotates, and the signals are then evaluated by the Control PCB. The voltage supply is +5 V.

Control panel with TFT display

Control panel

The control panel is the interface between the unit and the user. It is used to enter and display the ventilation parameters.

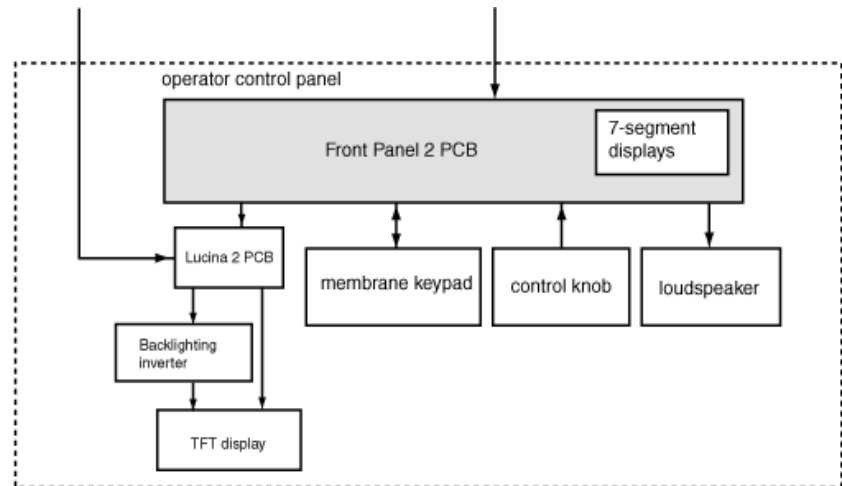


Fig. 10 Block diagram of the control panel with TFT display

Front Panel 2 PCB

The Front Panel 2 PCB contains the 7-segment displays for the pre-set ventilation parameters, the drivers for the key LEDs, and the drivers for interpretation of the keys and the rotary knob.

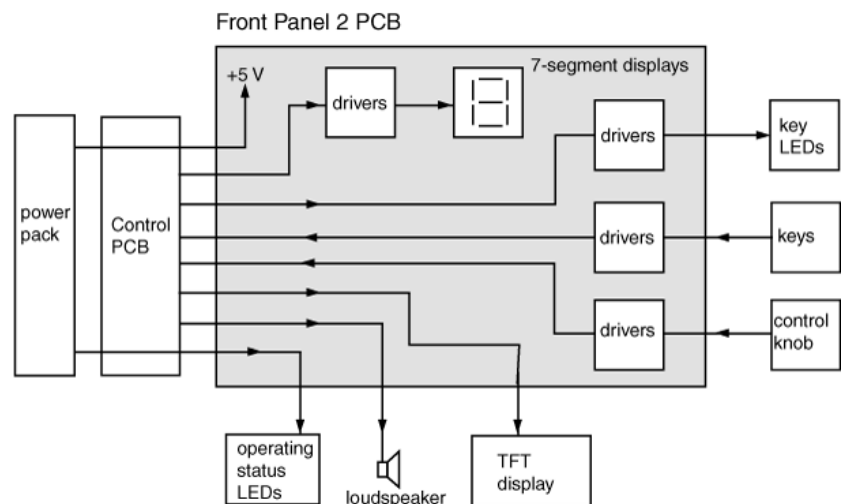


Fig. 11 Block diagram of Front Panel 2 PCB

Membrane keypad

The keypad features the control keys and the associated LEDs.

TFT display

The TFT display comprises the display, the Lucina 2 PCB, and the backlight inverter.

The TFT display has a resolution of 800x480 pixels.

The Lucina 2 PCB (control board) is connected to the Control PCB by means of a 20-pin ribbon cable. The Lucina 2 PCB has a FPGA (field programmable gate array) which converts the 240x128 monochrome picture into 720x384 colour picture and displays it on the TFT display. One monochrome pixel is displayed as 9 (3x3) pixels on the colour display. Colour conversion is not

Function descriptions

Electronic assembly

carried out by the firmware, but by detection of the different screen layouts. Colouring and text are fine-tuned by specific algorithms thus creating a higher-resolution colour picture.

The backlight inverter generates the high voltage for the display backlight.

Rotary encoder

The rotary knob is used to set and acknowledge the ventilation parameters. The rotary knob transmits square signals to the Front Panel PCB as it rotates, and the signals are then evaluated by the Control PCB. The voltage supply is +5 V.

Pneumatic assembly

Functional diagram

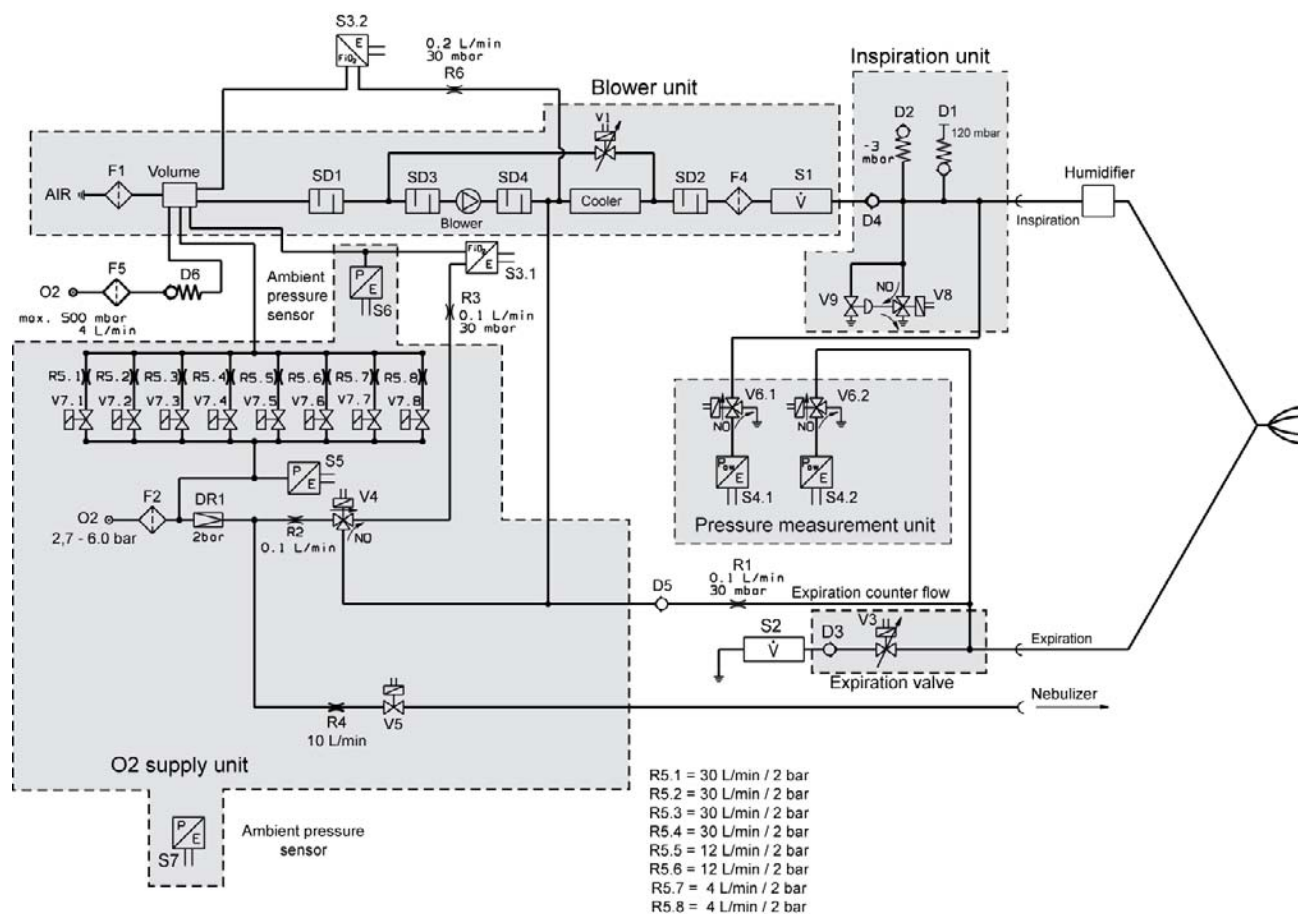


Fig. 12 Functional diagram 8412996, revision 23

Item no.	Designation
F1	Micro-filter (AIR)
F2	Filter (O2)
F4	Filter (inspiratory flow sensor)
F5	Filter (filter element)
SD1	Suction sound insulator
SD2	Sound insulator
DR1	Supply pressure regulator - oxygen
Blower	Blower and motor
Cooler	Cooler
V1	Reduction valve
V3	Expiratory valve
V4	Switching valve (oxygen compensation)

Function descriptions

Pneumatic assembly

Item no.	Designation
V5	Switching valve (nebulizer)
V6.1	Calibration valve (inspiratory airway pressure sensor).
V6.2	Calibration valve (expiratory airway pressure sensor).
V6.3	Calibration valve, inspiratory airway pressure sensor (The airway pressure sensor regulates the blower. Only available in the first lot of units).
V7.1 - V7.8	Oxygen metering valves
V8	Pilot valve for emergency vent valve
V9	Emergency vent valve
S1	Inspiratory flow sensor
S2	Expiratory flow sensor
S3.1	Oxygen sensor 1 (measurement and control)
S3.2	Oxygen sensor 2 (monitoring)
S4.1	Inspiratory airway pressure sensor (located in inspiratory branch).
S4.2	Expiratory airway pressure sensor (located in expiratory branch)
S5	Supply pressure sensor (oxygen)
S6	Pressure sensor 1 (absolute pressure)
S7	Pressure sensor 2 (absolute pressure)
D1	Safety pressure-limiting valve (passive, approx. 120 mbar)
D2	Emergency air valve (-3 mbar to -6 mbar)
D3	Expiratory non-return valve
D4	Inspiratory non-return valve
D5	Flush flow non-return valve
D6	Non-return valve (LPO)
R1	Flush flow metering unit (0.1 L/min at 30 mbar)
R2	O2 calibration metering unit (0.1 L/min, integrated in valve block)
R3	Metering unit for O2 measurement (0.2 L/min at 30 mbar, sensor 3.1)
R4	Metering unit for nebulizer (10 L/min, integrated in valve block)
R5.1 - R5.8	Metering units for the oxygen metering valves
R6	Metering unit for O2 measurement (0.2 L/min at 30 mbar, sensor 3.2)

The pneumatic system comprises the following principal components (see also pneumatics diagram):

- Plug-in unit
- Valve block
- Inspiratory block
- Pressure measuring block
- Patient system
- Flow sensors

The following description details the functions of the main components.

Device functions

Ventilation function

The blower draws ambient air through an ambient air filter F1 into a mixing chamber. The blower compresses the gas to a positive pressure of max. 140 mbar at a flow rate of up to 180 L/min. The blower is run at constant rotation speed - that is, the speed is not varied in the course of a breath. The inspiratory pressure is regulated by means of the bypass valve. The combination of the blower and the bypass valve function thus represents a pressure source.

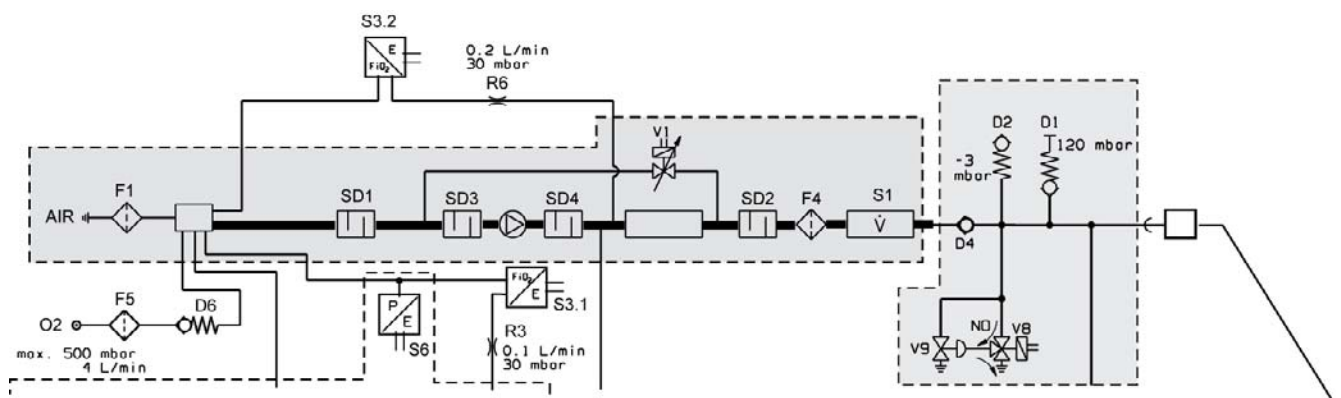


Fig. 13 Detail view of functional diagram; ventilation function

On the inlet and outlet sides of the blower there are mufflers SD1 and SD2, which reduce the sound level of the blower.

The bypass valve V1 is operated such that the desired respiratory pressure is applied to the blower outlet, and thus to the patient. In the inspiratory phase when a high flow rate is required by the patient, part or all of the gas flows from the blower outlet to the patient; the gas flow in the return line is reduced. In the expiratory phase the entirety of the blower gas flows via the return line.

A cooler reduces the respiratory gas temperature down to a permissible range. A fan blows cooling air onto the surface of the cooler to dissipate the heat from the cooler.

Expiration occurs via a directly operated valve V3.

The expiratory valve has two functions:

- Controls the PEEP during expiration
- Closes the breathing system during inspiration

O2 mixture with high pressure

In order to be able to ventilate with an increased O₂ concentration, the unit must be supplied with 2.7 to 6.0 bar O₂. O₂ is filtered via the intake filter F2. With the aid of a digital valve bank consisting of 8 digital solenoid valves, O₂ is metered into a volume (mixing chamber). The amount of metered O₂ depends on the pre-set O₂ concentration and on the inspiratory flow rate measured by the flow sensor S1. The addition of O₂ is regulated in a closed loop. In the process, the inspiratory O₂ concentration is measured by the O₂ sensor S 3.1.

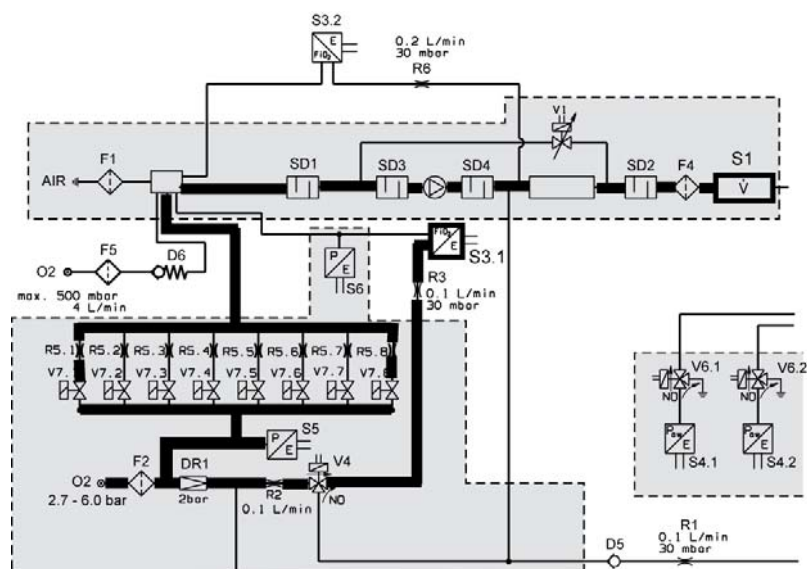


Fig. 14 Detail view of functional diagram; O₂ mixture with O₂ high pressure

O2 mixture with O2 low pressure (LPO option)

CAUTION

Connect only O2 low pressure sources without humidifier to the Savina!

An O2 low pressure source without humidifier feeds the oxygen into the „LPO“ connection on the back of the unit. The filter (filter element) F5 protects the non-return valve D6 from coarse particles. The oxygen flows from the non-return valve D6 into the volume (mixing chamber). In the volume (mixing chamber) it is mixed with the drawn-in and filtered fresh air.

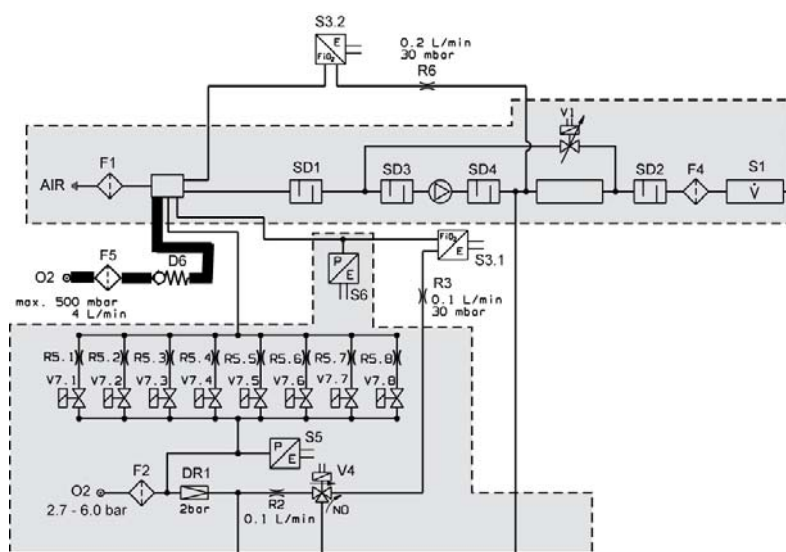


Fig. 15 Detail view of functional diagram; O2 mixture with O2 low pressure

When no O2 low pressure source is connected to the unit, the non-return valve D6 prevents gas from escaping during normal operation.

NOTE

In „LPO“ mode, the valve block in the O2 supply is not actuated.

Pneumatic safety devices

The independent pneumatic safety valve D1 ensures that the ventilation pressure can never rise above the legally prescribed limit of 120 mbar. In the event of inspiratory stenosis the pressure is limited by opening the expiratory valve. The mechanical negative-pressure valve D2 ensures (except in the case of inspiratory stenosis) that the patient can breathe spontaneously from the ambient air in case of a fault.

The emergency vent valve V9 relieves the pressure in the breathing system in a case of expiratory stenosis if the pressure cannot be relieved through the expiratory valve. The pilot valve V8 operates the emergency vent valve V9.

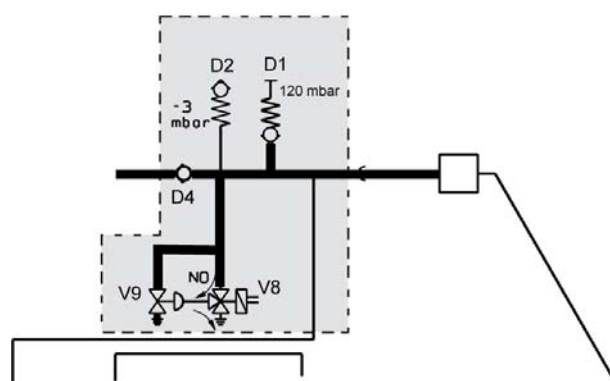


Fig. 16 Detail view of functional diagram; pneumatic safety devices

Drug nebulizer

The drug nebulizer is operated with 100% O₂. The supply pressure regulator DR1 ensures, with widely varying supply pressure (2.7 to 6.0 bar), that the pneumatic drug nebulizer receives a constant supply pressure of 2.0 bar.

When the nebulizer function is active the solenoid valve V5 operates in an „inspiration“ (open position) and „expiration“ (closed position) cycle. When the nebulizer function is inactive valve V5 is permanently closed.

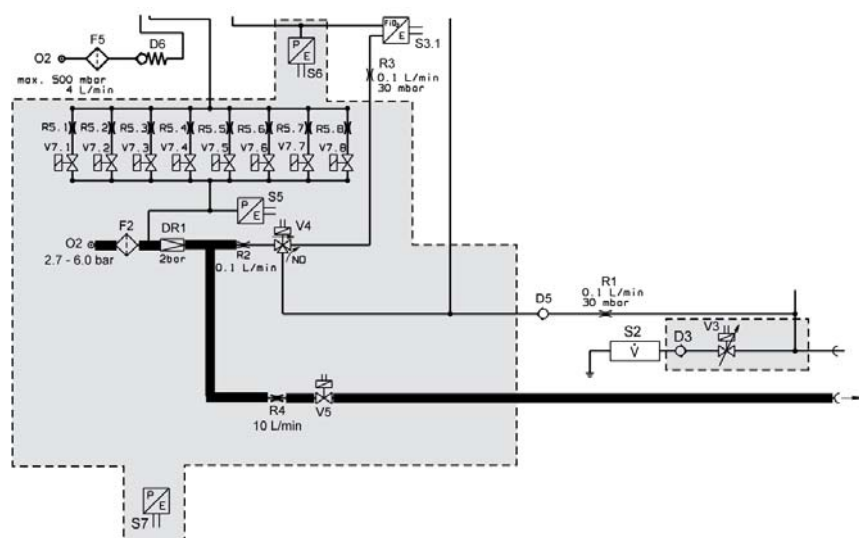


Fig. 17 Detail view of functional diagram; drug nebulizer

O2 calibration function

In normal operation of the unit the solenoid valve V4 is set to „measurement“ - that is, the connection between the inspiration and the oxygen sensor is open. During O2 sensor balancing it opens the way for the oxygen to the sensor. This layout permits online calibration of sensor S3.1 during ventilation. Sensor S3.2 must be calibrated manually (patient disconnected).

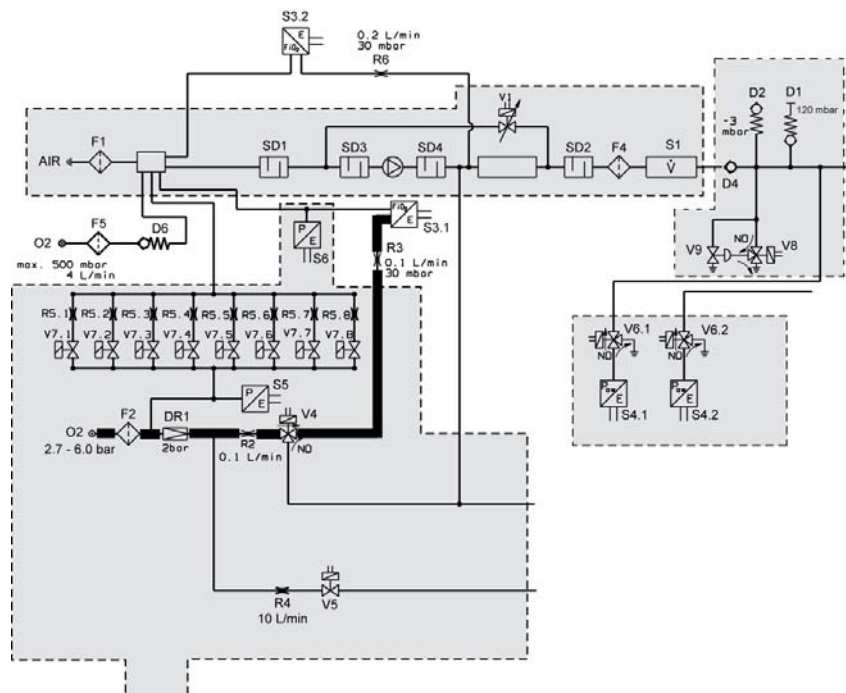


Fig. 18 Detail view of functional diagram; O2 calibration function

O2 sensor detection

The unit is provided with an O2 sensor detection. The O2 sensor detection is not required for the optional „LPO“.

Sensors

The absolute pressure sensor S6 delivers the measured atmospheric pressure value required for O₂ measurement and for volume application. Absolute pressure sensor S7 monitors sensor S6. Sensor S3.1 delivers the signal for the displayed value FiO₂ and the signal for control of the inspiratory O₂ concentration. Sensor S3.2 monitors sensor S3.1.

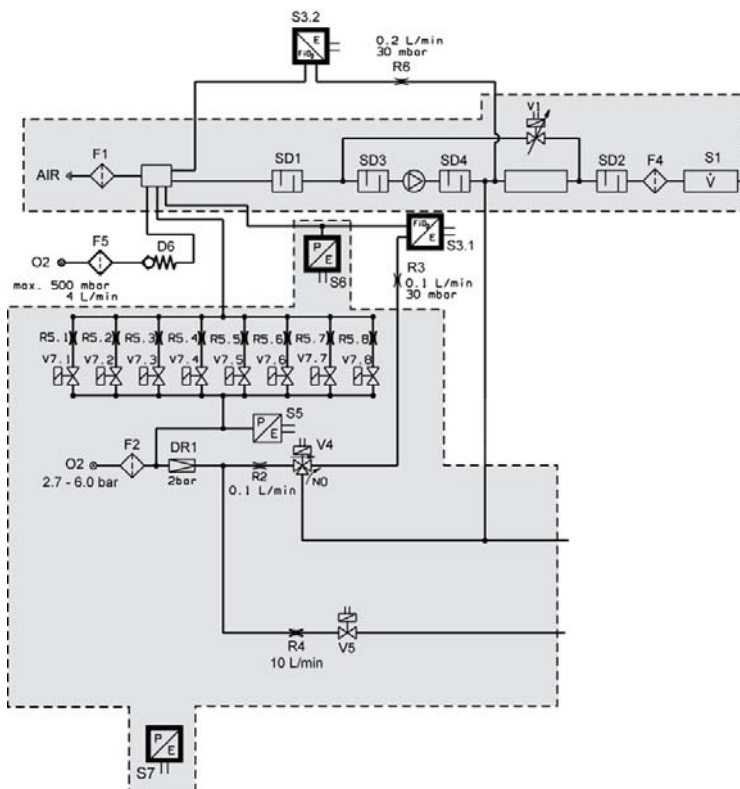


Fig. 19 Detail view of functional diagram; pressure sensors and oxygen sensor

The pressure sensor S4.1 measures the pressure in the inspiratory branch. The sensor signal, in conjunction with the expiratory pressure sensor S4.2, measures, controls and monitors the airway pressure. The airway pressure is

measured on the basis of the measured value from the pressure sensor in the respective no-flow branch. Pressure sensor S4.3 continuously measures the airway pressure. The measured value is required to regulate the blower.

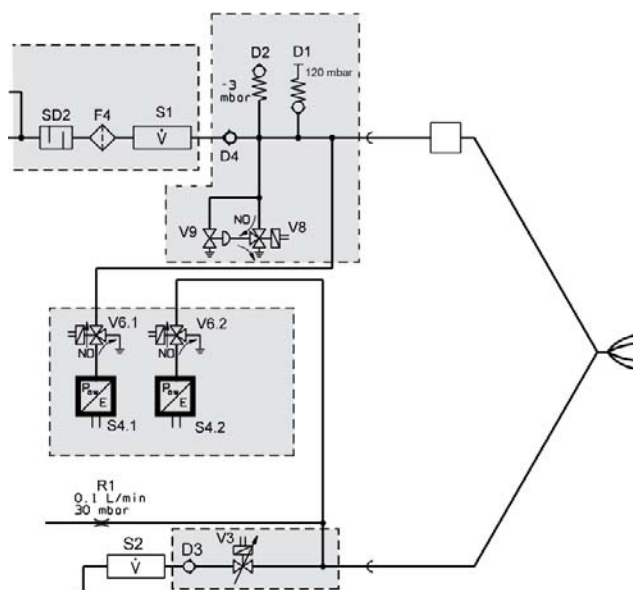


Fig. 20 Detail view of functional diagram; airway pressure sensors

Solenoid valves V6.1, V6.2 and V6.3 calibrate the inspiratory pressure sensors and the expiratory pressure sensor. During calibration, the corresponding valve interrupts the connection to the ventilation circuit and switches the sensor to ambient pressure.

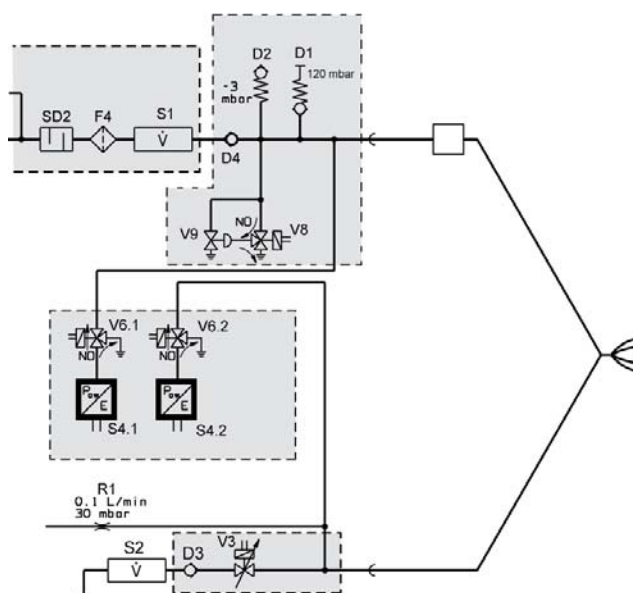
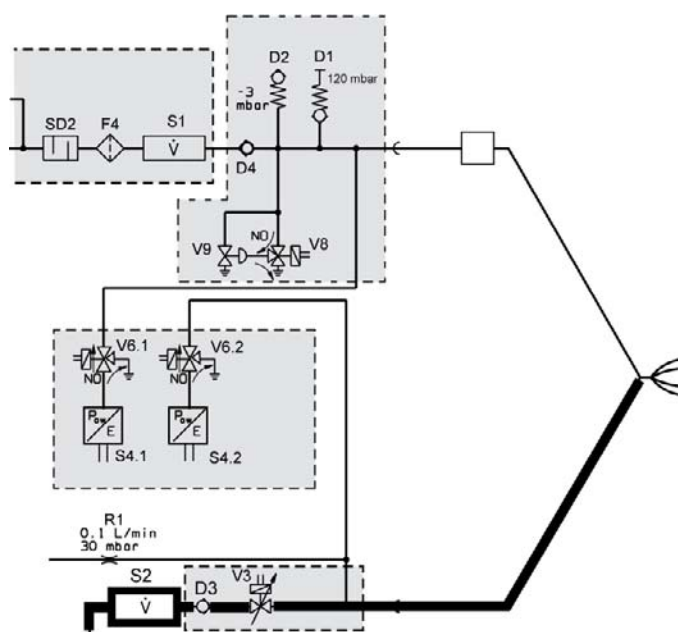


Fig. 21 Detail view of functional diagram; calibration valves

[illegible]

Flow sensor S2 measures the flow via the expiratory valve to the outlet. The flow sensor used is the Spirolog sensor from the Evita series (temperature-compensated hot wire flowmeter with no detection of flow direction). The signal is used for patient monitoring (e.g. minute volume monitoring) among other applications.



Maintenance instructions

This chapter describes the measures required to maintain the specified condition of the device.

Replacing the microfilter	38
Replacing the dust filter set.....	40
Replacing the O2 sensors.....	42
Replacing the diaphragm of the expiratory valve	46

Replacing the microfilter

Introduction

The following section provides a view of the microfilter and describes how to remove and fit it.

View



Fig. 24 Savina rear (filter cover removed); fitting location of microfilter

Removal

1. On both sides press down the catches (Fig. 25/1) against the filter cover (Fig. 25/2) lift the filter cover up towards **A** slightly and detach it.

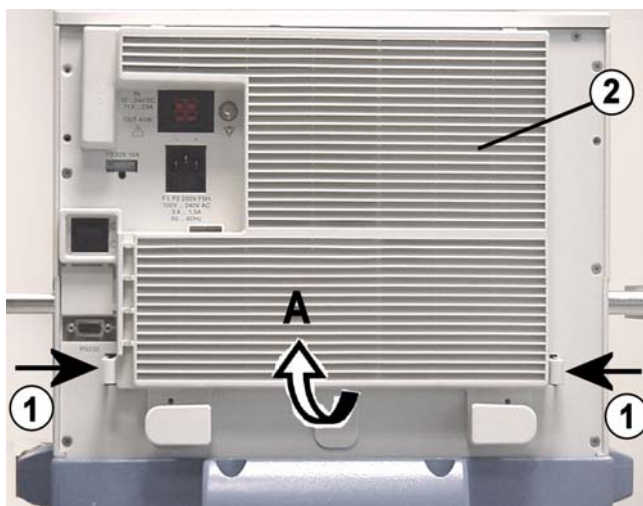


Fig. 25 View of unit rear; filter cover

2. Holding it by the tab (Fig. 26/1), pull the microfilter (Fig. 26/2) out of the mount and dispose of the microfilter in accordance with local waste disposal regulations.



Fig. 26 Savina rear; microfilter

Removal of the microfilter is complete.

Fitting

1. Slot the microfilter in the recesses on the frame and push the microfilter as far as it will go into the mount.
2. Swivel the tab (Fig. 26/1) towards the microfilter (Fig. 26/2).
3. If the power cable is to be installed, place it under the filter cover.
4. Slot the two pins (Fig. 27/1) on the top of the filter cover into the recesses in the rear panel, swing the filter cover down towards **A** and press the catches (Fig. 27/2) into the rear panel until they lock in place.

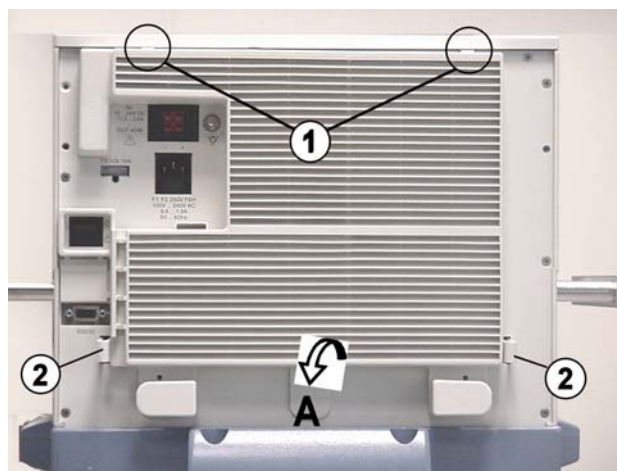


Fig. 27 View of unit rear; pins and filter cover

Fitting of the microfilter is complete.

Maintenance instructions

Replacing the dust filter set

Replacing the dust filter set

Introduction

The following section provides a view of the dust filter set and describes how to remove and fit it.

View

The dust filters ([Fig. 28/1](#)) are fitted on the inside of the filter cover.

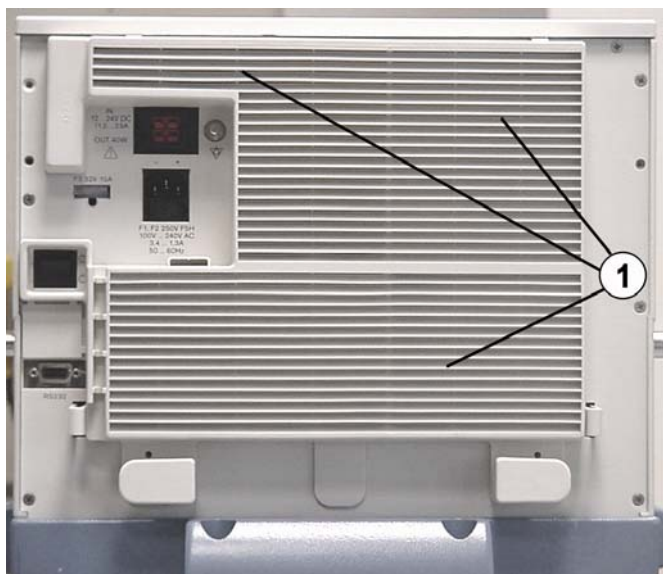


Fig. 28 Rear of unit; fitting location of dust filter

Removal

1. On both sides press down the catches ([Fig. 29/1](#)) against the filter cover ([Fig. 29/2](#)) lift the filter cover up towards **A** slightly and detach it.

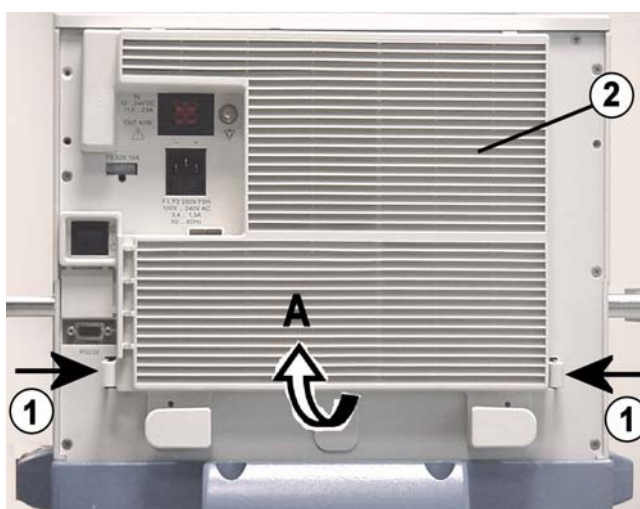


Fig. 29 View of unit rear; filter cover

2. Withdraw the dust filters (3x) (Fig. 30/1) out of the filter cover and dispose of them in the domestic waste bin.

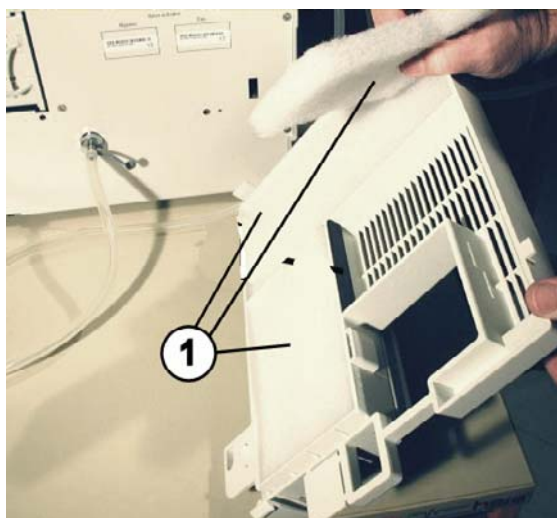


Fig. 30 View of filter cover; dust filter

Removal of the dust filters is complete.

Fitting

1. Insert the dust filters (Fig. 30/1) in the corresponding recesses in the filter cover.
2. If the power cable is to be installed, place it under the filter cover
3. Slot the two pins (Fig. 31/1) on the top of the filter cover into the recesses in the rear panel, swing the filter cover down towards **A** and press the catches (Fig. 31/2) into the rear panel until they lock in place.

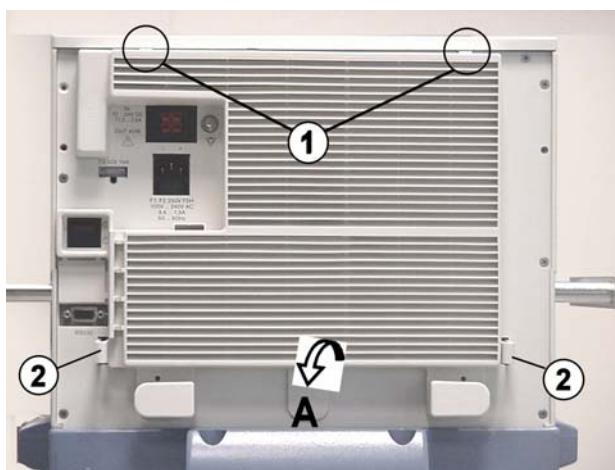


Fig. 31 View of unit rear; pins and filter cover

Fitting of the dust filters is complete.

Replacing the O2 sensors

Introduction

NOTE

Risk of confusion with the Oxytrace INCU O2 sensor, which is externally of the same design. However, the measurement methods are different.

- Use only O2 sensors of type Oxytrace VE (MX 01 049)!

NOTE

Replace O2 sensors under the following conditions:

- If calibration is no longer possible
- If the alarm „!!! O2 measurement inop Replace O2 sensor 1“ is displayed
- If the alarm „!!! O2 measurement inop Replace O2 sensor 2“ is displayed.

The following section provides a view of the O2 sensors and describes how to remove and fit them.

View

The O2 sensors are located behind the O2 sensor cover (Fig. 32/1) of the unit.

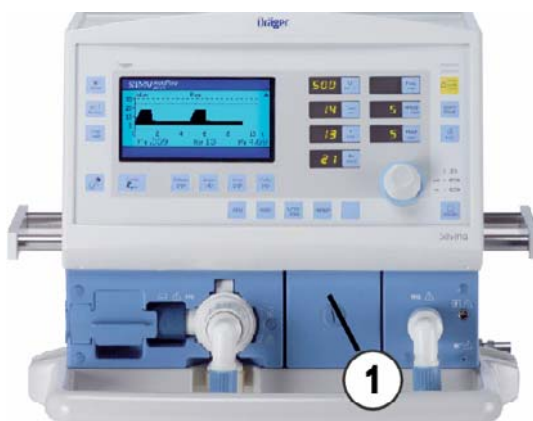


Fig. 32 Device front; O2 sensor cover

Removal

1. Swivel the inspiratory port (Fig. 33/1) down.
2. Loosen the screw (Fig. 33/2) using a coin or similar implement and detach the O2 sensor cover.

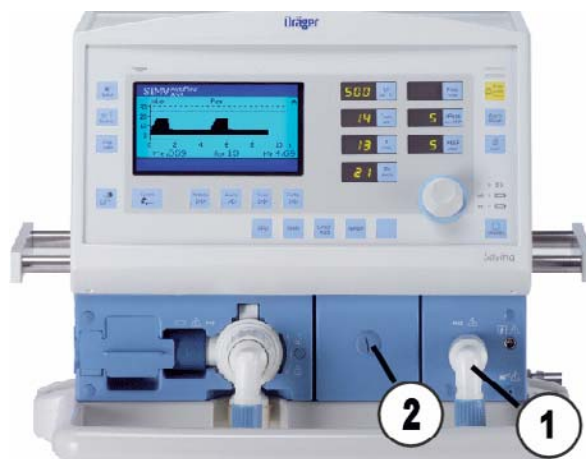


Fig. 33 Front view of unit, inspiratory socket and screw

NOTE

O2 sensors are special waste. When disposing of them, observe local waste disposal regulations.

3. Take the O2 sensors (Fig. 34/1) out of their mounts and dispose of them in accordance with local waste disposal regulations.

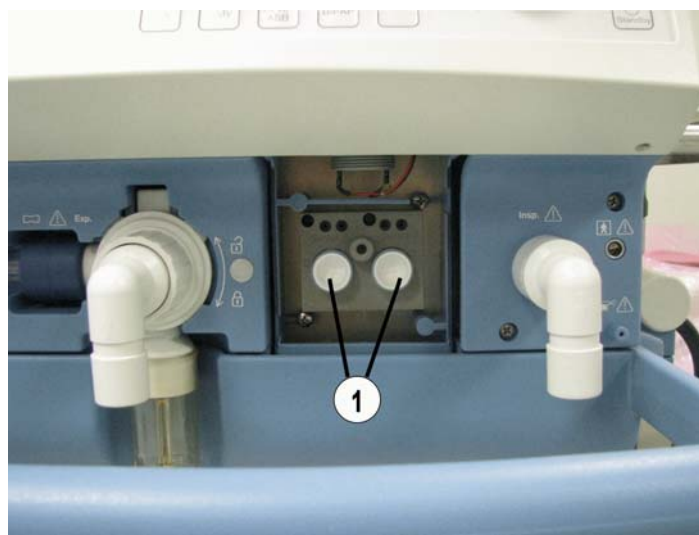


Fig. 34 Front view of unit; O2 sensors

Removal of the O2 sensors is complete.

Maintenance instructions

Replacing the O2 sensors

Fitting

1. Push the O2 sensors (Fig. 35/1) with the arrow markings (Fig. 35/2) pointing upwards into the mounts and turn them lightly a short distance until the O2 sensors slide into the corresponding mounts.

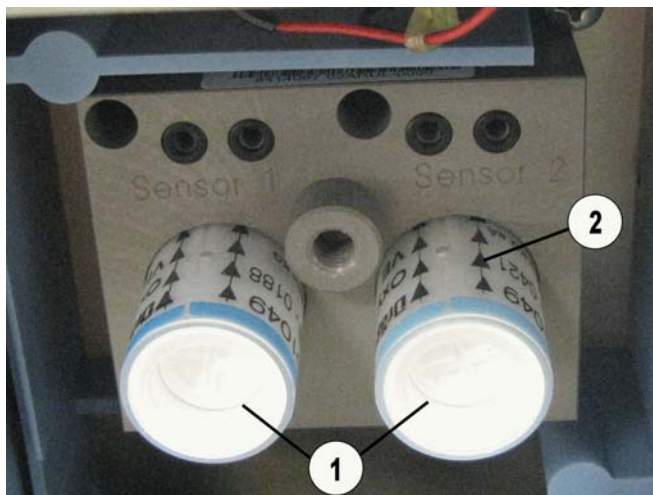


Fig. 35 View of O2 sensor mount; O2 sensors

2. Use the screw (Fig. 36/2) to secure the O2 sensor cover (Fig. 36/1).

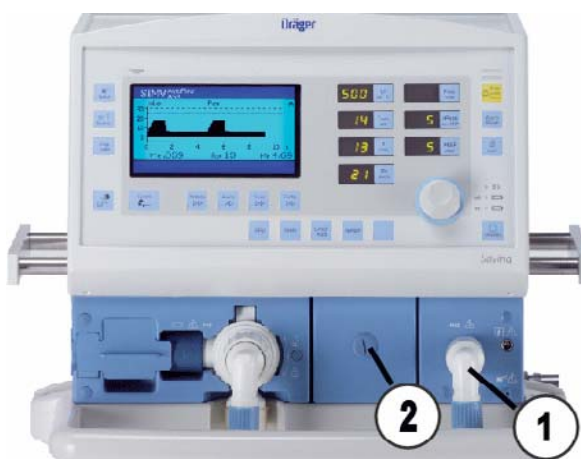


Fig. 36 Front view of unit, inspiratory socket and screw

Fitting of the O2 sensors is complete.

Calibrating the O2 sensors

O2 sensor 1

NOTE

If new O2 sensors have been fitted in the unit, the unit must run for at least 20 minutes before the O2 sensors can be calibrated.

Automatic calibration of O2 sensor 1

Savina calibrates O2 sensor 1 for O2 control and display automatically under the following conditions:

- after 8 operating hours
- after replacing the O2 sensors
- if sensor 1 and sensor 2 vary by more than 2 Vol. %
- after the air pressure changes by more than 200 hPa e.g. during helicopter transfers
- after a temperature change of more than 10 °C.

During automatic calibration the info line on the monitor shows: **O2 calibration active.**

After successful calibration the display shows: **O2 calibration OK.**

O2 sensor 2

Manual calibration of O2 sensor 2

Perform manual calibration of O2 sensor 2 for O2 monitoring on a monthly basis, or if the alarm message **!!! O2 measurement inop** appears on-screen.

NOTE

Manual O2 sensor calibration should be performed with an O2 gas supply delivering 100% oxygen.

NOTE

Manual O2 sensor calibration can be performed in the respective ventilation mode.

1. Press the „Config“ key repeatedly until the menu page „Configuration 2/4“ appears.
2. Turn the rotary knob and select the „O2 Calib“ line on-screen.
3. Press the rotary knob to activate the function.
4. Turn the rotary knob and select the „Start“ function.
5. Press the rotary knob to start the calibration.

The message „Disconnect patient“ is displayed.

6. Disconnect the patient within the next 30 seconds, maintaining ventilation with an independent ventilator as necessary.

The display indicates „O2 calibration active“. After about 60 seconds the prompt „Reconnect patient“ is displayed.

7. Reconnect the patient immediately.

The display indicates „O2 calibration OK“. The O2 calibration is complete. The Savina is again ventilating with the original settings. During calibration the Savina disables the alarms which would normally occur due to the disconnection and the changed O2 concentration. If the patient is not reconnected after 30 seconds, the Savina ventilates and all alarms are active again.

Maintenance instructions

Replacing the diaphragm of the expiratory valve

Replacing the diaphragm of the expiratory valve

Introduction

The following section provides a view of the expiratory valve diaphragm (Fig. 37/1) and describes how to remove and fit it.

View



Fig. 37 Expiratory valve; fitting location of the expiratory valve diaphragm

Removal

1. Swivel the flow sensor flap (Fig. 38/1) up to position **A**.
2. Push the flow sensor (Fig. 38/2, flow sensor is located under flow sensor flap) to the left as far as it will go.
3. Turn the bayonet ring (Fig. 38/3) of the expiratory valve to the left towards **B** as far as it will go.

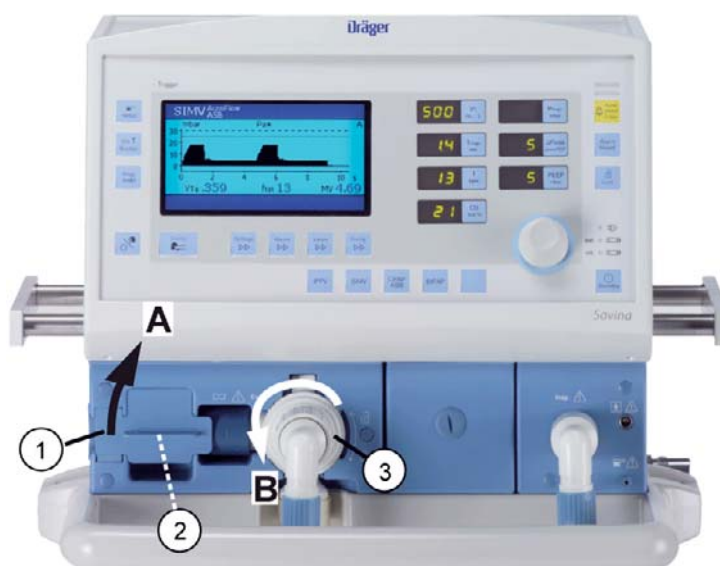


Fig. 38 View of Savina; removing expiratory valve

4. Take the expiratory valve out of its mount.
5. Remove the diaphragm (Fig. 39/1) from the expiratory valve.

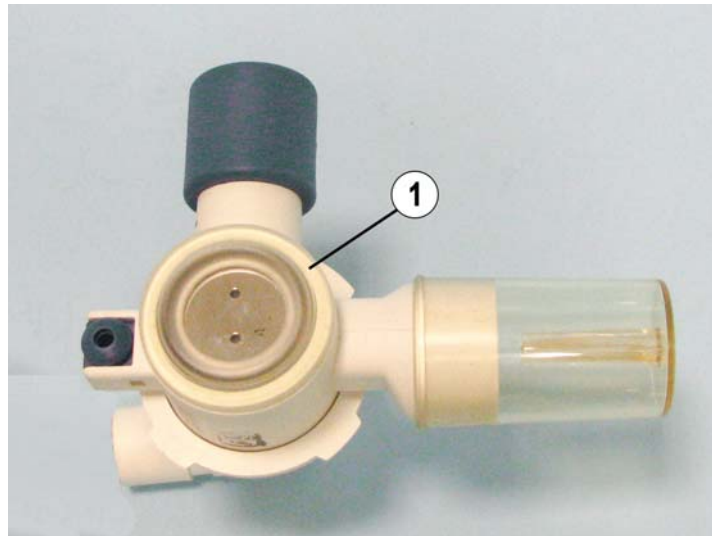


Fig. 39 Expiratory valve; diaphragm

NOTE

Used diaphragms are classified as special waste. When disposing of them, observe local waste disposal regulations.

6. Dispose of the diaphragm in accordance with local waste disposal regulations.

Removal of the expiratory valve diaphragm is complete.

Fitting

1. Clip the diaphragm (Fig. 40/1) onto the rim of the expiratory valve (Fig. 40/2) so that it engages on the expiratory valve rim all the way round.

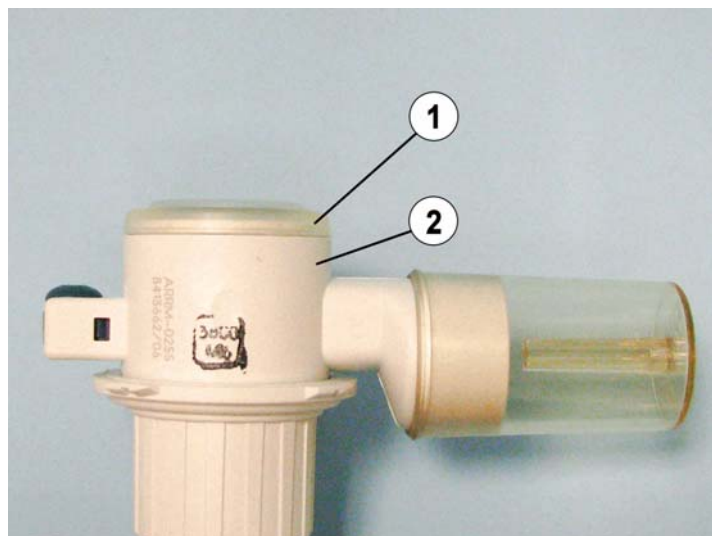


Fig. 40 Expiratory valve; diaphragm fitting location

Maintenance instructions

Replacing the diaphragm of the expiratory valve

2. Push the expiratory valve into the mount on the unit until you feel a resistance and turn the bayonet ring (Fig. 41/3) of the expiratory valve all the way to the right towards **A** until you feel it lock in place.

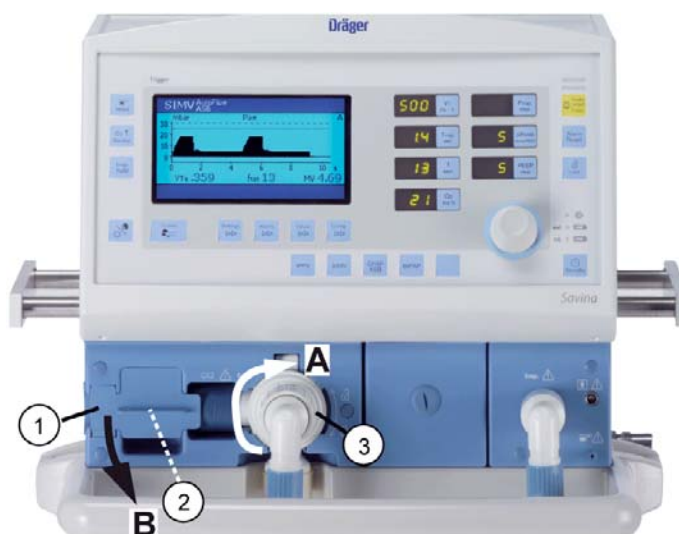


Fig. 41 View of Savina; fitting expiratory valve

3. Check that the expiratory valve is securely locked in place by pulling on it lightly.
4. Slide the flow sensor (Fig. 41/2) to the right into the flow sensor sleeve.
5. Swivel the flow sensor flap (Fig. 41/1) down towards **B**.

Fitting of the expiratory valve diaphragm is complete.



Annex

Parts catalog

This chapter contains a list of the device's orderable parts.

Test Instructions

This chapter contains the measures required to determine the actual condition of the device.

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Parts catalog

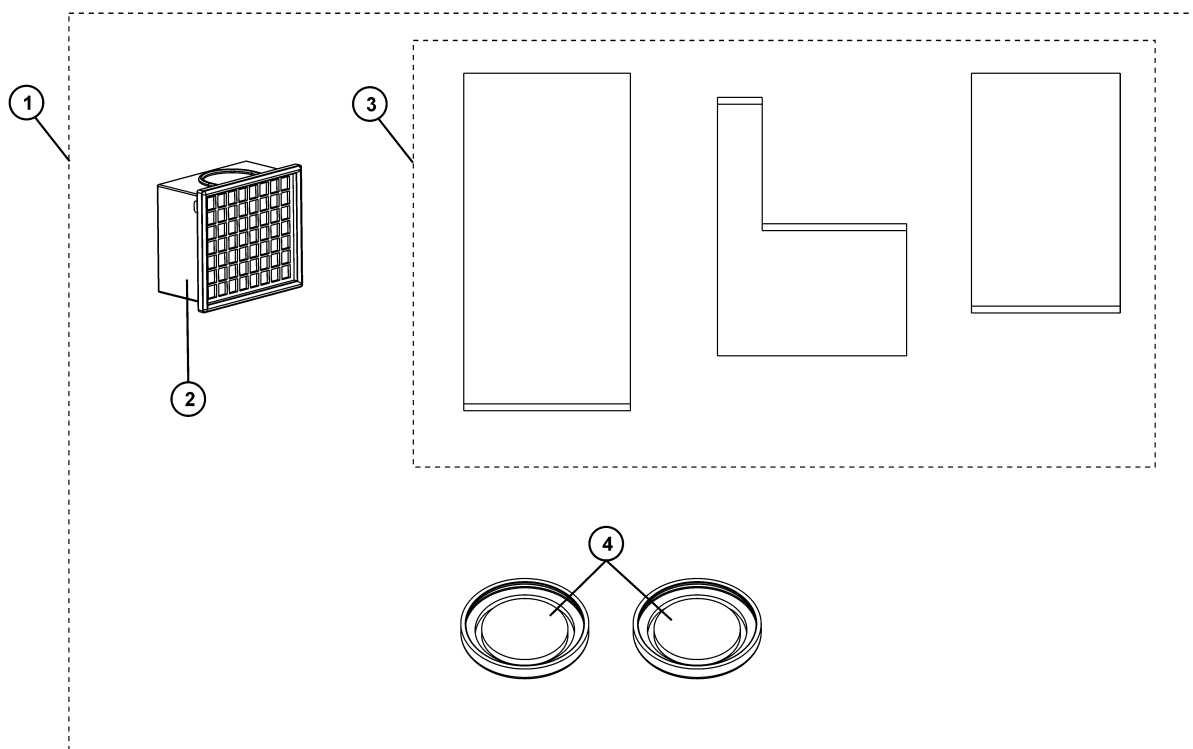
Savina

Revision: 12
2010-07-08
5664.900



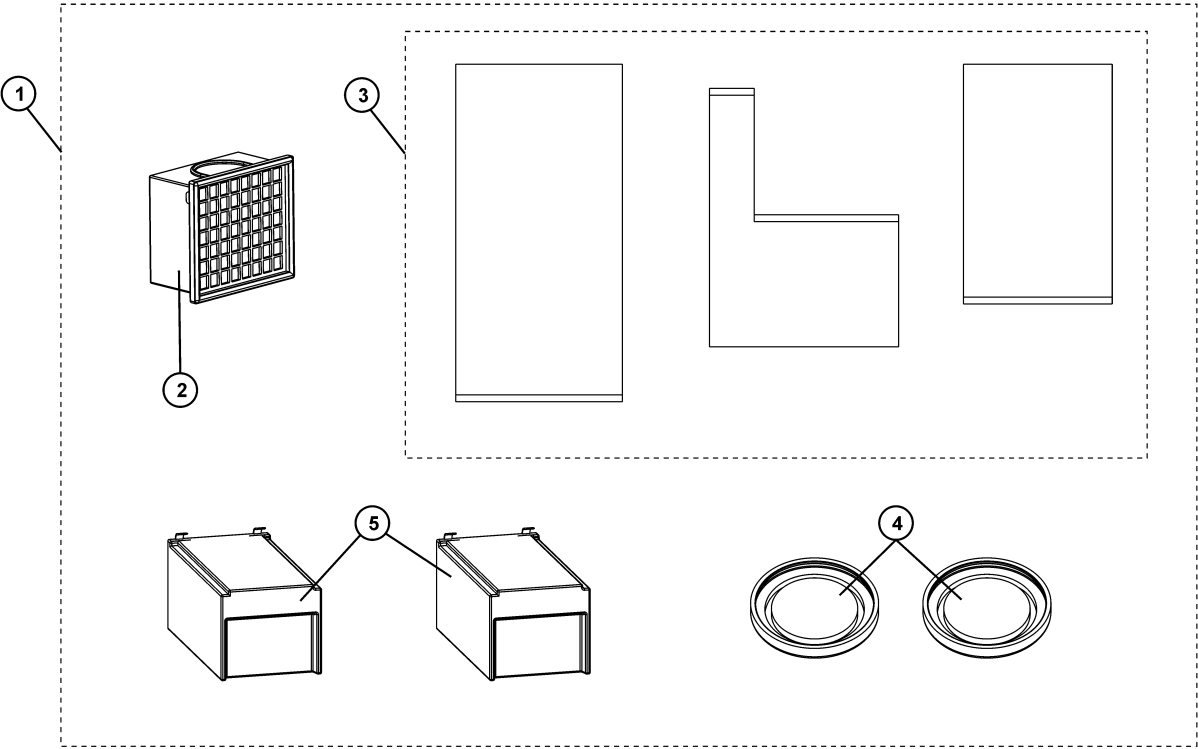
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8414000	Savina basic unit	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

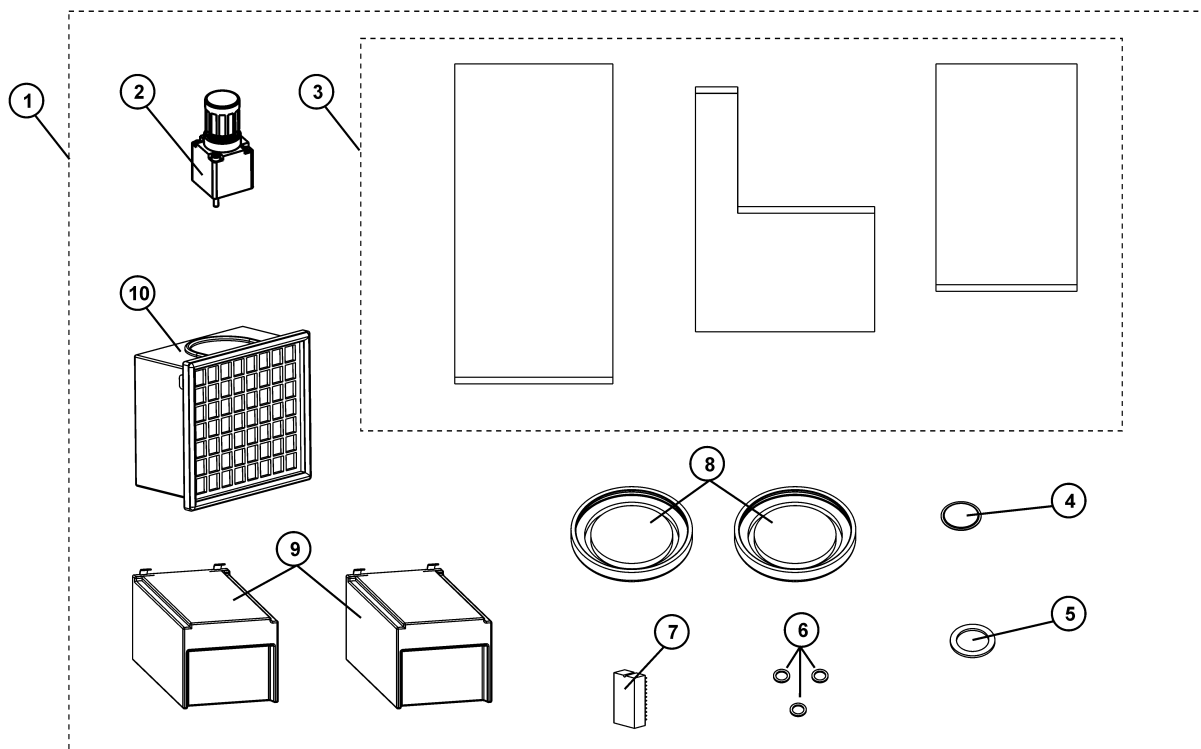


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	MX08283	Savina Service Set 1 year	1.000	St	Set kompl.
2	6737545	MICROFILTER	1.000	St	
3	8414057	SET DUST FILTER S	1.000	St	
4	8413661	Membrane, complete	2.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

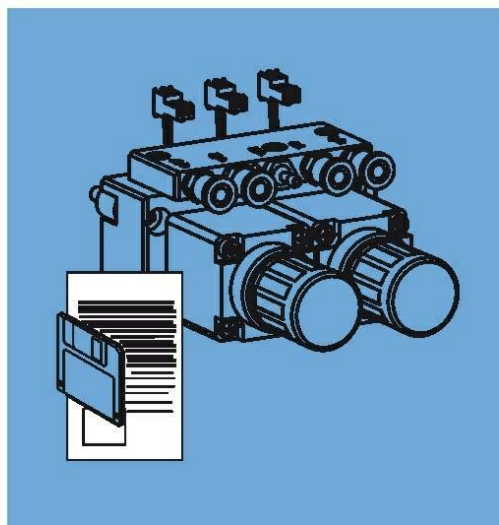


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	MX08659	Savina ServSet 2y	1.000	St	
2	6737545	MICROFILTER	1.000	St	
3	8414057	SET DUST FILTER S	1.000	St	
4	8413661	Membrane, complete	2.000	St	
5	1841416	Lead-acid battery 12V/3.5AH	2.000	St	



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	MX08284	Savina Service Set 6 year	1.000	St	Set kompl.
2	8413666	Pressure regulator	1.000	St	
3	8414057	SET DUST FILTER S	1.000	St	
4	8416117	Filter Gas Inlet	1.000	St	
5	M09257	PACKING RING	1.000	St	
6	M19311	WASHER	3.000	St	
7	1845527	REAL TIME CLOCK DIL24 RoHS	1.000	St	
8	8413661	Membrane, complete	2.000	St	
9	1841416	Lead-acid battery 12V/3.5AH	2.000	St	
10	6737545	MICROFILTER	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8414130	Kit Auto Flow	1.000	St	
	8414131	Kit BIPAP	1.000	St	
	8414072	Kit NIV	1.000	St	
	1846248	Nurse call connector	1.000	St	
	8415881	Flowsensor cover Savina	1.000	St	
	8415718	Kit SW 3.01 Savina	1.000	St	
	8413631	Nurse call S	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

Keine Zeichnung vorgesehen
No drawing planned/scheduled
Aucun schéma prévu
Ningún plano previsto

Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	M34402	O2-HOSE NIST 3M DIN PROBE	1.000	St	
	M34403	O2-HOSE NIST 5M DIN PROBE	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

Keine Zeichnung vorgesehen
No drawing planned/scheduled
Aucun schéma prévu
Ningún plano previsto

Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8405371	TEMPERATURE SENSOR	1.000	St	
	8405020	AQUAPOR (220-240V)	1.000	St	
	8414698	Aquapor EL, Humidifier	1.000	St	
	8405029	PATIENT PART (AQUAPOR)	1.000	St	
	8403345	SET OF SPARE BRACKETS	1.000	St	
	8413146	HOSE SET E2 (BLUE)	1.000	St	
	8412860	HOSE SET HME	1.000	St	
	8418285	F&P MR 730 AGU humidifier	1.000	St	
	8414720	Resp. humidifier MR850AGU	1.000	St	
	8411074	MOUNTING KIT F&P	1.000	St	
	8412217	HUMIDIFIER CHAMBER MR 370 (A)	1.000	St	
	8412108	Hose kit adult	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

Keine Zeichnung vorgesehen
No drawing planned/scheduled
Aucun schéma prévu
Ningún plano previsto

Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8418286	F&P MR 340 Kammer (d)	1.000	St	
	8411048	DUAL AIRWAY TEMP. SENSOR 1,45M	1.000	St	
	8411050	DRAW WIRE 1,50 M 900 MR 070	1.000	St	
	MX02652	SecuRed L, ST	1.000	St	
	8412081	PAED HOSE SET, F+P	1.000	St	
	8414986	Hose kit adult	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

Keine Zeichnung vorgesehen
No drawing planned/scheduled
Aucun schéma prévu
Ningún plano previsto

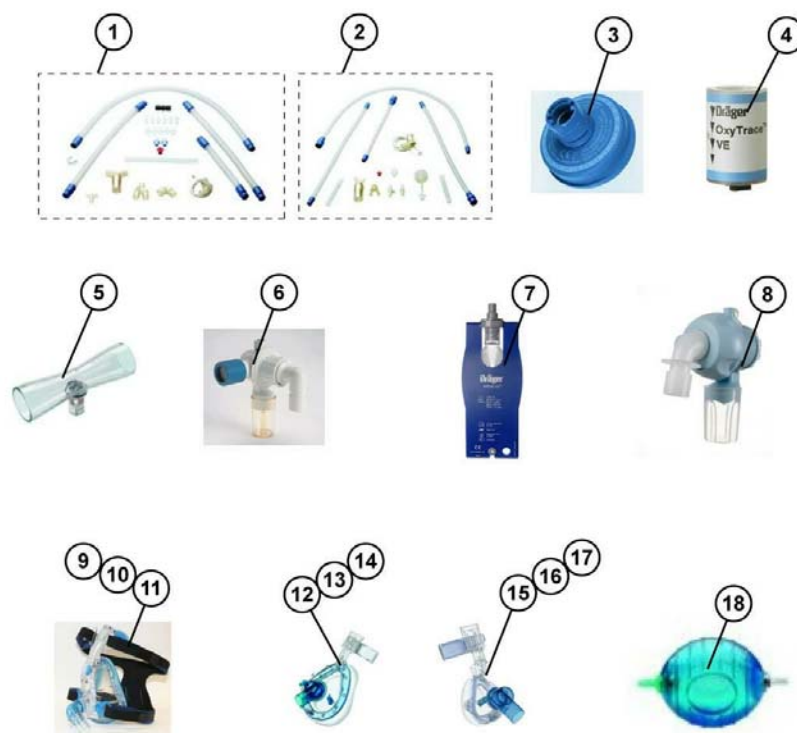
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8412935	MED. NEBULIZER EVITA 4 (PNEU)	1.000	St	
	8409609	Hinged arm	1.000	St	
	2M85706	Quickstop hinged arm 2	1.000	St	
	2120046	Resutator 2000 adults	1.000	St	
	2120984	Child-Resutator 2000	1.000	St	
	M26349	HOOK	1.000	St	
	8403201	TEST LUNG	1.000	St	
	8306488	Cable RS232 MEDIBUS	1.000	St	
	8414092	DC-battery cable S	1.000	St	
	1843303	Lead-acid battery 12V/17AH	1.000	St	
	8414048	DC-Board mains cable S	1.000	St	
	8413641	90 degrees connector O2	1.000	St	
	8414358	Side-Rails	1.000	St	
	8414335	Savina mobil	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



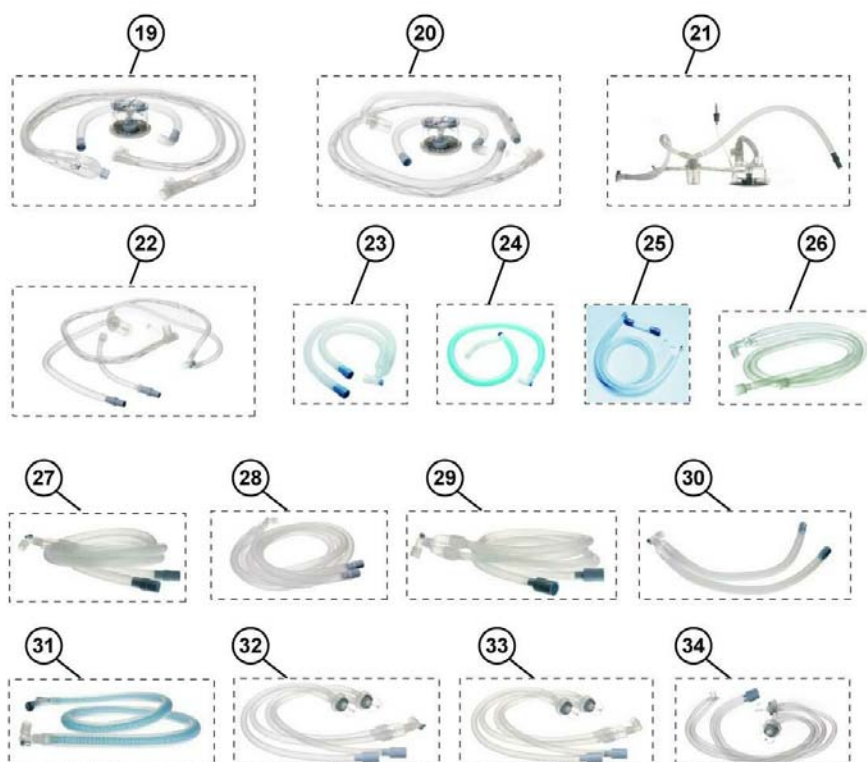
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8403735	Spirolog Flow Sensor (5x)	1.000	St	
	6737545	MICROFILTER	1.000	St	
	8414057	SET DUST FILTER S	1.000	St	
	8411073	ABSORBENT PAPER REFILL PACK	1.000	St	
	MX22750	SET HME EASYTUBE	1.000	St	
	MX02650	SecuRed Big, ST	1.000	St	
	MX02652	SecuRed L, ST	1.000	St	
	MX22904	COMFORT-FIT MASK 4	1.000	St	
	MX22906	COMFORT-FIT MASK 6	1.000	St	
	MX22907	COMFORT-FIT MASK ROUND	1.000	St	
	MX01049	OxyTrace VE	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



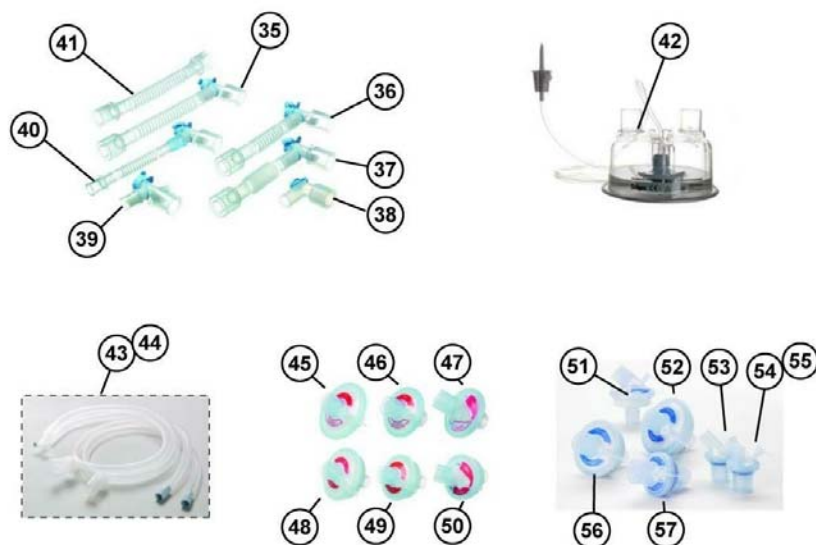
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8414986	Hose kit adult	1.000	St	
2	8414987	Hose kit paediatric	1.000	St	
3	6733895	SET MIC.FILTER 654ST-ISOCCLICK	1.000	St	
4	MX01049	OxyTrace VE	1.000	St	
5	8403735	Spirolog Flow Sensor (5x)	1.000	St	
6	8413660	EXPIRATION VALVE	1.000	St	
7	MP02400	SelfTestLung	1.000	St	
8	MP01061	Disp. Xvalve Savina	1.000	St	
9	MP01579	Mask NovaStar,NIV,w/SE,S	1.000	St	
10	MP01580	Mask NovaStar,NIV,w/SE,M	1.000	St	
11	MP01581	Mask NovaStar,NIV,w/SE,L	1.000	St	
12	MP01573	Mask ClassicStar,NIV,SE,S	1.000	St	
13	MP01574	Mask ClassicStar,NIV,SE,M	1.000	St	
14	MP01575	Mask ClassicStar,NIV,SE,L	1.000	St	
15	MP01623	Mask ClassicStar Nasal NIV, Non-Vented S	1.000	St	
16	MP01624	Mask ClassicStar Nasal NIV, Non-Vented M	1.000	St	
17	MP01625	Mask ClassicStar Nasal NIV, Non-Vented L	1.000	St	
18	MP01590	2side pumpball f. airmanagement	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



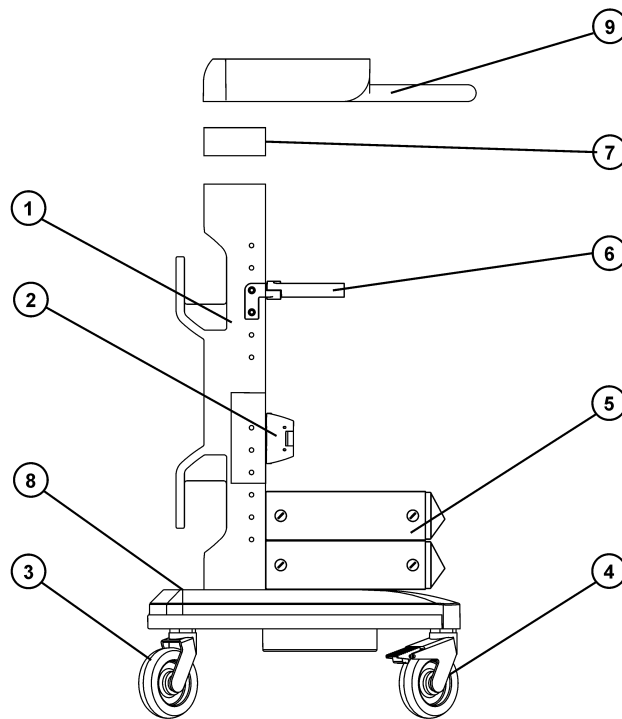
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
19	MP00306	VentStar dual heated	1.000	St	
20	MP00307	VentStar insp. heated	1.000	St	
21	MP00308	VentStar heated (N)	1.000	St	
22	MP00309	VentStar heated (N) Basic	1.000	St	
23	MP00305	Vent Set Flex	1.000	St	
24	MP00315	Vent Set COAX	1.000	St	
25	MP00316	Vent Set COAX with Holder	1.000	St	
26	MP00338	VentStar Basic P 150 w/o LuerL	1.000	St	
27	MP00349	VentStar Basic 180	1.000	St	
28	MP00350	VentStar Basic 250	1.000	St	
29	MP00351	VentStar Basic (P)180	1.000	St	
30	MP00355	VentStar Flex 220	1.000	St	
31	MP00356	VentStar Coax 180	1.000	St	
32	MP00361	VentStar Watertrap (P) 180	1.000	St	
33	MP00362	VentStar Watertrap (P) 180 w/o	1.000	St	
34	MP00363	VentStar Watertrap (N) 180	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



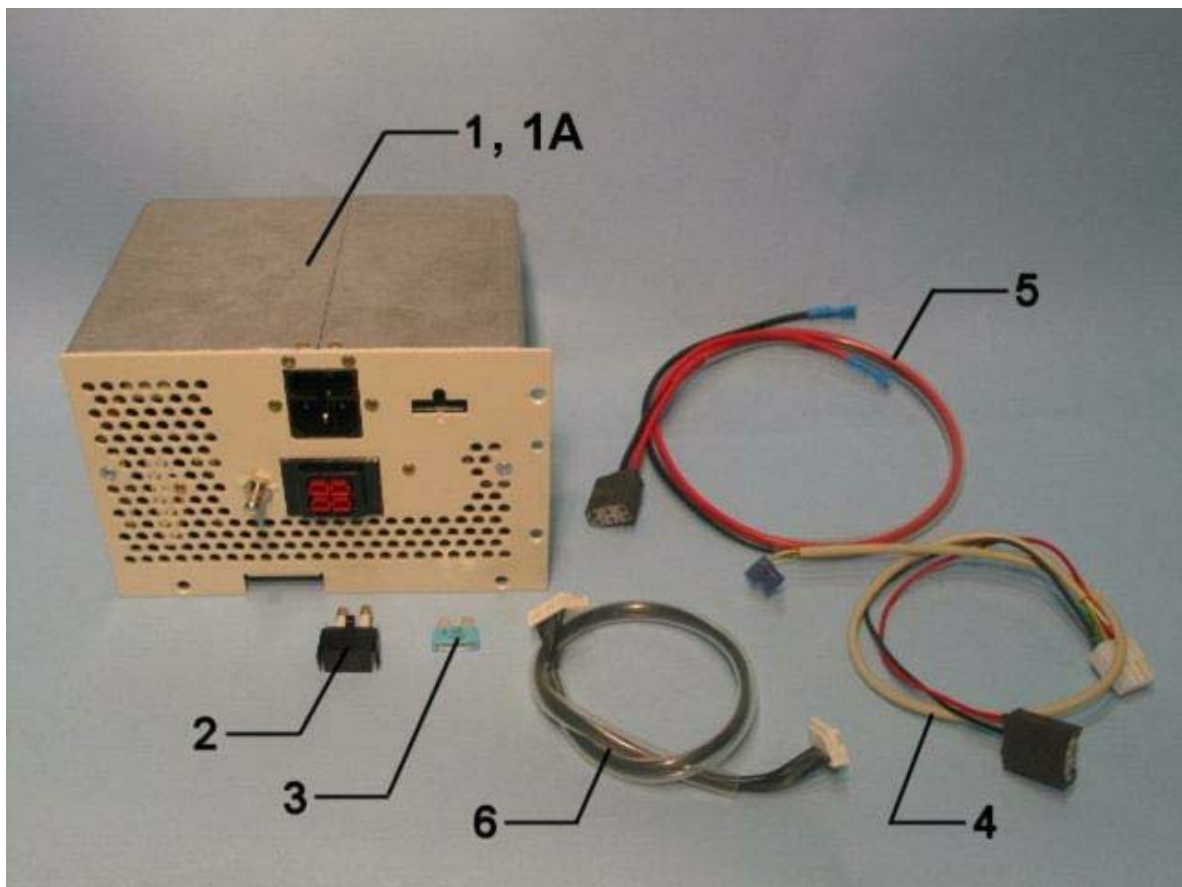
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
35	MP01840	ErgoStar CM 40	1.000	St	
36	MP01845	ErgoStar CM 45	1.000	St	
37	MP01850	ErgoStar CM 50	1.000	St	
38	MP01890	ErgoStar AC 90	1.000	St	
39	MP01895	ErgoStar AC 95	1.000	St	
40	MP01860	ErgoStar CM 60	1.000	St	
41	MP01855	ErgoStar CM 55	1.000	St	
42	MP00234	Disp. humi.chamber f.F&P MR850	1.000	St	
43	MP00334	VentStar Watert. 180 w/o LuerL	1.000	St	
44	MP00337	VentStar Watertrap 180	1.000	St	
45	MP01755	Filter CareStar 45	1.000	St	
46	MP01770	Filter CareStar 30	1.000	St	
47	MP01765	Filter CareStar 40A	1.000	St	
48	MP01785	Filter SafeStar 80	1.000	St	
49	MP01790	Filter SafeStar 55	1.000	St	
50	MP01795	Filter SafeStar 60A	1.000	St	
51	MP01810	Filter/HME TwinStar 65A	1.000	St	
52	MP01800	Filter/HME TwinStar 90	1.000	St	
53	MP01825	Filter/HME TwinStar 10A	1.000	St	
54	MP01815	Filter/HME TwinStar 25	1.000	St	
55	MP01820	Filter/HME TwinStar 8	1.000	St	
56	MP01801	Filter/HME TwinStar HEPA	1.000	St	
57	MP01805	Filter/HME TwinStar 55	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



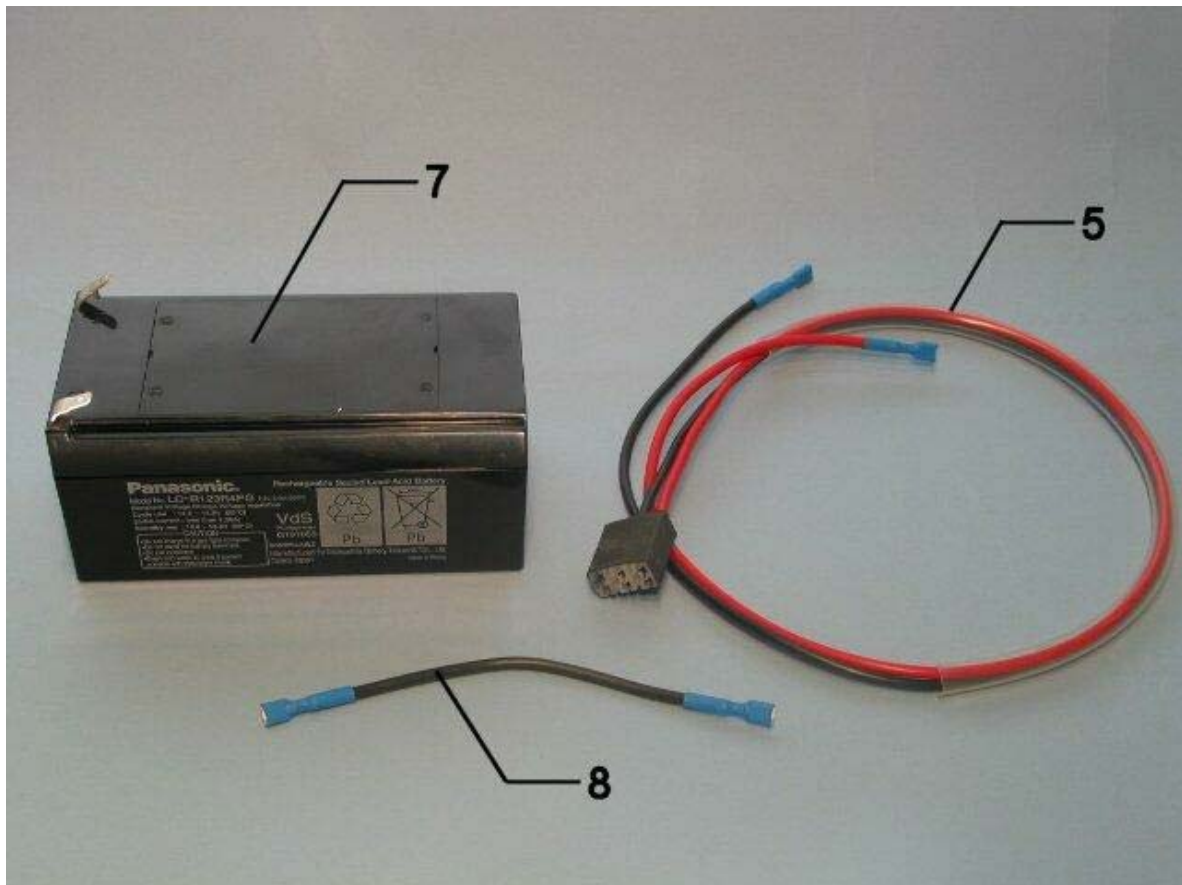
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	1329472	WASHER B 5,3 DIN 9021-A4	1.000	St	
	1327992	pan head screw M5x25	1.000	St	
1	8414335	Savina mobil	1.000	St	
2	8411970	SET CYLINDER BRACKET EV. MOBIL	1.000	St	2 pieces
3	8411946	CASTOR	1.000	St	
4	8411945	CASTOR WITH FIXING	1.000	St	
5	M31795	CUPBOARD 4H (2 DRAWERS)	1.000	St	
5A	M31796	CUPBOARD 8H (4 DRAWERS)	1.000	St	
6	8411956	HUMIDIFIER BRACKET EVITA MOBIL	1.000	St	
7	8413962	kit Column Extension	1.000	St	
8	8411973	Inlet	1.000	St	
9	8413721	Device seat, gray	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1		Powerpack as of SW 2.10	1.000	St	Servicedrawing
2	1850377	FUSE,5A	1.000	St	
3	1850369	FUSE 15A	1.000	St	
4	8414517	cableharness motorelectronic	1.000	St	
5	8413584	Cable power supply, akku	1.000	St	
6	8413582	CABLE POWERPACK	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
5	8413584	Cable power supply, akku	1.000	St	
7	1841416	Lead-acid battery 12V/3.5AH	1.000	St	
8	8413604	DC-Connecting AKKU, AKKU	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
9	8413609	MAINS SWITCH	1.000	St	

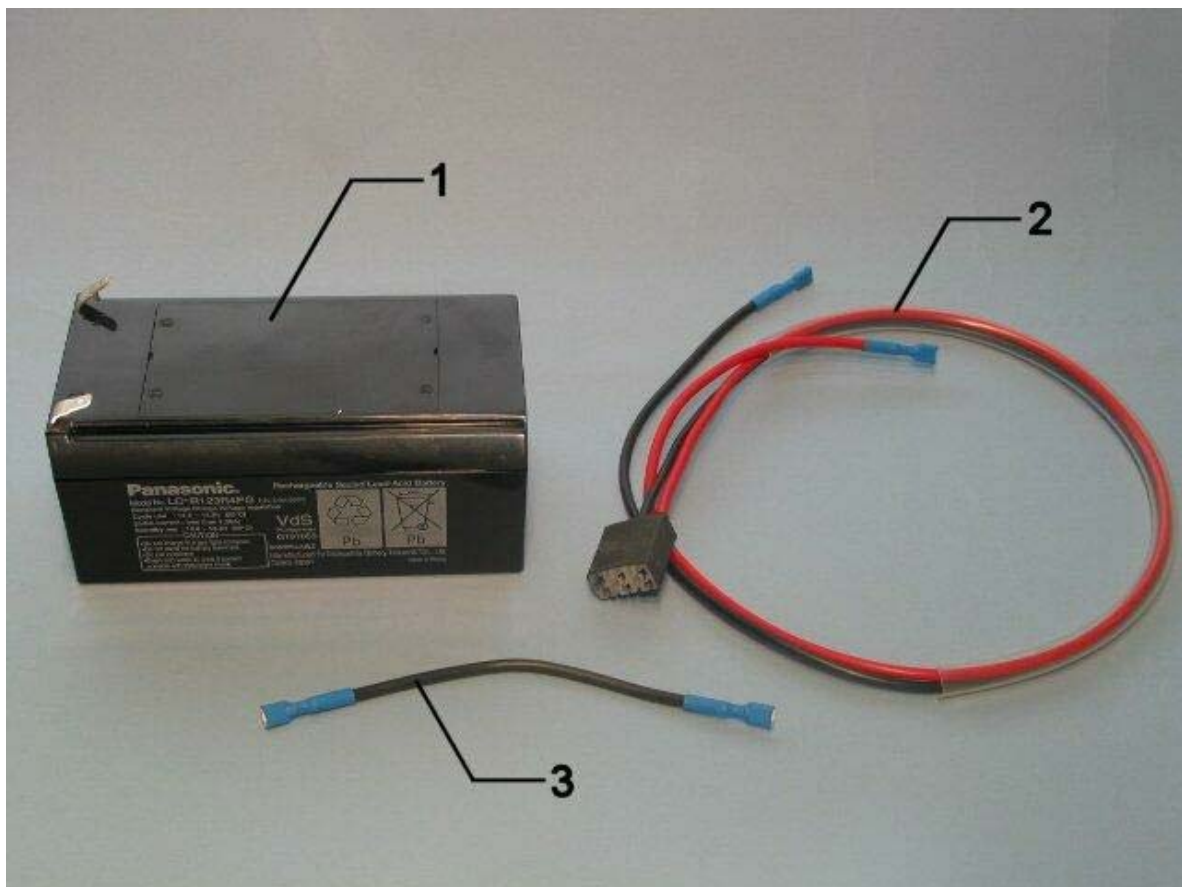
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8414092	DC-battery cable S	1.000	St	
	1843303	Lead-acid battery 12V/17AH	1.000	St	
		Powercords	1.000	St	Servicedrawing
		int. Battery/accessories	1.000	St	Servicedrawing
		ext. Battery/accessories	1.000	St	Servicedrawing

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



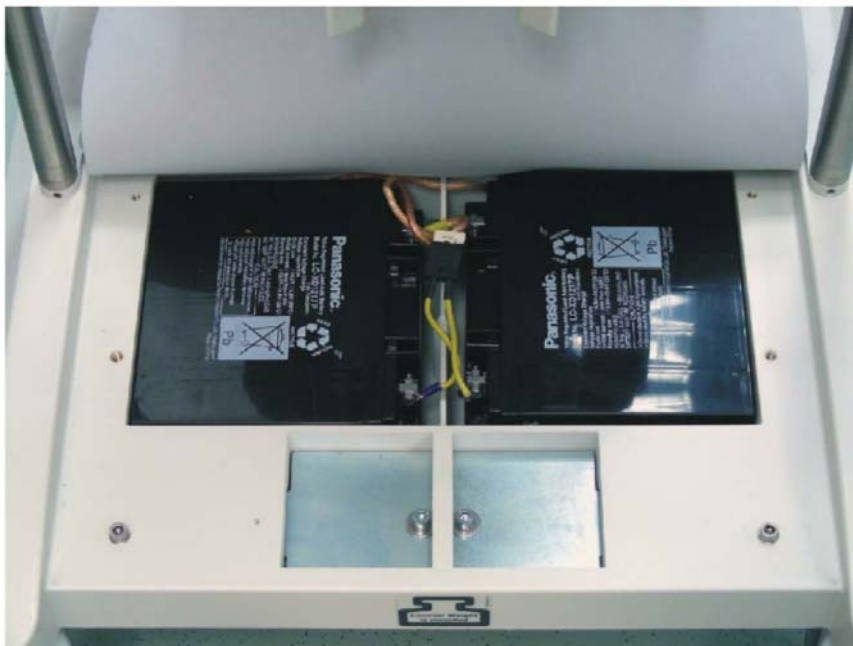
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	1824481	Power Cable CE,3m,10A,C13L,bk	1.000	St	
	1841793	PWR Cord 10A,3m,gr,USA/J RoHS	1.000	St	
	1844342	Power cable DK, 3 m, 10 A	1.000	St	
	1844350	Power cable Australia 3m,10A,C13L	1.000	St	
	1844369	Power cable Great Britian 3m black	1.000	St	
	1844377	POWERCORD CH 3M	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



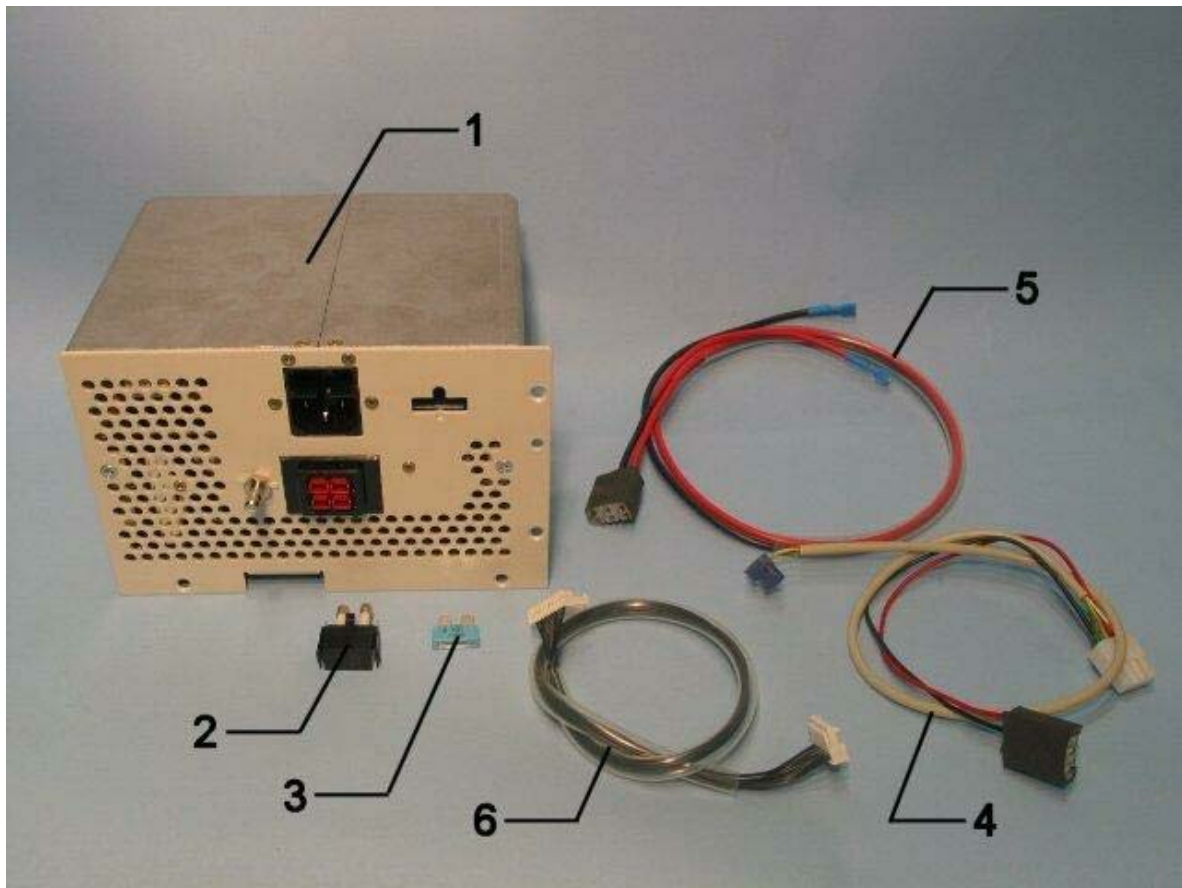
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	1841416	Lead-acid battery 12V/3.5AH	1.000	St	
2	8413584	Cable power supply, akku	1.000	St	
3	8413604	DC-Connecting AKKU, AKKU	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



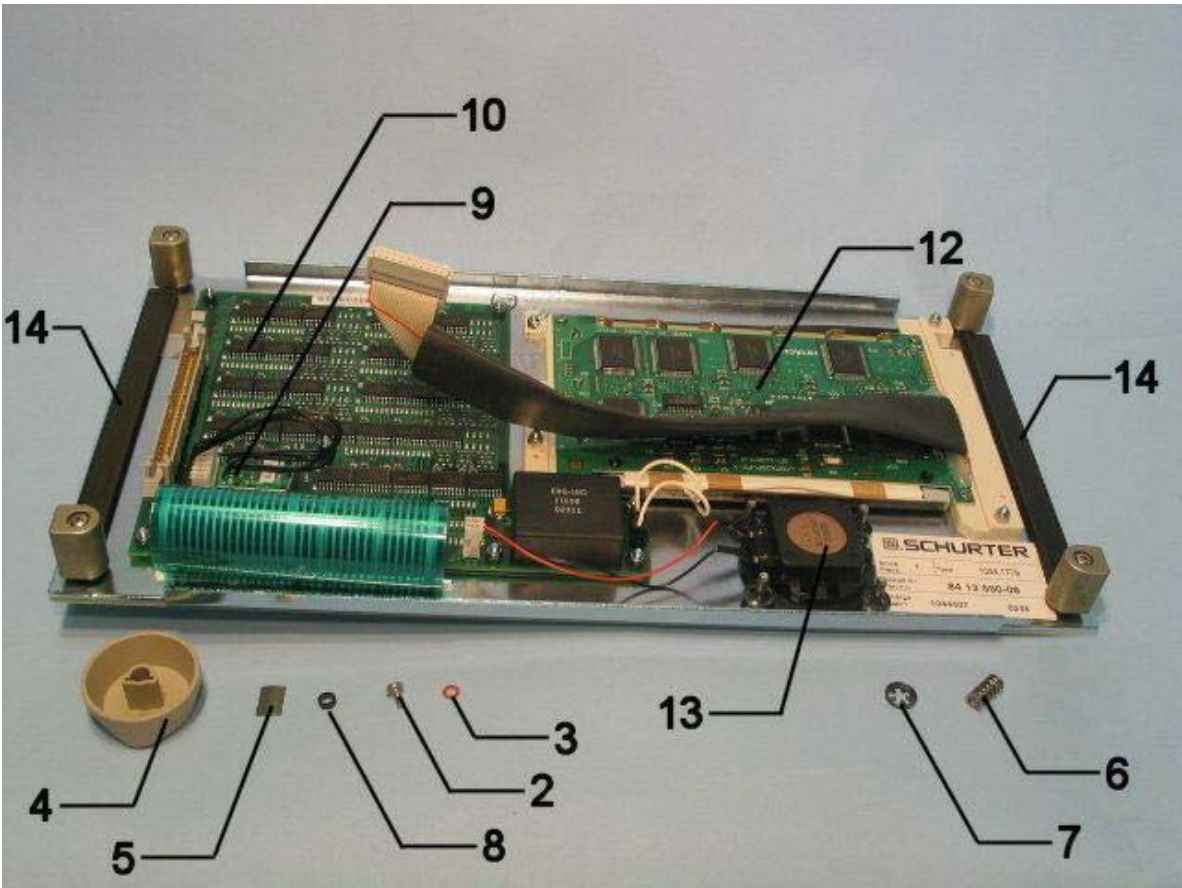
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8414092	DC-battery cable S	1.000	St	
	1843303	Lead-acid battery 12V/17AH	1.000	St	
	8414048	DC-Board mains cable S	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



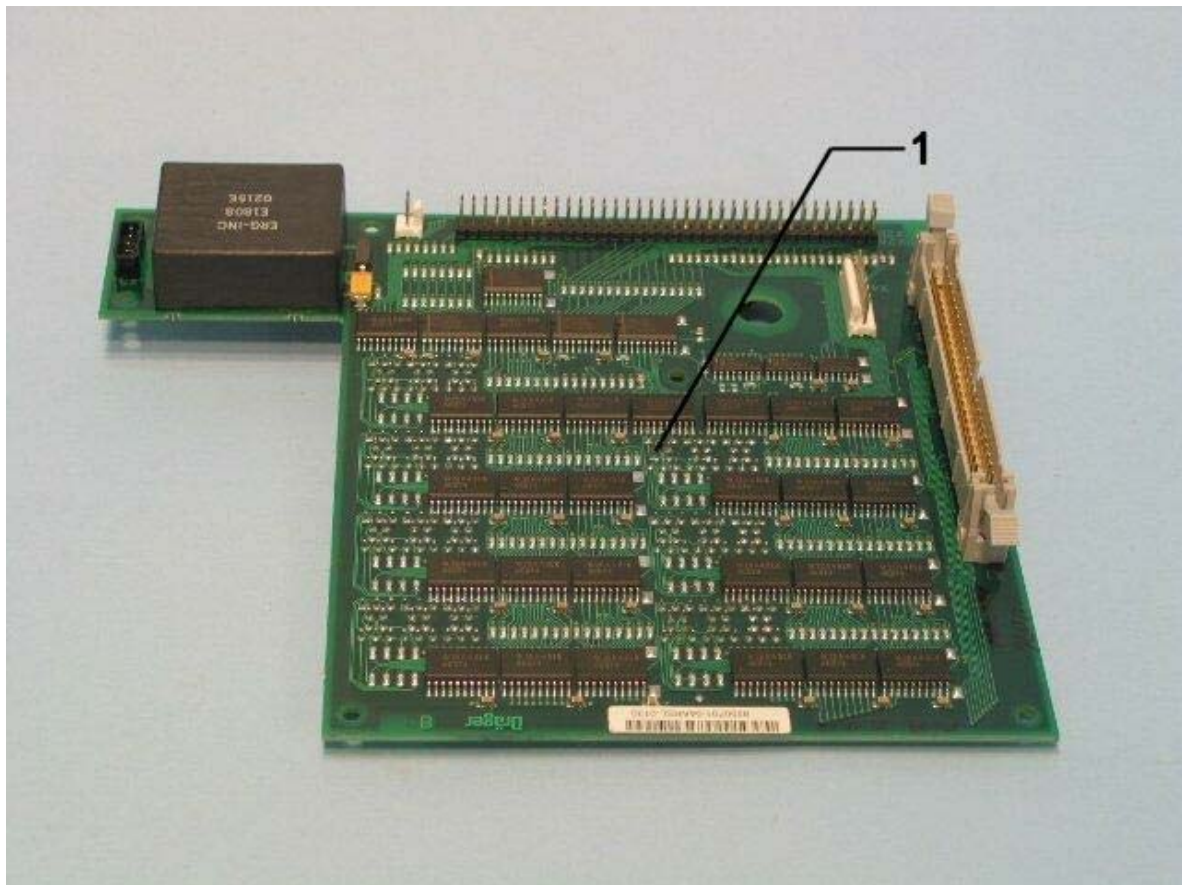
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8414132	Savina-Power Supply	1.000	St	
2	1850377	FUSE,5A	1.000	St	
3	1850369	FUSE 15A	1.000	St	
4	8414517	cableharness motorelectronic	1.000	St	
5	8413584	Cable power supply, akku	1.000	St	
6	8413582	CABLE POWERPACK	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



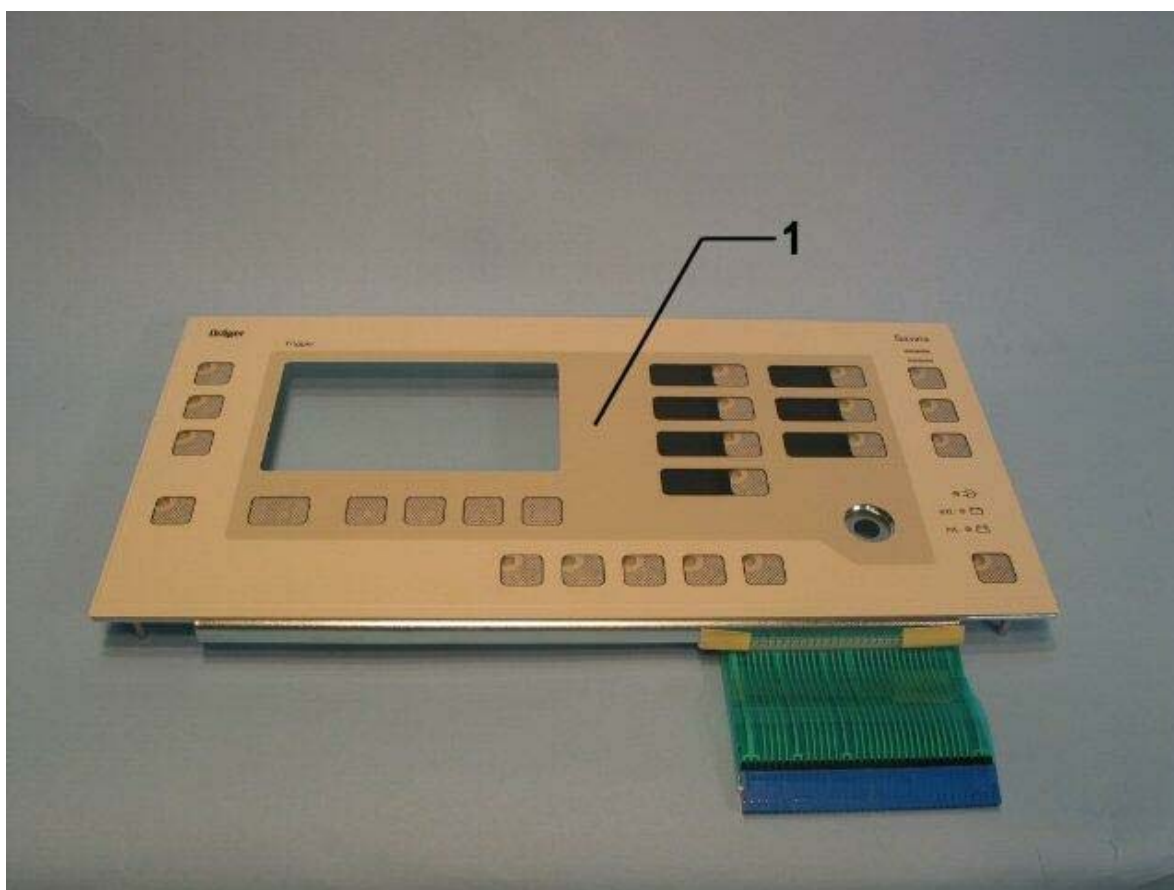
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
2	1340727	OVAL HEAD SCR.DIN7985-M3X6-A2	1.000	St	
3	D04766	PACKING RING	1.000	St	
4	M29655	CONTROL KNOB	1.000	St	
5	M29952	PLATE SPRING	1.000	St	
6	R03802	SPRING	1.000	St	
7	8100245	LOCKING RING	1.000	St	
8	8305747	DISC	1.000	St	
9	8309118	Roatary encoder, compl.	1.000	St	
10		PCB Frontpanel	1.000	St	
12		display	1.000	St	
13	8414037	Loudspeaker, complete	1.000	St	
14	8600784	EMI SEALING	1.000	m	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



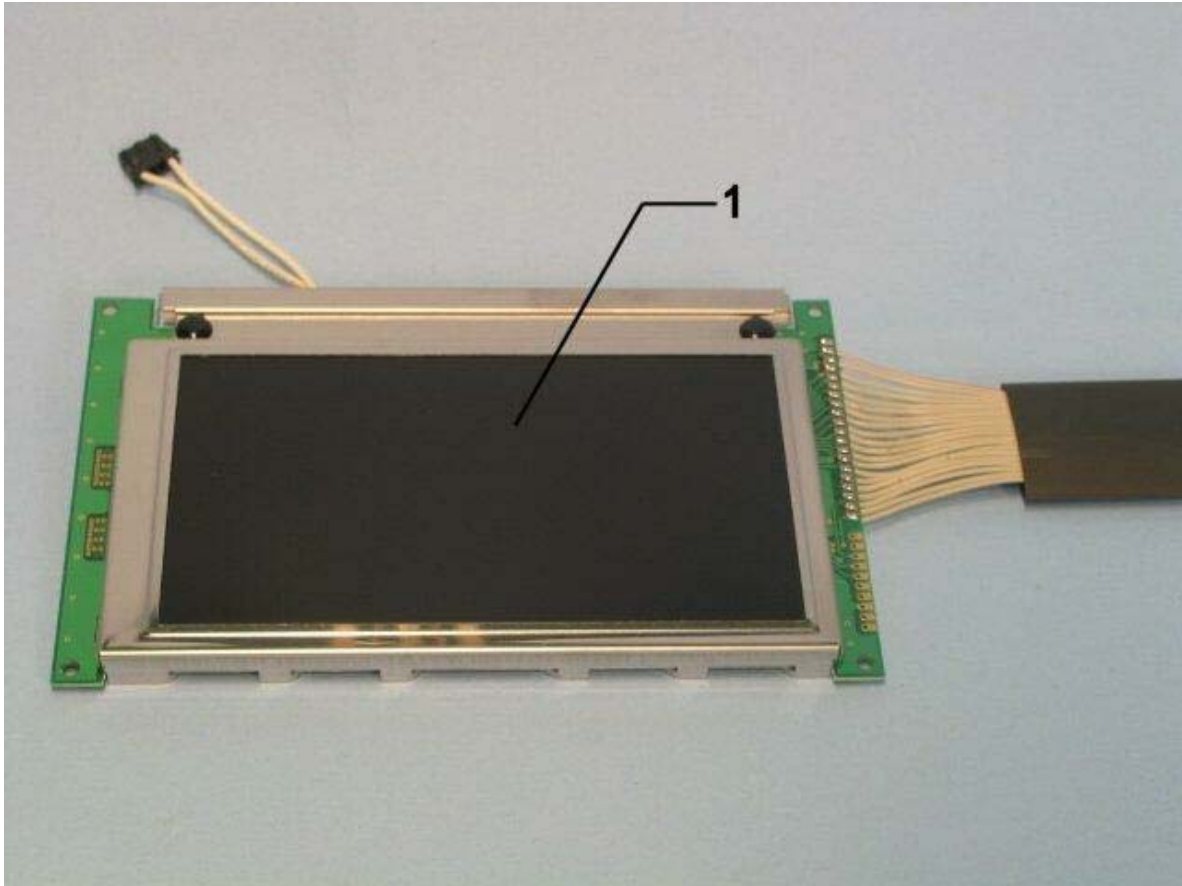
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8350701	PCB O2-FRONT PANEL	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



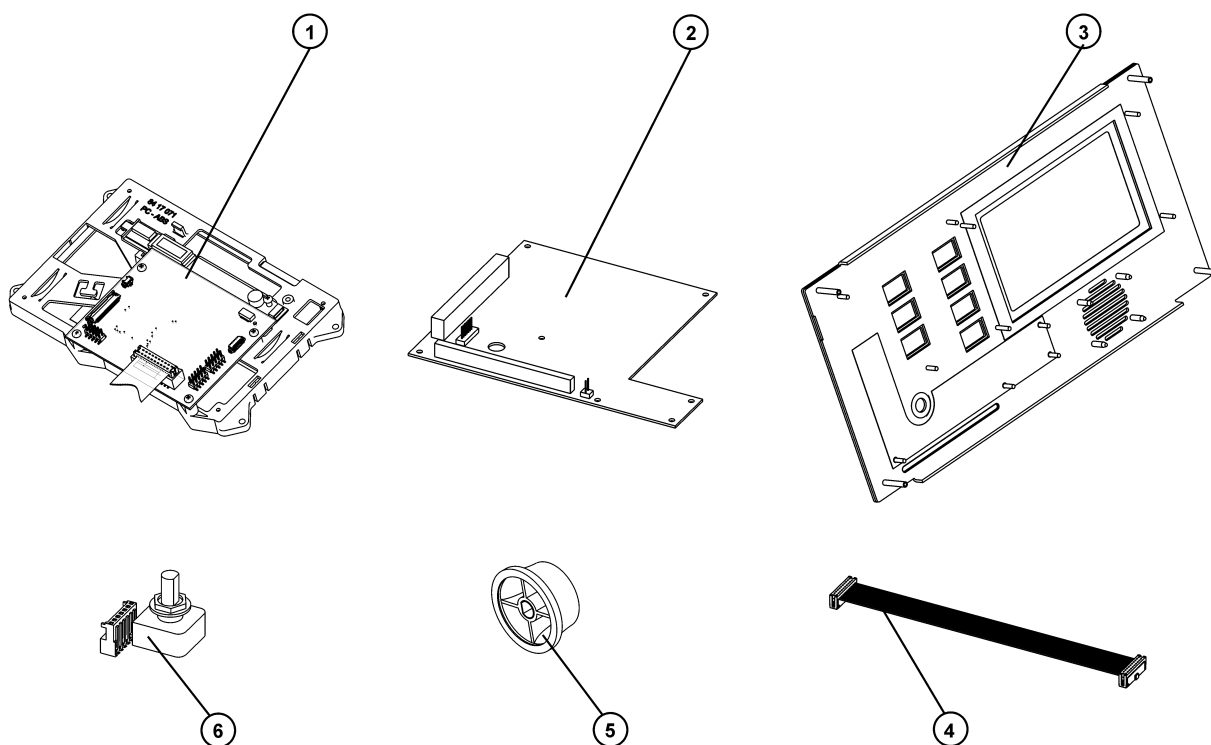
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413590	DISPLAY FIELD COMPLETE	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



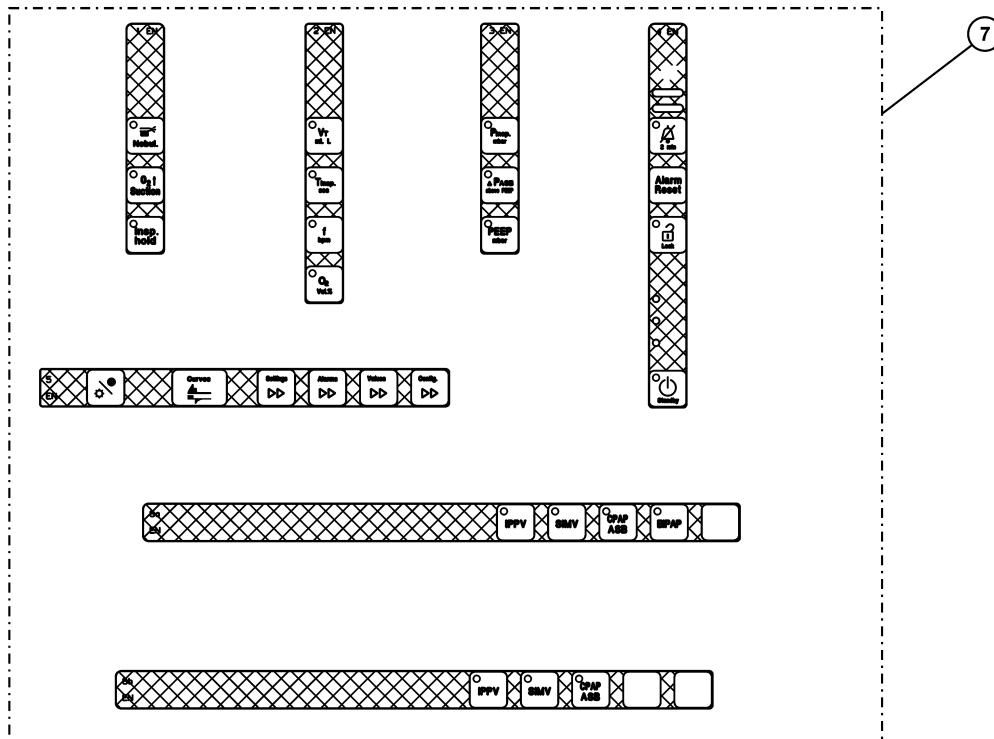
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413668	Display	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



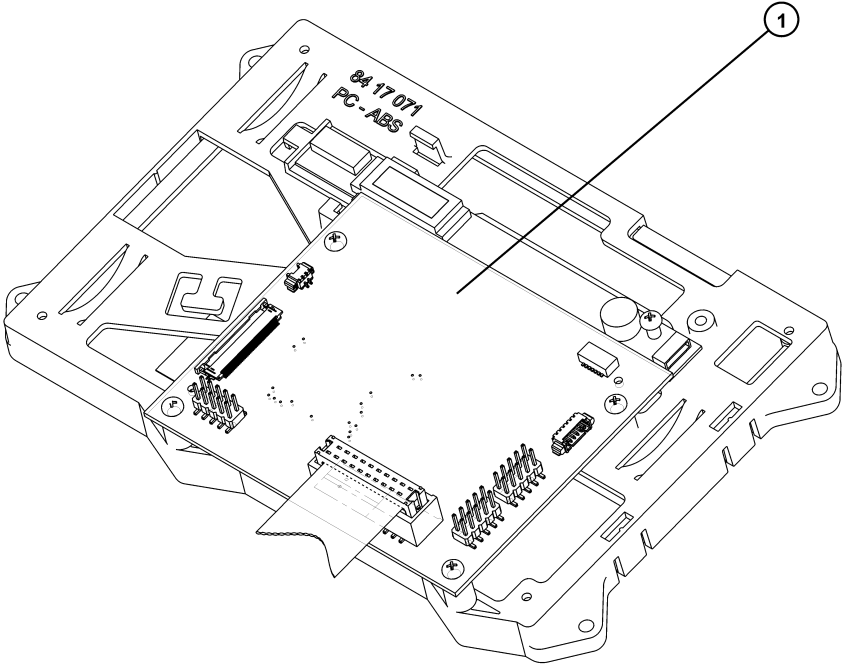
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1		Color display	1.000	St	
2		PCB Frontpanel 2	1.000	St	
3		Display field, color	1.000	St	
4	8420607	Cable harness Savina display	1.000	St	
5	8607597	trim knob Cockpit	1.000	St	
6	8417068	Rotary encoder, compl.	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

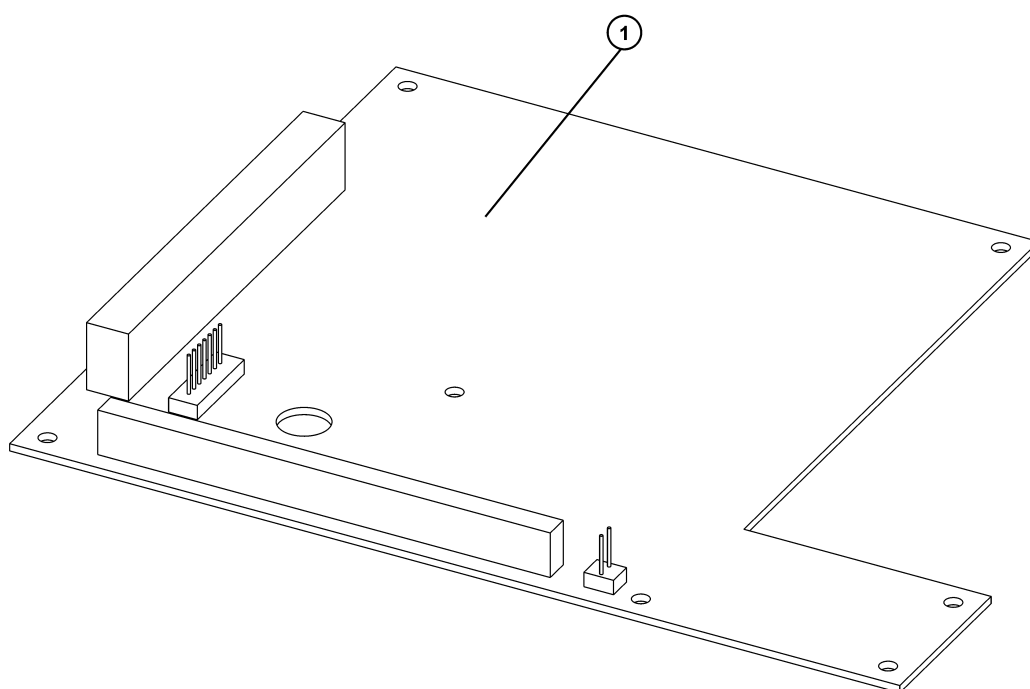


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
7	8417080	Kit of insert strips, DE	1.000	St	
7	8417089	Set of insert strips, PL	1.000	St	
7	8417084	Kit Insertion Stripes, ES	1.000	St	
7	8417082	Kit Insertion Stripes, EN, US	1.000	St	
7	8417088	Kit Insertion Stripes, CN	1.000	St	
7	8417087	Kit Insertion Stripes, PT	1.000	St	
7	8417085	Kit Insertion Stripes, JP	1.000	St	
7	8417086	Kit Insertion Stripes, IT	1.000	St	
7	8417083	Kit Insertion Stripes, FR	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

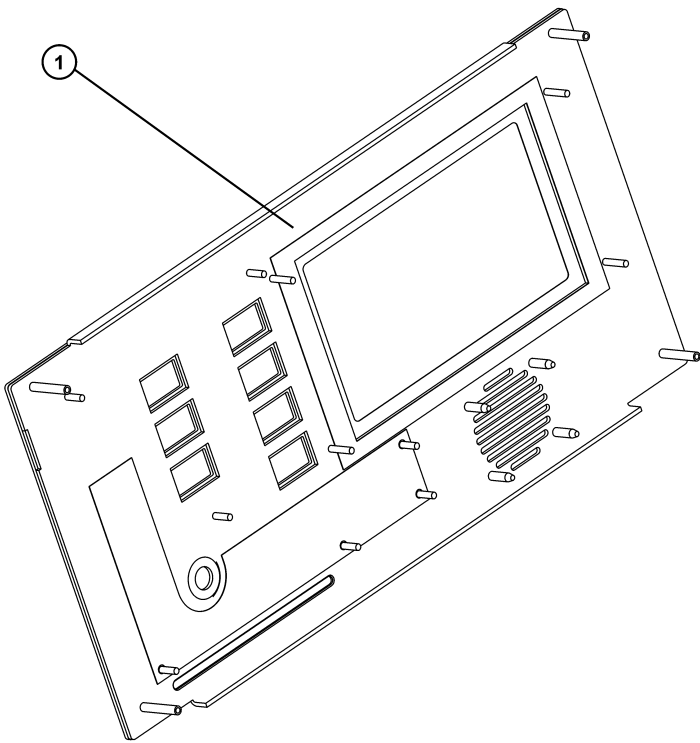


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8420606	Savina color display, complete	1.000	St	

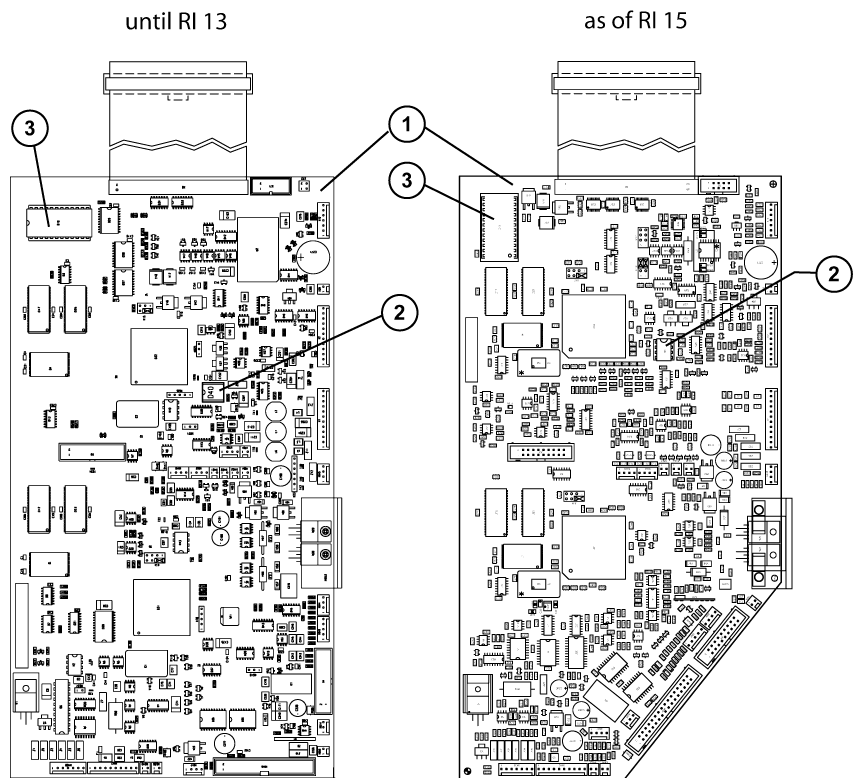


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8419571	PCB, Front panel 2	1.000	St	

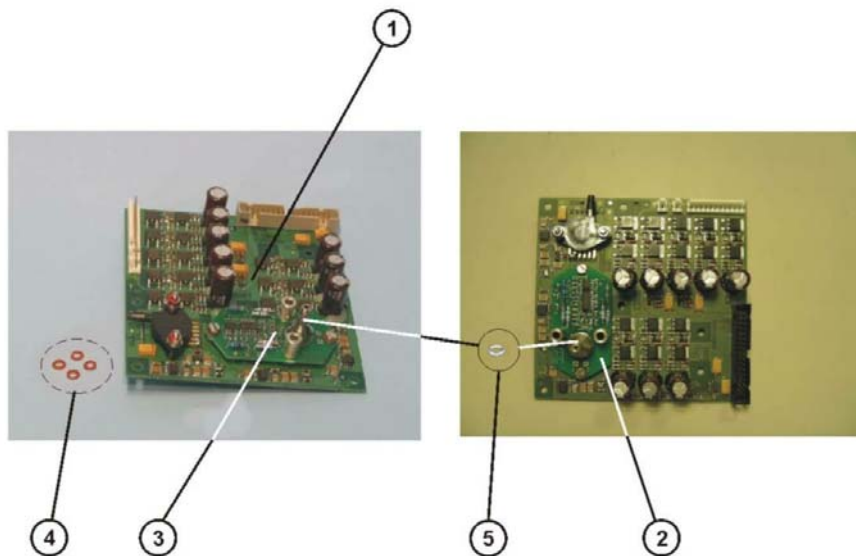
Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8417060	Display, complete	1.000	St	

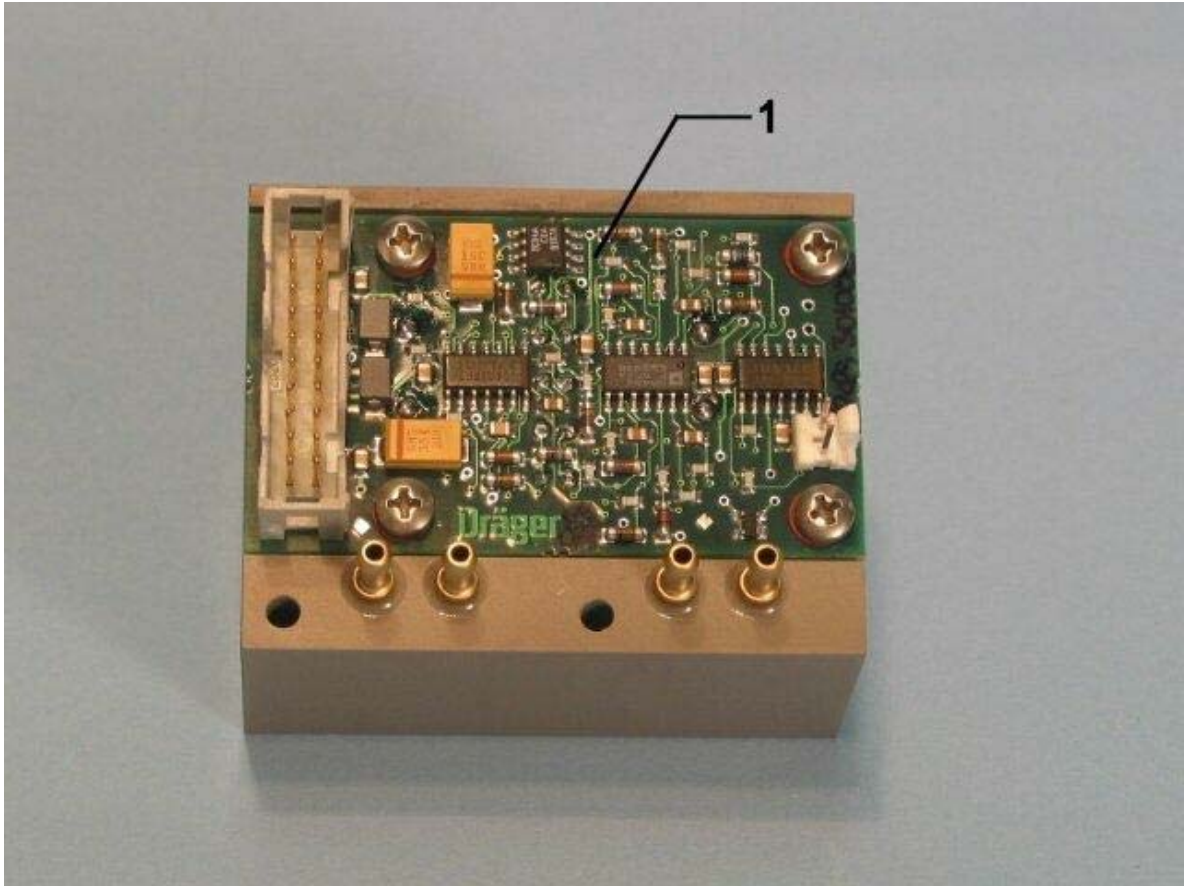


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8350471	pba controller Savina	1.000	St	the pcb is backwards compatible
2	1845586	EEPROM 256X8 DIP8 I2CLV02856	1.000	St	
3	1845527	REAL TIME CLOCK DIL24 RoHS	1.000	St	

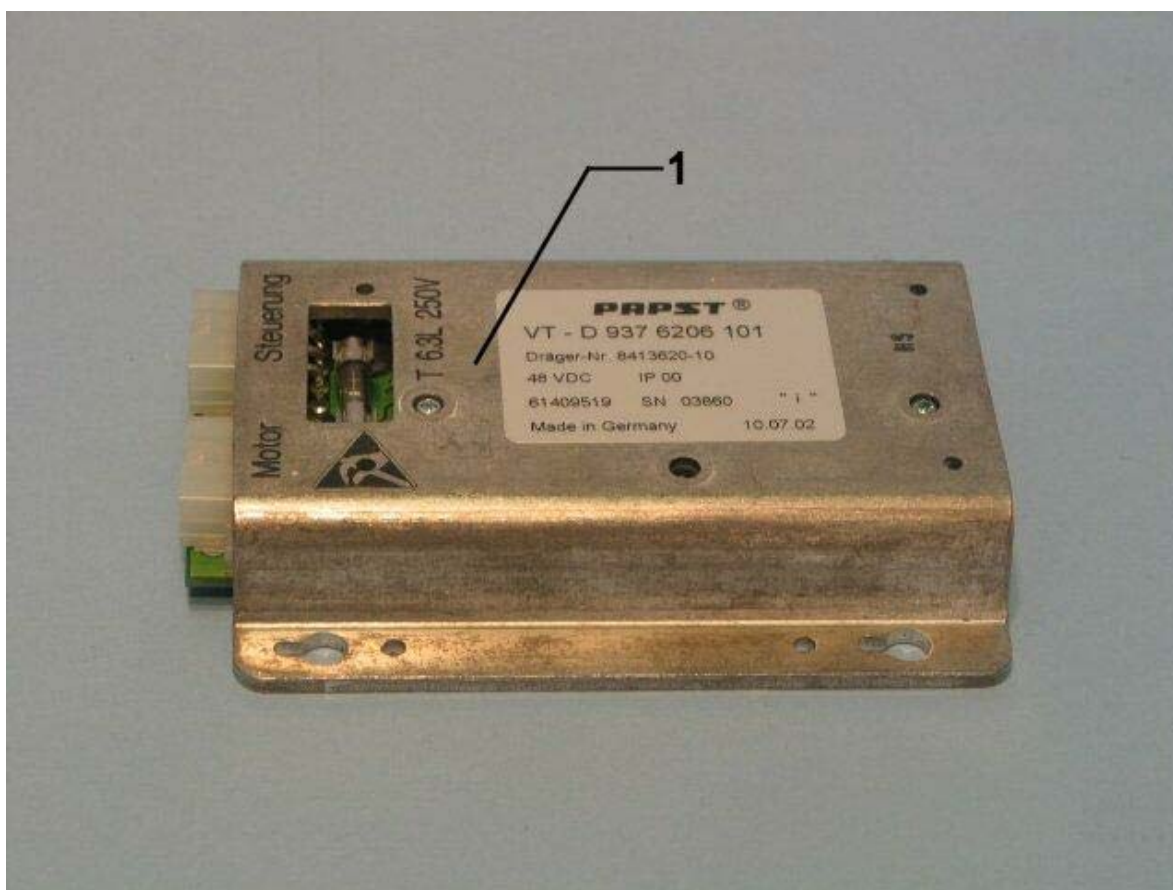


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8350841	PCB O2-VALVE	1.000	St	
2	1865862	Pressure Sensor 7bar absolute	1.000	St	oder 8305624
3	8305624	ADMISSION PRESSURE SENSOR	1.000	St	oder 1865862
4	D04766	PACKING RING	4.000	St	
5	8410713	O-RING SEAL	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

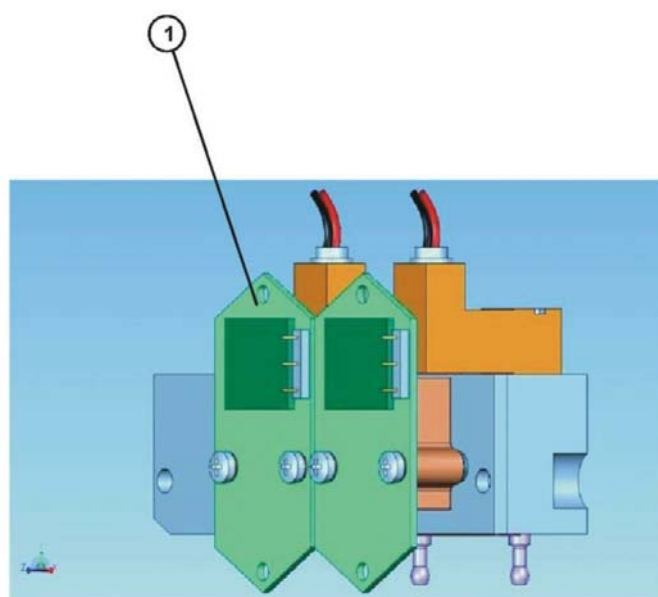


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8351201	PCB O2-DIAPHRAGM	1.000	St	



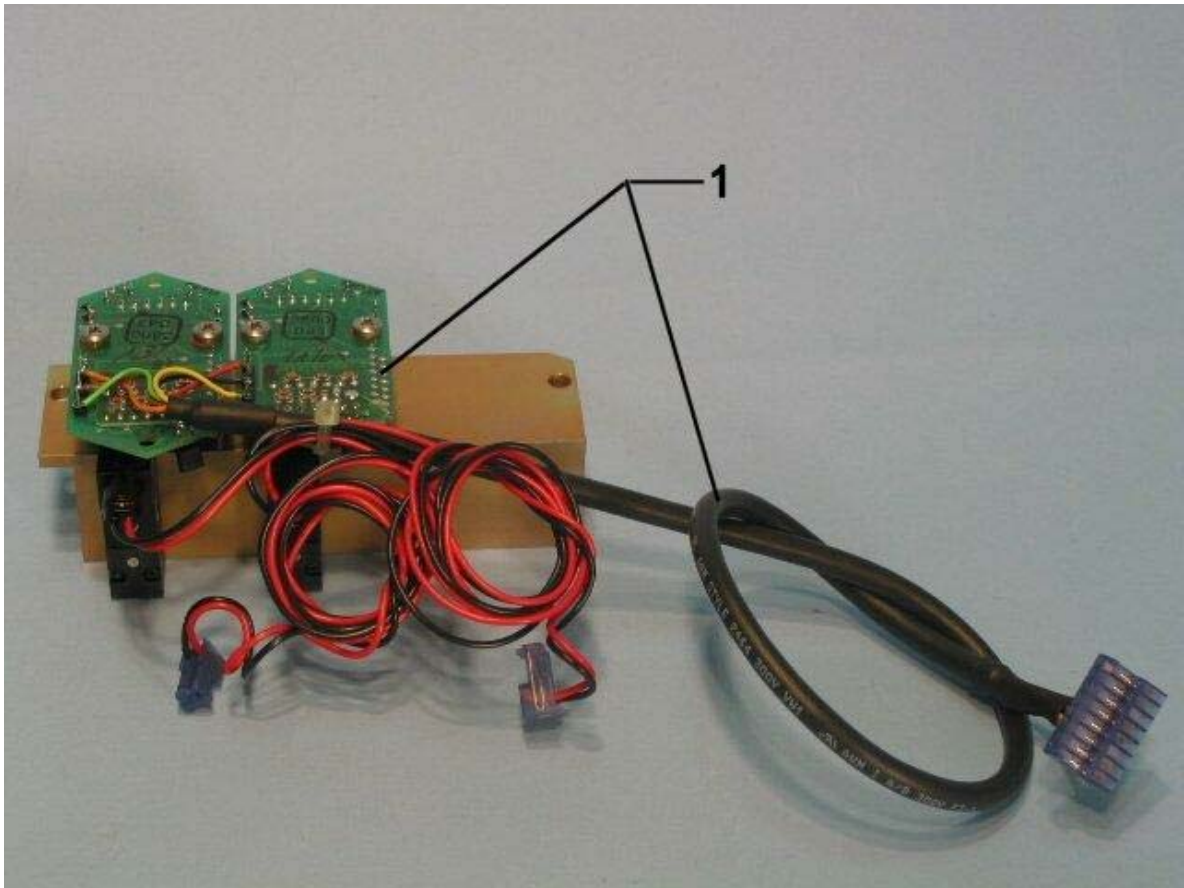
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413620	Enginedrive, compl.	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



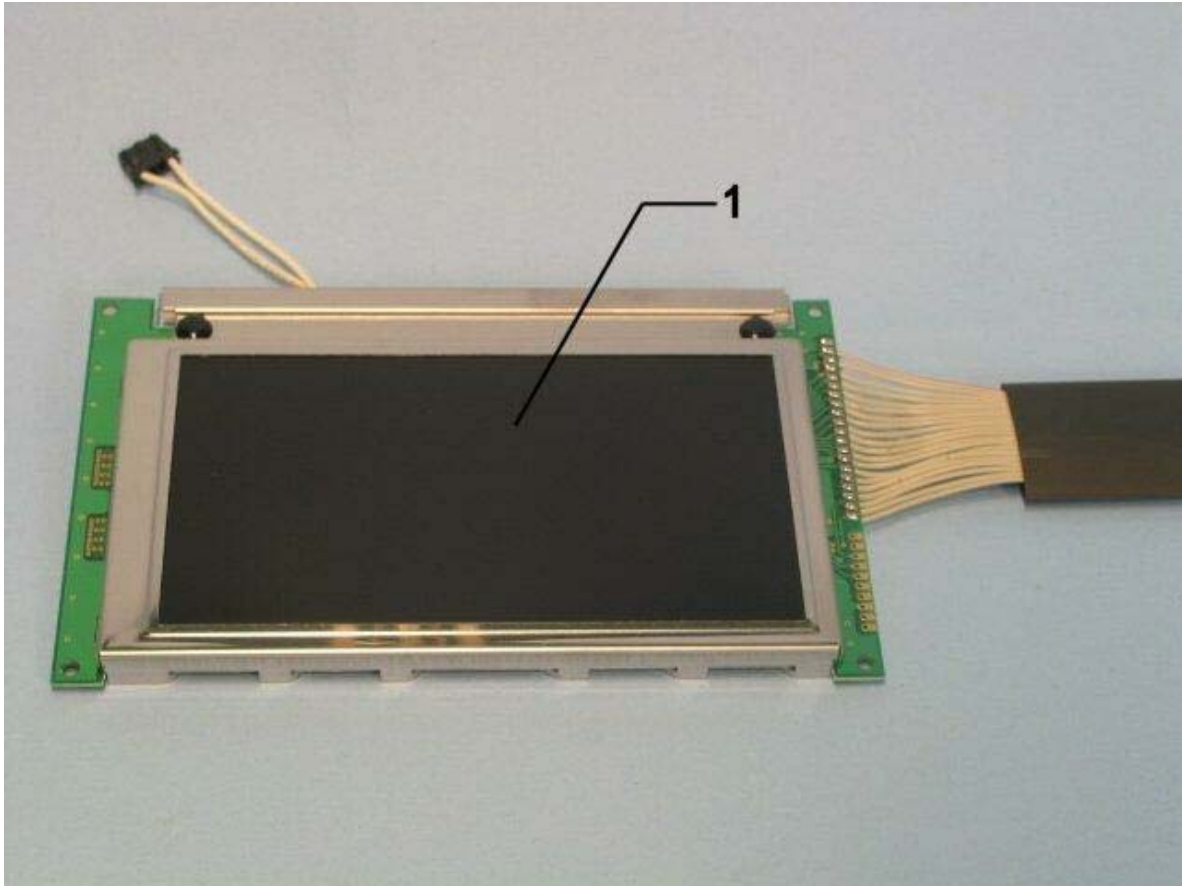
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
2	1865889	Pres.Sensor 120mbar difference	1.000	St	or 8415643

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



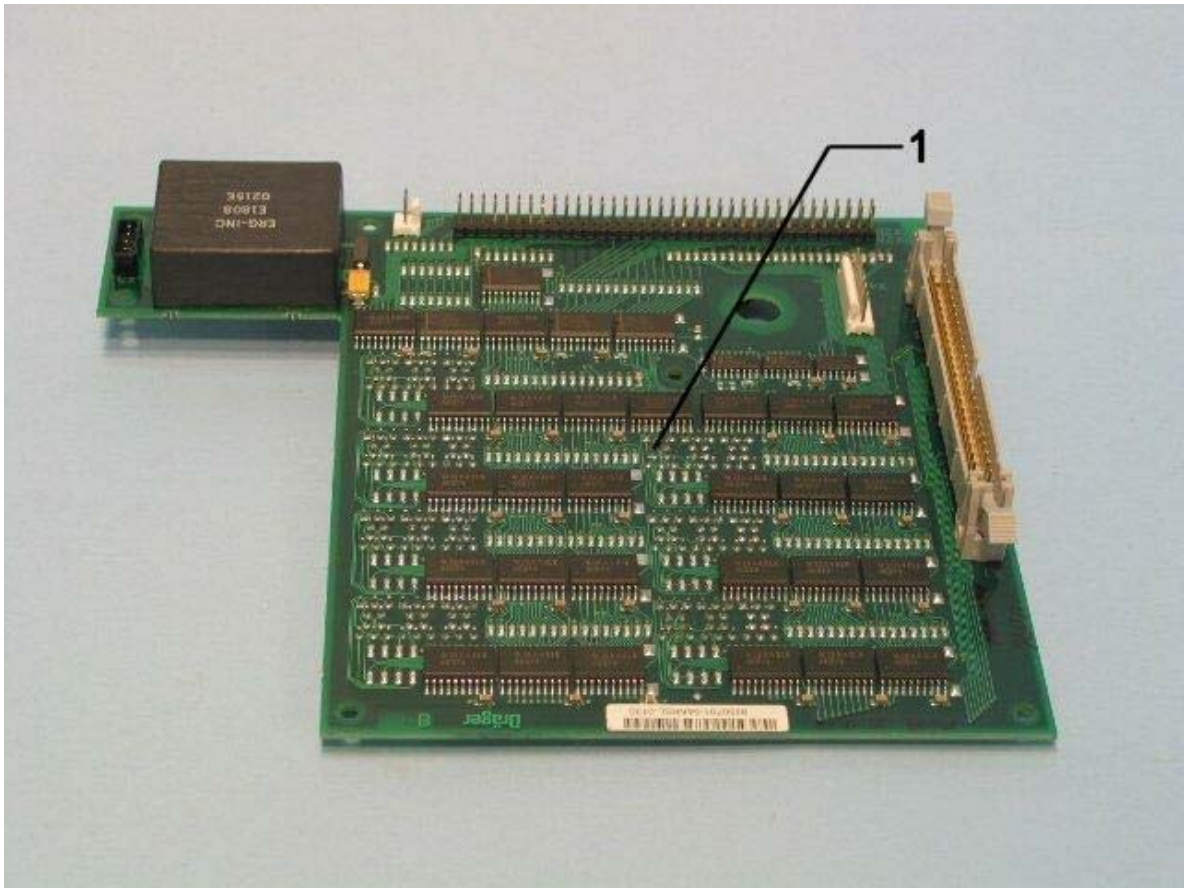
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8414177	pressure sensor 140mbar Savina	2.000	St	läuft aus (Restbestände)

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

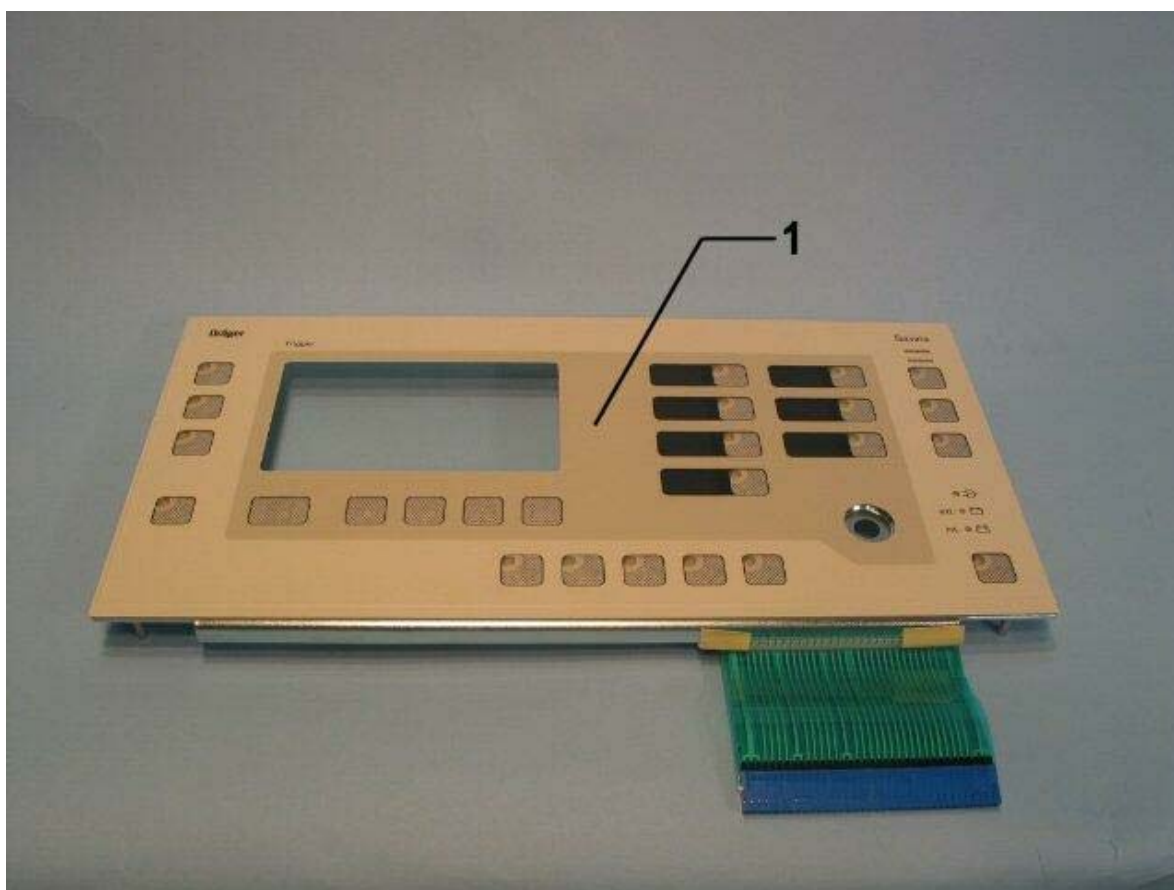


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413668	Display	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

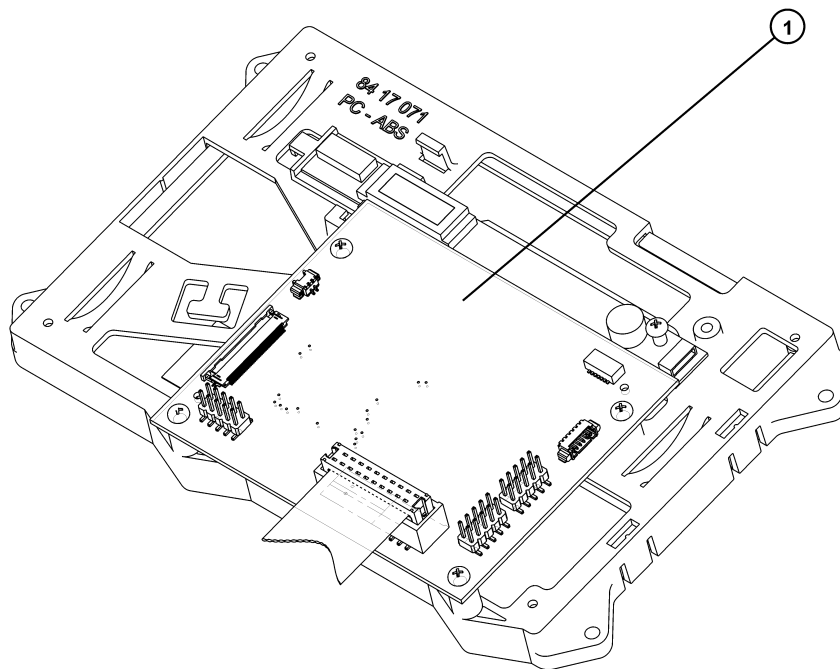


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8350701	PCB O2-FRONTANEL	1.000	St	



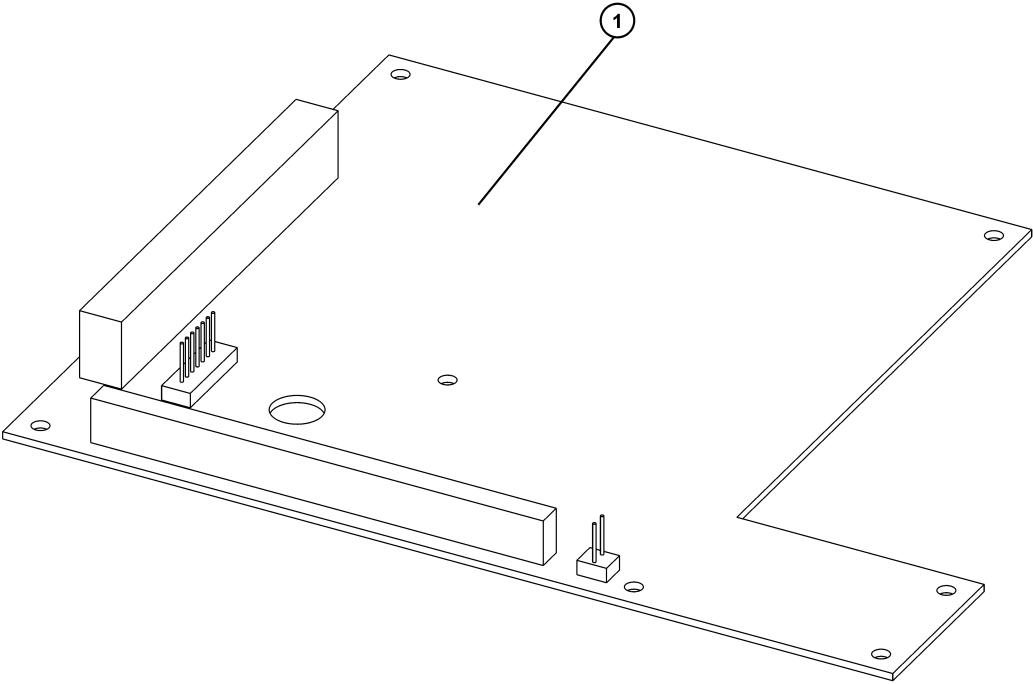
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413590	DISPLAY FIELD COMPLETE	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

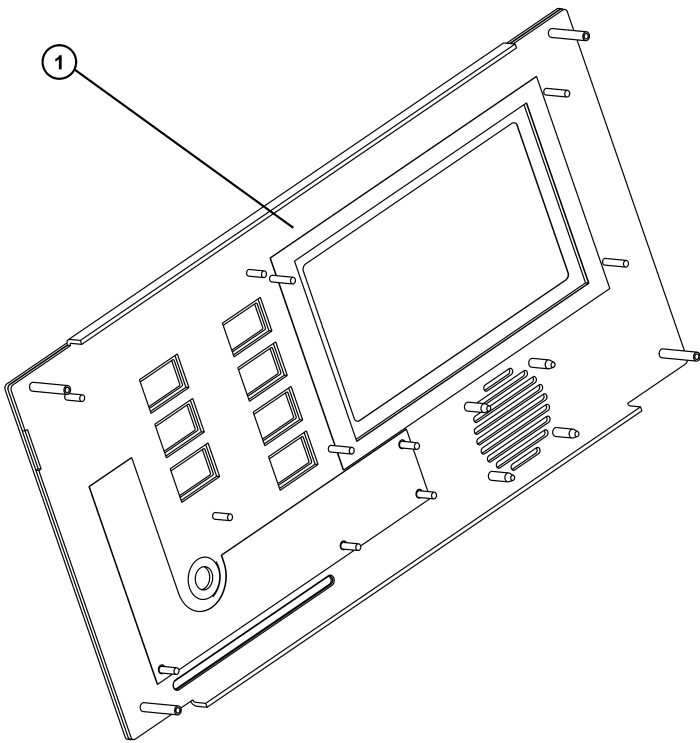


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8420606	Savina color display, complete	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

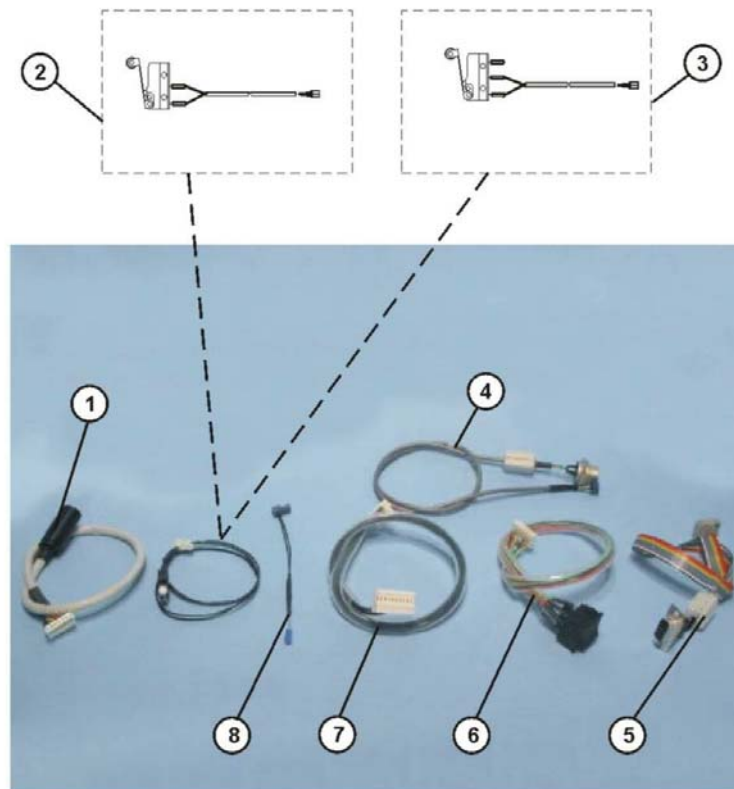


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8419571	PCB, Front panel 2	1.000	St	



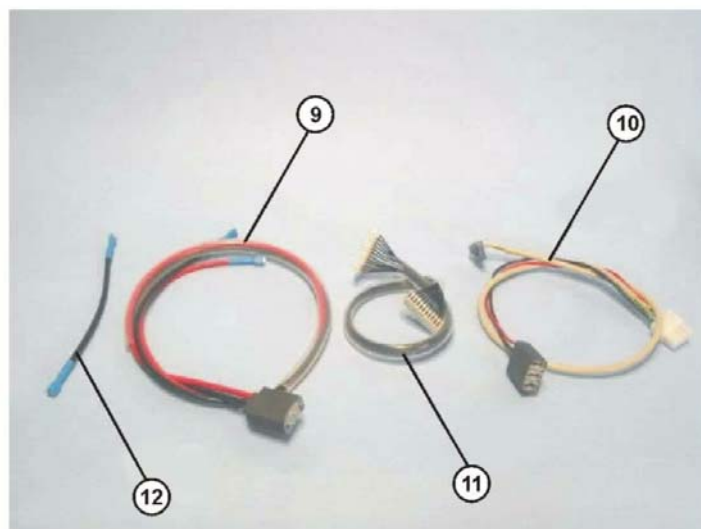
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8417060	Display, complete	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



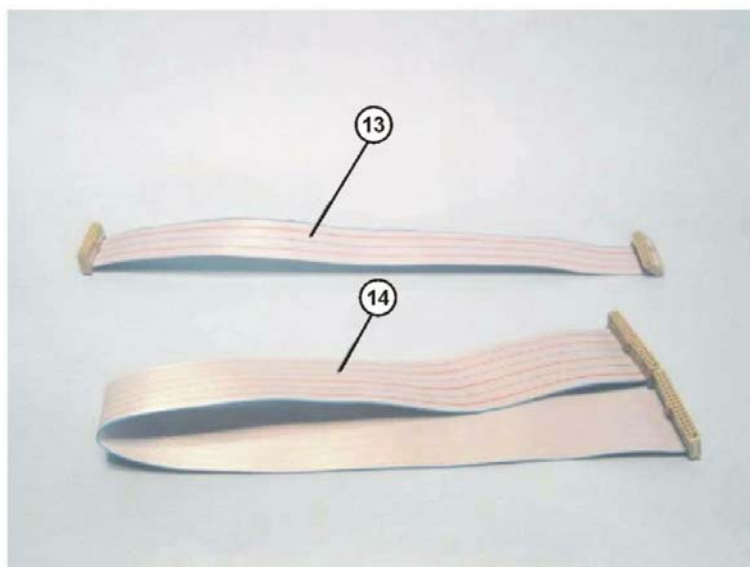
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8414028	Cable harness spiroplog sensor	1.000	St	
2	8414338	Cable harness flow switch	1.000	St	discontinued,use up; or 8416370 oder 8414338
3	8416370	Cable harness flow switch	1.000	St	
4	8413631	Nurse call S	1.000	St	
5	8413627	Interface Cable RS232	1.000	St	
6	8413609	MAINS SWITCH	1.000	St	
7	8413700	CABLE HARNESS	1.000	St	
8	8414314	Cable Harness Temp. Sensor	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
9	8413584	Cable power supply, akku	1.000	St	
10	8414517	cableharness motorelectronic	1.000	St	
11	8413582	CABLE POWERPACK	1.000	St	
12	8413604	DC-Connecting AKKU, AKKU	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
13	8413622	Flat cable,O2-Measuring Module	1.000	St	
14	8413621	Flat cable, Valve bench	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

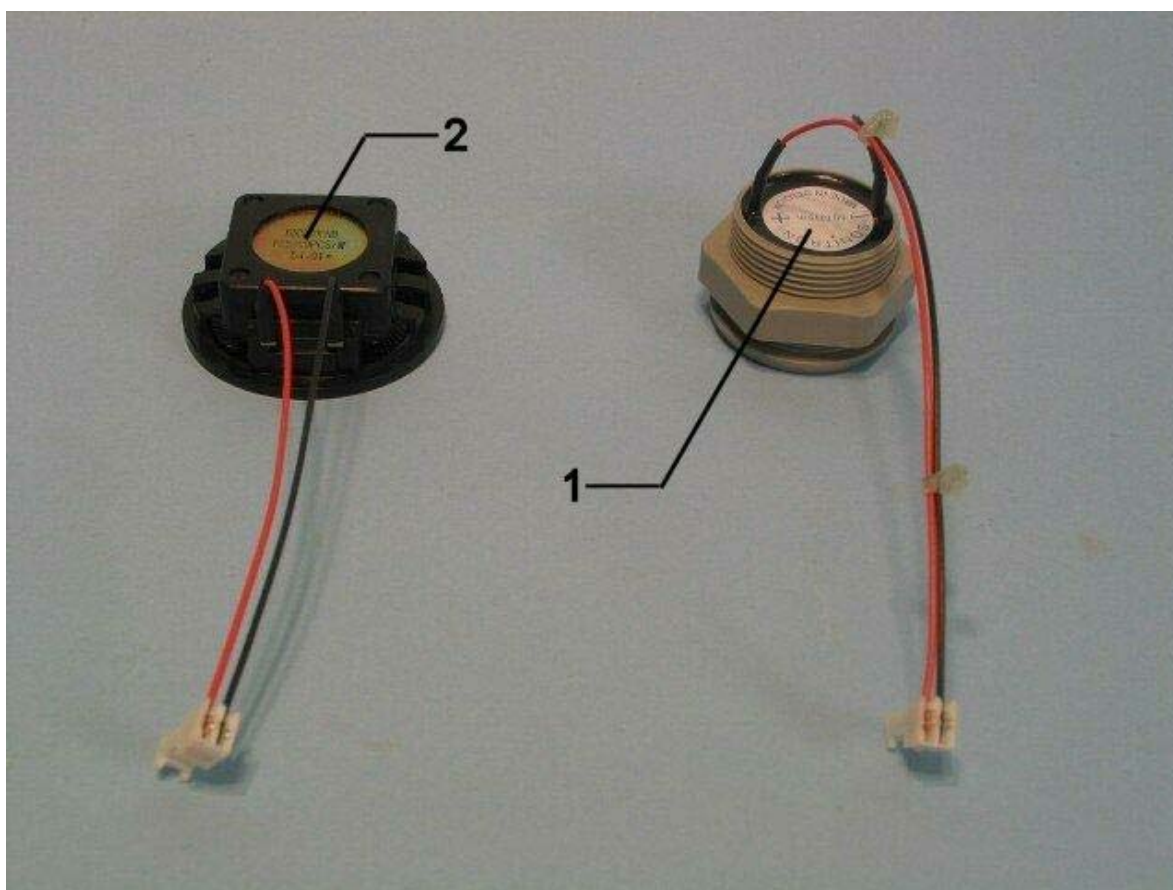
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8306488	Cable RS232 MEDIBUS	1.000	St	Servicedrawing
		Powercords	1.000	St	
	8414092	DC-battery cable S	1.000	St	
	8414048	DC-Board mains cable S	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



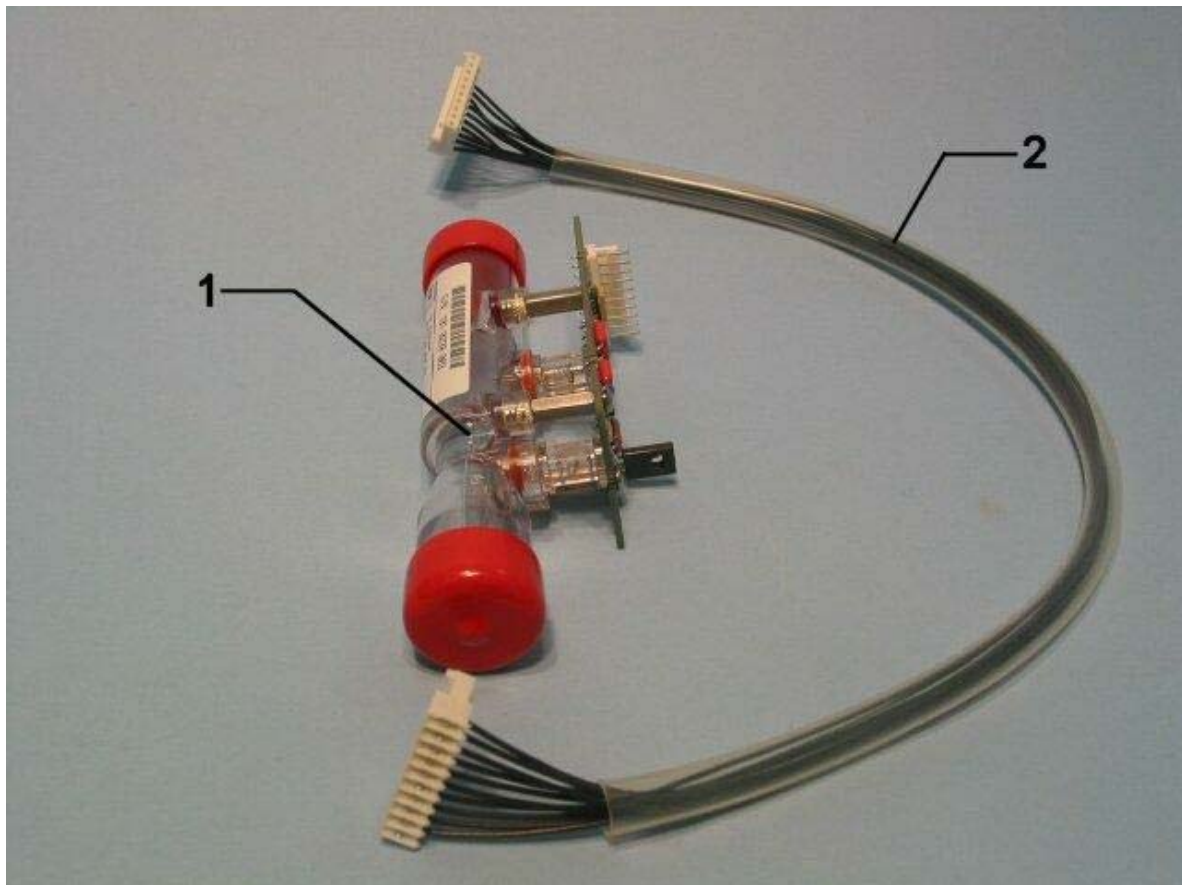
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	1824481	Power Cable CE,3m,10A,C13L,bk	1.000	St	
	1841793	PWR Cord 10A,3m,gr,USA/J RoHS	1.000	St	
	1844342	Power cable DK, 3 m, 10 A	1.000	St	
	1844350	Power cable Australia 3m,10A,C13L	1.000	St	
	1844369	Power cable Great Britian 3m black	1.000	St	
	1844377	POWERCORD CH 3M	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



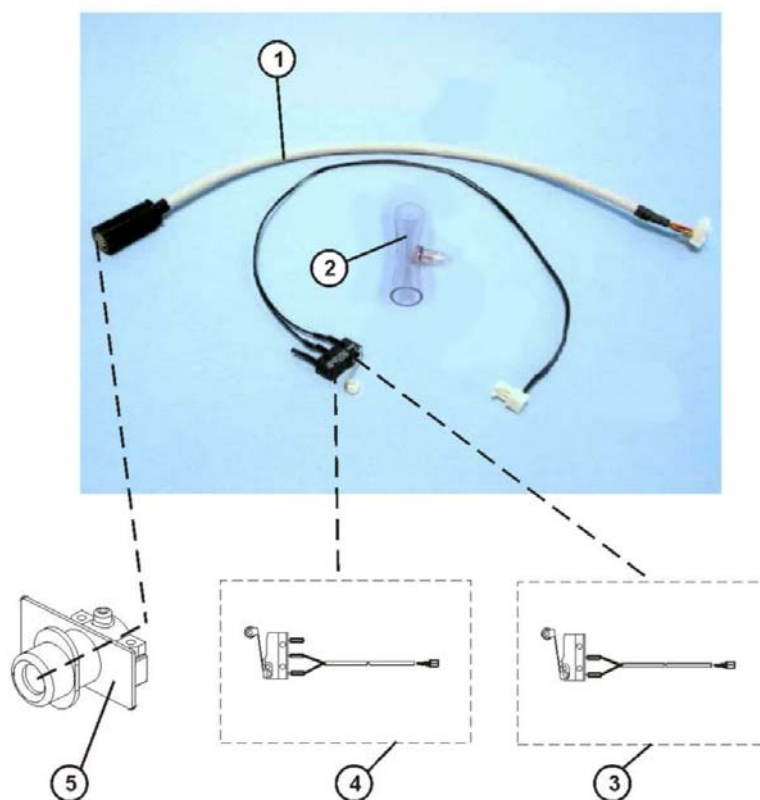
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8414518	HORN,CPL.	1.000	St	
2	8414037	Loudspeaker, complete	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



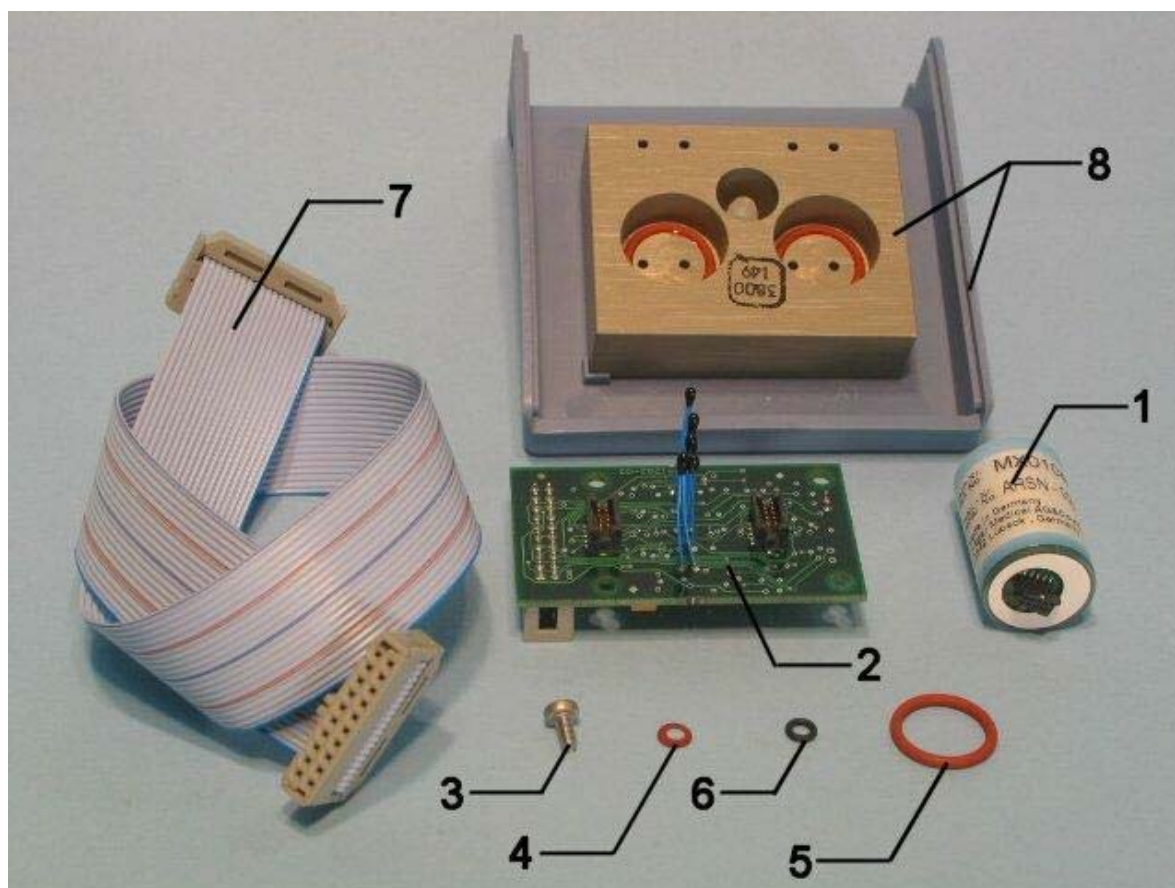
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413579	TSI-sensor	1.000	St	
2	8413700	CABLE HARNESS	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



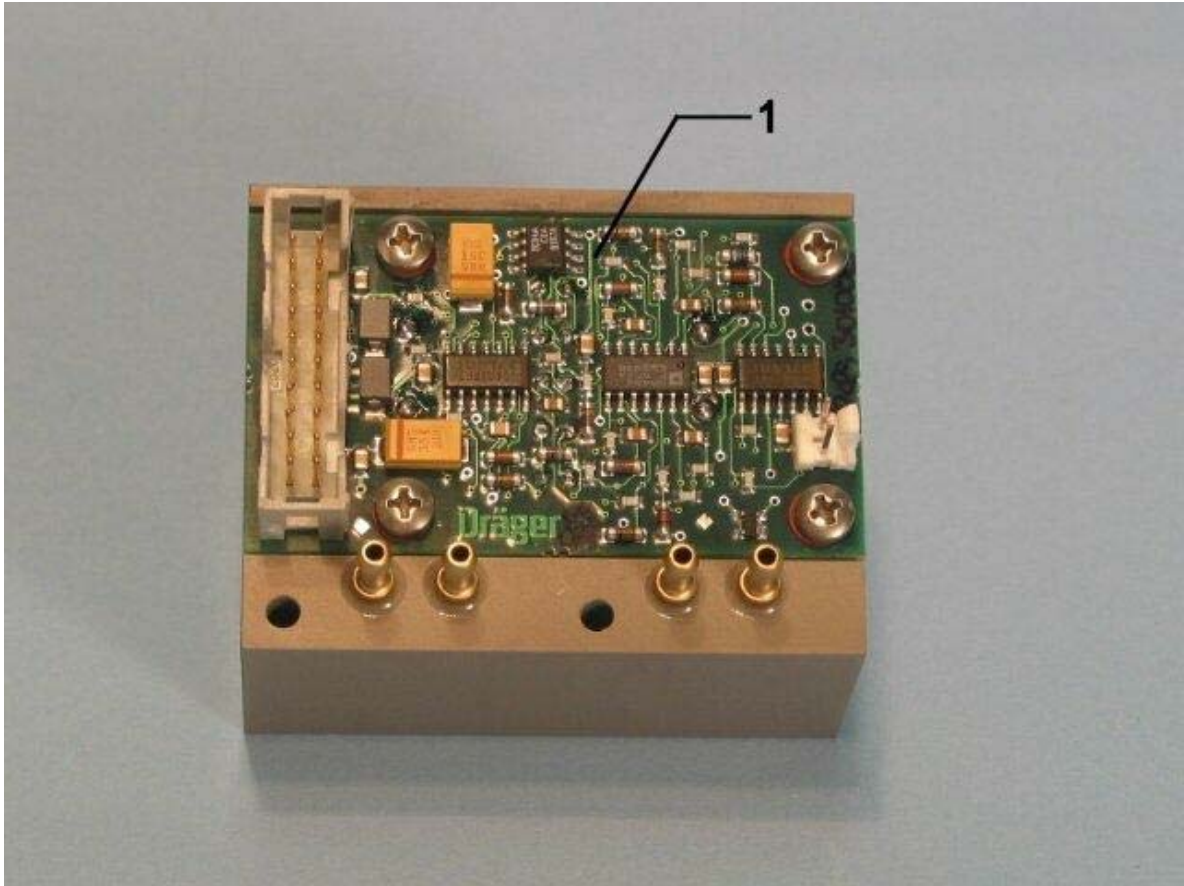
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8414028	Cable harness spirolog sensor	1.000	St	
2	8403735	Spirolog Flow Sensor (5x)	1.000	St	
3	8414338	Cable harness flow switch	1.000	St	läuft aus, aufbrauchen oder 8416370 oder 8414338
4	8416370	Cable harness flow switch	1.000	St	
5	8410663	Plug accommodation	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

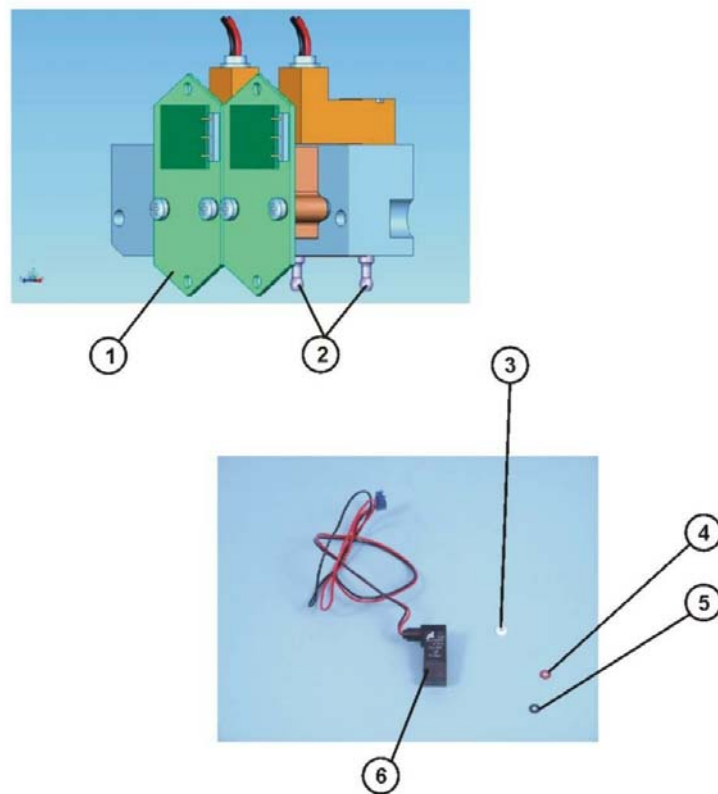


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	MX01049	OxyTrace VE	1.000	St	Servicedrawing
2		PCB O2-Diaphragm	1.000	St	
3	1340727	OVAL HEAD SCR.DIN7985-M3X6-A2	1.000	St	
4	D04766	PACKING RING	1.000	St	
5	R31296	O-RING SEAL	1.000	St	
6	8410713	O-RING SEAL	1.000	St	
7	8413622	Flat cable,O2-Measuring Module	1.000	St	
8	8413735	O2-sensor covering	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

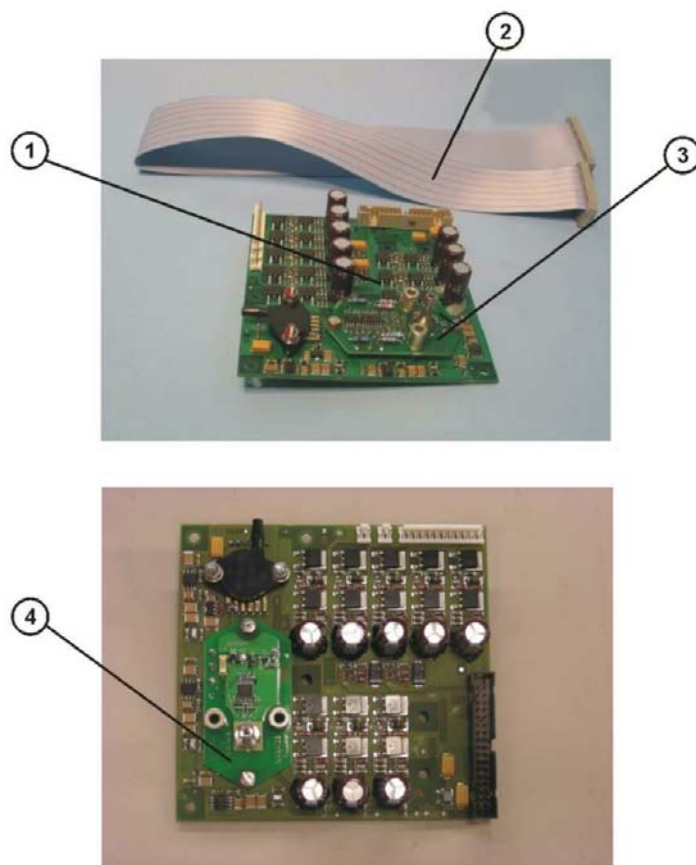


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8351201	PCB O2-DIAPHRAGM	1.000	St	



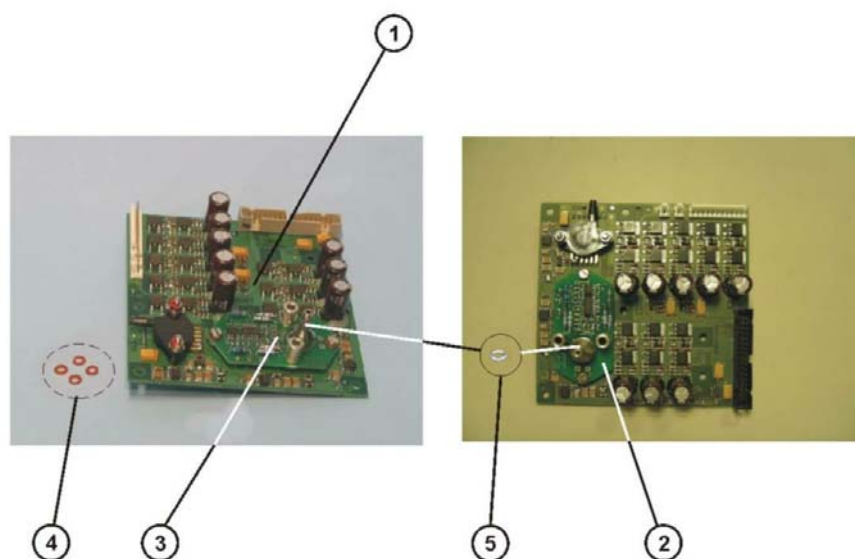
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8712065	CABLE CLIP	1.000	St	
1	1865889	Pres.Sensor 120mbar difference	1.000	St	or 8414177 (remaining stock, discontinued)
2	8400964	SOCKET	1.000	St	
3	6804141	Isolate socket	1.000	St	
4	D04766	PACKING RING	1.000	St	
5	8410713	O-RING SEAL	1.000	St	
6	8412993	ELECTROVALVE	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



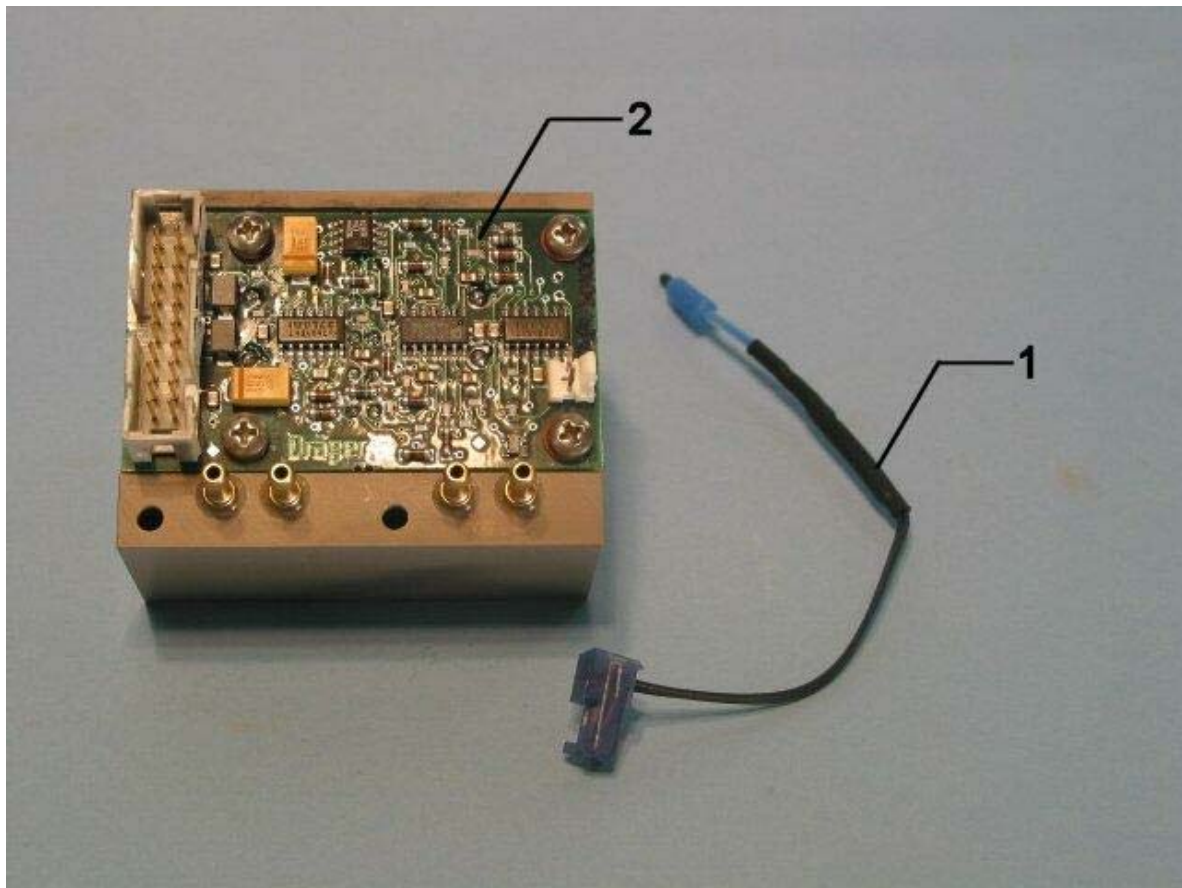
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1		PCB O2-Valve	1.000	St	
2	8413621	Flat cable, Valve bench	1.000	St	
3	8305624	ADMISSION PRESSURE SENSOR	1.000	St	oder 1865862
4	1865862	Pressure Sensor 7bar absolute	1.000	St	oder 8305624

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



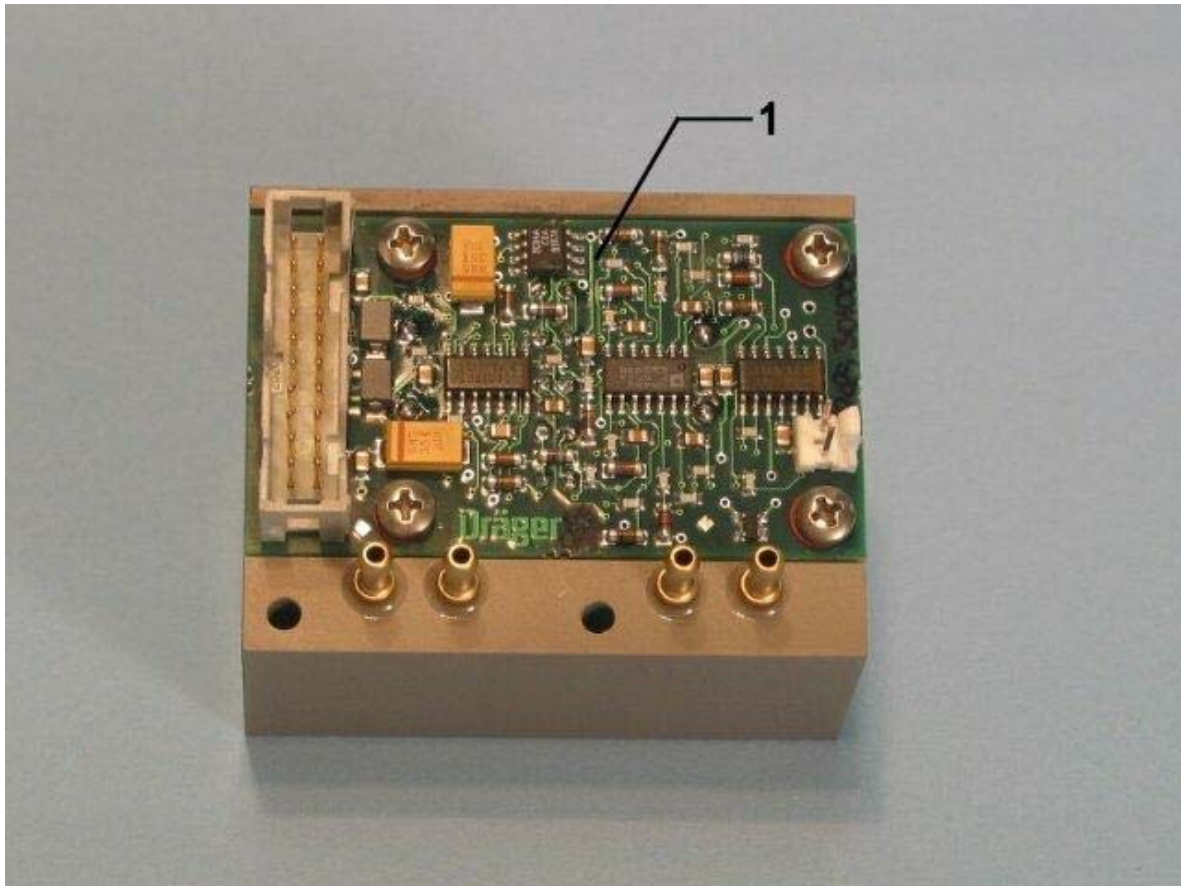
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8350841	PCB O2-VALVE	1.000	St	
2	1865862	Pressure Sensor 7bar absolute	1.000	St	oder 8305624
3	8305624	ADMISSION PRESSURE SENSOR	1.000	St	oder 1865862
4	D04766	PACKING RING	4.000	St	
5	8410713	O-RING SEAL	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



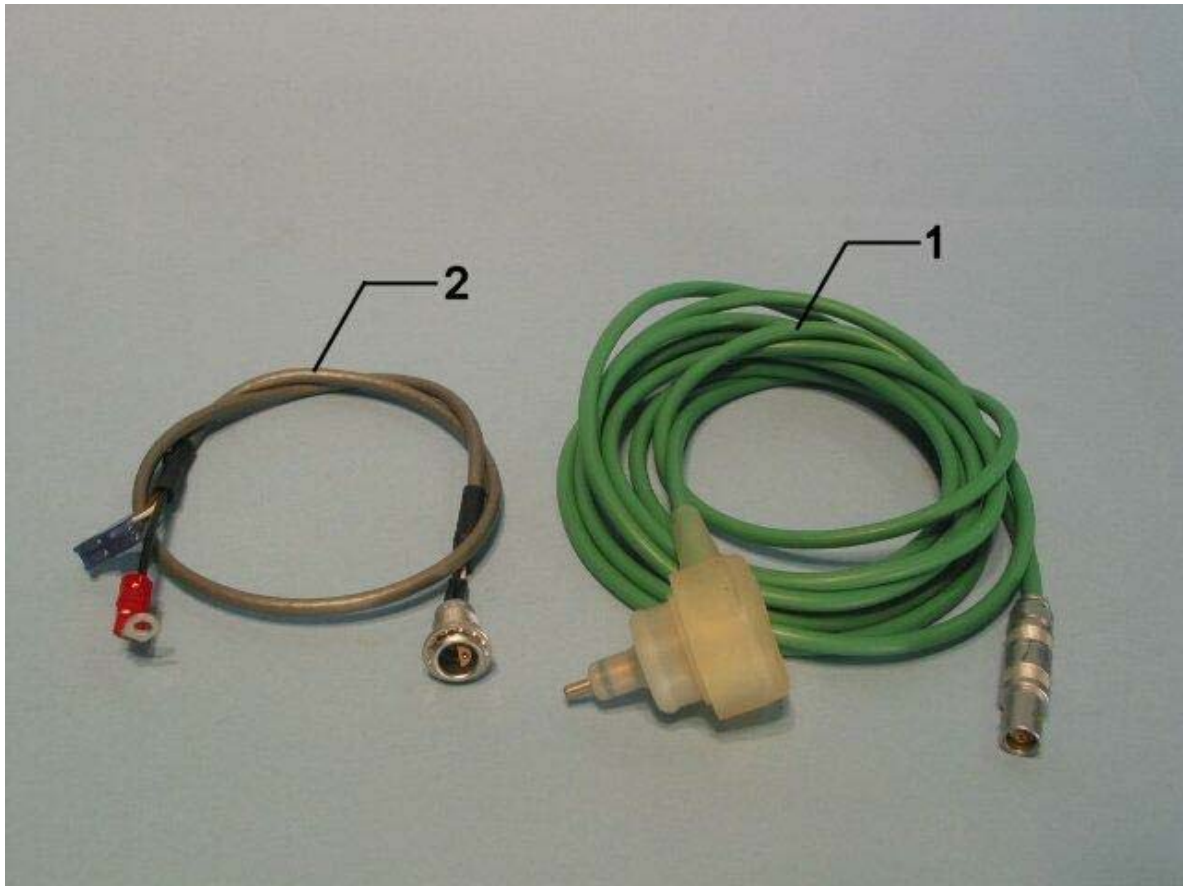
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8414314	Cable Harness Temp. Sensor	1.000	St	
2		PCB O2-Diaphragm	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



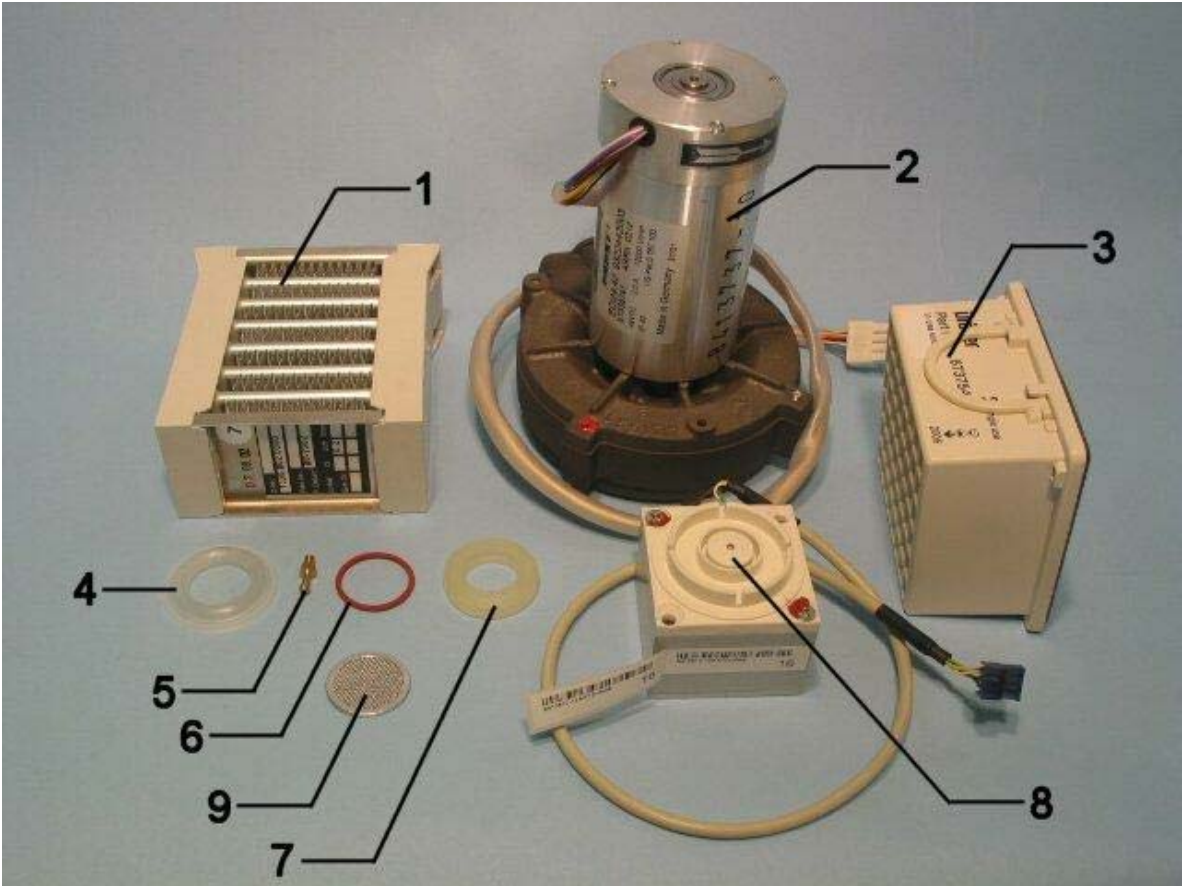
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8351201	PCB O2-DIAPHRAGM	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



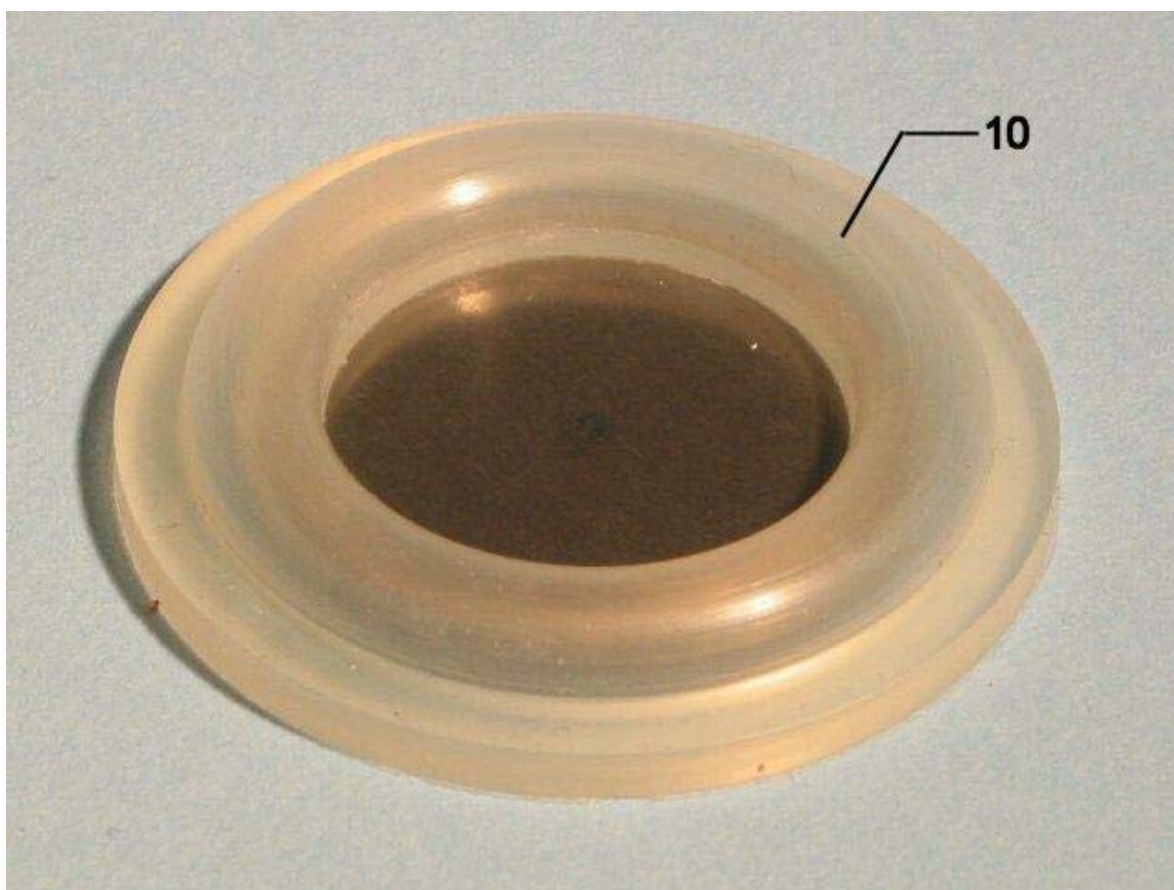
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8405371	TEMPERATURE SENSOR	1.000	St	
2	8414519	Cable harness AWT01	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413644	REP.SET RADIATOR	1.000	St	
2	8413643	Spare Parts (Blow.Engine Unit)	1.000	St	
3	6737545	MICROFILTER	1.000	St	
4	8410181	DIAPHRAGM	1.000	St	
5	8408197	SOCKET	1.000	St	
6	M20622	O-RING SEAL	1.000	St	
7	8413710	GASKET	1.000	St	
8		valve drive	1.000	St	Servicedrawing
9	8413748	FILTER TSI	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

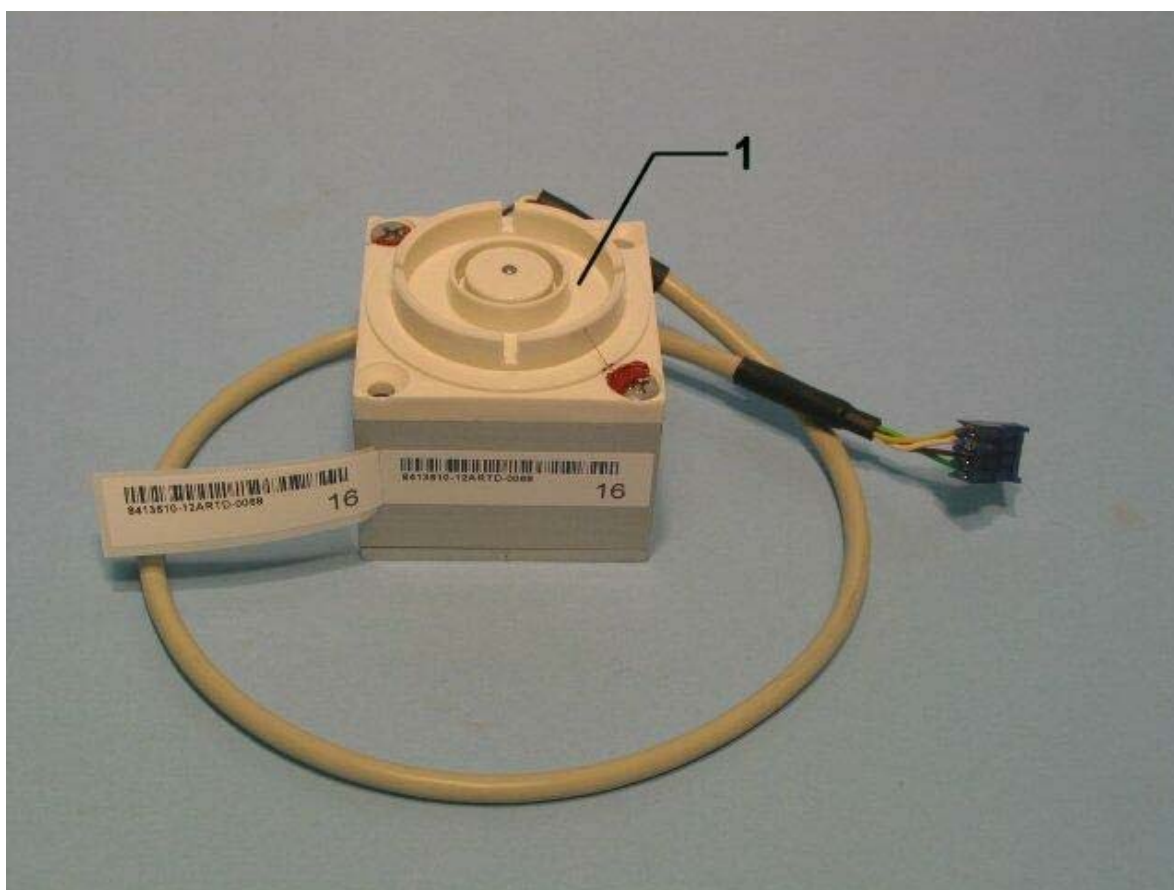


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
10	8414081	REP.SET DIAPHRAGM	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	1554123	GLASS OF OXYGENOEX S 4, 125GR	1.000	St	
	1339958	COUNTER SUNK SCREW M4X8 DIN965	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



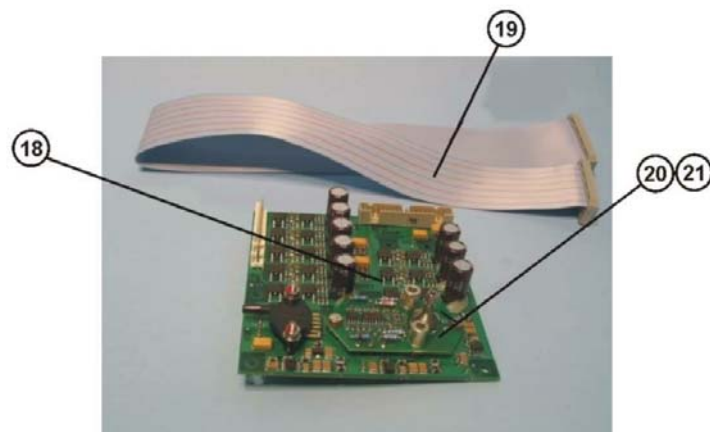
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413610	Valve actuator	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



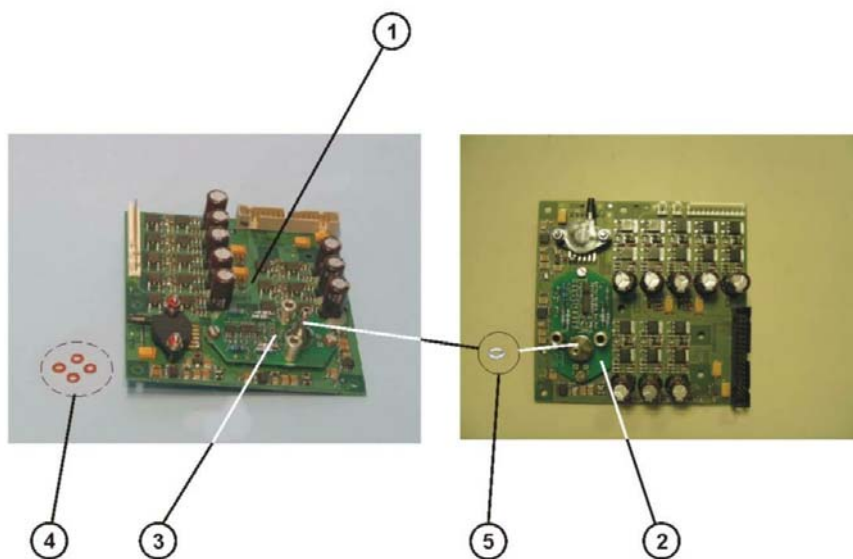
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	1340727	OVAL HEAD SCR.DIN7985-M3X6-A2	1.000	St	
2	CH09932	RUBBER BUFFER	1.000	St	
3	D04766	PACKING RING	1.000	St	
4	M09257	PACKING RING	1.000	St	
5	M12701	O-RING	1.000	St	
6	M11995	TOROIDAL SEALING RING	1.000	St	
7	2M10633	O-RING SEAL	1.000	St	
8	8400964	SOCKET	1.000	St	
9	8412993	ELECTROVALVE	1.000	St	
10	8413603	Valve Unit	1.000	St	
11	8413666	Pressure regulator	1.000	St	
12	8413755	FILTER TUBE 1	1.000	St	
13	8413754	FILTER TUBE 2	1.000	St	
14	8413756	filtering plate	1.000	St	
15	8414050	Metering screw 75	1.000	St	
16	2M03646	slide washer	1.000	St	
17	1329472	WASHER B 5,3 DIN 9021-A4	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



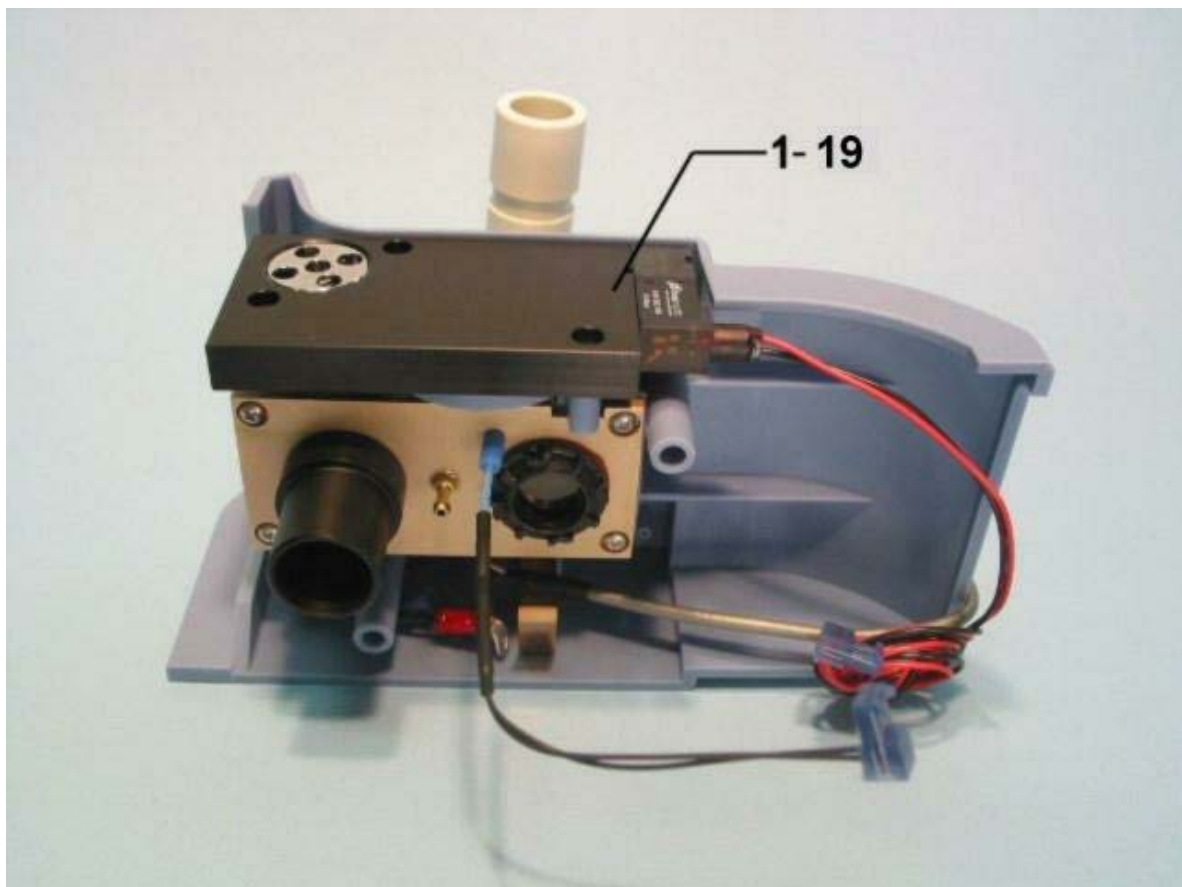
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
18		PCB O2-Valve	1.000	St	Servicedrawing
19	8413621	Flat cable, Valve bench	1.000	St	
20	8305624	ADMISSION PRESSURE SENSOR	1.000	St	oder 1865862
21	1865862	Pressure Sensor 7bar absolute	1.000	St	oder 8305624

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



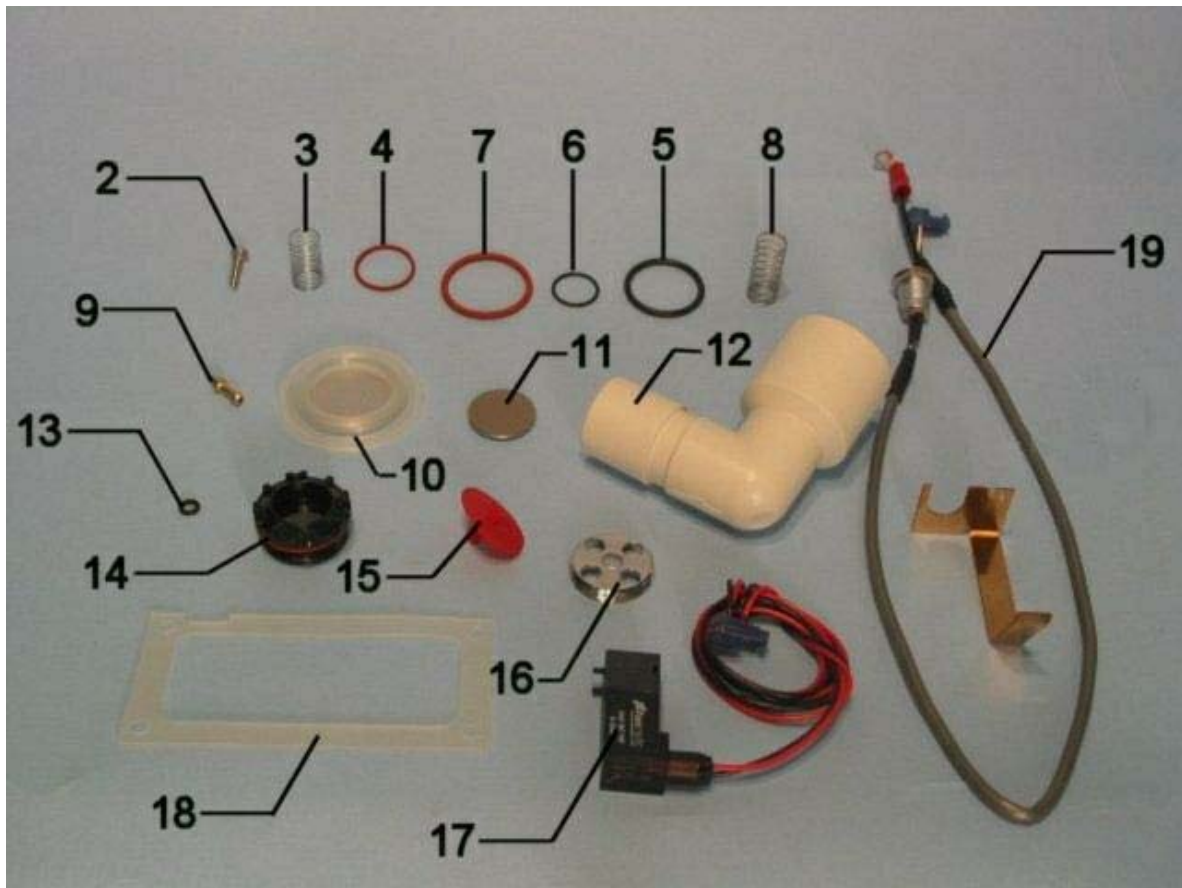
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8350841	PCB O2-VALVE	1.000	St	
2	1865862	Pressure Sensor 7bar absolute	1.000	St	oder 8305624
3	8305624	ADMISSION PRESSURE SENSOR	1.000	St	oder 1865862
4	D04766	PACKING RING	4.000	St	
5	8410713	O-RING SEAL	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1-19	8413650	Inspiration unit, complete	1.000	St	

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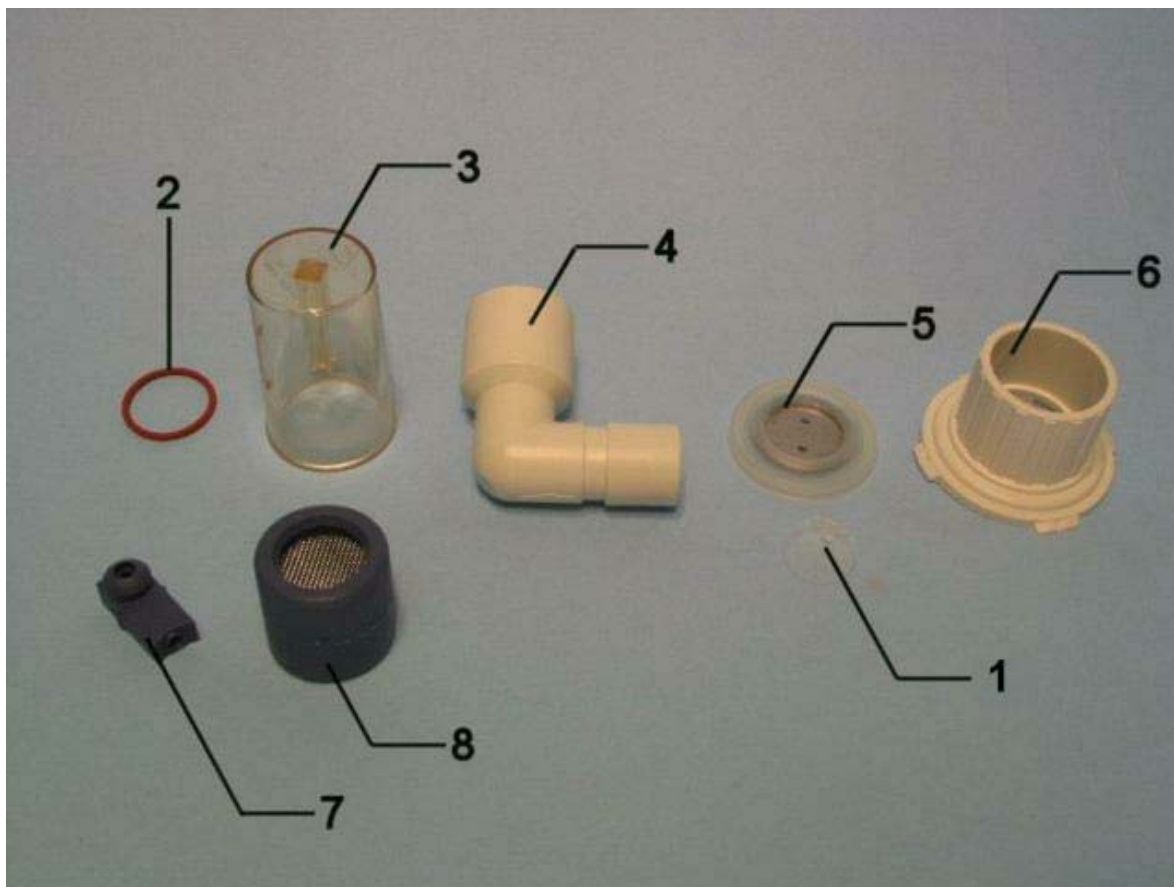
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
2	1338986	SCREW F. PLASTICS 3X12 DWN562	1.000	St	
3	M06763	VALVE SPRING	1.000	St	
4	M16996	O-RING SEAL	1.000	St	
5	M20622	O-RING SEAL	1.000	St	
6	R22363	O-ring	1.000	St	
7	R16442	O-RING	1.000	St	
8	2M12034	SPRING	1.000	St	
9	8400964	SOCKET	1.000	St	
10	8410181	DIAPHRAGM	1.000	St	
11	8410307	SEALING WASHER	1.000	St	
12	8410676	ANGULAR PORCELAIN BUSH	1.000	St	
13	8410713	O-RING SEAL	1.000	St	
14	8411147	Non-return valve	1.000	St	
15	8412002	DIAPHRAGM	1.000	St	
16	8412952	CREW	1.000	St	
17	8412993	ELECTROVALVE	1.000	St	
18	8413654	GASKET	1.000	St	
19	8414314	Cable Harness Temp. Sensor	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



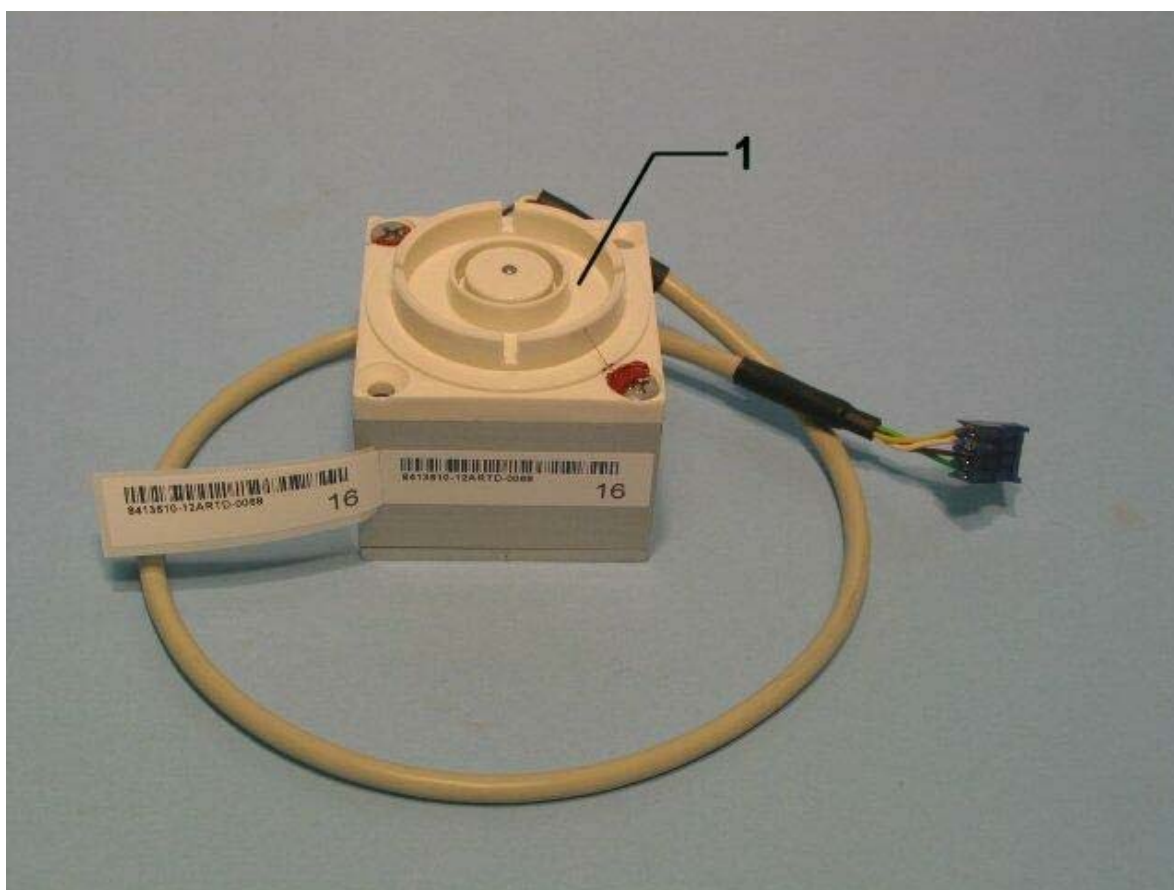
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1-8	8413660	EXPIRATION VALVE	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



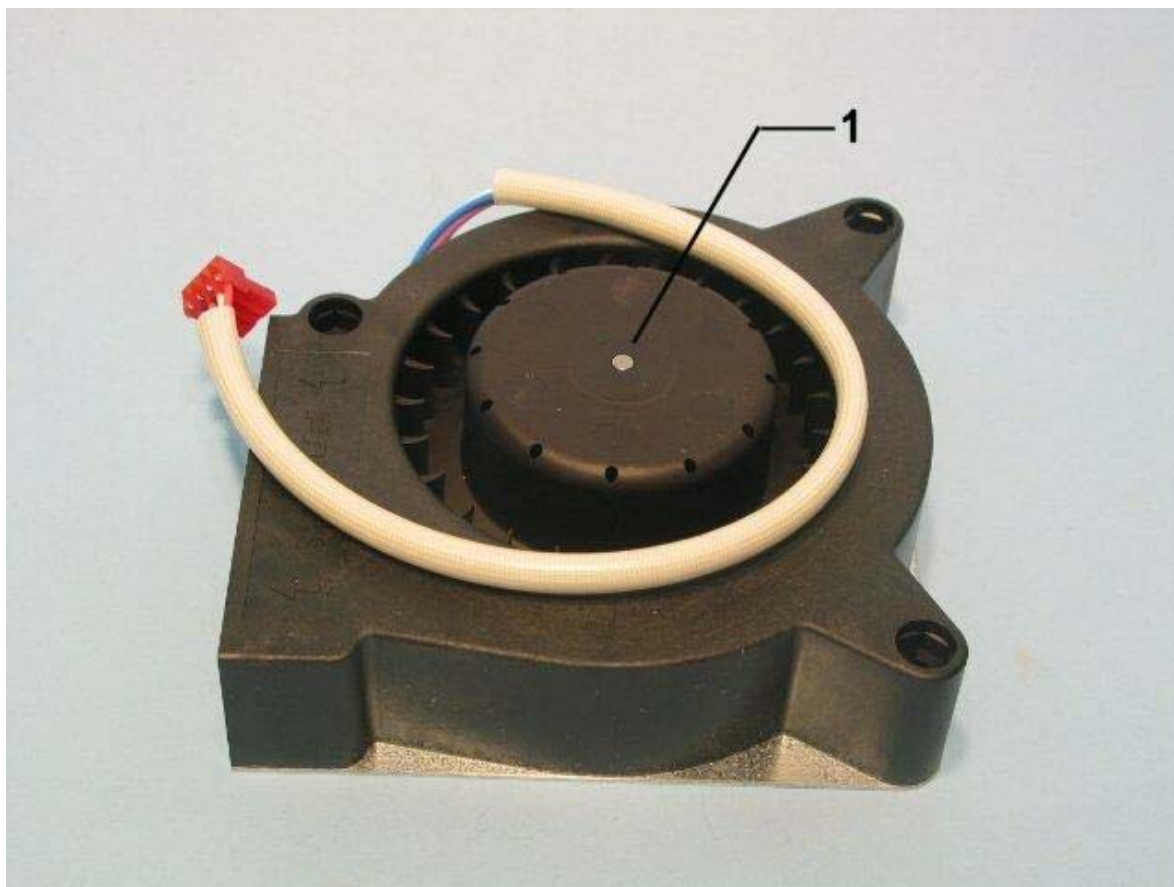
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8410682	DIAPHRAGM	1.000	St	
2	M20622	O-RING SEAL	1.000	St	
3	8403976	POT	1.000	St	
4	8410575	ANGULAR PORCELAIN BUSH	1.000	St	
5	8413661	Membrane, complete	1.000	St	
6	8413663	Bayonet ring	1.000	St	
7	8413664	LIP SEAL	1.000	St	
8	8414080	FLOWSENSOR BUSHING,CPL.	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



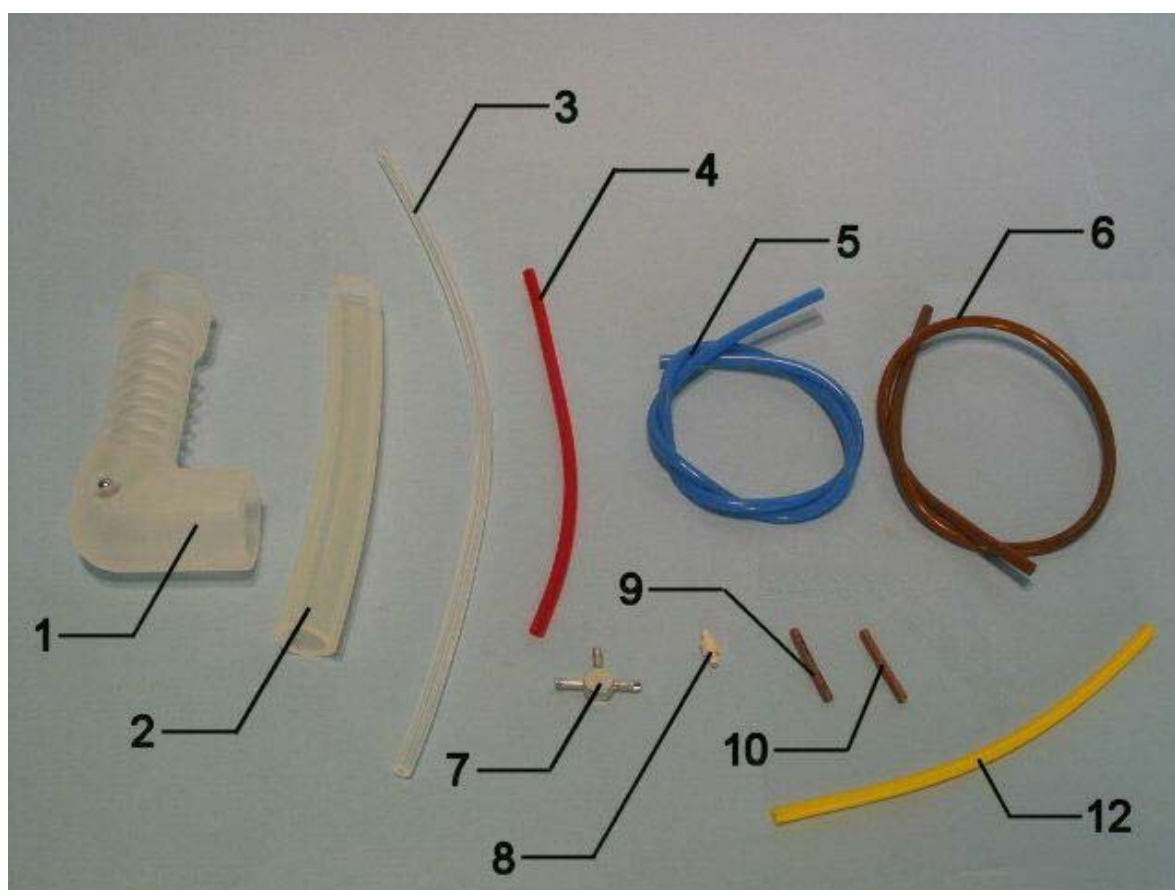
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413610	Valve actuator	1.000	St	

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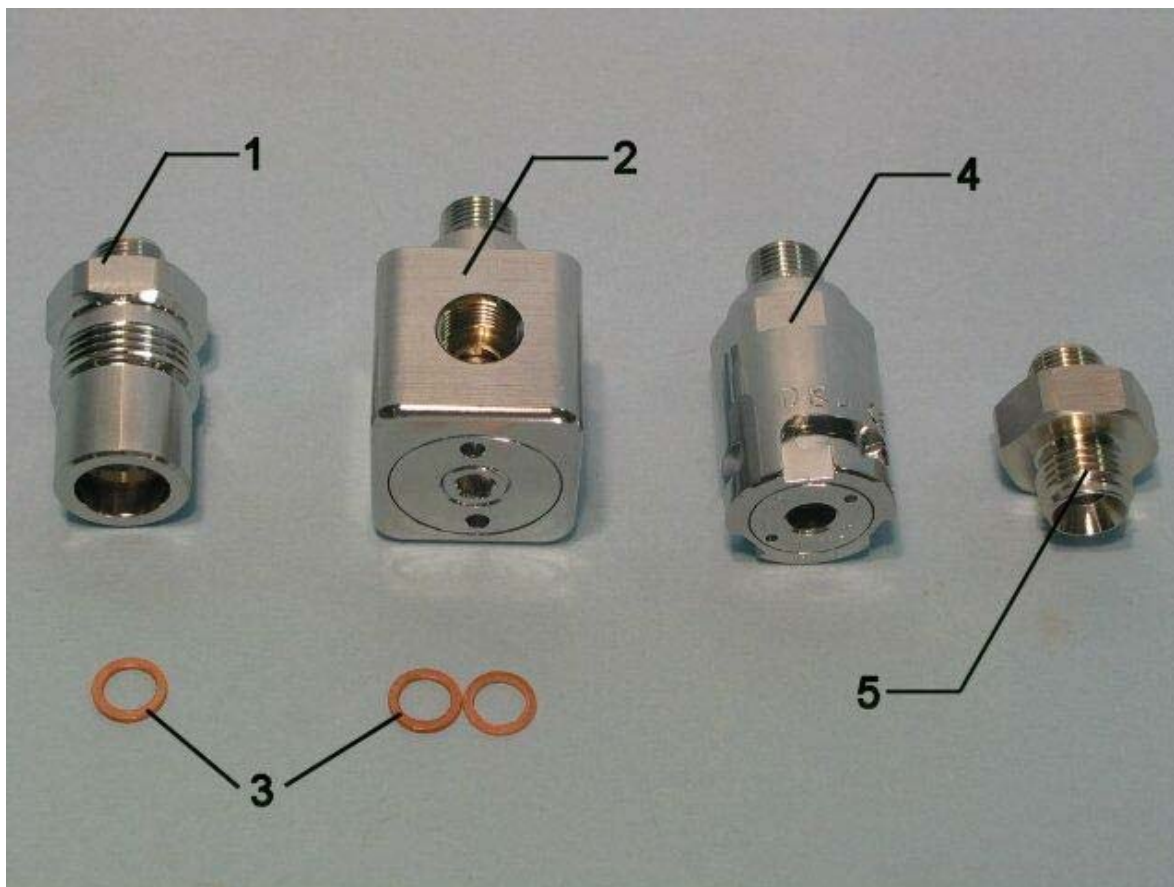
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413625	RADIAL FAN	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



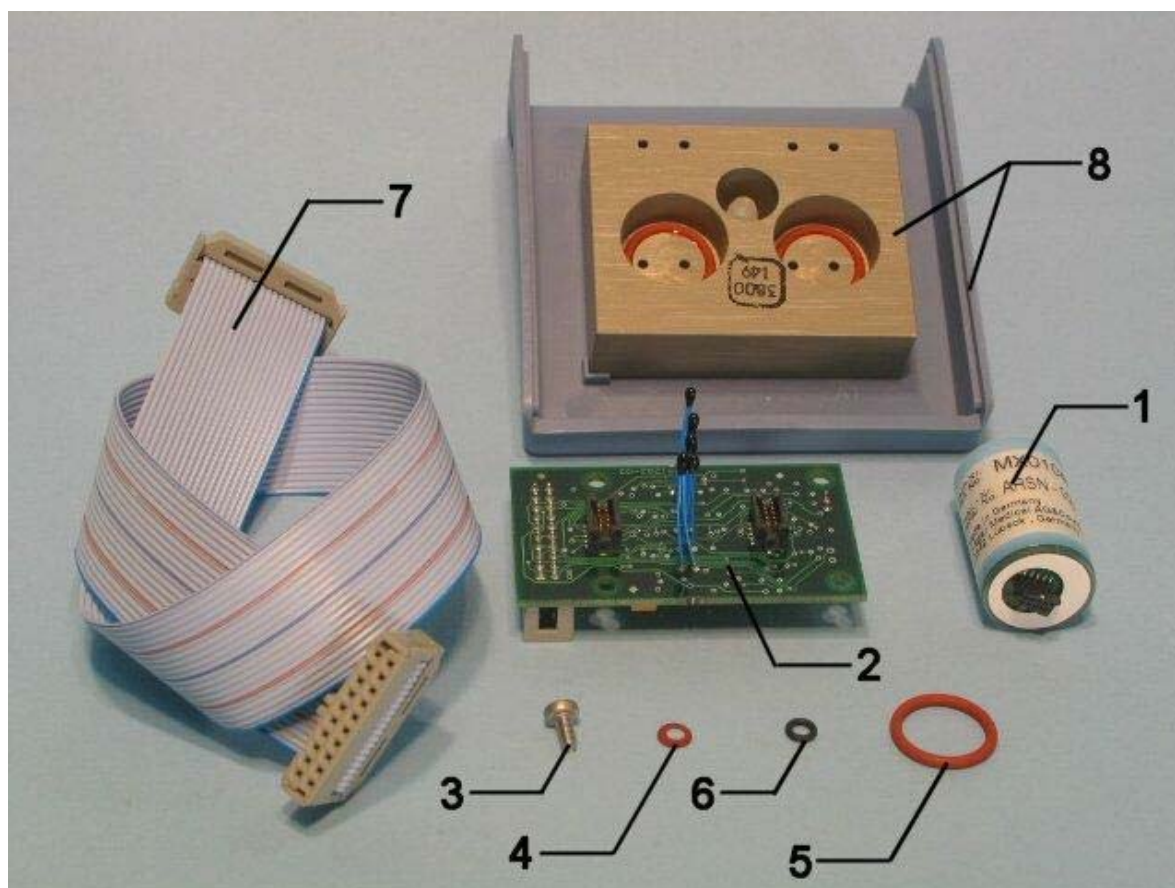
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8413698	TSI-hose	1.000	St	
2	1198912	HOSE 12X3-SI NF M29909	1.000	m	
3	1203622	HOSE 2X1,5 SI NF 8403323	1.000	m	
4	1204793	HOSE 2X1-SIGN RED	1.000	m	
5	1204785	HOSE 2X1-SIGN BL	1.000	m	
6	1204815	HOSE 2X1-SIGN BROWN	1.000	m	
7	8401083	T-PIECE	1.000	St	
8	8406909	DIODE	1.000	St	
9	8414511	Restrictor	1.000	St	
10	8414512	Restrictor	1.000	St	
12	1204831	HOSE 2X1-SIGN YELLOW	1.000	m	

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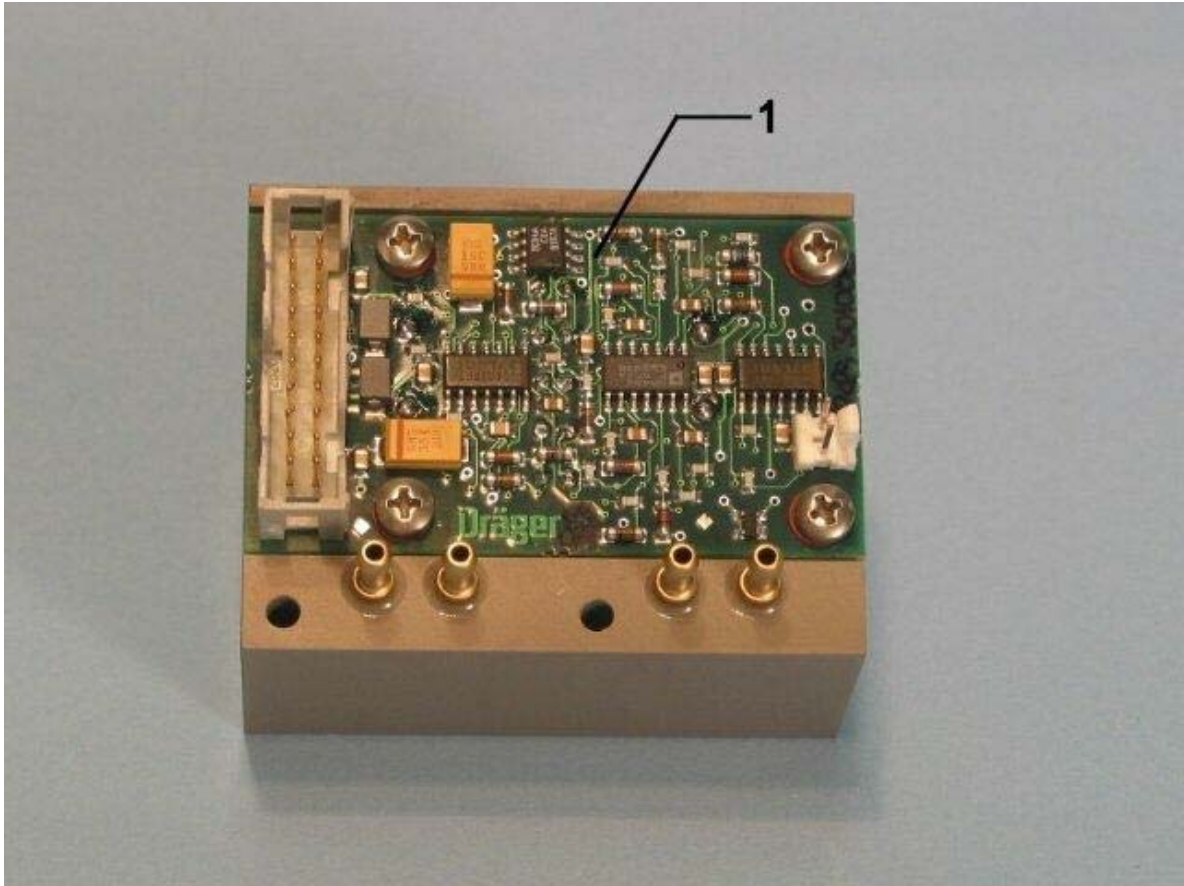
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	M34403	O2-HOSE NIST 5M DIN PROBE	1.000	St	
	M34402	O2-HOSE NIST 3M DIN PROBE	1.000	St	
1	M32489	Adapter O2	1.000	St	
2	8413641	90 degrees connector O2	1.000	St	
3	M19311	WASHER	1.000	St	
4	4300988	Plug O2 M12X1, right	1.000	St	
5	8412961	O2-Connector (DISS)	1.000	St	

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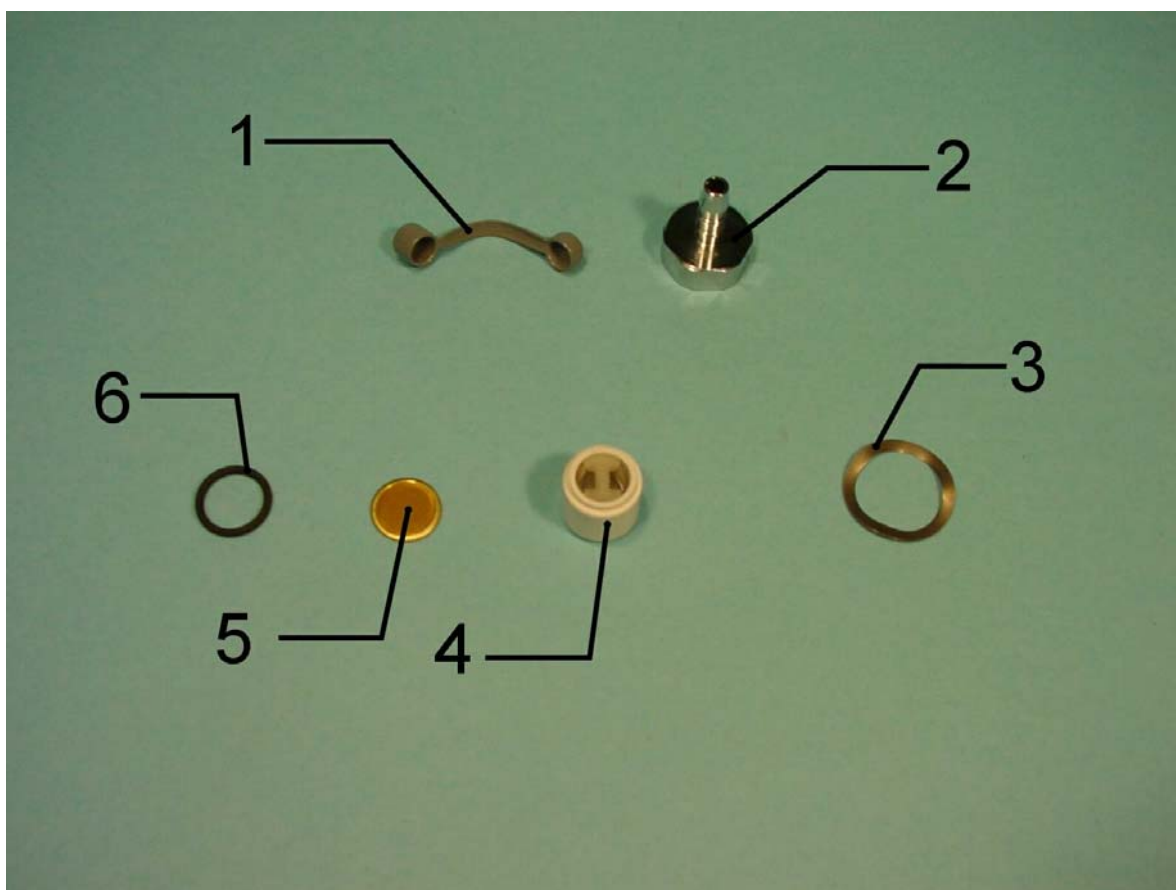


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	MX01049	OxyTrace VE	1.000	St	Servicedrawing
2		PCB O2-Diaphragm	1.000	St	
3	1340727	OVAL HEAD SCR.DIN7985-M3X6-A2	1.000	St	
4	D04766	PACKING RING	1.000	St	
5	R31296	O-RING SEAL	1.000	St	
6	8410713	O-RING SEAL	1.000	St	
7	8413622	Flat cable,O2-Measuring Module	1.000	St	
8	8413735	O2-sensor covering	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

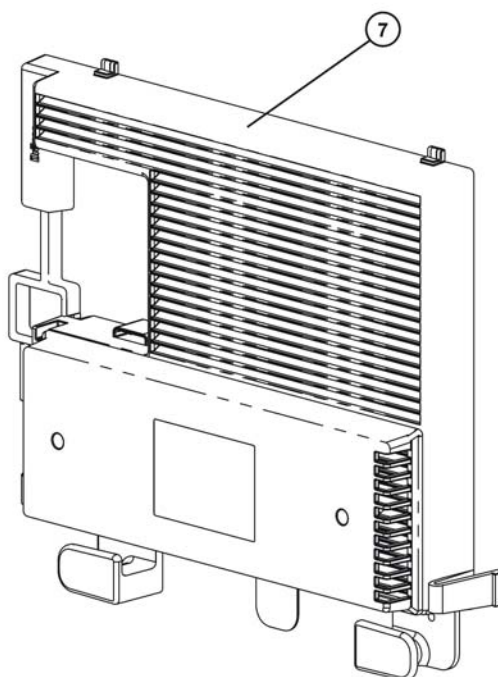


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8351201	PCB O2-DIAPHRAGM	1.000	St	



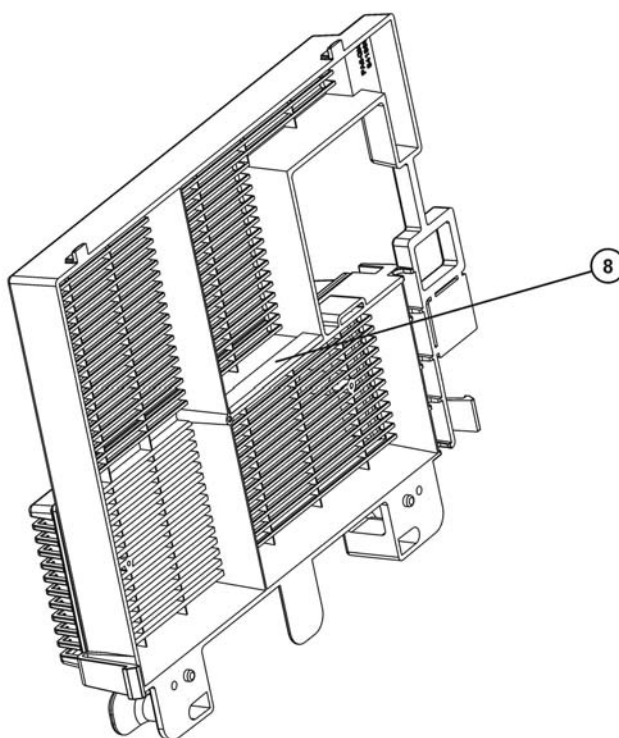
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8415745	Retainer cap	1.000	St	
2	8414137	Closure (LPO)	1.000	St	
3	8415828	Lock washer, rippled	1.000	St	
4	8411515	NONRETURN VALVE (FOR 8411848)	1.000	St	
5	M16201	SIEVE	1.000	St	
6	D18400	O-RING SEAL	1.000	St	

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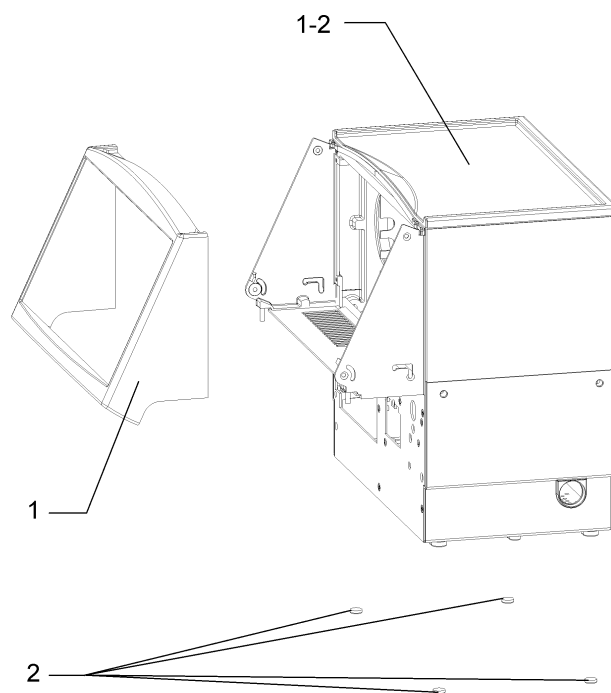
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
7	8415835	Filter cover, complete (LPO)	1.000	St	

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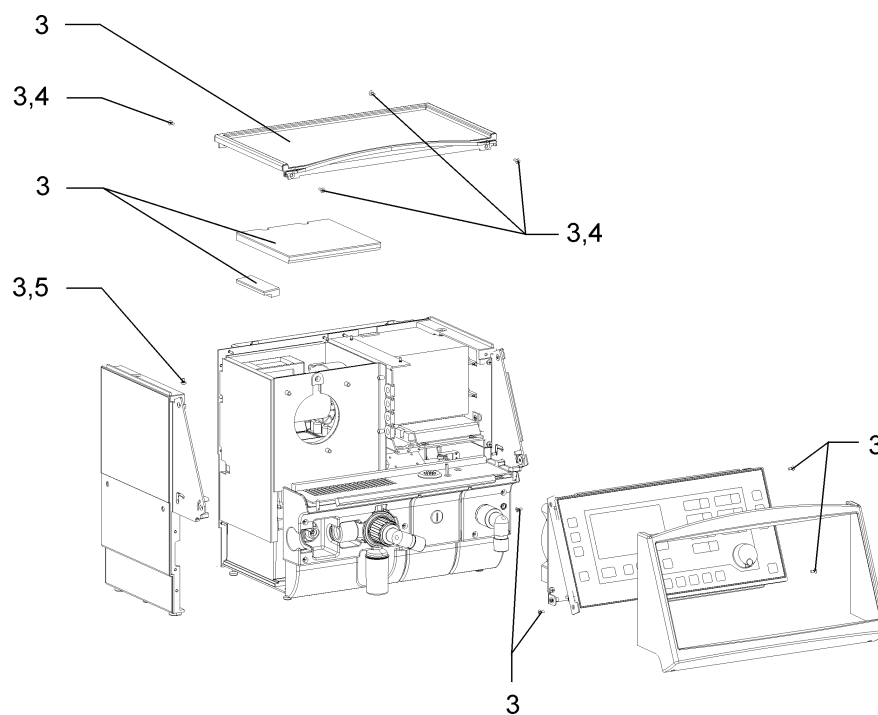
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
8	8600784	EMI SEALING	1.000	m	

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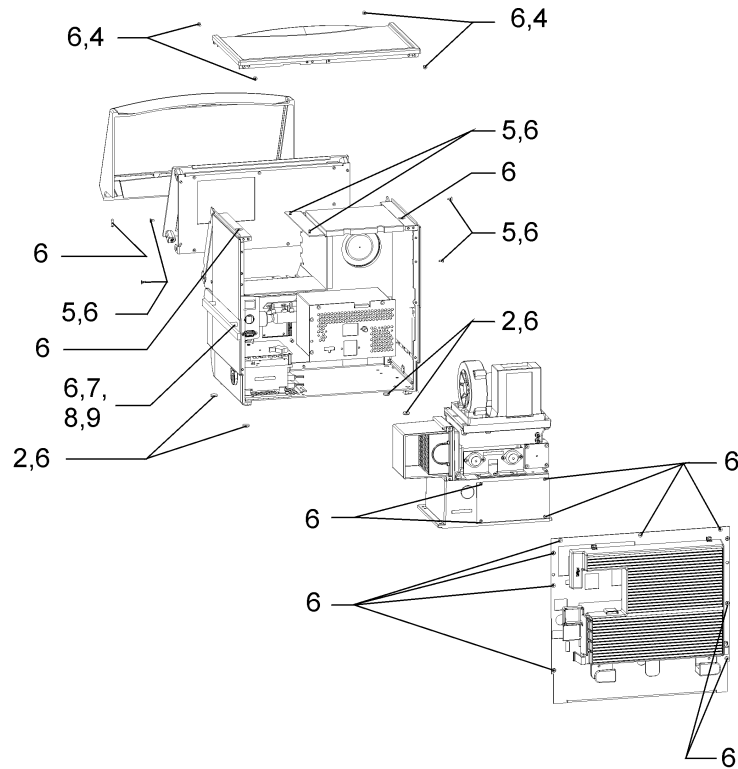
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8417066	Front panel housing	1.000	St	replacement of 8414279 use this up
1	8414279	front panel housing	1.000	St	
1-2	8414280	Housing, complete	1.000	St	
2	6800478	BUFFER	1.000	St	

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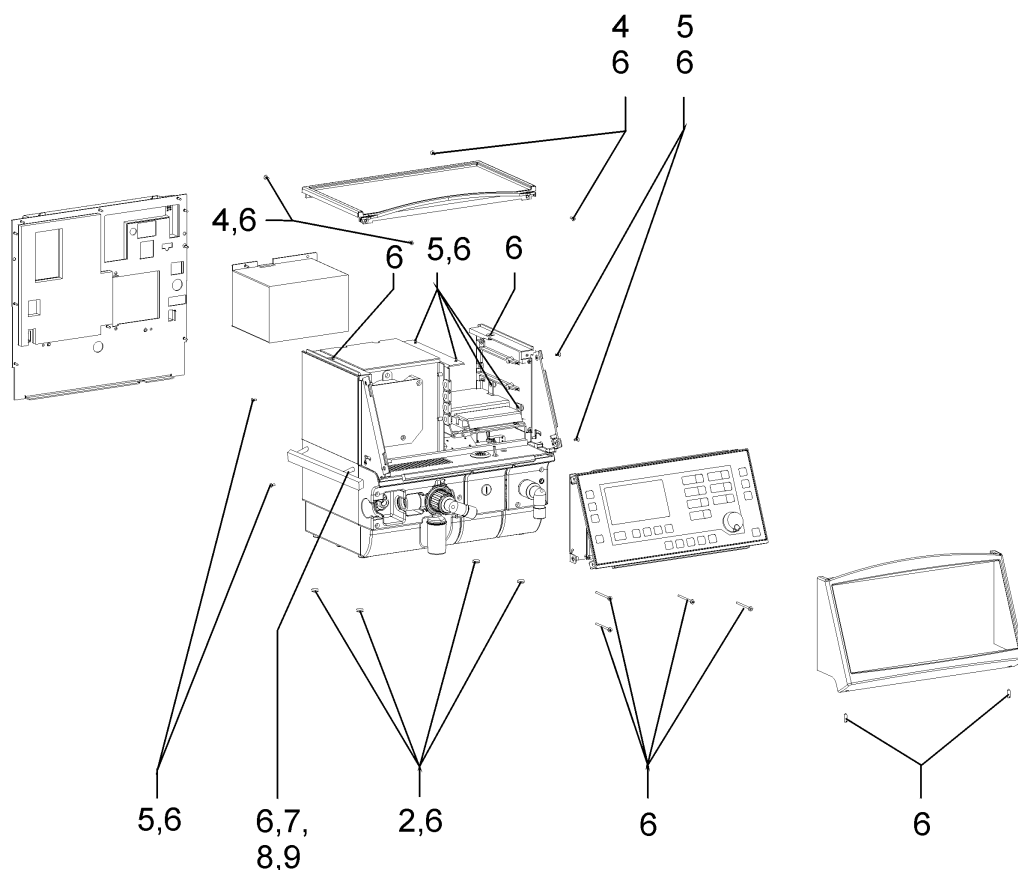
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
3	MX08146	Top cover kit Savina	1.000	St	Servicedrawing
4	1315803	FLAT HEAD SCREW AM4X10DIN965	1.000	St	
5	1339958	COUNTER SUNK SCREW M4X8 DIN965	1.000	St	

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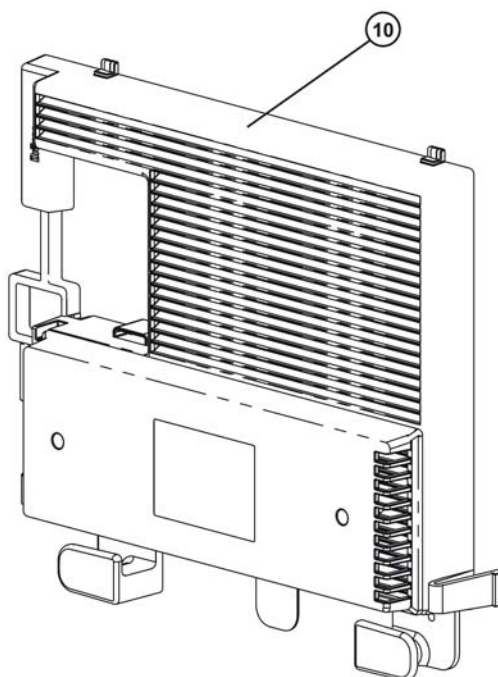
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
2	6800478	BUFFER	1.000	St	Servicedrawing
4	1315803	FLAT HEAD SCREW AM4X10DIN965	1.000	St	
5	1339958	COUNTER SUNK SCREW M4X8 DIN965	1.000	St	
6	MX08145	Srews kit Savina	1.000	St	
7	1314440	SPLIT WASHER 8 DIN7980-X12CRNI	1.000	St	
8	1329952	SCREW M 8X60 DIN 6912-A2	1.000	St	
9	8406504	SOCKET	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



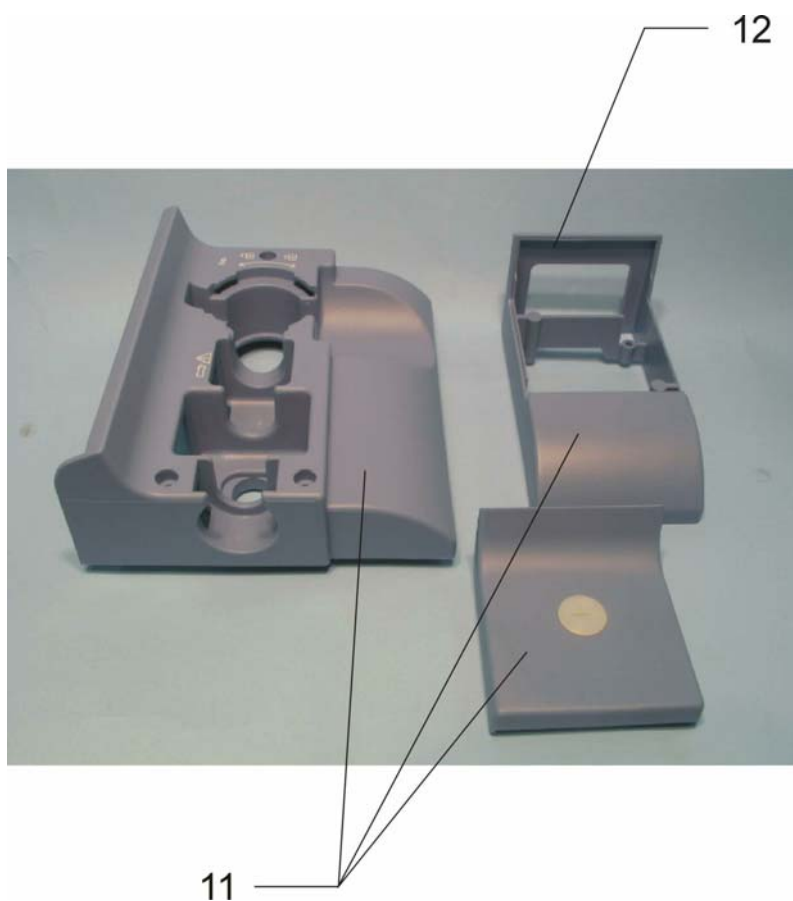
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
2	6800478	BUFFER	1.000	St	
4	1315803	FLAT HEAD SCREW AM4X10DIN965	1.000	St	
5	1339958	COUNTER SUNK SCREW M4X8 DIN965	1.000	St	
6	MX08145	Srews kit Savina	1.000	St	Servicedrawing
7	1314440	SPLIT WASHER 8 DIN7980-X12CRNI	1.000	St	
8	1329952	SCREW M 8X60 DIN 6912-A2	1.000	St	
9	8406504	SOCKET	1.000	St	

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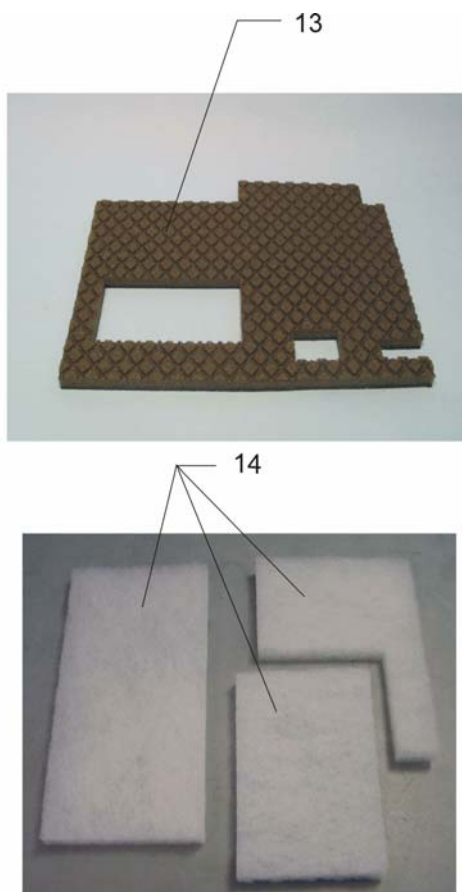
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
10	8415835	Filter cover, complete (LPO)	1.000	St	

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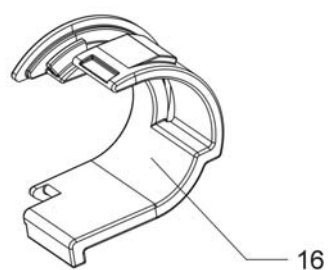
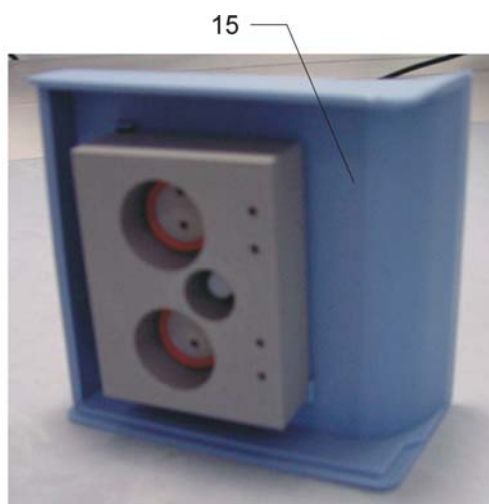
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
11	8413675	Connecting housing	1.000	St	
12	8413658	Cover 1	1.000	St	

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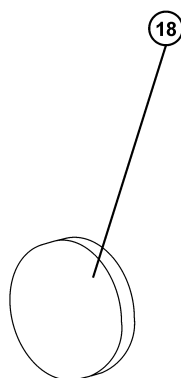
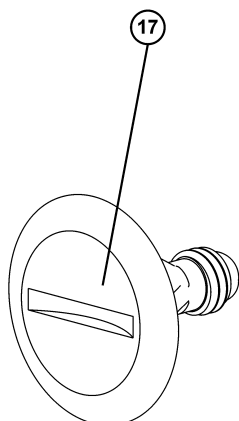
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
13	8414086	Sound insulation mate	1.000	St	
14	8414057	SET DUST FILTER S	1.000	St	

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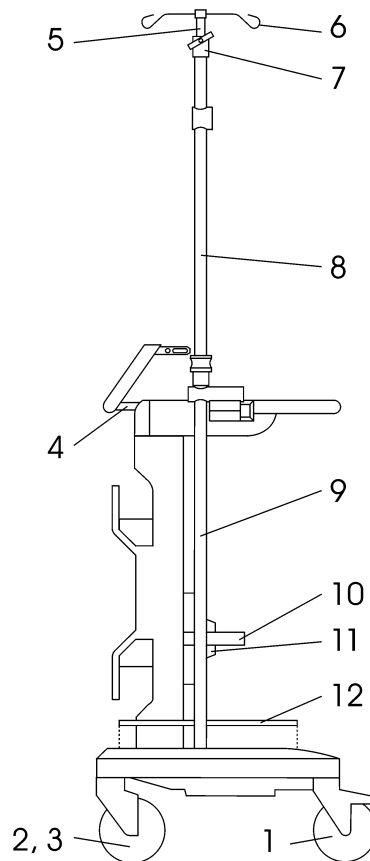
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
15	8413735	O2-sensor covering	1.000	St	
16	8414199	hose stop Savina	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



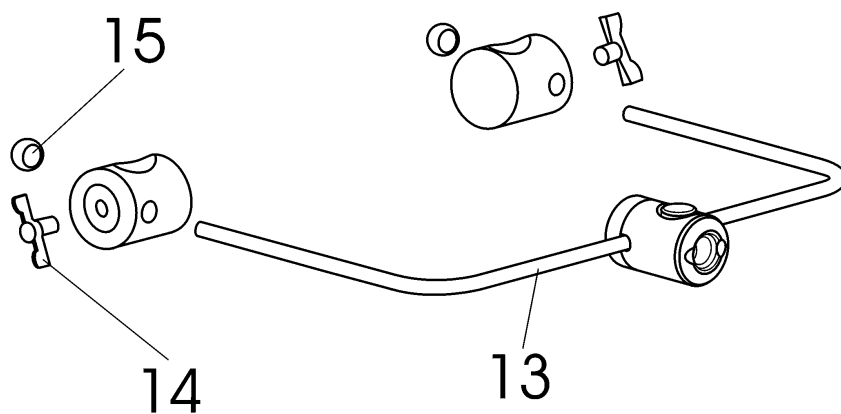
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
17	8417005	Screw-S	1.000	St	
18	8417006	Plug	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



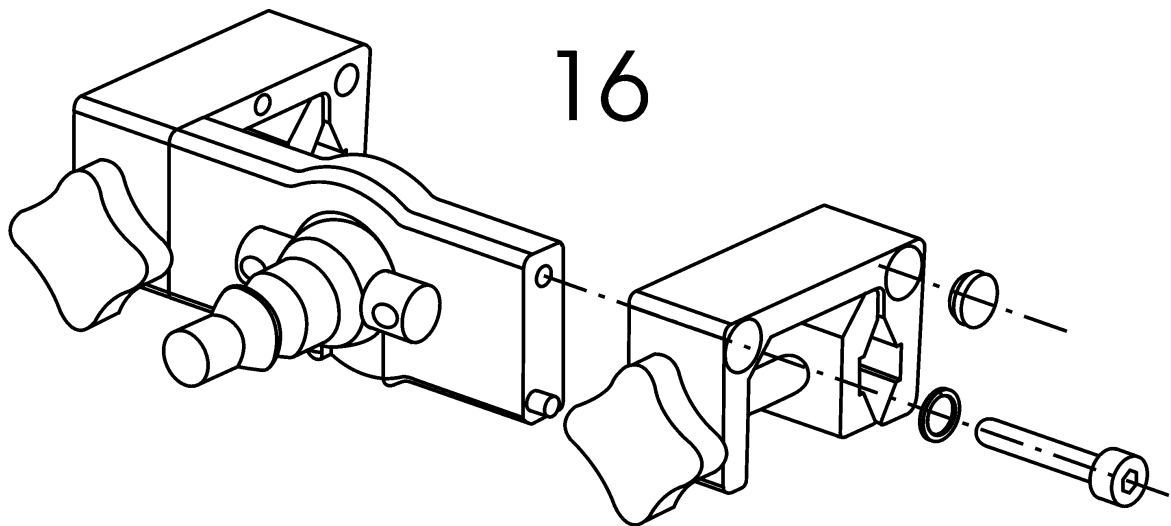
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8415810	Lockable castor	1.000	St	
2	8414227	CASTOR	1.000	St	
3	8414228	ROLLER, UNLOCKED	1.000	St	
4	8415821	Handle interface kit	1.000	St	
5	8415817	Telescopic rod	1.000	St	
6	MP00050	Infusion bottle cross, 4-arm	1.000	St	
7	8415815	Clamp bush with T-handle	1.000	St	
8	8414688	TRANSPORT-INFUSION-ROD	1.000	St	
9	8415823	Later pole kit	1.000	St	
10	8411972	belt	1.000	St	
11	8415820	Cylinder holder kit	1.000	St	
12	8411973	Inlet	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
13	8415545	Coupling, device-side	1.000	St	
14	8414217	TOMMY SCREW	1.000	St	
15	1255673	Spherical end-piece	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

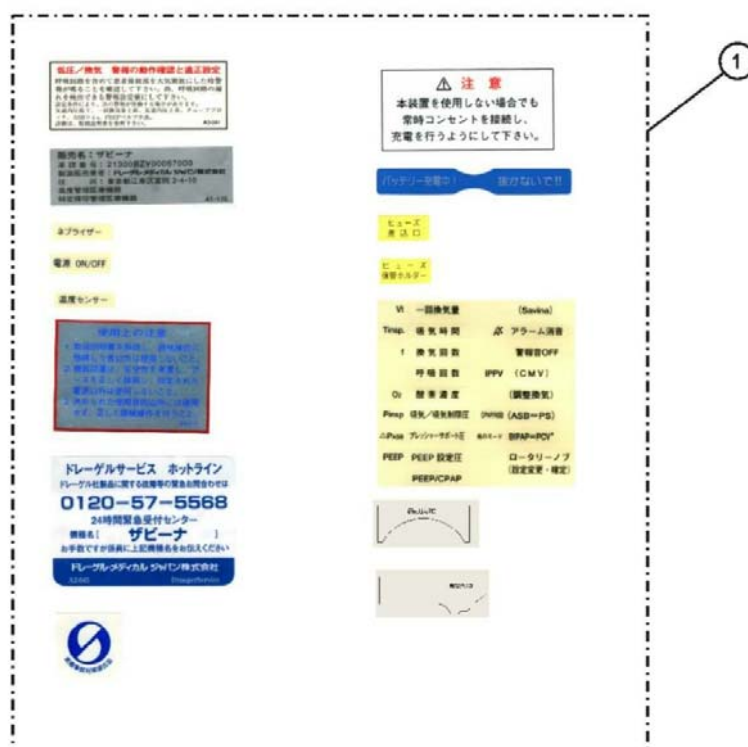


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
16	8415544	Coupling, bedside	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

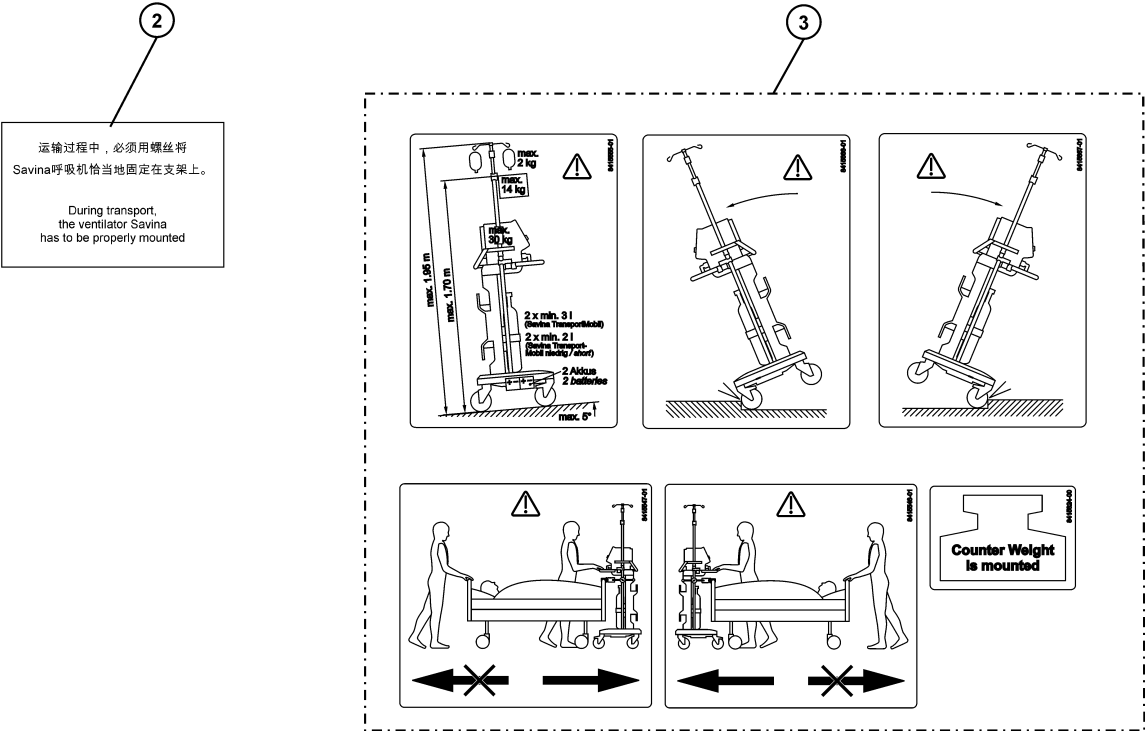
Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8415822	Rail spacer bushes kit	1.000	St	ohne Abbildung

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

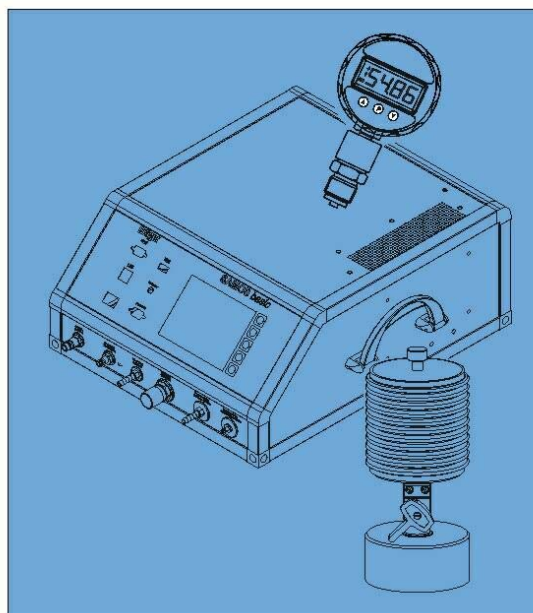


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
1	8419015	Label set Savina, Japan	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

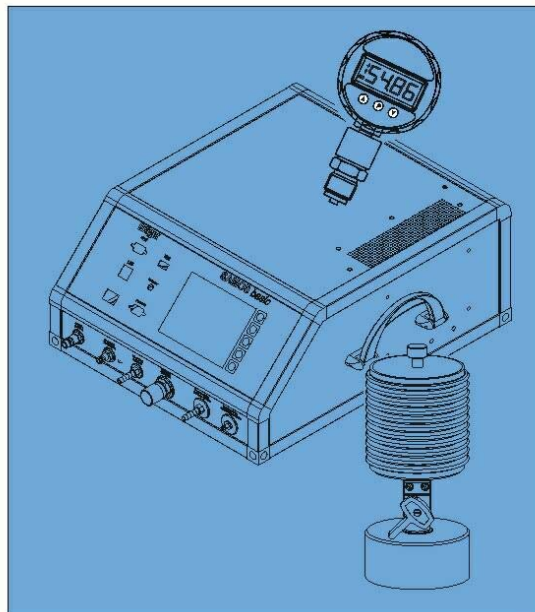


Item No.	Order No.	Description	Qty.	Qty.unit	Remark
2	8419493	Label, Transport China	1.000	St	
3	8415818	Label kit	1.000	St	



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	8403201	TEST LUNG	1.000	St	
	8401892	TEST LUNG	1.000	St	
	8290285	PATIENT ADAPTOR	1.000	St	
	8304411	Oxydig complete	1.000	St	
	7910722	PRES. MEAS. DEVICE, DIG. 1BAR	1.000	St	
	7910724	PRES. MEAS. DEVICE, DIG. 20BAR	1.000	St	
	7910594	VDE TESTER GMC SECUTEST 0751	1.000	St	
	7901022	MEASURING LEAD, RED, 1M	1.000	St	
	7901023	MEASURING LEAD, BLACK, 1M	1.000	St	
	M25647	NOZZLE 22/22	1.000	St	
	M13506	35COUPLING SLEEVE	1.000	St	
	7901888	TEST CABLE 9-PIN MALE	1.000	St	
	7901808	TEST CABLE RS232 EXTENSION	1.000	St	
	7901482	TEST PRESSURE REDUCER O2	1.000	St	
	7910342	TEST PRESS. RED. O2, PIN-INDEX	1.000	St	
	7900930	INJECTOR	1.000	St	
	1294105	PLUG	1.000	St	
	7901161	FLOWM., BL. , 0.02 - 14 L/MIN.	1.000	St	
	7900718	FLOWM. 10-120 L/MIN (O2. AIR)	1.000	St	
	7910385	CHARGE TESTER (EVITA), COMPLETE	1.000	St	
	7910387	Cable for charge tester	1.000	St	
	7910426	POWER SUPPLY UNIT 3 - 18 VDC / 2 (3.5)	1.000	St	
	7900909	TORQUE WRENCH, 5 - 50 NM	1.000	St	
	7910132	TORQUE WRENCH, 20-100 NM	1.000	St	
	7901204	WRENCH, SPECIAL OPEN-ENDED, WAF 17	1.000	St	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts



Item No.	Order No.	Description	Qty.	Qty.unit	Remark
	7910462	SPECIAL OPEN-ENDED WRENCH, SW 41	1.000	St	
	7900484	HOSE CLAMP	1.000	St	
	2M12754	CONNECTION PIECE	1.000	St	
	7902275	Leak detection spray	1.000	St	
	1180614	HOSE 2X1-SI NF M17749	1.000	m	
	1198343	HOSE 7X2,5 SI NF M29908	1.000	m	
	1190520	HOSE 4X1,5-SI 50 SH A NF	1.000	m	
	1197851	SILICONE HOSE 6X2,5 NF M29907	1.000	m	

Items that are shown in the illustration but are not listed below the illustration are not available as spare parts

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Test instructions / Service Card IPM Savina

NOTE

- Prior to using these test instructions, check that they are the latest revision (compare revision with current service documentation).
- All results and inputs must be documented in the „Test Report“ or „Result Sheet“, as applicable.

NOTE

Do not use these test instructions for testing after a repair procedure.

These test instructions apply to devices with the following software versions:

- 2.n
- 3.n

Conversion:

1 bar = 14.504 PSI; 1 mbar = 1.01973 cmH₂O; 1 mbar = 1 hPa



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1 Device configuration

This chapter is used to record the device configuration.

1.1 Device configuration 6

1.1 Device configuration

1.1.1 Serial numbers

Action • Enter the serial numbers of the component listed below:

Entry **Savina** [_____.txt]

Entry **Expiratory valve 1** [_____.txt]

Entry **Expiratory valve 2** [_____.txt]

Entry **Optional airway temperature sensor** [_____.txt]

1.1.2 Device data

Action • Enter existing options with „Yes“ or „No“. Note: Options are identifiable by the rating plate affixed on the side.

Entry **BIPAP/PCV+ (8414060) (Yes/No)** [_____.txt]

Entry **Autoflow (8414069) (Yes/No)** [_____.txt]

Entry **Central alarm (nurse call) (8414476) (Yes/No)** [_____.txt]

Entry **NIV (mask ventilation, as from SW 02.n) (8414115) (Yes/No)** [_____.txt]

Entry **O2 angled connector 90° (8413641) (Yes/No)** [_____.txt]

Entry **Set of side rails (8414358) (Yes/No)** [_____.txt]

Entry **Optional LPO (Yes/No)** [_____.txt]

Entry **Optional Savina transport mobile (Yes/No)** [_____.txt]

Entry **Optional external rechargeable battery in trolley (Yes/No)** [_____.txt]

Entry **Option bed dock (Yes/No)** [_____.txt]

1.1.3 Software version (Savina)

- Action • Switch on the Savina and, during the boot phase, read and note down the software version from the display.

Entry [_____]txt]

- Action • Switch the Savina to „Standby“ mode and press the „Alarm Reset“ key to reset the acoustic alarm.

1.1.4 Operating hours

Prerequisites Savina is connected to the mains power supply and is switched on.

- Action • In operating mode, read the operating hours (operating hours in total and operating hours since load service) from the „Config“ menu by pressing the „Config“ key four times in succession.

Entry **Total operating hours** [_____]h]

Entry **Operating hours „Service“** [_____]h]

1.1.5 Recording of user-specific settings ("Settings" menu)

NOTE

The user-specific settings and alarms must be re-entered after completion of the test procedure and before handing the unit over to the customer/owner.

Prerequisites Savina is connected to the mains power supply and is switched on. Savina is in standby mode.

- Action • Press the „Settings“ key and read out and enter the following settings:

Entry **Trigger** [_____]txt]

Entry **FlowAcc** [_____]txt]

Entry **AutoFlow** [_____]txt]

Entry **Sigh** [_____]txt]

1.1.6 Recording of user-specific settings ("Alarms" menu)

- Action • Press the „Alarms“ key and read out and enter the following settings:

Entry **Paw** [_____]txt]

Entry **MV high** [_____]txt]

Entry **MV low** [_____]txt]

Entry	TApnoea	[_____]txt]
Entry	ftot	[_____]txt]
Entry	VTi	[_____]txt]

1.1.7 Select the „Config, page 1/4“ menu

Action	<ul style="list-style-type: none">Press the „Config.“ key and on display page 1/4 read out and enter the pre-set measured value selection, e.g. 1., 2., 3., 4., 5., or 6:
Entry	Measured values (selection: 1., 2., 3., etc.)

1.1.8 Select the „Config, page 2/4“ menu

Action	<ul style="list-style-type: none">Press the „Config.“ key to select display page 2/4 and read out and enter the following settings:	
Entry	O2 Monitoring (ON/OFF)	[_____txt]
Entry	Flow Monitoring (ON/OFF)	[_____txt]
Entry	Pmax (ON/OFF)	[_____txt]
Entry	Plateau (ON/OFF)	[_____txt]

2 Maintenance parts

This chapter contains interval-related maintenance parts, measures, and tests that can only be performed on an open device.

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2.3	Maintenance parts, 2-yearly	11
2.4	Maintenance parts, 6-yearly	13
2.5	Maintenance parts, 8-yearly, but at the latest after 20000 operating hours.....	15

2.1 Device inspection and maintenance

2.1.1 General notes

NOTE

Carry out the device inspection and maintenance for the first time after 2 years or at the latest after 12000 operating hours, whichever occurs first. Thereafter carry out the device inspection every year. In the initial inspection use the „2-yearly“ maintenance set parts.

2.2 Maintenance parts, yearly

2.2.1 Service set for Savina

The service set (quantity 1) with the number MX08283 includes the following items:

Quantity	Designation	Number	Location/Remark
1	Microfilter	6737545	Filter mount
1	Set of dust filters S	8414057	Rear panel
2	Diaphragm, complete	8413661	Expiratory valve (for 2 expiratory valves)

Entry

Next replacement: [_____]dat]

2.3 Maintenance parts, 2-yearly

2.3.1 Service set for Savina

The service set (quantity 1) with the number MX08659 includes the following items:

Quantity	Designation	Number	Location/Remark
1	Microfilter	6737545	Filter mount
1	Set of dust filters S	8414057	Rear panel
2	Diaphragm, complete	8413661	Expiratory valve (for 2 expiratory valves)
2	Lead-acid accumulator 12 V/3.5 Ah	1841416	Compartment for the internal battery / Replacement by trained service personnel

Entry

Next replacement: [_____] dat]

2.3.2 Optional external battery (trolley)

Quantity	Designation	Number	Location/Remark
2	Rechargeable battery	1843303	Trolley foot (2 required for the option) / Replacement by trained service personnel

Entry

Next replacement: [_____] dat]

2.3.3 LPO option

NOTE

Fit the filter screen in the unit so that the side with the more pronounced curve is facing outwards.

Quantity	Designation	Number	Location/Remark
1	Filter screen	M16201	Connector LPO

Entry

Next replacement: [_____] dat]

Quantity	Designation	Number	Location/Remark
1	O-ring	D18400	Connector LPO

Entry

Next replacement: [_____] dat]

Quan- tity	Designation	Number	Location/Remark
1	Protective cap	8415745	Connecting port

Entry

Next replacement: [_____] dat]

Quan- tity	Designation	Number	Location/Remark
1	Washer	M19311	Tubing connection NIST, DIN, Air Liquide or DISS and in the "90° connector" option (angled connector)

Entry

Next replacement: [_____] dat]

2.4 Maintenance parts, 6-yearly

2.4.1 Service set for Savina

NOTE

After replacing the real-time clock make the following settings on the device:

- Current date and time
- User/operator ventilation settings and alarm limits.

The service set (quantity 1) with the number MX08284 includes the following items:

Quantity	Designation	Number	Location/Remark
1	Microfilter	6737545	Filter mount
1	Set of dust filters S	8414057	Rear panel
2	Diaphragm, complete	8413661	Expiratory valve / for 2 expiratory valves
1	Filter Gas inlet	8416117	O2 inlet / Replacement by trained service personnel
2	Lead-acid accumulator 12 V/3.5 Ah	1841416	Compartment / internal battery / Replacement by trained service personnel
1	Filter	8408208	Valve block (O2) / Replacement by trained service personnel
1	Sealing ring	M09257	O2 inlet / Replacement by trained service personnel
3	Washer	M19311	O2 inlet
1	Pressure regulator	8413666	Valve block (O2) / Replacement by trained service personnel
1	Real-time clock	1845527	Control PCB / Replacement by trained service personnel
2	Spacing roll 3.2x2	1858025	

Entry

Next replacement: [_____] dat]

2.4.2 Optional external battery (trolley)

Quantity	Designation	Number	Location/Remark
2	Rechargeable battery	1843303	Trolley foot (2 required for the option) / Replacement by trained service personnel

Entry

Next replacement: [_____]dat]

2.4.3 LPO option

NOTE

Fit the filter screen in the unit so that the side with the more pronounced curve is facing outwards.

Quan- tity	Designation	Number	Location/Remark
1	Filter screen	M16201	Connector LPO

Entry

Next replacement: [_____]dat]

Quan- tity	Designation	Number	Location/Remark
1	O-ring	D18400	Connector LPO

Entry

Next replacement: [_____]dat]

Quan- tity	Designation	Number	Location/Remark
1	Protective cap	8415745	Connecting port

Entry

Next replacement: [_____]dat]

Quan- tity	Designation	Number	Location/Remark
1	Washer	M19311	Tubing connection NIST, DIN, Air Liquide or DISS and in the "90° connector" option (angled connector)

Entry

Next replacement: [_____]dat]

2.5 Maintenance parts, 8-yearly, but at the latest after 20000 operating hours

2.5.1 Blower

Quantity	Designation	Number	Location/Remark
1	Blower with spare parts set	8413643	Savina / Replacement by trained service personnel

Entry

Next replacement: [_____ dat]

2.5.2 Service set for Savina

The service set (quantity 1) with the number MX08659 includes the following items:

Quantity	Designation	Number	Location/Remark
1	Microfilter	6737545	Filter mount
1	Set of dust filters S	8414057	Rear panel
2	Diaphragm, complete	8413661	Expiratory valve (for 2 expiratory valves)
2	Lead-acid accumulator 12 V/3.5 Ah	1841416	Compartment for the internal battery / Replacement by trained service personnel

Entry

Next replacement: [_____ dat]

2.5.3 Optional external battery (trolley)

Quantity	Designation	Number	Location/Remark
2	Rechargeable battery	1843303	Trolley foot (2 required for the option) / Replacement by trained service personnel

Entry

Next replacement: [_____ dat]

2.5.4 LPO option

NOTE

Fit the filter screen in the unit so that the side with the more pronounced curve is facing outwards.

Quantity	Designation	Number	Location/Remark
1	Filter screen	M16201	Connector LPO

Entry

Next replacement: [_____]dat]

Quan- tity	Designation	Number	Location/Remark
1	O-ring	D18400	Connector LPO

Entry

Next replacement: [_____]dat]

Quan- tity	Designation	Number	Location/Remark
1	Protective cap	8415745	Connecting port

Entry

Next replacement: [_____]dat]

Quan- tity	Designation	Number	Location/Remark
1	Washer	M19311	Tubing connection NIST, DIN, Air Liquide or DISS and in the "90° connector" option (angled connector)

Entry

Next replacement: [_____]dat]

3 Electrical safety

This chapter contains tests that need to be performed in order to verify that the medical electrical system is operational.

3.1	Electrical safety to EN 62353	18
3.2	Electrical safety according to IEC 60601-1	26

3.1 Electrical safety to EN 62353

NOTE
The device conforms to the conditions of protection class I. When the airway temperature sensor is connected it conforms to type BF.

Introduction The following subsections provide descriptions of device checks, recurrent testing and testing after servicing of medical electrical (ME) devices.

NOTE
The tester, e.g. SECUTEST, must be correctly configured for all measurements. If implausible measurement results are obtained, such as a leakage current of 0.0 µA, check the tester configuration in addition to the test setup!

NOTE

- In testing to IEC 62353, the medical electrical device (ME device) or the medical electrical system (ME system) must be tested.
- ME systems must be treated like ME devices.
- An ME system is a combination of several devices, as specified by the manufacturer, of which at least one must be an ME device, which are interconnected by a functional connection or by means of a multiple socket outlet.

NOTE
In the case of devices connected to other devices by a data cable, this connection must be disconnected prior to performing the electrical safety test, in order to avoid false measurements.

3.1.1 Visual check

Prerequisites The tester and the device under test are switched off.

Action • Disconnect the power plug from the mains socket.

WARNING!
Hazardous voltage.
Touching live components can lead to serious injury or death.

- Disconnect the power cord from the AC outlet before checking the power fuse-links.

Test – The power fuse-links of the device under test match the specifications on the rating plate.
– The power cable and plug are not dirty or damaged.

Result Condition checked.

[_____] OK

3.1.2 Protective conductor resistance

Test set-up

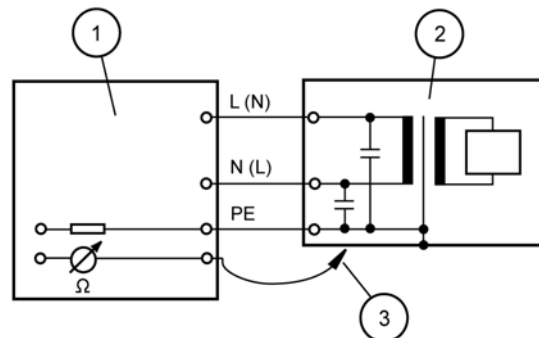


Fig. 1 Protective conductor resistance

Item	Designation
1	Tester
2	Device under test
3	Tester probe cable
L	Conductor
N	Neutral conductor
PE	Protective earth conductor

- Action
- Prepare the test setup.
 - Switch the tester on.
 - Configure the tester appropriately and follow the instructions on the tester.
 - Using the tip of the probe cable, scan each of the points on the device under test listed under [Protective earth conductor resistance measurement points](#) one after the other, moving the mains power cable along the entire length during the measurement. The resistance must not change when you do so.

Test The protective conductor resistance of devices with detachable but connected mains power cables must not exceed **0.3 Ohm** in each case.

Entry **Maximum measured value of device with power cable.**

[_____ Ohm]

Test If other optional power cables are fitted, the respective protective conductor resistance must not exceed **0.1 Ohms**. Move the power cable along the entire length during the measurement. The resistance must not change when you do so.

Entry **Maximum measured value of optional power cable.**

[_____ Ohm]

3.1.3 Protective earth conductor resistance measurement points

- Action
- Scan the following measurement points for protective earth conductor resistance measurement one after the other using the tip of the probe cable:
 - Power supply unit potential equalization pin
 - Gas inlet O2
 - Option, side-mounted rails
- Result
- Measurement points scanned

[_____OK]

3.1.4 Device leakage current

NOTE

- The device leakage current can be tested by the differential measurement method or the direct measurement method.
- In direct measurement, set up the device under test with insulation and scan all touchable conductive components using the probe (the protective conductor is internally interrupted in the tester).

Prerequisites The tester is switched on.

Test set-up

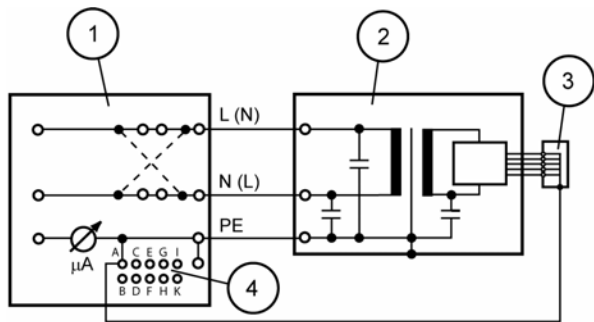


Fig. 2 Device leakage current

Item	Designation
1	Tester
2	Device under test
3	(applied part) Device-specific test adapter for tester
4	(applied part) Configurable sockets for applied parts
L	Conductor
N	Neutral conductor
PE	Protective earth conductor

- Action
- Prepare the test setup.
 - (applied part) Connect the device-specific test adapter on one end to the device under test and on the other end to the tester's configurable socket „A“ for applied parts (paying attention to the configuration!).
 - Follow the instructions on the tester.

NOTE

The test must be performed twice! The second test is performed with the plug rotated 180° in the socket. In many test devices the mains plug rotation is simulated by means of a built-in selector switch. The higher measured value must be documented.

NOTE

The reference value (initial measured value) must always be transmitted!

NOTE

If the measured values are between 90% and 100% of the permissible limit value, the reference value and the previously measured values of the recurrent test should be applied to assess electrical safety!

Test The reference value must not exceed **500** µA.

Entry **Reference value**

[] µA]

Test The recurrent test value must not exceed **500** µA.

Entry **Recurrent test**

[] µA]

3.1.5 Applied parts for measurement of the device leakage current

The following device-specific test adapters are required for the device under test:

- Measuring lead, 2-pin, temperature sensor, if installed

Test Measure leakage current at temperature connection.

3.1.6 Leakage current, mains on applied part with airway temperature sensor AWT 01, if installed

NOTE
In the following test the leakage current is measured at the airway temperature sensor AWT01. The expected value is very low (the typical measured value is 1.5 µA to 2 µA).

- Prerequisites
- The tester is switched on.
- Action
- Prepare the following test setup:
- Test set-up

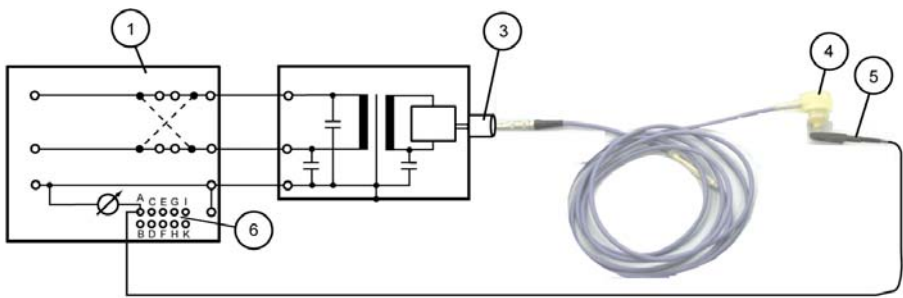


Fig. 3 Leakage current of airway temperature sensor

Item	Designation
1	Tester
2	Device under test
3	Connection socket of device under test
4	Airway temperature sensor AWT 01
5	Test clip with measuring lead
6	Configurable sockets for applied part
L	Conductor
N	Neutral conductor
PE	Protective earth conductor

- Action
- (applied part) Connect the airway temperature sensor on one end to the device under test and on the other end by a test clip with measuring lead and the tester, configurable socket „A“ for applied parts (paying attention to the configuration!).
 - Follow the instructions on the tester.

NOTE

The test must be performed twice! The second test is performed with the plug rotated 180° in the socket. In many test devices the mains plug rotation is simulated by means of a built-in selector switch. The higher measured value must be documented.

NOTE

The reference value (initial measured value) must always be transmitted!

NOTE

If the measured values are between 90% and 100% of the permissible limit value, the reference value and the previously measured values of the recurrent test should be applied to assess electrical safety!

Test The reference value must not exceed **5000** μA .

Result **Reference value**

[] μA

Test The recurrent test value must not exceed **5000** μA .

Result **Recurrent test**

[] μA

3.1.7 Leakage current on applied part with test adapter (normal condition)

NOTE

The following measurement is performed under „normal condition“.

Prerequisites The tester is switched on.

Test set-up

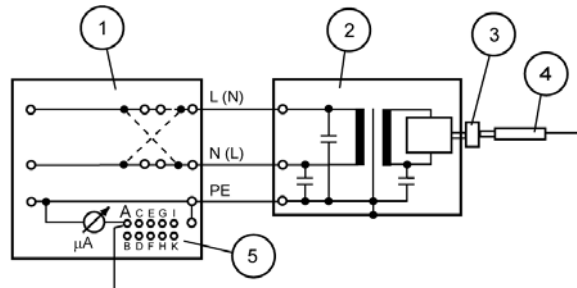


Fig. 4 Leakage current on applied part

Item	Designation
1	Tester
2	Device under test
3	Applied part of device under test
4	Test adapter
5	Configurable sockets for applied parts
L	Conductor
N	Neutral conductor
PE	Protective earth conductor

- Action
- Prepare the test setup.
 - (applied part) Connect the device-specific test adapter on one end to the device under test and on the other end to the tester's configurable socket „A“ for applied parts (paying attention to the configuration!).
 - Follow the instructions on the tester.

NOTE

The test must be performed twice! The second test is performed with the plug rotated 180° in the socket. In many test devices the mains plug rotation is simulated by means of a built-in selector switch. The higher measured value must be documented.

NOTE

The reference values (initial values measured) should always be entered in the „Test Report“ or „Result Sheet“ document!

NOTE

If the measured values are between 90% and 100% of the permissible limit value, the reference value and the previously measured values of the recurrent test should be applied to assess electrical safety!

Test	The initial value must not exceed 10 µA „IAC“.	
Entry	Initial value „IAC“	[] µA
Test	The initial value must not exceed 100 µA „IDC“.	
Entry	Initial value „IDC“	[] µA
Test	The recurrent test value must not exceed 10 µA „IAC“.	
Entry	Recurrent test „IAC“	[] µA
Test	The recurrent test value must not exceed 100 µA „IDC“.	
Entry	Recurrent test „IDC“	[] µA

3.1.8 Optional multiple socket strip on trolley

Power fuse links

Action • Compare the power fuse links with rated values on the multiple socket strip.

Test The power fuse-links match the specifications on the multiple socket strip.

Result [] OK]

Protective conductor resistance

Action • Check the protective conductor contacts of all sockets on the multiple socket strip with tester probe.

Test The value of the protective earth conductor resistance must not exceed 0.3 ohms in each case.

Entry Document the highest protective conductor resistance measurement in the „Test Report“.

[] Ohm]

Equivalent device leakage current

NOTE

The equivalent device leakage current test applies to the multiple-socket outlet only!

NOTE

Always enter the initial value in a new „Test Report“ document.

Test The initial value must not exceed 100 µA.

Entry Initial value

[] µA]

Test The recurrent test value must not exceed 100 µA.

Entry Recurrent test

[] µA]

3.2 Electrical safety according to IEC 60601-1

- NOTE**
The medical product to be tested conforms to the requirements of protection class I, type B with an airway temperature sensor type BF connected.
- NOTE**
An optional multiple socket-outlet, if any, must be included in the individual tests (medical electrical system).
- NOTE**
With devices that are connected to other devices by means of a data cable, this connection must be disconnected prior to performing the electrical safety check, in order to avoid incorrect measurements.

3.2.1 Visual check

Prerequisites	Savina is switched off and not connected to the mains power supply.
Action	<div><div>• Check the following items for damage:</div><div><div>– Power supply cord of the device</div><div>– Power switch</div><div>– Power fuse link for mains power supply</div><div>– Fuse link for internal battery</div></div></div>
Test	The items mentioned above are undamaged. The fitted power fuse-links match the values specified on the labels.
Result	Visual check completed.
[_____]OK	

3.2.2 Protective conductor resistance

NOTE
The protective earth conductor resistance is measured with the power cable connected.

Test set-up

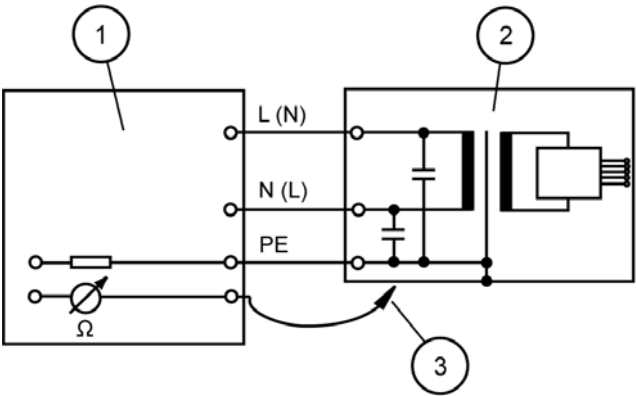


Fig. 5 Test setup for protective earth conductor resistance

Item	Designation
1	Tester, e.g. SECUTEST
2	Device under test
3	Test probe with tip
L	Conductor
N	Neutral conductor
PE	(Protective Earth) conductor

- Action
- Prepare the test setup.
 - Switch on the tester and the device under test.
 - Configure the tester appropriately, and follow the instructions on the tester.
 - Using the tip of the test probe, scan the following points on the device under test, move the power supply cord section-wise while doing so:
 - Power supply unit earth pin
 - Screws on the housing
 - Oxygen connection
 - Optional rails (on side of Savina)
 - LPO option (connector)
- Test
- The protective conductor resistance must not exceed **0.2 Ohm** (including mains power cable) in each case.
- Entry
- Enter the highest measured value of the protective conductor resistance.

[_____ Ohm]

3.2.3 Earth leakage current

NOTE
In order to avoid incorrect measurement, set up the device under test so that it is insulated.

Test set-up

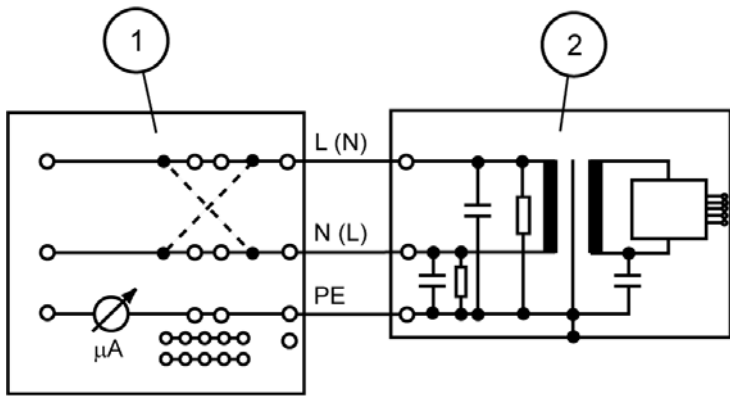


Fig. 6 Earth leakage current test setup

Item	Designation
1	Tester, e.g. SECUTEST
2	Device under test
L	Conductor
N	Neutral conductor
PE	(Protective earth) conductor

- Action
- Prepare the test setup.
 - Switch on the tester and the device under test.
 - Follow the instructions on the tester.

NOTE
For symmetrical mains plugs that have no preferential position in the socket-outlet, the earth leakage current test must be performed twice! The second test is performed with the plug rotated 180° in the socket. In many test devices the mains plug rotation is simulated by means of a built-in selector switch. The higher measured value must be documented.

- Test
- Normal condition (N.C.): The value must not exceed **500** μA.
- Entry
- Normal condition (N.C.)**
- [μA]
- Test
- Single fault condition (S.F.C.): The value must not exceed **1000** μA.
- Entry
- Single fault condition (S.F.C.)**
- [μA]
- Action
- Plug the power supply connector (inverted, if possible) into the test socket of the test device. (In many test devices the power supply connector inversion can be simulated by means of a built-in selector switch.)
- Test
- Normal condition (N.C.): The value must not exceed **500** μA.

Entry	Normal condition (N.C.)	[] μA
Test	Single fault condition (S.F.C.): The value must not exceed 1000 μA .	
Entry	Single fault condition (S.F.C.)	[] μA

3.2.4 Patient leakage current

Test set-up

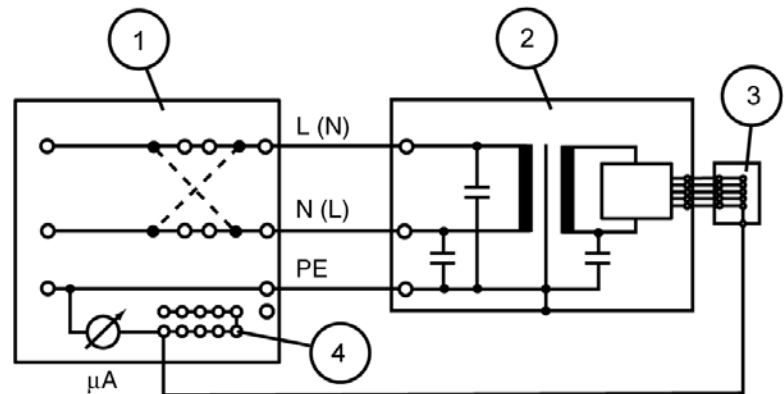


Fig. 7 Patient leakage current test setup

Item	Designation
1	Tester, e.g. SECUTEST
2	Device under test
3	Measuring line, 2-pin, temperature
4	Sockets for applied parts
L	Conductor
N	Neutral conductor
PE	(Protective Earth) conductor

- Action
- Prepare the test setup.
 - Follow the instructions on the tester.

NOTE

For symmetrical mains plugs that have no preferential position in the socket-outlet, the patient leakage current test must be performed twice! The second test is performed with the plug rotated 180° in the socket. In many test devices the mains plug rotation is simulated by means of a built-in selector switch. The higher measured value must be documented.

Test	Normal condition (N.C.) DC: The value must not exceed 100 μA .	
Entry	Normal condition (N.C.) DC	[] μA
Test	Single fault condition (S.F.C.) DC: The initial value must not exceed 500 μA .	
Entry	Single fault condition (S.F.C.) DC	[] μA

Action	<ul style="list-style-type: none"> Plug the power supply connector (inverted, if possible) into the test socket of the test device. (In many test devices the power supply connector inversion can be simulated by means of a built-in selector switch.)
Test	Normal condition (N.C.) AC: The value must not exceed 100 μA .
Entry	Normal condition (N.C.) AC [_____ μA]
Test	Single fault condition (S.F.C.) AC: The value must not exceed 500 μA .
Entry	Single fault condition (S.F.C.) AC [_____ μA]

3.2.5 Optional multiple socket strip on trolley

Power fuse links

Action	<ul style="list-style-type: none"> Compare the power fuse links with rated values on the multiple socket strip.
Test	The power fuse-links match the specifications on the multiple socket strip.
Result	[_____ OK]

Protective conductor resistance

Action	<ul style="list-style-type: none"> Check the protective conductor contacts of all sockets on the multiple socket strip with tester probe.
Test	The value of the protective earth conductor resistance must not exceed 0.3 ohms in each case.
Entry	Document the highest protective conductor resistance measurement in the „Test Report“. [_____ Ohm]

Equivalent device leakage current

NOTE

The equivalent device leakage current test applies to the multiple-socket outlet only!

NOTE

Always enter the initial value in a new „Test Report“ document.

Test	The initial value must not exceed 100 μA .
Entry	Initial value [_____ μA]
Test	The recurrent test value must not exceed 100 μA .
Entry	Recurrent test [_____ μA]

4 Function and condition test

This chapter contains tests that need to be performed in order to verify that the function and condition of the device and the accessories used meet the specifications according to the Instructions for Use.

4.1	Condition tests	32
4.2	Function tests	34
4.3	Options	44
4.4	User-specific settings	47
4.5	Final action	47

4.1 Condition tests

4.1.1 Accompanying documents

Action • Check that the following accompanying documents are available:

- Instructions for use
- Medical Products Logbook (applicable to Germany only)

Result The accompanying documents are available (according to user/operator).

[_____]OK]

4.1.2 Device labelling

Action • Check the device labelling.

Test The labels on the device are readable and not dirty or damaged.

Result

[_____]OK]

4.1.3 General condition (Savina, accessories, special accessories)

Action • Check the condition of the following parts:

- Savina
- Tubing system according to instructions for use/accessories list
- Expiratory valve/expiratory valves
- Accessories, humidifier
- Accessories, water traps
- Accessories, tube holder
- Accessories, hinged arm
- Special accessories, Resutator 2000
- Special accessories, Child Resutator 2000
- Special accessories, drug nebulizer

Test The above components are not dirty or damaged.

Result

[_____]OK]

4.1.4 General condition, trolley (option)

Action • Check the trolley and its screw fittings.

Test The trolley is not contaminated or damaged. All the trolley screw fittings are secure. The castors are undamaged. The castors are securely attached to the trolley.

Result

[_____]OK]

4.1.5 „O2“ compressed gas connecting tube

Action • Check the „O2“ compressed gas connecting tube, the connector and the screw fitting.

Test The „O2“ compressed gas connecting tube conforms to the accessory list and to national regulations. The „O2“ compressed gas connecting tube, the connector and the screw fitting are undamaged.

Result

[_____OK]

4.2 Function tests

4.2.1 Power supply unit

Electrical supply display

NOTE

For this test do not connect any external battery or DC supply to the Savina.

Prerequisites	The Savina is connected to the mains power supply.	
Action	• Switch the Savina on and set to „standby“ mode.	
Test	The LEDs on the front of the Savina show the following operating states: <ul style="list-style-type: none"> – Mains power supply: „green“; External battery: „off“ – Internal battery: „green“ when internal rechargeable batteries are fully charged, or „yellow“ when internal rechargeable batteries are being charged. 	
Result		[_____OK]

Internal supply voltage (internal battery)

Prerequisites	Savina is in „Standby“ mode.	
Action	• Cut the mains power supply to the Savina.	
Test	The acoustic alarm sounds and the display message "!! Int. rechargeable battery activated" appears. The LEDs on the front of the Savina show the following operating states: <ul style="list-style-type: none"> – Mains power supply: „off“; External battery: „off“ – Internal battery: „green“ or „yellow“ 	
Action	• Press the „Standby“ key and switch the Savina to „IPPV“ mode.	
Test	The blower runs up to speed. Ignore the error messages and alarms during this test.	
Result		[_____OK]

Mains power failure warning

Action	• Remove the fuse for the internal rechargeable battery. Note: The fuse is located on the rear panel of the unit.	
Test	The alarm "No int. rechargeable battery" is given.	
Action	• Reset this alarm (press the „Alarm Reset“ key).	
	• Disconnect the Savina from the mains power supply.	
Test	All LEDs on the front are out. The acoustic power failure warning sounds.	
Action	• Switch off Savina.	
Test	The acoustic alarm stops.	
Action	• Re-insert the fuse for the internal rechargeable battery.	
	• Connect the unit to mains power supply.	
	• Switch the Savina to „Standby“ mode.	
Result		[_____OK]

4.2.2 Non-return valve in expiratory valve

Prerequisites The expiratory valve(s) has/have been removed.

Action • Prepare the following test setup:

Test set-up

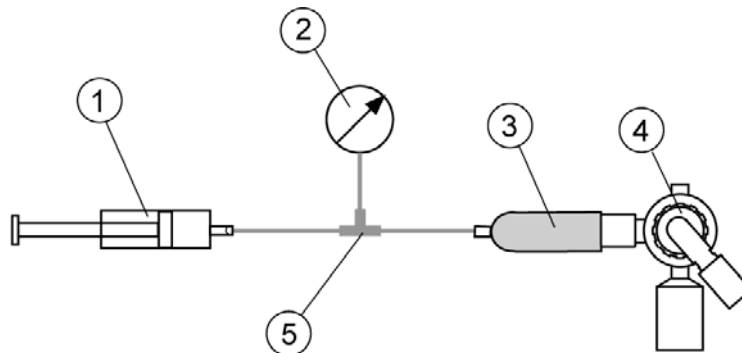


Fig. 8 Test setup; non-return valve in expiratory valve

Item	Designation
1	Syringe 60 mL
2	Pressure gauge
3	Connecting sleeve
4	Expiratory valve
5	T-piece

Action • Using the syringe, slowly (permissible pressure change less than 1 mbar/s) build up a pressure of 2.0 to 3 mbar at the outlet of the expiratory valve.

Expiratory valve 1

Test The volume injected from the syringe in one minute must not exceed 35 mL.

Result [_____ OK]

Action • Repeat the test for expiratory valve 2.

Expiratory valve 2

Test The volume injected from the syringe in one minute must not exceed 35 mL.

Result [_____ OK]

4.2.3 **Pneumatic safety valve**

- Prerequisites The Savina is not connected to the mains power supply or to the „O2“ compressed gas supply. Savina is switched off.
- Action • Prepare the following test setup:
- Test set-up

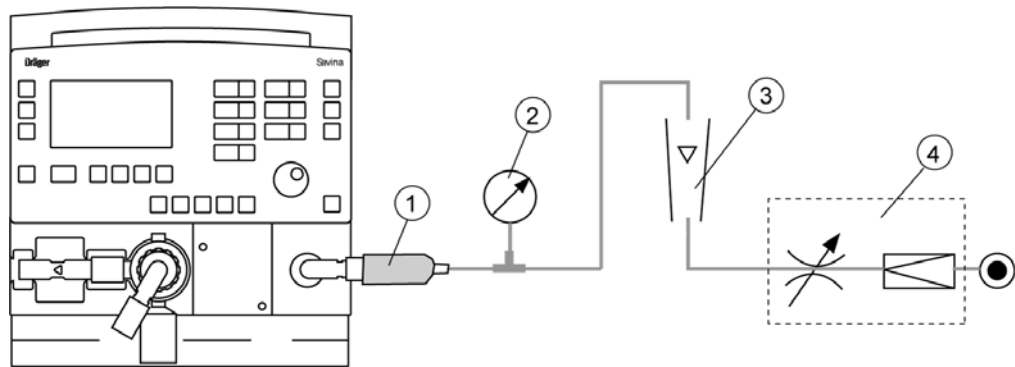


Fig. 9 Test setup; „pneumatic safety valve“

Item	Designation
1	Connecting sleeve
2	Pressure gauge
3	Flowmeter
4	Test pressure regulator

- Action • Using a test pressure regulator, set a flow of 2 to 3 L/min.
- Test The measured pressure is in a range from **80 mbar** to **120 mbar**.
- Result

[OK]

4.2.4 Emergency respiratory valve (D2)

Prerequisites The Savina is not connected to the mains power supply or to the „O2“ compressed gas supply. Savina is switched off.

Action • Prepare the following test setup:

Test set-up

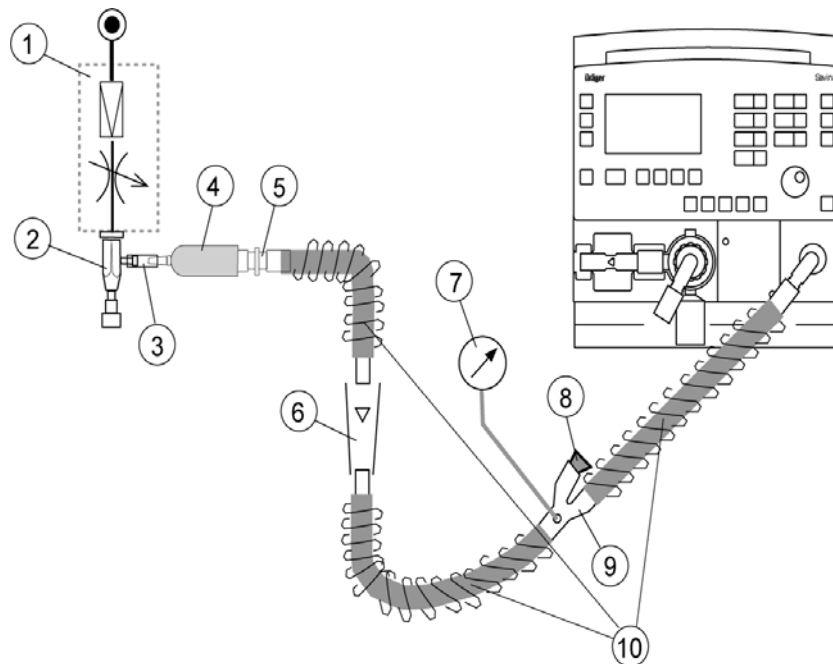


Fig. 10 Test setup; „emergency respiratory valve (D2)“

Item	Designation
1	Test pressure regulator
2	Injector
3	Silicone tube
4	Connecting sleeve
5	ISO socket
6	Flowmeter
7	Pressure gauge
8	Sealing plug
9	Y-piece, adult, Luer-Lock
10	Adult ventilation tube (tube length 0.9 to 1.2 m)

Action • Using the test pressure regulator, set a flow of 59 to 61 L/min.

Test The measured pressure is in a range from -3 mbar to -6 mbar.

Result

[] OK

4.2.5 Emergency expiratory valve

Prerequisites The Savina is connected to the mains power supply and to the „O2“ compressed gas supply. Savina is switched on.

- Action**
- Make the following settings on the Savina:
 - Operating mode: IPPV
 - Frequency (f): 6 1/min
 - Tidal volume (Vt): 500 mL/min
 - End-expiratory pressure (PEEP): 5 mbar
 - Oxygen concentration (O2): 21 vol. %
 - Inspiration time (Tinsp): 5 s
 - Airway pressure limit high (Paw high): 10 mbar above peak pressure

- Action**
- Prepare the following test setup:

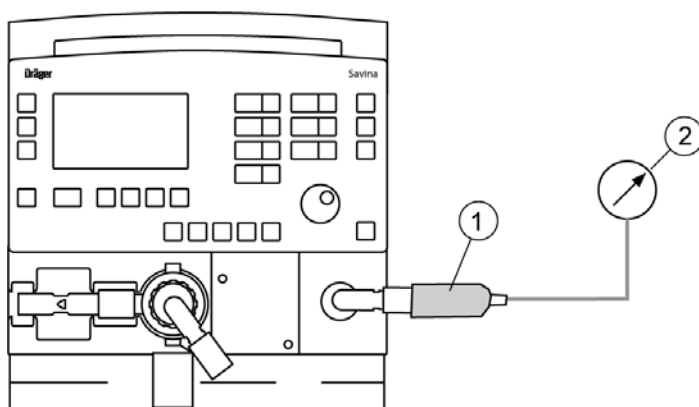


Fig. 11 Test setup; „emergency expiratory valve“

Item	Designation
1	Connecting sleeve
2	Pressure gauge

Test Savina builds up a pressure up to the airway pressure limit (Paw high). Then the pressure is briefly relieved via the emergency expiratory valve to less than 6 mbar.

Result

[] OK

4.2.6 Testing the ventilation

Prerequisites The Savina is connected to the mains power supply and to the „O2“ compressed gas supply and switched on.

Action • Prepare the following test setup:

Test set-up

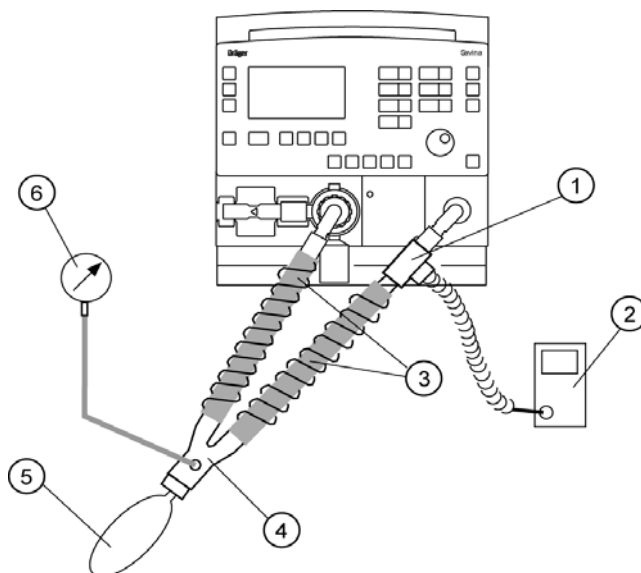


Fig. 12 Test setup; testing the ventilation

Item	Designation
1	O2 adapter
2	O2 analyzer
3	Adult ventilation tubing
4	Y-piece, adult, Luer-Lock
5	Test lung
6	Pressure gauge

Action • Make the following settings:

- Operating mode: IPPV
- Trigger: Off
- FlowAcc: 60 mbar/s (60 cmH₂O/s)
- AutoFlow: Off
- Sigh: off
- Set the following alarm values:
- Paw: 100 mbar (100 cmH₂O)
- MVhigh = 41 L/min
- MVlow: 0.5 L/min
- TApnoea: 60 s
- ftot: 120 bpm
- VTi: 4 L

Function tests

- Set the following configuration:

- O2 calib: Off
- O2 monitoring: On
- Flow monitoring: On
- Pmax: Off
- Plateau: On

- Enter the following parameters:

- VT = 500 mL
- Tinsp = 2 s
- f = 12 1/min
- PEEP = 5 mbar (5 cmH2O)
- O2 = 21%

VT metering and Vt measurement (IPPV mode)**NOTE**

Perform the „VT metering and VT measurement“ test with **all** the expiratory valves listed in the „Device configuration“ section under „Serial numbers“.

- Action
- Ventilate the test lung for at least three cycles.
 - Press the „Values“ key and confirm.
 - While the test lung is being ventilated, push the Spirolog sensor to the left-hand end position and back to the right-hand end position in order to trigger a flow calibration.
 - After the display message „Flow calibration OK“ appears, ventilate the test lungs for at least another three cycles.
 - Read out the „Vte“ measured value and compare it with the specified tolerance range.
 - Press the „Alarms“ key.

Vt=500 mL (expiratory valve 1)

The displayed value is in the range from **440** mL to **540** mL.

Entry [_____ mL]

Vt=500 mL (expiratory valve 2)**NOTE**

If the expiratory valve is faulty, such as due to a damaged crater, stop using it.

- Action
- After the tidal volume measurement (Vt) perform a flow calibration.

The displayed value is in the range from **440** mL to **540** mL.

Entry [_____ mL]

NOTE

If the expiratory valve is faulty, such as due to a damaged crater, stop using it.

- Action
- After the tidal volume measurement (Vt) perform a flow calibration.

4.2.7 O₂ regulation (IPPV mode)

Prerequisites The Savina is connected to the mains power supply and to the „O₂“ compressed gas supply and switched on.

Action • Prepare the following test setup:

Test set-up

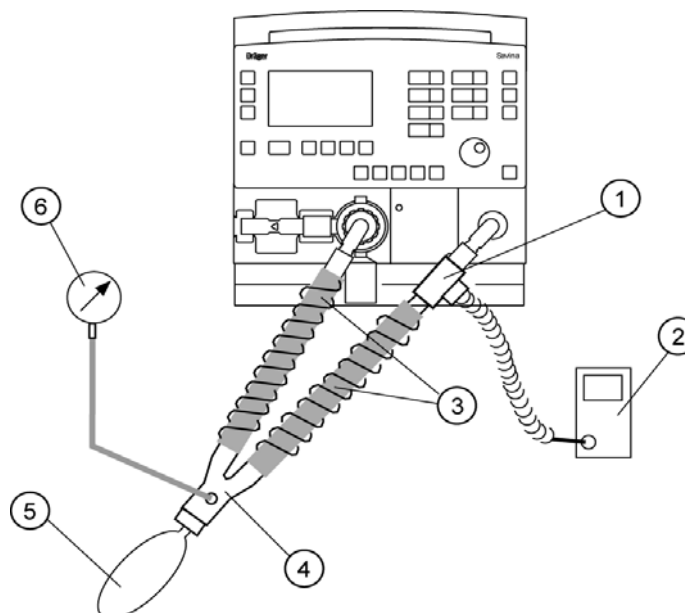


Fig. 13 Test setup; O₂ regulation

Item	Designation
1	O ₂ adapter
2	O ₂ analyzer
3	Adult ventilation tubing
4	Y-piece, adult, Luer-Lock
5	Test lung
6	Pressure gauge

Action • Set the „O₂“ concentration to the following values. Note: The comparative measurement with the reference O₂ analyzer is carried out when the displayed „O₂“ measured value corresponds to the „O₂“ specification.
• Set specified O₂ value to 60 % by volume.

Test The test value is in a range from **57** to **63** % by volume O₂.

Entry Enter the measured test value.

[_____ vol% O₂]

Action • Set specified O₂ value to 21 % by volume O₂.

4.2.8 Paw pressure regulation (BIPAP mode (PCV+))

Prerequisites The Savina is connected to the mains power supply and to the „O₂“ compressed gas supply and switched on. Savina is in „Standby“ mode.

Action • Prepare the following test setup:

Test set-up

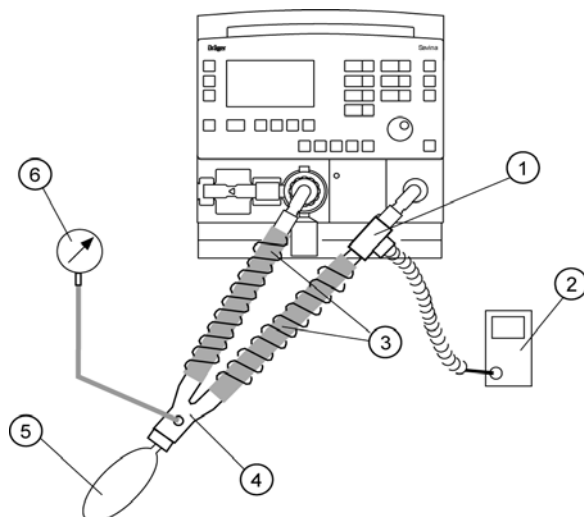


Fig. 14 Test setup; Paw pressure regulation

Item	Designation
1	O ₂ adapter
2	O ₂ analyzer
3	Adult ventilation tubing
4	Y-piece, adult, Luer-Lock
5	Test lung
6	Pressure gauge

Action • Set the following parameters on the Savina:

- Press the „BIPAP“ key and confirm.
- T_{insp} = 5 s
- Frequency „f“ = 6 1/min

NOTE

The display message „!!Tidal volume low“ may be triggered during this test. It does not affect the result of measurement.

- P_{insp} = 25 mbar (25 cmH₂O)
- PEEP = 5 mbar (5 cmH₂O)
- Press the „Standby“ key.
- Press the „Values“ key.

The displayed value of the external pressure gauge is in a range from **3 mbar** to **7 mbar** (3.1 cmH₂O to 7.1 cmH₂O).

Entry **Expiratory phase, 5 mbar (external pressure gauge)**

[_____ mbar]

The internal display shows a PEEP value of **4** mbar to **6** mbar (4 cmH₂O to 6 cmH₂O).

Entry **Expiratory phase, 5 mbar (Savina display)**

[_____]mbar]

Action • Set the PEEP value to 25 mbar (25 cmH₂O).

The displayed value of the external pressure gauge is in a range from **23** mbar to **27** mbar (23.5 cmH₂O to 27.5 cmH₂O).

Entry **Inspiratory phase, 25 mbar (external pressure gauge)**

[_____]mbar]

The internal display shows a Pplat value of **24** mbar to **26** mbar (24 cmH₂O to 26 cmH₂O).

Entry **Inspiratory phase, 25 mbar (Savina display)**

[_____]mbar]

4.3 Options

4.3.1 AWT 01 temperature sensor

- Prerequisites** The Savina is connected to the mains power supply and to the „O2“ compressed gas supply and switched on.
- Action**
- Connect the AWT 01 temperature sensor to the Savina.
 - Perform a comparative measurement with a reference thermometer at room temperature.
- Test** The measured value of the reference thermometer matches the Savina read-out and is within a tolerance of 2 °C.
- Result** [_____]OK]

4.3.2 Central alarm

- Prerequisites** The Savina is connected to the mains power supply and to the O2 supply, and is switched on.

Test set-up

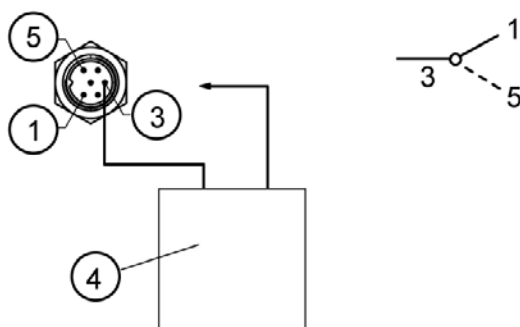


Fig. 15 Test setup; central alarm

Item 1	Designation
1	Pin 1 (no alarm)
3	Pin 3
4	Multimeter (resistance measurement)
5	Pin 5 (alarm)

- Action**
- Make the following settings: Activate ...INFO:[check function] [check function] Alarm ("!!!.....") by detaching the ventilation tube from the inspiratory socket. Do not reset the audible alarm by pressing the „Standby“ key!
 - Operating mode „IPPV“
 - Set the following alarm values:
 - Paw = 100 mbar
 - Set the following configuration:
 - Pmax = Off

- Set the following parameters:

- VT = 500 mL
- Tinsp = 2 s
- f = 12 1/min
- O2 = 21%

NOTE

No alarm with three exclamation marks ("!!!") may be active before performing the following test.

Test	No alarm:	
	– Pin 1 to pin 3: closed	
	– Pin 3 to pin 5: open	
Action	• Activate alarm ("!!!.....") by disconnecting the ventilation hose from the inspiratory socket. Do not reset the audible alarm by pressing the „Standby“ key!	
Test	Alarm:	
	– Pin 1 to pin 3: open	
	– Pin 3 to pin 5: closed	
Result		[_____ OK]

4.3.3 External battery or DC onboard power

Prerequisites	The Savina is connected to the mains power supply and not to the external battery or the DC onboard power. Savina is in „Standby“ mode.	
Test	The „External battery“ LED on the front of the Savina is unlit.	
Action	• Plug the connector of the external battery or of the DC onboard power supply into the Savina's power supply unit.	
Test	The „External battery“ LED on the front of the Savina is lit „green“ or „yellow“.	
Action	• Disconnect the Savina from the mains power supply. • Switch the Savina to any ventilation mode.	
Test	Savina ventilates with the external battery or with the DC onboard power supply. The Savina display shows „! Ext. DC active“.	
Result	Function tested with external battery	[_____ OK]
Result	Function tested with DC onboard power	[_____ OK]
Action	• Restore the mains power supply to the Savina.	

4.3.4 LPO

Prerequisites Savina is switched off.

- Action
- Using an approximately 40 cm silicone tube (4 x 1.5), connect the Savina connecting port („LPO“ connection) to the cross-piece 7901504.
 - Using an approximately 40 cm silicone tube (4 x 1.5), connect the manometer 7910722 to the cross-piece.
 - Using an approximately 30 cm silicone tube (4 x 1.5), connect the syringe 7901541 to the cross-piece.
 - Using an approximately 40 cm silicone tube (4 x 1.5), connect the connecting sleeve M13506 to the cross-piece.
 - Plug the ISO connector M25647 into the connecting sleeve.
 - Plug the ventilation hose (1.20 m) onto the ISO connector.
 - Seal off the free end of the ventilation hose using a rubber plug 22/25, P/N 7901665.
 - Using the syringe (see following illustration), generate a negative pressure of -8 mbar.

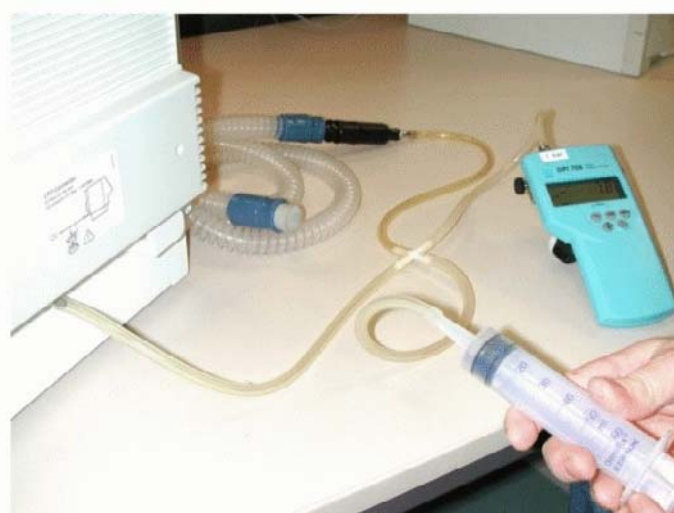


Fig. 16 Test setup; „LPO“ leak test

After 5 seconds the pressure has risen to maximum -6 mbar.

Result

[] OK

4.4 User-specific settings

4.4.1 Input of user-specific settings

Action • Re-enter all settings entered under the „Input of user-specific settings“ test item in the „Device configuration“ section into the device.

Result The user-specific settings have been programmed into the Savina.

[_____ OK]

4.5 Final action

Prerequisites – The test instructions have been performed as specified.
 – All tests performed were passed successfully.

4.5.1 Device handover with test label

Action • Attach a test label to the device.
 • Supply the user/owner with a fully functioning device.

Entry

[_____ OK]

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5 Test equipment

This chapter lists the service equipment required to perform the tests specified in these test instructions.







5.1 Test equipment subject and not subject to mandatory calibration..... 50




5.1 Test equipment subject and not subject to mandatory calibration

NOTE

Use the following test equipment or equivalent aids.

5.1.1 Test equipment subject to mandatory calibration







Designation	Part number	Comments
Electrical safety tester, e.g. GMC Secutest	7910596	
Multimeter	7901021	
Oxygen analyzer, e.g. MiniOx 3000	2M22464	
Temperature and humidity meter	7910980	
Pressure gauge	7910722	
Pressure gauge	7910724	

Designation	Part number	Comments
Test pressure regulator (hose connection) or	7901482	
Test pressure regulator (pin index)	7910342	No illustration available
Flowmeter, 3-block set	7901161	
Flowmeter	7900718	

Result **Valid calibrated test equipment was used.**

[☐ OK]

5.1.2 Test equipment not subject to mandatory calibration

Designation	Part number	Comments
Breathing bag with 7 mm catheter connector, set	8403201	
Measuring line, 2-pin, temperature	7910364	
ISO socket	M25647	
Connecting sleeve	M13506	
Injector	7900930	
O2 adapter	8405807	
Y-piece, adult, Luer-Lock	M33278	No illustration available

Designation	Part number	Comments
Rubber plug 18/20 DIN 12871	1294105	
Rubber plug 22/25	7901665	
Cross-piece, plastic	7901504	
T-piece, plastic	6800187	
Syringe, 60 mL	7910745	
Tube 6 x 2.5, silicone	1197851	
Tube 4 x 1.5, silicone	1190520	
Nebulizer tube	8412985	
Suction tube	M25780	
Tube 1 x 2.5, silicone	1198343	No illustration available
Tube 2 x 1, silicone	1180614	No illustration available

5.1.3 Additionally required items

Designation	Part number	Comments
Test label		No illustration available
Tubing system	As specified in instructions for use	No illustration available
„AIR“ pipeline supply connecting tube	As specified in instructions for use	No illustration available
„O2“ pipeline supply connecting tube	As specified in instructions for use	No illustration available

Result Sheet Test instructions / Service Card IPM Savina

Order number: 9500648

Location:

Department:

Maintenance interval:

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Serial no. (basic unit):

Cust. invent. no.:

Other / Delivery date:

Key

- ✓ / OK = OK
- + = Spare part used
- ! = Error / Report
- / = Accessory not available
- = Not applicable

Applies to Test instructions / Service Card IPM Revision 2.n

OK	Result
1 Device configuration	
1.1 Device configuration	
1.1.1 Serial numbers	
<input type="checkbox"/> 1.1.1.1 Savina	txt
<input type="checkbox"/> 1.1.1.2 Expiratory valve 1	txt
<input type="checkbox"/> 1.1.1.3 Expiratory valve 2	txt
<input type="checkbox"/> 1.1.1.4 Optional airway temperature sensor	txt
1.1.2 Device data	
<input type="checkbox"/> 1.1.2.1 BIPAP/PCV+ (8414060) (Yes/No)	txt
<input type="checkbox"/> 1.1.2.2 AutoFlow (8414069) (Yes/No)	txt
<input type="checkbox"/> 1.1.2.3 Central alarm (nurse call) (8414476) (Yes/No)	txt
<input type="checkbox"/> 1.1.2.4 NIV (mask ventilation, as from SW 02.n) (8414115) (Yes/No)	txt
<input type="checkbox"/> 1.1.2.5 O2 angled connector 90° (8413641) (Yes/No)	txt
<input type="checkbox"/> 1.1.2.6 Set of side rails (8414358) (Yes/No)	txt
<input type="checkbox"/> 1.1.2.7 Optional LPO (Yes/No)	txt
<input type="checkbox"/> 1.1.2.8 Optional Savina transport mobile (Yes/No)	txt
<input type="checkbox"/> 1.1.2.9 Optional external rechargeable battery in trolley (Yes/No)	txt
<input type="checkbox"/> 1.1.2.10 Option bed dock (Yes/No)	txt
<input type="checkbox"/> 1.1.3 Software version (Savina)	txt
1.1.4 Operating hours	
<input type="checkbox"/> 1.1.4.1 Total operating hours	h
<input type="checkbox"/> 1.1.4.2 Operating hours Service	h
1.1.5 Recording of user-specific settings ("Settings" menu)	
<input type="checkbox"/> 1.1.5.1 Trigger	txt
<input type="checkbox"/> 1.1.5.2 FlowAcc	txt
<input type="checkbox"/> 1.1.5.3 AutoFlow	txt
<input type="checkbox"/> 1.1.5.4 Sigh	txt
1.1.6 Recording of user-specific settings ("Alarms" menu)	
<input type="checkbox"/> 1.1.6.1 Paw	txt
<input type="checkbox"/> 1.1.6.2 MV high	txt
<input type="checkbox"/> 1.1.6.3 MV low	txt
<input type="checkbox"/> 1.1.6.4 TApnoea	txt
<input type="checkbox"/> 1.1.6.5 ftot	txt
<input type="checkbox"/> 1.1.6.6 VTi	txt
1.1.7 Select the Config, page 1/4 menu	
<input type="checkbox"/> 1.1.7.1 Measured values (selection: 1., 2., 3., etc.)	txt
1.1.8 Select the Config, page 2/4 menu	
<input type="checkbox"/> 1.1.8.1 O2 Monitoring (ON/OFF)	txt
<input type="checkbox"/> 1.1.8.2 Flow Monitoring (ON/OFF)	txt

OK	Result
<input type="checkbox"/> 1.1.8.3 Pmax (ON/OFF)	txt
<input type="checkbox"/> 1.1.8.4 Plateau (ON/OFF)	txt
2 Maintenance parts	
2.1 Device inspection and maintenance	
2.2 Maintenance parts, yearly	
<input type="checkbox"/> 2.2.1 Service set for Savina	dat
2.3 Maintenance parts, 2-yearly	
<input type="checkbox"/> 2.3.1 Service set for Savina	dat
<input type="checkbox"/> 2.3.2 Optional external battery (trolley)	dat
2.3.3 LPO option	
<input type="checkbox"/> 2.3.3.1 Filter screen	dat
<input type="checkbox"/> 2.3.3.2 O-ring	dat
<input type="checkbox"/> 2.3.3.3 Protective cap	dat
<input type="checkbox"/> 2.3.3.4 Washer	dat
2.4 Maintenance parts, 6-yearly	
<input type="checkbox"/> 2.4.1 Service set for Savina	dat
<input type="checkbox"/> 2.4.2 Optional external battery (trolley)	dat
2.4.3 LPO option	
<input type="checkbox"/> 2.4.3.1 Filter screen	dat
<input type="checkbox"/> 2.4.3.2 O-ring	dat
<input type="checkbox"/> 2.4.3.3 Protective cap	dat
<input type="checkbox"/> 2.4.3.4 Washer	dat
2.5 Maintenance parts, 8-yearly, but at the latest after 20000 operating hours	
2.5.1 Blower	
<input type="checkbox"/> 2.5.1.1 Blower with spare parts set	dat
<input type="checkbox"/> 2.5.2 Service set for Savina	dat
2.5.3 Optional external battery (trolley)	
<input type="checkbox"/> 2.5.3.1 Rechargeable battery	dat
2.5.4 LPO option	
<input type="checkbox"/> 2.5.4.1 Filter screen	dat
<input type="checkbox"/> 2.5.4.2 O-ring	dat
<input type="checkbox"/> 2.5.4.3 Protective cap	dat
<input type="checkbox"/> 2.5.4.4 Washer	dat
3 Electrical safety	
3.1 Electrical safety to EN 62353	
<input type="checkbox"/> 3.1.1 Visual check	OK
3.1.2 Protective conductor resistance	
<input type="checkbox"/> 3.1.2.1 Maximum measured value of device with power cable	Ohm
<input type="checkbox"/> 3.1.2.2 Maximum measured value of optional power cable	Ohm
3.1.3 Protective earth conductor resistance measurement points	

OK	Result
<input type="checkbox"/> 3.1.3.1 Measurement points scanned	OK
3.1.4 Device leakage current	
<input type="checkbox"/> 3.1.4.1 Reference value	µA
<input type="checkbox"/> 3.1.4.2 Recurrent test	µA
3.1.5 Leakage current, mains on applied part with airway temperature sensor AWT 01, if installed	
<input type="checkbox"/> 3.1.5.1 Reference value	µA
<input type="checkbox"/> 3.1.5.2 Recurrent test	µA
3.1.6 Leakage current on applied part with test adapter (normal condition)	
<input type="checkbox"/> 3.1.6.1 Initial value IAC	µA
<input type="checkbox"/> 3.1.6.2 Initial value IDC	µA
<input type="checkbox"/> 3.1.6.3 Recurrent test IAC	µA
<input type="checkbox"/> 3.1.6.4 Recurrent test IDC	µA
3.1.7 Optional multiple socket strip on trolley	
<input type="checkbox"/> 3.1.7.1 Power fuse links	OK
<input type="checkbox"/> 3.1.7.2 Protective conductor resistance	Ohm
<input type="checkbox"/> 3.1.7.3 Equivalent device leakage current	µA
<input type="checkbox"/> 3.1.7.4 Recurrent test	µA
3.2 Electrical safety according to IEC 60601-1	
<input type="checkbox"/> 3.2.1 Visual check	OK
<input type="checkbox"/> 3.2.2 Protective conductor resistance	Ohm
3.2.3 Earth leakage current	
<input type="checkbox"/> 3.2.3.1 Normal condition (N.C.)	µA
<input type="checkbox"/> 3.2.3.2 Single fault condition (S.F.C.)	µA
<input type="checkbox"/> 3.2.3.3 Normal condition (N.C.)	µA
<input type="checkbox"/> 3.2.3.4 Single fault condition (S.F.C.)	µA
3.2.4 Patient leakage current	
<input type="checkbox"/> 3.2.4.1 Normal condition (N.C.) DC	µA
<input type="checkbox"/> 3.2.4.2 Single fault condition (S.F.C.) DC	µA
<input type="checkbox"/> 3.2.4.3 Normal condition (N.C.) AC	µA
<input type="checkbox"/> 3.2.4.4 Single fault condition (S.F.C.) AC	µA
3.2.5 Optional multiple socket strip on trolley	
<input type="checkbox"/> 3.2.5.1 Power fuse links	OK
<input type="checkbox"/> 3.2.5.2 Protective conductor resistance	Ohm
<input type="checkbox"/> 3.2.5.3 Equivalent device leakage current	µA
<input type="checkbox"/> 3.2.5.4 Recurrent test	µA
4 Function and condition test	
4.1 Condition tests	
<input type="checkbox"/> 4.1.1 Accompanying documents	OK
<input type="checkbox"/> 4.1.2 Device labelling	OK
<input type="checkbox"/> 4.1.3 General condition (Savina, accessories, special accessories)	OK
<input type="checkbox"/> 4.1.4 General condition, trolley (option)	OK
<input type="checkbox"/> 4.1.5 O ₂ compressed gas connecting tube	OK
4.2 Function tests	
<input type="checkbox"/> 4.2.1 Power supply unit	OK
4.2.2 Non-return valve in expiratory valve	
<input type="checkbox"/> 4.2.2.1 Expiratory valve 1	OK
<input type="checkbox"/> 4.2.2.2 Expiratory valve 2	OK
<input type="checkbox"/> 4.2.3 Pneumatic safety valve	OK
<input type="checkbox"/> 4.2.4 Emergency respiratory valve (D2)	OK
<input type="checkbox"/> 4.2.5 Emergency expiratory valve	OK
4.2.6 Testing the ventilation	
<input type="checkbox"/> 4.2.6.1 V _t =500 mL (expiratory valve 1)	mL
<input type="checkbox"/> 4.2.6.2 V _t =500 mL (expiratory valve 2)	mL
<input type="checkbox"/> 4.2.7 O ₂ regulation (IPPV mode)	vol% O ₂
4.2.8 Paw pressure regulation (BIPAP mode (PCV+))	

OK	Result
<input type="checkbox"/> 4.2.8.1 Expiratory phase, 5 mbar (external pressure gauge)	mbar
<input type="checkbox"/> 4.2.8.2 Expiratory phase, 5 mbar (Savina display)	mbar
<input type="checkbox"/> 4.2.8.3 Inspiratory phase, 25 mbar (external pressure gauge)	mbar
<input type="checkbox"/> 4.2.8.4 Inspiratory phase, 25 mbar (Savina display)	mbar
4.3 Options	
<input type="checkbox"/> 4.3.1 AWT 01 temperature sensor	OK
<input type="checkbox"/> 4.3.2 Central alarm	OK
4.3.3 External battery or DC onboard power	
<input type="checkbox"/> 4.3.3.1 Function tested with external battery	OK
<input type="checkbox"/> 4.3.3.2 Function tested with DC onboard power	OK
<input type="checkbox"/> 4.3.4 LPO	OK
4.4 User-specific settings	
<input type="checkbox"/> 4.4.1 Input of user-specific settings	OK
4.5 Final action	
<input type="checkbox"/> 4.5.1 Device handover with test label	OK
5 Test equipment	
5.1 Test equipment subject and not subject to mandatory calibration	
5.1.1 Test equipment subject to mandatory calibration	
<input type="checkbox"/> 5.1.1.1 Valid calibrated test equipment was used	OK

Report:

Test has been performed according to the test instructions.

Name: _____

Date/Signature: _____

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Revision 2.0

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