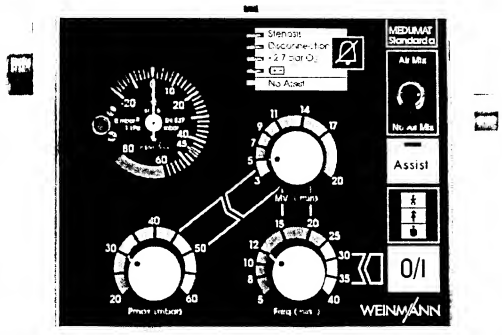
Servicing and
repair instructions

MEDUMAT Standard a



Ventilator
WM 22800

WEINMANN

Contents

Introduction

For decades, Weinmann has developed, manufactured and distributed equipment for emergency medicine, oxygen therapy and inhalation therapy.

In 1972, Weinmann introduced the first MEDUMAT emergency ventilator to the market.

MEDUMAT emergency ventilators are automatic resuscitators. They are used for controlled respiration in emergency medicine, e.g. in the event of acute ventilatory disorders, and for secondary obstructions.

The new generation of equipment, which was especially developed to meet the requirements of users and launched on the market in 1997, offers users and patients an enhanced level of safety. An intelligent alarm system monitors the patient's breathing and notifies the user of any malfunctions. Hence, this technology offers even greater safety and reliability during respiration.

The aim of these service and repair instructions is to familiarise you, as a **knowledgeable expert,** with the MEDUMAT in terms of function, technology and repairs. In conjunction with the training you have already received from Weinmann, you are now a "trained, qualified expert" and are able to instruct your clients correctly, rectify faults yourself, and perform the functional checks described in the instructions for use, as well as conduct any repairs which may be necessary, as outlined in these service and repair instructions.

In the event of a guarantee claim, MEDUMAT should be returned to Weinmann.

To enable us to process any guarantee or goodwill claims, please return the consumer's proof of purchase (invoice) together with the device.

Repairs and maintenance work must be carried out only by Weinmann or by knowledgeable experts.

You are responsible for all repairs performed by yourself and the warranty thereof!

Only original Weinmann spare parts should be used for repair purposes.

Please remember:
Your customer trusts you and relies on your expertise, just as you rely on Weinmann.

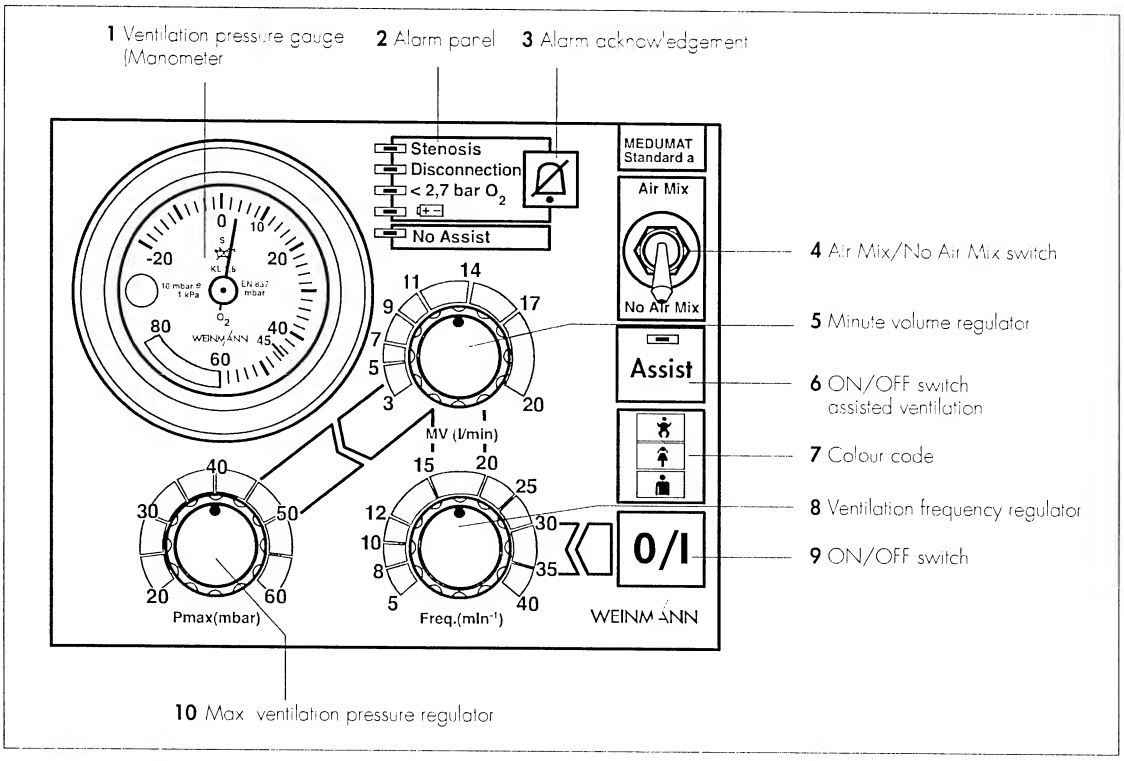
Note:

The following information can be found in the description and operating instructions for MEDUMAT Standard a:

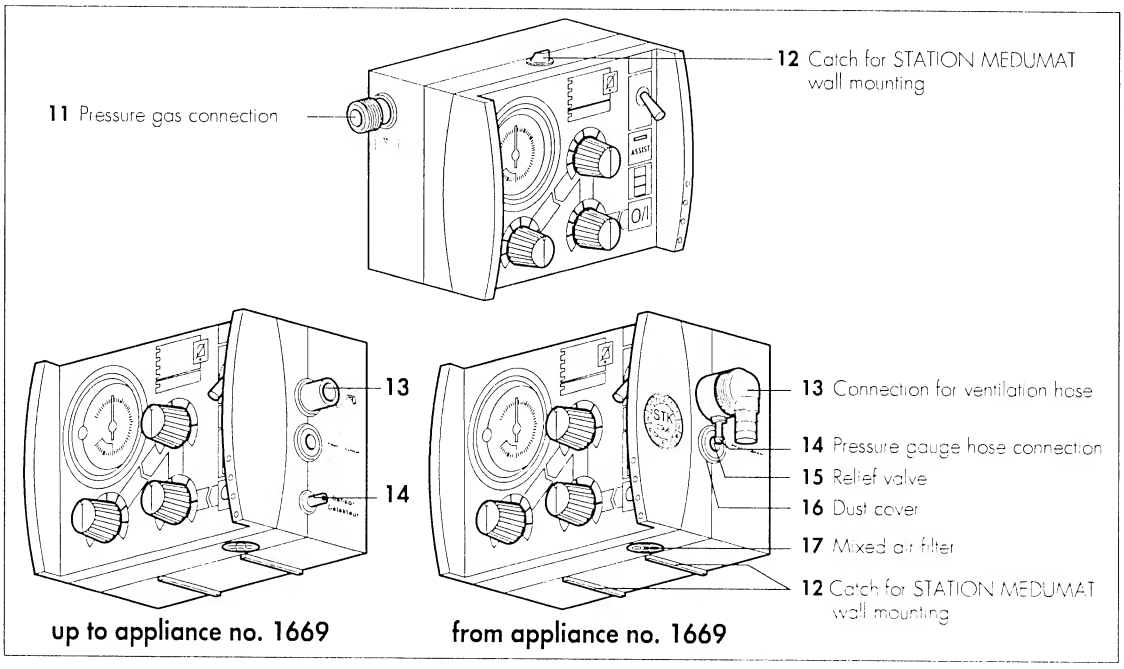
- Safety instructions:
  See chapter 2.
- Mounting with the wall bracket STATION MEDUMAT,
  Mounting of accessories:
  See chapter 3.
- Operation of the MEDUMAT emergency ventilator:
  See chapter 4.
- Hygienic preparation:
  See chapter 5.
- Functional check:
  See chapter 6.

1. Overview

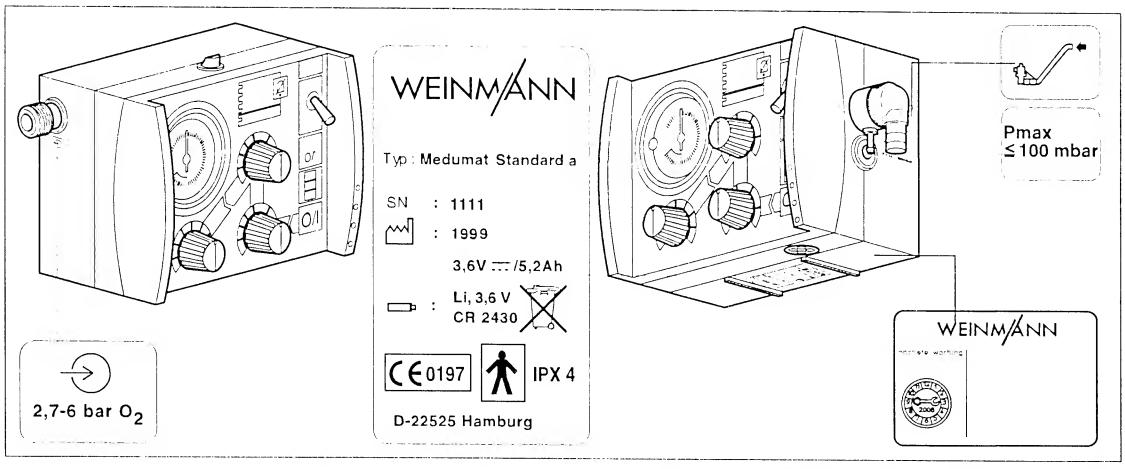
Control panel MEDUMAT Standard a



MEDUMAT Standard a connections



1.1 Symbols used on the ventilator



2,7-6 bar O_2	Inlet 2,7 - 6 bar O_2.
MEDUMAT Standard a device information plate	
SN	Serial number of device
	Year of manufacture
	Do not dispose of device in domestic waste.
Safety check and servicing label	
	Servicing label: indicates when the next service is due.
	Safety check label (in Germany only): marks when the next safety check as per §6 of the German law relating to users of medical devices is required.

2. Description of ventilator

2.1 Uses

MEDUMAT Standard a is an automatic (short-term) ventilator.

You can use MEDUMAT Standard a:

- to revive patients at the site of an emergency
- on a longer term basis in more protracted emergencies, e.g. fires.

You can use MEDUMAT Standard a whilst transporting patients:

- between the various rooms and departments of a hospital;
- between the hospital and other premises;
- in emergencies;
- when transport over a considerable distance is planned.

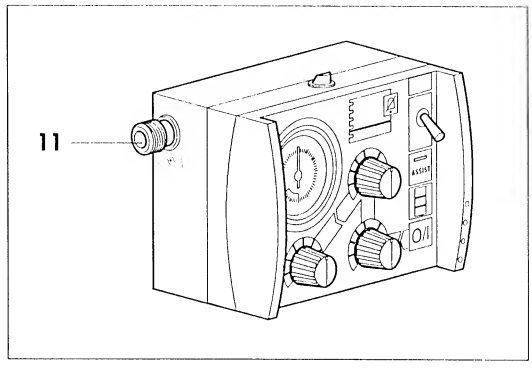
MEDUMAT Standard a:

- is used for controlled ventilation of persons with a body weight of about 10 kg upward, or for assisted ventilation from about 15 kg body weight;
- is used to treat respiratory arrest;
- can be preset to parameters that ensure evenly balanced ventilation provided that the selected maximum ventilation pressure P_{max} is not exceeded;
- can be supplied with additional modules for aspiration and oxygen inhalation. (N.B. MEDUMAT Standard a cannot be used as a ventilator simultaneously with these modules)

2.2 Ventilation function

MEDUMAT Standard a operates within a pressure range of 2.7 to 6 bar and at a flow rate of not less than 70 l/min O_2. It has a built-in power pack.

The gas used for ventilation is highly compressed medical oxygen, which is reduced to the required operating pressure by a two-stage external pressure reducer. The oxygen supply is fed in at input valve **11**.

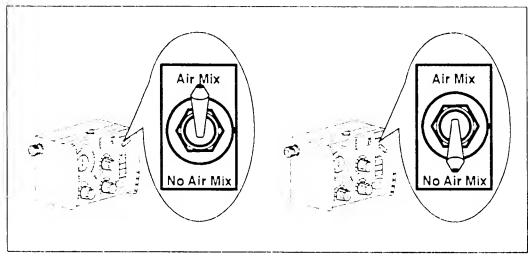


The continuously variable ventilation frequency and the inspiration/expiration ratio of 1:1.67 for controlled ventilation are controlled by electronic control routines within the device.

Regardless of the ventilation mode selected, the patient is free to use the patient valve to take a spontaneous breath between ventilation cycles. In that case the patient draws the air for breathing from the surroundings.

The gas for inspiration flows along the hose and through the patient valve and either the mask or the tracheal tube into the patient's airways. The patient valve is fitted with a lip membrane that enables expired gas to be conducted away through the expiration tube.

At the normal **Air Mix** setting, atmospheric air is admixed to give an O_2-concentration of between 55% and 85% at 10 mbar ventilation pressure (see „9.2 O_2 content when using Air Mix" on page 52).



In certain indications and in cases where the surrounding atmosphere is contaminated, you can switch to **No Air Mix** and ventilate with pure oxygen.

The injector unit is switched off when switching from **Air Mix** to **No Air Mix**. This increases minute volume which can result in the set pressure limit being **exceeded** and a stenosis alarm (Stenosis) being triggered. In this case, set minute volume correspondingly **lower**.

In the opposite instance, in other words when switching from **No Air Mix** to **Air Mix**, the injector unit is switched on. This reduces minute volume which can lead to the set pressure limit being **undershot**. In this case, set minute volume correspondingly **higher**.

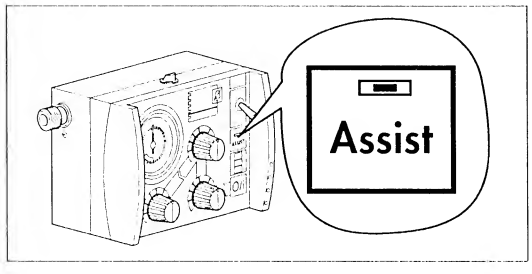
2.3 Controlled ventilation

After switching on, MEDUMAT Standard a is automatically in the controlled ventilation mode. This means that the intubated patient receives mandatory ventilation cycles which depend on the ventilation values set on the device.

Mandatory ventilation cycle: it is not the patient, but the device which determines the time of the next breath.

2.4 Assisted ventilation

In addition to the controlled ventilation mode the MEDUMAT Standard a provides an assisted ventilation mode.



Once you switch on the assisted ventilation mode by pressing the **Assist** button, a green LED flashes to indicate that this mode is operating.

Triggered ventilation cycle: the patient can trigger a ventilation cycle by making an effort to breathe.

Within a time window of 40 % of expiration, the patient can now start a triggered ventilation cycle. To do this the patient must create a flow of at least 5 l/min by making their own efforts to breathe.

If the patient's efforts to breathe are not sufficient to trigger a cycle, the patient automatically receives a mandatory ventilation cycle at the end of the time window, thereby ensuring compliance with the set minute ventilation.

This function allows the device ventilation cycles to be synchronised with the patient's own efforts to breathe.

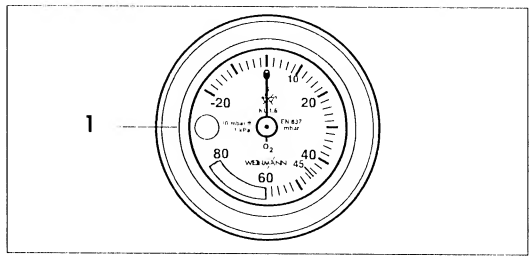
Between mandatory ventilation cycles the patient has the opportunity to breathe ambient air via the patient valve.

If the patient does not trigger the device, an alarm is set off. The patient then receives controlled ventilation.

IPPV: Intermittent Positive Pressure Ventilation (= controlled ventilation).

2.5 Checking course of ventilation

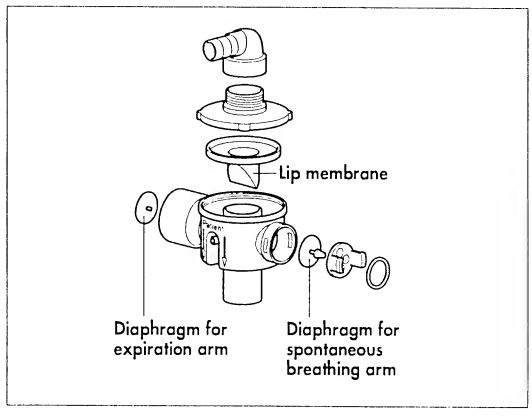
You can check the course of the ventilation on pressure gauge **1**.



2.6 Patient valve

The gas for inspiration is channelled into the patient's airways through the patient valve.

The patient valve is designed so that even in the event of failure of the MEDUMAT Standard a, spontaneous breathing is possible regardless of which ventilation mode you selected.



3. Final Check

After any repair and maintenance work, the device must be subjected to the following final check in accordance with the Test Instructions WM 22805 and Test Record.

Note:
For a final check on the MEDUMAT Standard a you must connect the respiration tube and the patient valve.

If the final check reveals any faults or deviations from the specified values, you must not use the MEDUMAT Standard a.

We recommend you to keep the following parts in stock:

- Replacement seals for device connections;
- Replacement dust filter;
- Lip diaphragm for patient valve;
- Diaphragm for spontaneous breathing arm;
- Diaphragm for expiration arm;
- O-ring 1145/118.

3.1 Test resources required

- Oxygen concentration measuring device,Type Oxycontrol WM 13550
- Volumetric flowmeter, Type RT 200 (Timeter) or Type EKU VIP – Ventilator
- Functional check test set WM 15382
- Adjustable orifice, e.g. ball valve, internal diameter ≥ 10 mm
- Set: hose with injector WM 15359
- Pressure gauge 0 - 6.3 bar, class 1.6
- Pressure gauge 0 - 100 mbar, class 1.6
- Set, supply test Medumat / Modules WM 15440

3.2 Preparations for final check

1. Connect MEDUMAT Standard a to test equipment.
2. Set MEDUMAT Standard a with switch in position **No Air Mix** to Freq. = 40 min^{-1}, MV = 5 l/min and P_{max} = 60 mbar.

3.3 Entering device data

- Enter the device type, device number and date of manufacture in the Test Record.

3.4 Testing for leaks and checking pressure reading

3.4.1 Testing for leaks on the inlet side

- With device switched off, apply pressure of 6 bar to inlet side and shut off outlet pressure.
- Set lever to **No Air Mix.**

  Requirement: The pressure drop must be less than 0.2 bar/min.
- Set lever to **Air Mix.**

  Requirement: The pressure drop must be less than 0.2 bar/min.

3.4.2 Testing for leaks in pressure measurement segment

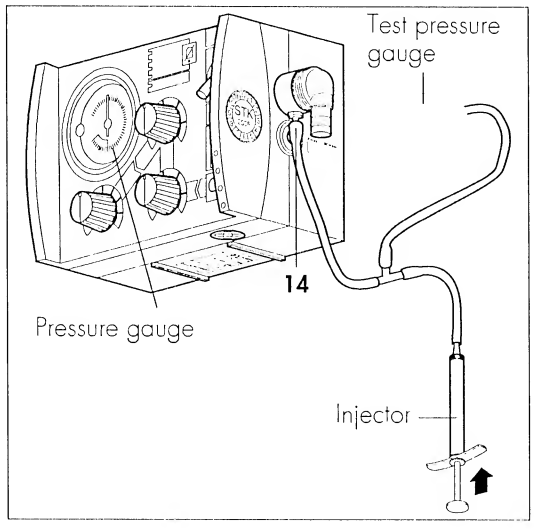
- Apply pressure of 60 mbar to pressure measurement segment of Medumat.
- During the measurement, a traction force of approx. 3 N must be applied manually to the elbow outlet.

  Requirement: The pressure drop must be less than 2 mbar/min.

3.4.3 Checking pressure reading

1. Attach T-connector with injector (WM 15359) to pressure measurement connection **14**.
2. Connect test pressure gauge 0 - 100 mbar or Timeter to free end of T-connector (pressure gauge/volumetric flowmeter not supplied with device).
3. Use injector to create a pressure of 55 mbar as shown on the test pressure gauge.

Requirement: Respiration pressure reading must not deviate from set value by more than ≤ 1.5 mbar.



3.5 Device self-test after switching on

1. Apply approx. 4.5 bar to the inlet.
2. Switch on MEDUMAT Standard a

   Requirement: The self-test is activated: all 6 LEDs light up together and a brief signal tone sounds.

3.6 Functional check on alarms

3.6.1 Stenosis alarm check up to appliance no. 1799

- Set MEDUMAT Standard a to the **Air Mix** setting at f = 40/min, MV = 3 l/min and p_{max} = 60 mbar. Close patient valve outlet.
  Note: Over-response of needle is normal.

  Requirement: The stenosis alarm must be activated after two respiration cycles.

- Set MEDUMAT Standard a to the **No Air Mix** setting at f = 40/min, MV = 3 l/min and p_{max} = 60 mbar. Close patient valve outlet.
  Note: Over-response of needle is normal.

  Requirement: The stenosis alarm must be activated after two respiration cycles

3.6.2 Stenosis alarm check from appliance no. 1800

- Set MEDUMAT Standard a to the **Air Mix** setting at f = 40/min, MV = 3 l/min and p_{max} = 60 mbar. Close patient valve outlet.
  Note: Over-response of needle is normal.

  MEDUMAT Standard a briefly switches to expiration if the maximum ventilation pressure is exceeded, but then tries to continue inspiration in the same inspiration phase

  If the maximum ventilation pressure is exceeded for a second time during the same inspiration phase, the unit finally switches to expiration and vents the patient tube system completely. The next inspiration begins with the following ventilation stroke according to the frequency selected.

  Requirement: The stenosis alarm must be activated after two respiration cycles.

- Set MEDUMAT Standard a to the **No Air Mix** setting at f = 40/min, MV = 3 l/min and p_{max} = 60 mbar. Close patient valve outlet.
  Note: Over-response of needle is normal.

  Requirement: The stenosis alarm must be activated after two respiration cycles.

3.6.3 Alarm acknowledgement check

- Immediately after first alarm tone sounds, press button **3** (alarm acknowledgement).

  Requirement: The alarm tone must be suppressed immediately.

3.6.4 Disconnection alarm check

- Open patient valve outlet.

  Requirement: The disconnection alarm must be activated after two respiration cycles.

3.6.5 Pressure alarm check

- Shut off pressurised gas connection of Medumat (2.7 - 6.0 bar).

  Requirement: The pressure alarm must be activated.

3.7 Checking assisted ventilation

Connect ventilation tube with patient valve to test bag.

1. Set MEDUMAT Standard a to MV 8 l/min, **Air Mix,** f = 8 /min and P_{max} = 60 mbar.
2. Switch on Assist button **6**, green LED in button flashes.
3. Wait for two inspiration phases.

   Requirement: The visual alarm **No Assist** is actuated (flashing yellow light in alarm field 2).

   The acoustic alarm does not cut in until one minute has elapsed
4. Simulate inspiration impulses (negative pressure) by squeezing the test bag **several times** before the next inspiration.

   During simulation the pointer must swing into the negative sector and reach at least -0.8 mbar.

   Requirement: The yellow **No Assist** LED must go out on inspiration

3.8 Functional check on frequency setting

Connect respiration tube to 10 mbar orifice and to volumetric flowmeter, then set MEDUMAT Standard a to MV = 11 l/min

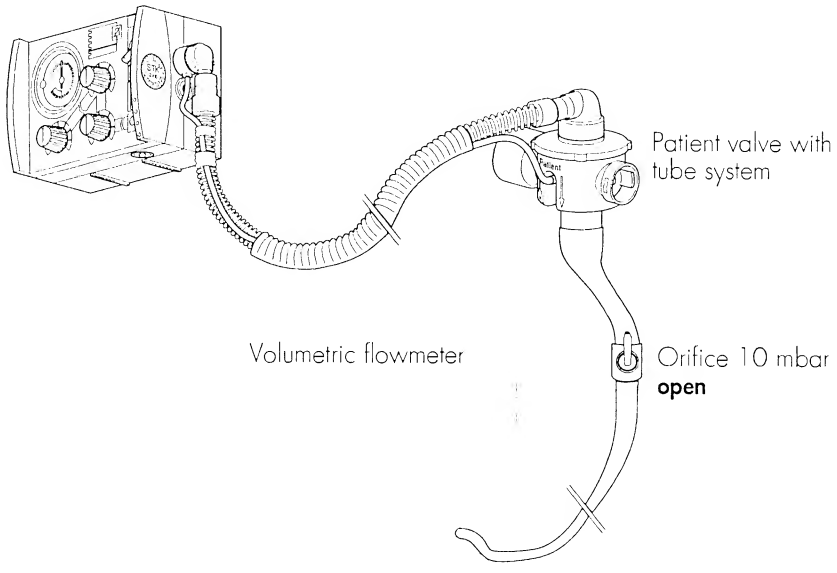
1. Run MEDUMAT Standard a in position **No Air Mix**, Freq. = 5 min^{-1}.

   Requirement: The measured frequency must be 5 ± 1 min^{-1}.
2. Run MEDUMAT Standard a in position **No Air Mix**, Freq. = 15 min^{-1}.

   Requirement: The measured frequency must be 15 ± 2 min^{-1}.
3. Run MEDUMAT Standard a in position **No Air Mix**, Freq. = 25 min^{-1}.

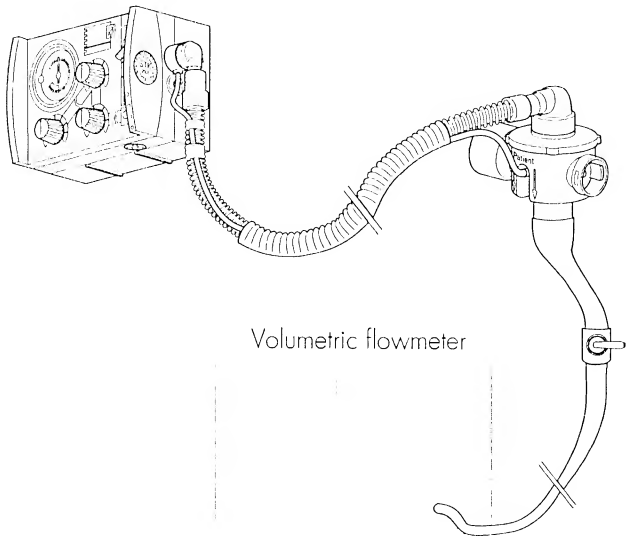
   Requirement: The measured frequency must be 25 ± 2 min^{-1}.
4. Run MEDUMAT Standard a in position **No Air Mix**, Freq. = 40 min^{-1}.

   Requirement: The measured frequency must be 40 ± 2 min.



3.9 Functional check on tidal volume at 4.5 bar delivery pressure and 10 mbar counterpressure

1. Run MEDUMAT Standard a in position **No Air Mix**, Freq. = 15 min^{-1} and MV = 20 l/min.
   Requirement: Tidal volume must be 1300 ± 200 ml.
   Switch MEDUMAT Standard a to position **Air Mix**.
   Requirement: Tidal volume must be 1300 ± 200 ml.
2. Run MEDUMAT Standard a in position **No Air Mix**, Freq. = 15 min^{-1} and MV = 11 l/min.
   Requirement: Tidal volume must be 730 ± 110 ml.
   Switch MEDUMAT Standard a to position **Air Mix**.
   Requirement: Tidal volume must be 730 ± 110 ml.
3. Run MEDUMAT Standard a in position **No Air Mix**, Freq. = 40 min^{-1} and MV = 5 l/min.
   Requirement: Tidal volume must be 125 ± 25 ml.
   Switch MEDUMAT Standard a to position **Air Mix**.
   Requirement: Tidal volume must be 125 ± 25 ml.

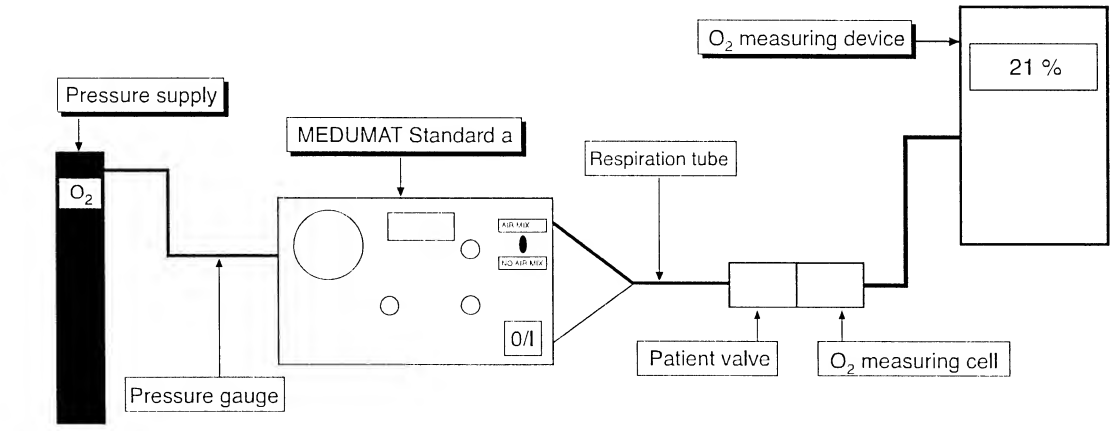


3.10 Checking oxygen concentration

1. Run MEDUMAT Standard a in position Freq. = 10 min^{-1} and MV = 11 l/min with 100 % O_2.
2. Check O_2 concentration in position **No Air Mix**.

   Requirement: The O_2 concentration must be greater than 98 %.
3. Check O_2 concentration in position **Air Mix**.

   Requirement: The O_2 concentration must lie between 50 % and 65 %.



3.11 Functional check on pressure limit

1. Connect respiration tube to test bag.
2. Set MEDUMAT Standard a to **No Air Mix**, Freq. = 8 min^{-1} and MV = 9 l/min.
3. Set pressure limit to 20 mbar.

   Requirement: The pressure limit must respond at 20 ± 5 mbar and trigger the stenosis alarm.
4. Set pressure limit to 60 mbar.

   Requirement: The pressure limit must respond at 60 ± 5 mbar and trigger the stenosis alarm.

3.12 Functional check on exhaust valve without patient valve

1. Run MEDUMAT Standard a in position f = 8 min^{-1} and MV = 7 l/min.
2. Connect patient valve to device outlet with expiration outlet closed, **without** lip diaphragm and with test bag.

   Requirement: The test bag is completely inflated in one inspiration stroke. The respiration device can then be heard to exhaust.

3.13 Checking equipment and accessories (system components)

- Respiration tube with patient valve undamaged and in working order
- Functional check test set in working order
- Pressure reducer in working order
- O_2 cylinder within test deadline; valve in working order
- Support plate complete and in working order
- Medical products book present
- Operating instructions present

3.14 Checking external condition

- Check external condition of device.

  Requirement: No mechanical damage to housing.

  Device labels with operating information are legible.

  Sealing sleeves are properly seated.

  Pressure gauge zero reading is correct.

  Connecting thread G3/8 is undamaged and functions smoothly.

  All rotary knobs are self-locking against inadvertent readjustment.

3.15 Documentation

- Document points 4 to 14 in the Test Record, along with test date and tester number.

4. Servicing

N.B.
Always remember to carry out a technical safety check of the ventilator after every repair.

MEDUMAT Standard a must be serviced regularly.

We recommend having all maintenance work, servicing and repairs carried out either by the manufacturer Weinmann or by a qualified agent expressly authorised by that company.

4.1 Intervals and Scope

Every 2 years:

Every 2 years, you must subject the device (including patient valve and tube system) to a **technical safety check** in accordance with §6 of the Regulations for Users.

The servicing and inspection may also be carried out by the manufacturer Weinmann.

The following points should be observed:

- Check that the equipment is complete
- Visual check for:
  - physical or mechanical damage
  - correct markings on controls
  - damage to all external hoses;
- Replacement of worn components/ compulsory change parts (see "7.2 Maintenance set" on page 46);
- Check of system components: transport platforms, oxygen supply fittings, secretion suction system, hose connections etc.
- Check test bag.
- Repeat testing of aluminium oxygen bottles WM 1821 and WM 3621 by the Technical Testing Association. The specified testing date is stamped on the shoulder of the bottle;
- **Final check in accordance with Test Instructions/ Test Report STK WM 22805**
  (see "3. Final Check" on page 9 and see "11. Repair and inspection log" on page 53.

Every 4 years:

- Servicing of the fittings in the oxygen supply system (e.g. pressure reducer) either by the manufacturer or by a qualified agent expressly authorised by him.

Every 10 years:

- Repeat testing of the conventional steel or aluminium oxygen bottles by the Technical Testing Association. The specified testing date is stamped on the shoulder of the bottle.

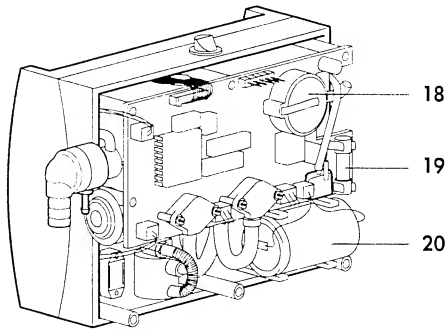
4.2 Batteries and fuses

MEDUMAT Standard a is fitted with two batteries which must always be changed together:

A button cell CR2430 **18** supplies the electronics with auxiliary power if the capacity of the main battery **20** is exhausted. This means that an alarm can still be activated in the event of sudden failure of the main battery. The device switches to expiration.

As a general rule, the capacities of the batteries are designed in such a way that under normal usage conditions, they do not need to be changed during the 2-year servicing intervals. Within the context of the prescribed 2-year servicing, the batteries are replaced completely.

We recommend that the batteries be changed only by the manufacturer Weinmann or by authorised specialists explicity authorised by them, since special precautions must be taken to protect the electronics (see "6.6 Changing the batteries" on page 24).



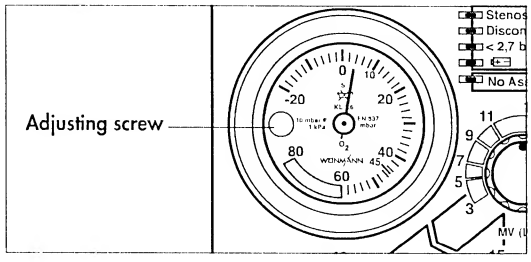
18: Button cell for auxiliary power
19: Fuse to prevent internal short-circuiting
20: Lithium battery 3.6 V for main power to MEDUMAT Standard a

4.3 Adjusting the pressure gauge

In the idle state, with MEDUMAT Standard a deactivated and the oxygen cylinder closed, the needle of the pressure gauge must point precisely to "**0**".

To adjust the needle, proceed as follows:

1. Carefully lever out the plastic cover of the adjusting screw.
2. Adjust the needle with the adjusting screw using a small screwdriver (e.g watchmaker's screwdriver).
3. Re-insert the plastic cover.



4.4 Storage

If you are not intending to use MEDUMAT Standard a for a long period, we recommend the following storage precautions:

1. Clean and disinfect the ventilator (see "5. Hygienic preparation" of the description and operating instructions for MEDUMAT).
2. Store MEDUMAT Standard a in a dry place.

Important note!
Remember that the ventilator still requires servicing at the stipulated intervals even when in storage, otherwise it **cannot** be used when removed from storage.

4.5 Disposal

Do not dispose of the unit with domestic waste. For proper waste disposal of the equipment, please contact an approved and certified waste disposal site for electronic goods. Ask your Environmental Officer or town council for the address.

5. Troubleshooting

Defect	Cause of defect	Elimination
MEDUMAT Standard a cannot be switched on	MEDUMAT Standard a defective	Perform a functional check (chap. 3., page 9)
	Battery failure	Replace both batteries (chap. 6.6, page 24)
Stenosis alarm (excessive airway resistance)	Obstruction of airways	Arrange for repair
	Tube incorrectly positioned	
	P_{max} set too low	
	Obstruction in tube/mask	
No stenosis alarm	MEDUMAT Standard a defective	Perform a functional check (chap. 3., page 9)
	Valve unit membrane leaking	Check that valve membrane is properly seated
Disconnection alarm (interruption of breathing system)	Ventilation hose leaking/slipped out	Check connections
	Tube/mask incorrectly positioned	
	Pressure gauge hose leaking/ slipped out	
< 2,7 bar alarm (oxygen pressure too low)	MEDUMAT Standard a defective	Perform a functional check (chap. 3., page 9)
	Oxygen cylinder nearly empty	Change O_2 cylinder
	Oxygen valve closed	Open oxygen valve
	Pressure reducer defective	Replace pressure reducer
	Kink or blockage in oxygen hose	Take action to correct
Alarm [+ −]	Battery failing	Replace both batteries (chap. 6.6, page 24)
Visual alarms flashing but no acoustic alarm.	Short-term electronic disruption or electronic failure	Switch off and on again. If error recurs, perform a functional check (chap. 3., page 9)
Acoustic alarm but no visual alarm		
Acoustic alarm and all visual alarms flashing		
MEDUMAT Standard a is functioning but without any displays	Pressure gauge hose on MEDUMAT Standard a or on patient valve slipped off	Check pressure gauge hose
	Kink in pressure gauge hose	
MV too high	Measured without 10 mbar counterpressure	Set to 10 mbar counterpressure

Defect	Cause of defect	Elimination
MV not correct	Measuring device not calibrated	Calibrate measuring device
	Inlet pressure > 6 bar	Adjust system to below 6 bar
	Patient valve not in order	Check diaphragms and O-ring, replace if necessary (Chapter 6.7, page 37 of Operating Instructions)
	Adjustment knob incorrectly set	Reset adjustment knob (chap. 6.9, page 26)
	Leak in pneumatic block	Replace pneumatic block (chap. 6.13, page 32) or replace pneumatic block with angled outlet (chap. 6.14, page 34)
Unusually high oxygen consumption	Leak in oxygen supply	Seek and eliminate leak (Chap. 6.2, page 34 of Operating Instructions)
MEDUMAT Standard a cannot be switched off	User error	Keep switch depressed for at least 2 seconds
Manometer needle not standing at "0"	Manometer needle needs adjustment	Adjust (chap. 4.3, page 17)
Alarm **No Assist**	Patient does not trigger device within time window	Adapt ventilation frequency to suit patient
	Patient does not trigger device at all	Continue ventilating in Controlled Ventilation mode
	Valve membrane in spontaneous breathing arm defective or missing	Insert new valve membrane (Chap. 7.4, page 46 of Operating Instructions)
Pressure limit (P_{max}) incorrect	Incorrect setting selected on device	Make correct setting (Chapter 6.5, page 35 of Operating Instructions)
	Pressure gauge not reading "0", or faulty	Adjust (chap. 4.3, page 17) or check (chap. 3.4.3, page 10) pressure gauge
		Replace pressure gauge (chap. 6.12, page 31)
	Patient valve not in working order	Check diaphragms and O-ring, if necessary replace (Chapter 6.7, page 37 of Operating Instructions)
	Patient valve or test bag incorrectly connected	Check tube connections and bag
	MV not correct	See defect "MV not correct"
	Tube connections in device faulty	Check tubes and replace if necessary (chap. 6.13, page 32)
	Pressure sensor on circuit board faulty	Replace circuit board (chap. 6.11, page 29)
	Respiration adjustment knob faulty	Replace adjustment knob (chap. 6.9, page 26)
	Pressure measurement connection blocked	Replace (chap. 6.8, page 25)

Defect	Cause of defect	Elimination
Alarms (visual and acoustic) faulty	LEDs do not light up	Replace top of housing (chap. 6.16, page 38)
	Incorrect indication (Stenosis/Disconnection)	Check settings, check tube connection to patient valve (Chapter 6.7, page 37 of Operating Instructions)
No alarm (visual + acoustic)	Circuit board faulty	Replace circuit board (chap. 6.11, page 29)
No acoustic alarm	Alarm acknowledgement pressed	Wait for 30 – 120 s
	Alarm sensor faulty	Replace alarm sensor (chap. 6.8, page 25)
Alarm < 2,7 bar despite existence of pressure	Pressure sensor faulty	Replace circuit board (chap. 6.11, page 29)
	Tube connections in device faulty	Check tubes and replace if necessary (chap. 6.13, page 32)
Leak at pressure inlet	Elbow connector in device loose or faulty	Check (chap. 6.17, page 43)
Leaks in tubes in device		Check tubes and replace if necessary (chap. 6.12, page 31)
Leak in pressure sensor on circuit board		Replace circuit board (chap. 6.11, page 29)
Air Mix/No Air Mix switch faulty		Replace switch **4** (chap. 6.15, page 37)
Leak in pneumatic block		Replace pneumatic block (chap. 6.13, page 32) or replace pneumatic block with angled outlet (chap. 6.14, page 34)
O_2 concentration not correct	Measuring device not calibrated	Calibrate measuring device
	Incorrect measurement sequence	Check **No Air Mix** first, then **Air Mix**
	Air Mix/No Air Mix switch faulty	Replace switch **4** (chap. 6.15, page 37)
	Pneumatic block faulty	Replace pneumatic block (chap. 6.13, page 32) or replace pneumatic block with angled outlet (chap. 6.14, page 34)
Frequencies incorrect	Calibration	Calibrate potentiometer (chap. 6.9, page 26)
	Potentiometer faulty	Replace potentiometer (chap. 6.9, page 26)
Test bag is not sufficiently inflated during functional check, disconnection alarm	Ventilation parameters wrongly selected	Correct ventilation parameters
	Patient valve not working properly	Check lip membrane
	Pressure gauge hose not fitted	Fit pressure gauge hose
No stenosis alarm when patient valve is closed during functional check (chap. 3.9, page 13)	Patient valve not working properly	Check lip membrane

6. Repair information and repair instructions

6.1 General

Repairs to MEDUMAT Standard a should be carried out only at an ESD workstation!

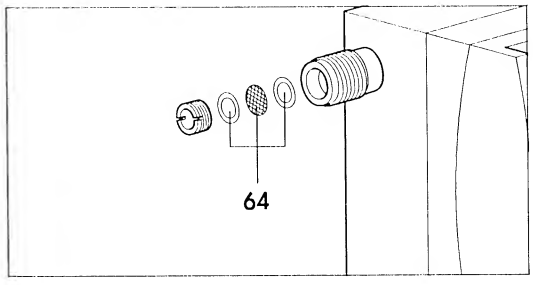
- **Please follow the safety instructions for MEDUMAT Standard a on page 9 of the description and operating instructions.**
- All handling of the device pre-supposes a precise knowledge of and compliance with the description and operating instructions and the service and repair instructions.
- Please carry out only the repairs described in these service and repair instructions. Otherwise, perfect functioning of the MEDUMAT Standard a cannot be guaranteed.
- Please ensure that your hands and workplace are clean when carrying out repairs.
- After each repair, please perform a functional check (see "3. Final Check" on page 9).
- When you replace components or individual parts, please use original Weinmann parts only.
- When ordering the housing base section **30** please specify the device model, year of construction and device number.
- **Note:**
  The item numbers used in the following text match the item numbers in the spare parts list on page 44 and the overview on page 4.

6.2 Replacing the sieve in the compressed gas connection

Tools required:

- Slotted screwdriver,
- Tweezers.

1. Unscrew the slotted screw at the compressed gas connection **11**.
2. Using the tweezers, remove the sieve set **64**.
3. Carefully insert a new sieve set **64** into the compressed gas connection
4. Screw the slotted screw back into the compressed gas connection.

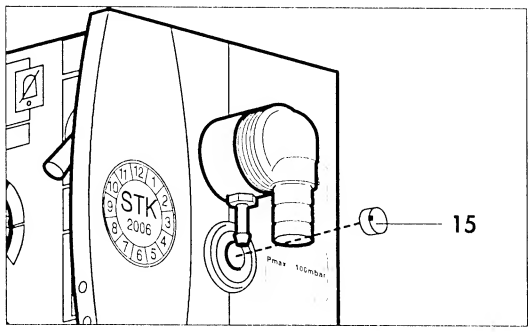


6.3 Changing the foam insert in the pressure relief valve outlet

Tools required:

- Tweezers.

1. Use tweezers to remove foam insert **15**.
2. Place a new foam insert **15** in the outlet.

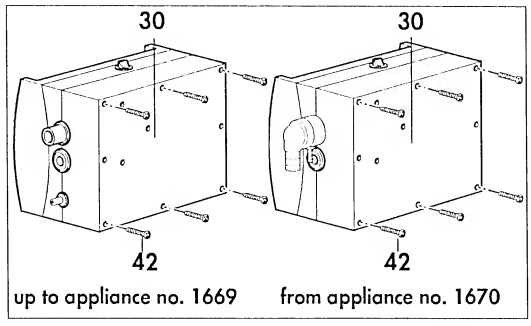


6.4 Opening the device

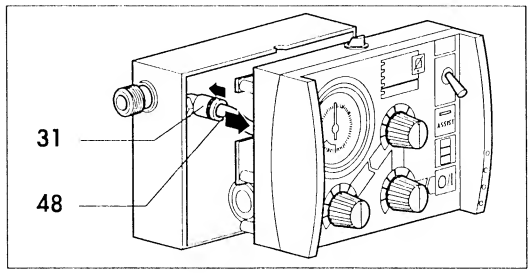
Tools required:

- Crosstip screwdriver, size 2.

1. Carefully place the device on a non-slip surface and unscrew the 6 screw **42** from the rear panel of the device.
2. Pull off the housing base section **30** and fold it away.



3. Next, loosen the connecting tube **48** from the oxygen inlet by pushed back the sleeve on the angular bush **31** and pulling out the tube.



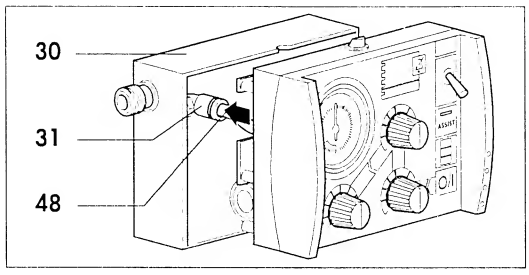
6.5 Closing the device

Tools required:

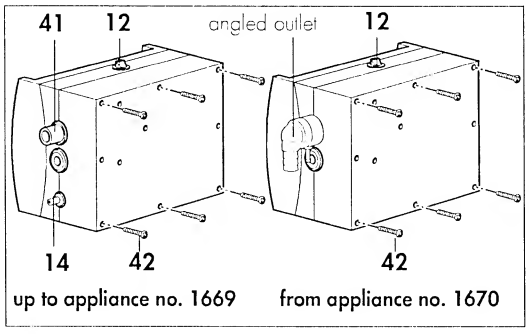
- Crosstip screwdriver, size 2.

1. Push the connecting hose **48** into the angular bush **31** as far as it will go.
2. Place the housing base section **30** onto the upper housing section.

   Make sure that none of the lines are pinched, and that the twistlock 12, the grommet 41 and the angled outlet with pressure measurement connection 14 are correctly seated.



3. Next, secure the housing base section using the 6 screws **42**.
4. Perform a functional check (see "3. Final Check" on page 9).



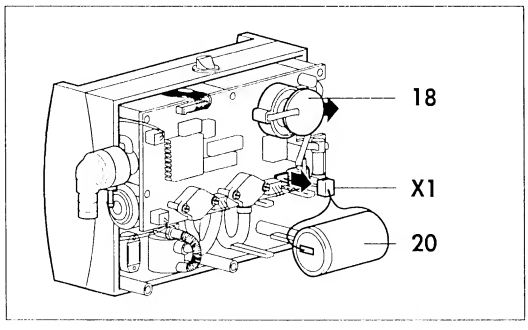
6.6 Changing the batteries

Tools required:

- Crosstip screwdriver, size 2.

1. Open the device (see "6.4 Opening the device" on page 23).
2. The main battery **20** can be removed by lifting the battery out of its holder and then pulling connector **X1** from the circuit board.
3. To remove the button cell **18** , gently lift up the plus contact and pull the button cell out sideways with your other hand.
4. Insert the new batteries by proceeding in the reverse order.

   Make sure that the wires for the main battery are not pinched and that the button cell is inserted with correct polarity!



5. Close the device (see "6.5 Closing the device" on page 24).
6. Perform a functional check (see "3. Final Check" on page 9).

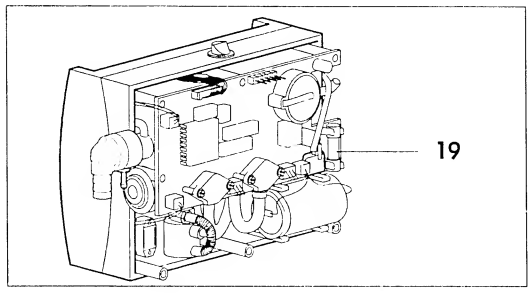
Remember that used batteries must not be disposed of with your domestic waste. Used batteries should be taken to a collection point in your area, or to a specialist dealer.

6.7 Replacing the fuse

Tools required:

- Crosstip screwdriver, size 2.

1. Open the device (see "6.4 Opening the device" on page 23).
2. Pull out the defective fuse **19** upwards.
3. Carefully press a new fuse **19** into the holder.
4. Close the device (see "6.5 Closing the device" on page 24).
5. Perform a functional check (see "3. Final Check" on page 9).

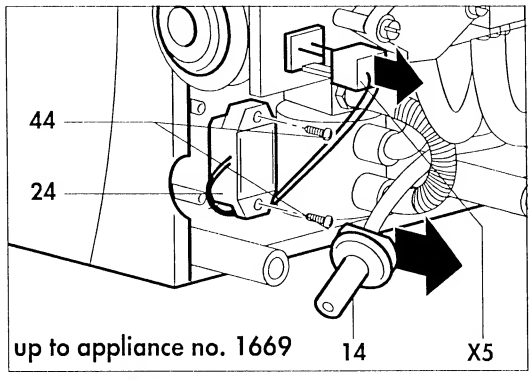


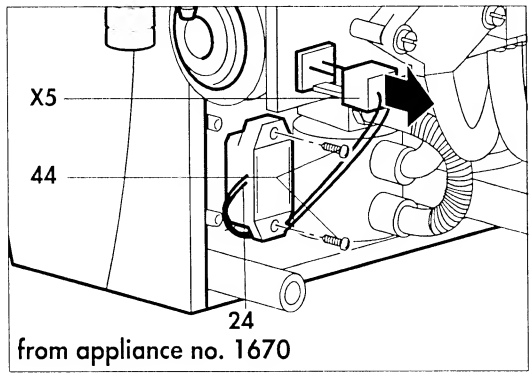
6.8 Replacing the alarm signalling device

Tools required:

- Crosstip screwdriver, size 2,
- Crosstip screwdriver, size 1.

1. Open the device (see "6.4 Opening the device" on page 23).
2. **Up to appliance no. 1669:**
   Pull the pressure measurement connection **14** upwards out of the housing wall
3. Pull the connector **X5** from the circuit board.
4. Unscrew both screws **44**.
5. Remove the defective alarm signalling device **24**.
6. Insert the new alarm signalling device **24**.
7. Secure the alarm signalling device using the two screws **44**.
8. Push the connector **X5** onto the contacts on the circuit board.
9. Close the device (see "6.5 Closing the device" on page 24).
10. Perform a functional check (see "3 Final Check" on page 9).





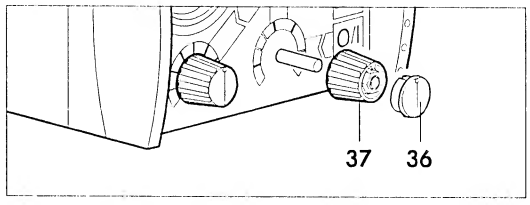
6.9 Replacing the potentiometer (for setting pressure or frequency)

Tools required:

- Crosstip screwdriver, size 2,
- L-handled socket wrench 10 mm,
- Special tool WM 22829 from special tool set WM 15349.
- Calibration device WM 22836

1. Lift off the lid **36**.
2. Using the special tool, hold the control knob **37** steady and loosen the nuts with an L-handled socket wrench (10 mm).

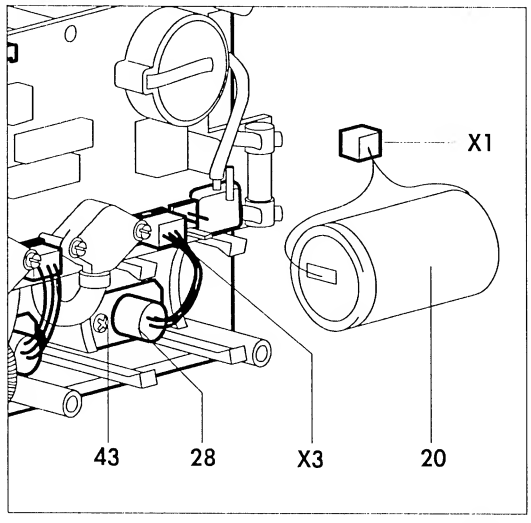
   Just loosen – do not remove, otherwise the knob will be dismantled into its component parts.
3. Pull off the control knob **37**.
4. Open the device (see "6.4 Opening the device" on page 23).



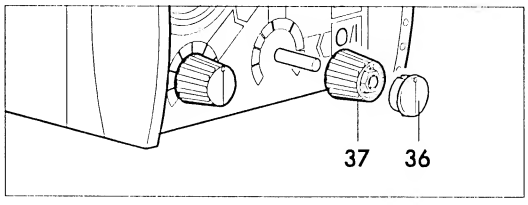
If you wish to replace the potentiometer 28 for respiratory frequency:

5. Remove the battery **20**, by lifting it out of its holder and then pulling connector **X1** from the circuit board.

   Pull on the connector only, not on the lead!
6. Pull the connector **X3** from the circuit board.
7. Unscrew both the screws **43** and remove the potentiometer **28**.
8. Insert a new potentiometer **28** and secure it using the screws **43**.
9. Push the connector **X3** onto the contacts on the circuit board.
10. Connect the connector **X1** of the battery to the circuit board and insert the battery into the holder.



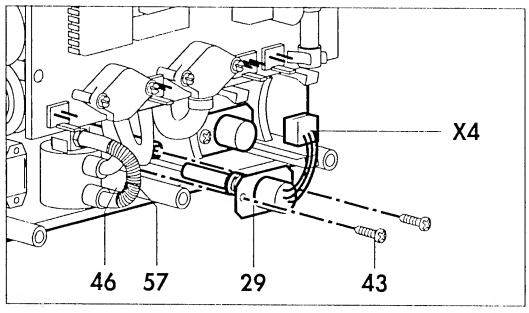
11. Secure the control knob **37**:
    - Push the control knob onto the spindle almost to the limit.
    - Hold the knob steady with the special tool and screw it down.

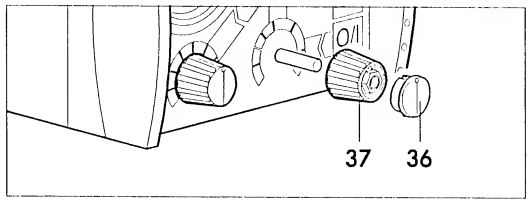


12. Check the display on the control knob: At the left limit, the white line must indicate the lowest value.
    If this is not the case, loosen the nuts and align the control knob
13. **Perform calibration (see "6.10 Calibration after removal of PCB or Pot 28 (frequency)" on page 28).**
14. Close the device (see "6.5 Closing the device" on page 24).
15. Turn the MEDUMAT Standard a round.
16. Place the lid **36** on the control knob **37**.
17. Perform a functional check (see "3. Final Check" on page 9).

If you wish to replace potentiometer 29 for respiratory pressure:

5. Pull the connector **X4** from the circuit board.
6. Press both tubes **46** towards the circuit board and hold them there.
7. Unscrew both the screws **43** and remove the potentiometer **29**.
8. Insert a new potentiometer **29** and secure it using the screws **43**.
9. Push the connector **X4** onto the contacts on the circuit board.
10. Close the device (see "6.5 Closing the device" on page 24).
11. Turn the MEDUMAT Standard a round.
12. Secure the control knob:
    - Push the control knob onto the spindle almost to the limit.
    - Hold the knob steady using the special tool and screw it on.
13. Check the display on the control knob: At the left limit, the white line must indicate the lowest value.
    If this is not the case, loosen the nuts and align the control knob.
14. Place the lid **36** on the control knob **37**.
15. Perform a functional check (see "3. Final Check" on page 9).





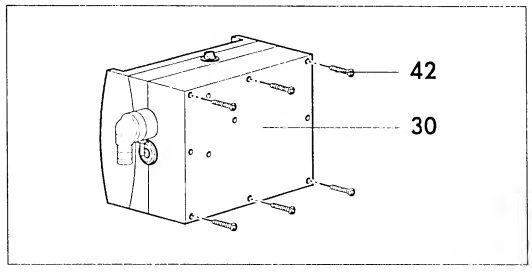
6.10 Calibration after removal of PCB or Pot 28 (frequency)

The control knob **8** controls an EPROM on the printed circuit board of the MEDUMAT Standard a To ensure correct setting of the minute ventilation, the EPROM must be calibrated after every removal of the PCB or of potentiometer **28**.

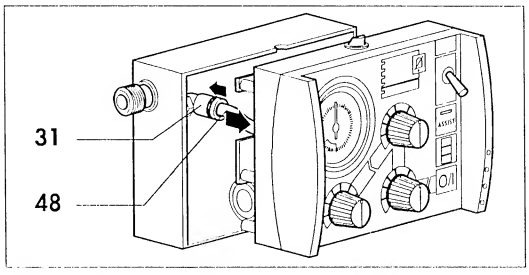
Tools required:

- Crosstip screwdriver, size 2,
- Calibration device WM 22836.

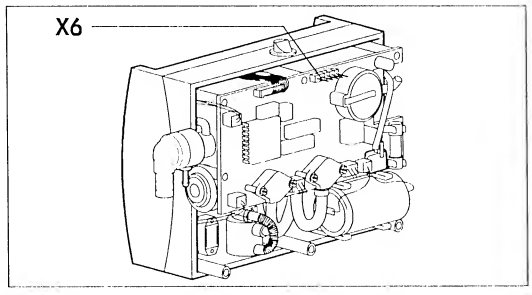
1. Remove the back of the housing. To do so:
   - Place the device on a non-slip surface and unscrew the 6 screws **42** from the back of the device.
   - Pull off the lower part of the housing **30** and swing it out of the way.



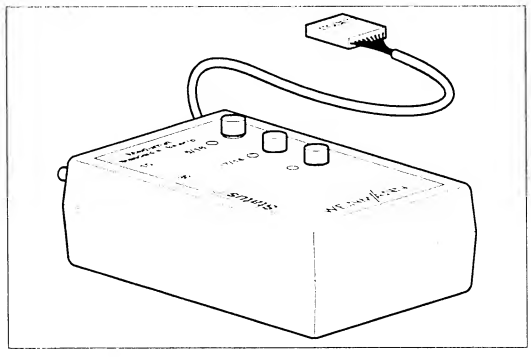
2. Now detach the connecting tube **48** from the oxygen inlet by pushing back the angular bush **31** and pulling out the tube.



3. Switch the calibration device off at the toggle switch. The **Status** LED is not on.
4. Connect the power cord of the calibration device to connector **X6** on the circuit board of the MEDUMAT Standard a.



5. Switch on the MEDUMAT Standard a. You must hear the valve switch.
6. Switch on the calibration device at the toggle switch. The **Status** LED lights up.
7. Press the bottom button **Start/Stop** on the calibration device. When it is pressed, all the LEDs on the calibration device light up.
8. As soon as you release the **Start/Stop** button, communication between the devices is automatically established. While this is happening, the LEDs **10**, **30** and **Start/Stop** flash. Once the **Start/Stop** LED stay on continuously and LEDs **10** and **30** have gone out, communication is established The solenoid valve of the MEDUMAT Standard a does not switch any more.



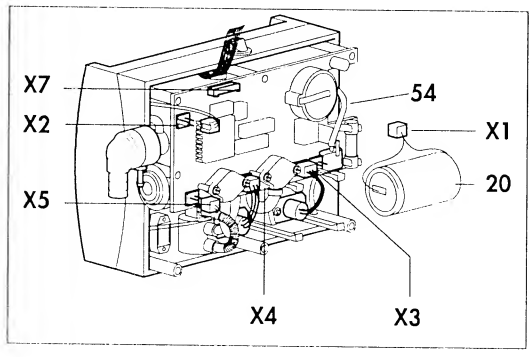
9. Turn the control knob **8** on the MEDUMAT Standard a to the setting frequency=**10.**
10. Press the top button on the calibration device. The corresponding LED **10** must light up.
11. Turn the control knob **8** on the MEDUMAT Standard a to the setting frequency=**30.**
12. Press the middle button on the calibration device. The corresponding LED **30** must light up.
13. Press the bottom button **Start/Stop** on the calibration device. All LEDs except **Status** go out. You must hear the solenoid valve of the MEDUMAT Standard a switching.
14. Switch off the calibration device at the toggle switch.
15. Disconnect the calibration device from the MEDUMAT Standard a.
16. Close the device (see "6.5 Closing the device" on page 24).
17. Perform a functional check (see "3. Final Check" on page 9).
18. Turn MEDUMAT Standard a off.

6.11 Replacing the circuit board

Tools required:

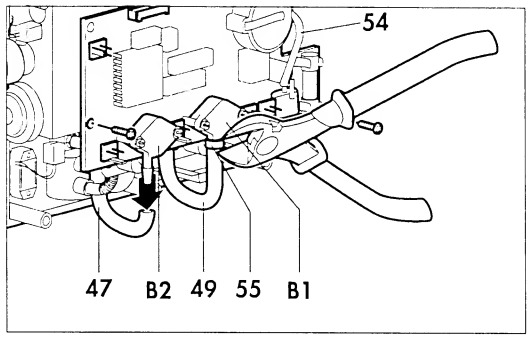
- Crosstip screwdriver, size 2,
- Side nippers,
- Cable tie,
- Calibration device WM 22836.

1. Open the device (see "6.4 Opening the device" on page 23).
2. Remove the battery **20**, by lifting it out of its holder and then pulling connector **X1** from the circuit board.
   Only pull on the connector, not on the lead!
3. Pull connectors **X3**, **X4** and **X5** from the circuit board.
4. Release the flat cable from the locking device **X7**: To do so, pull the upper part of the locking device upwards. You can then pull out the cable.



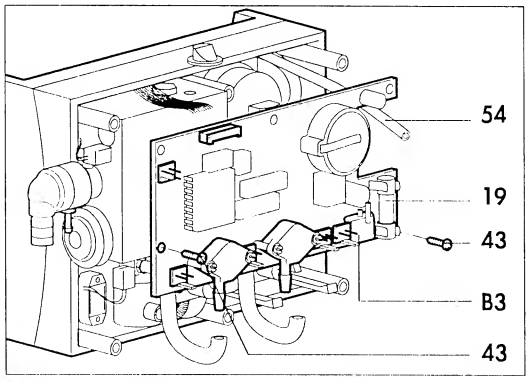
5. Carefully pull the tube **47** from the sensor **B2**.
6. Using side nippers, cut through the cable tie **55** at the tube **49**.
7. Carefully pull the tube **49** from the sensor **B1**. If the tube cannot be pulled off, you may cut through it (e.g. using a scalpel).

   In such cases, the tube must be replaced (as explained in step 10.).



8. Carefully pull the tube **54** from the sensor **B3**.

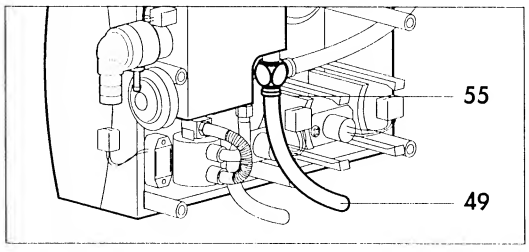
   If the tube cannot be pulled off, you may cut through it (e.g. using a scalpel).
9. Unscrew the two screws **43** and remove the defective circuit board **23**.

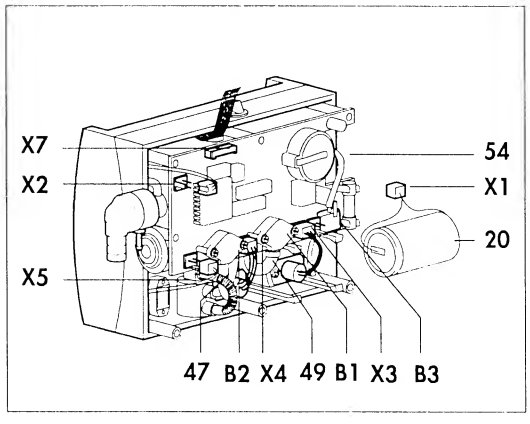


10. If you have cut through the tube **49** under point **7.**, please replace it as follows:
    - Using side nippers, cut through the cable tie **55** at the distributor.
    - Pull off the tube.
    - Slide a new tube **49** onto the distributor and secure with a cable tie.
11. Replace the alarm signalling device (see "6.8 Replacing the alarm signalling device" on page 25).
12. Replace the potentiometer (see "6.8 Recplacing the potentiometer", page 26).
13. Place the new circuit board **23** onto the spacer brackets. The points of the spacer brackets snap into the circuit board.

    Make sure that no leads are beneath the circuit board, where they may be pinched.
14. Secure the circuit board with the two short screws **43**.
15. Slide the tube **47** onto the sensor **B2**.
16. Slide the tube **49** onto the sensor **B2** and secure it there with a cable tie.
17. Slide the tube **54** onto the lower connection of the sensor **B3**.

    If you have cut through the tube **54** under point **8.**, please replace it.
18. Push the connectors **X2**, **X3**, **X4** and **X5** onto the contacts of the circuit board.





19. Connect the connector **X1** of the battery to the circuit board and insert the battery into the holder.
20. Place the flat cable into the locking device **X7**: To do so, pull the upper part of the locking mechanism upwards, slide the cable into it, and press the upper part down again.
21. **Perform a calibration (see "6.10 Calibration after removal of PCB or Pot 28 (frequency)" on page 28).**
22. Close the device (see "6.5 Closing the device" on page 24).
23. Perform a functional check (see "3. Final Check" on page 9).

6.12 Replacing the pressure gauge

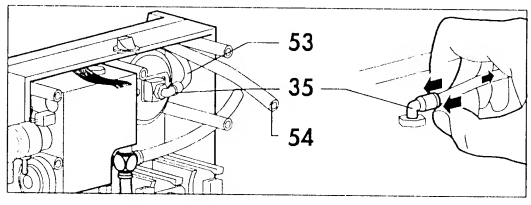
Note: The pressure gauge is identical to the respiratory pressure meter described in the instructions for use.

Tools required:

- Crosstip screwdriver, size 2,
- Open-ended spanner SW 7,
- If necessary, side nippers,
- If necessary, cable tie.

1. Open the device (see "6.4 Opening the device" on page 23).
2. Unscrew the circuit board (see „6.11 Replacing the circuit board" on page 29, steps **2.** to **10.**).

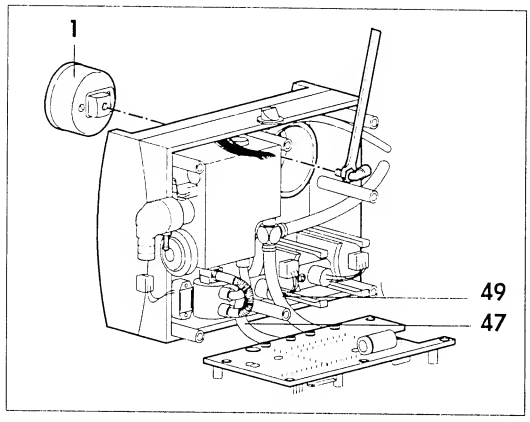
   The tubes 47 and 49 may be left on the circuit board.
3. Release the pressure gauge tube **53** by pushing back the sleeve of the swivel screw connection **35** and pulling out the tube.



4. Using an open-ended spanner (SW 7), unscrew the swivel screw connection **35** from the pressure gauge **1**.
5. Using your fingers, press the pressure gauge **1** out of its holder.

   Tip:
   You will find the pressure gauge easier to remove if you dribble a small amount of spirit between the pressure gauge and the holder.
6. Wet a new pressure gauge **1** with a small amount of spirit and press it into the holder.

   Take care to install the gauge in the right position, so that it is easy to read.
7. Screw the swivel screw connection **35** onto the pressure gauge.
8. Push the pressure gauge tube **53** into the swivel screw connection as far as it will go.
9. Secure the circuit board (see „6.11 Replacing the circuit board" on page 29, steps **13.** to **20.**).
10. Close the device (see "6.5 Closing the device" on page 24).
11. Perform a functional check (see "3. Final Check" on page 9).



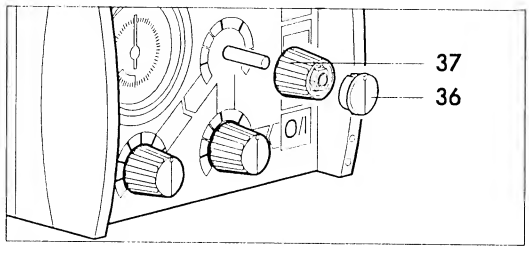
6.13 Replacing the pneumatic block

Tools required:

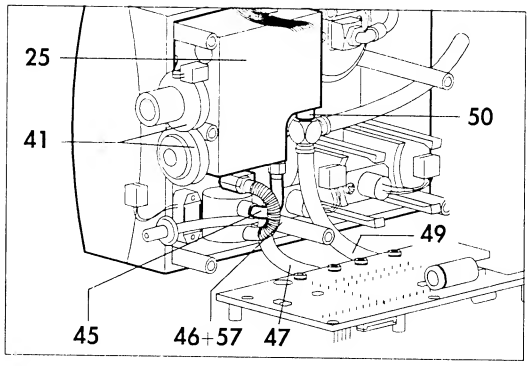
- Crosstip screwdriver, size 2,
- L-handled socket wrench 10 mm,
- Special tool WM 22829 from special tool set WM 15349,
- If necessary, side nippers,
- If necessary, cable tie,
- Calibration device WM 22836.

1. Lift off the lid **36** from the control knob for minute volume **37**.
2. Using the special tool, hold the control knob **37** steady and loosen the nuts with an L-handled socket wrench (10 mm).
3. Pull off the control knob.
4. Open the device (see "6.4 Opening the device" on page 23).
5. Unscrew the circuit board (see „6.11 Replacing the circuit board" on page 29, steps **2.** to **10.**).

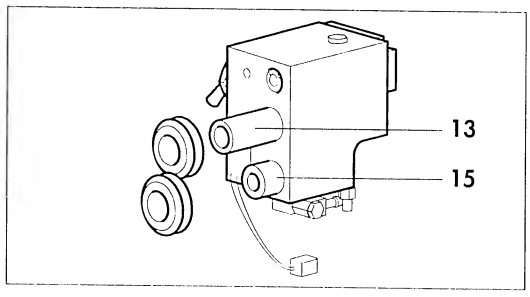
   You can leave the pressure measurement tube 49 attached to the circuit board.



6. Pull the tube **47** off the sensor **B2**.
7. Pull the ventilation tube **46** with the spring **57** from the pneumatic block **25**.
8. Pull the suction connector **45** from the pneumatic block **25**.
9. Release the pressure tube **50** by pushing back the sleeve of the inlet and pulling out the tube.
10. Carefully pull the defective pneumatic block upwards out of the housing.
11. Pull off the two grommets **41**.



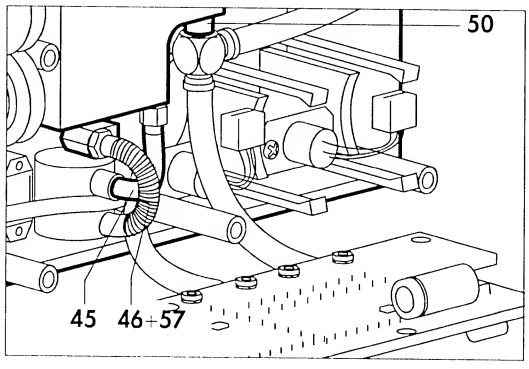
12. Take a new pneumatic block **25** push the grommets **written side first** onto the connection **13** and the valve **15**.



13. Insert the new pneumatic block into the housing.

    Make sure,

    - That you push the rocker and the spindle through the corresponding holes in the housing
    - That no tubes or leads are underneath the pneumatic block where they may be pinched
    - That the grommets are positioned correctly in the housing wall (the housing wall must be in the groove)
    - That the pneumatic block is resting on the four rubber buffers.
14. Slide the suction connector **45** and the ventilation tube **46** with the spring **57** onto the corresponding connections on the pneumatic block **25** as far as they will go.
15. Slide the pressure tube **50** into the inlet of the pneumatic block as far as it will go.



16. Secure the circuit board (see „6.11 Replacing the circuit board" on page 29, steps **13.** to **20.**).
17. Push tube **47** onto sensor **B2**.
18. Close the device (see "6.5 Closing the device" on page 24).
19. Turn the MEDUMAT Standard a round

20 Secure the control knob **37**:

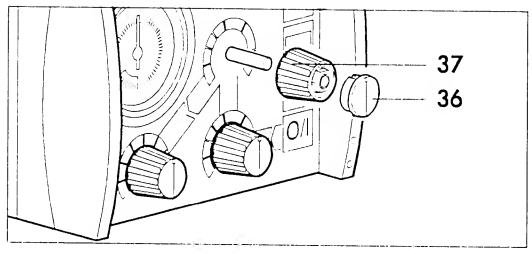
- Slide the control knob onto the spindle as far as it will go.
- Hold the knob steady with the special tool and screw it down.

21. Check the display on the control knob: At the left limit, the white line must indicate the value **3**.
If this is not the case, loosen the nuts and align the control knob.

22. Perform a calibration (see "6.10 Calibration after removal of PCB or Pot 28 (frequency)" on page 28).

23. Place the lid **36** on the control knob **37**.

24. Perform a functional check (see "3. Final Check" on page 9).



6.14 Replacing the pneumatic block with angled outlet

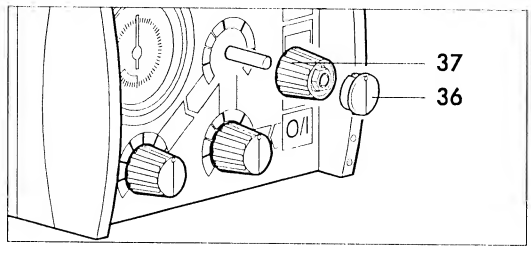
The pneumatic block with angled outlet is fitted as standard to MEDUMAT Standard a from appliance No. 1670 onward. Old appliances should be converted not later than the 6-year service.

Tools required:

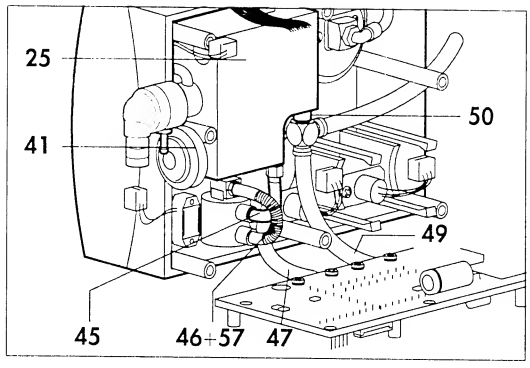
- Crosstip screwdriver, size 2,
- L-handled socket wrench 10 mm,
- Special tool WM 22829 from special tool set WM 15349,
- If necessary, side nippers,
- If necessary, cable tie,
- Calibration device WM 22836,
- Special pliers WM 22928.

1. Lift off the lid **36** from the control knob for minute volume **37**.
2. Using the special tool, hold the control knob **37** steady and loosen the nuts with an L-handled socket wrench (10 mm).
3. Pull off the control knob **37**.
4. Open the device (see "6.4 Opening the device" on page 23).
5. Pull the tube **47** off the sensor **B2**.
6. Unscrew the circuit board (see „6.11 Replacing the circuit board" on page 29, steps **2.** to **10.**)

   You can leave the pressure measurement tube 49 attached to the circuit board.

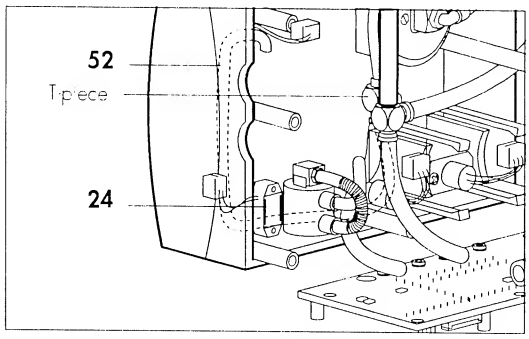


7. Pull the ventilation tube **46** with the spring **57** from the pneumatic block **25**.
8. Pull the suction connector **45** from the pneumatic block **25**.
9. Release the pressure tube **50** by pushing back the sleeve of the inlet and pulling out the tube.
10. Carefully pull the defective/old pneumatic block upwards out of the housing.
11. Pull off the grommet **41** from the pneumatic block **25**.

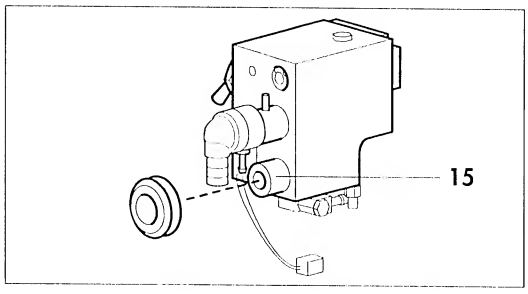


For conversion of appliances up to No. 1669: go to step **12.**.
For replacement in appliances from No. 1670 onward: go to step **14.**.

12. Pull tube **51** off the T-piece and replace it with the new tube **52** (use **WM 22967**).
13. Route the tube so that it is below the valve insert locator and the alarm unit **24** and run it along the inside wall of the housing.



14. Take a new or replacement pneumatic block **25** and push the grommet **written side first** onto valve **15**.
15. Insert the new pneumatic block into the housing and push tube **52** onto the pneumatic block.



16. Now take the swivelling angled connector and push it onto the connector of the pneumatic block. To fit the swivelling angled connector properly into the upper housing section, lift the pneumatic block slightly and push it over the outer wall of the housing.

Make sure,

- That you push the rocker and the spindle through the corresponding holes in the housing
- That no tubes or leads are underneath the pneumatic block where they may be pinched
- That the grommet is positioned correctly in the housing wall (the housing wall must be in the groove)
- That the pneumatic block is resting on the four rubber buffers.

For conversion: go to step **17.**.

For replacement: go to step **19.**.

17 Where present: If you have a device that you have converted to a swivelling angled connector, you must insert sealing plug WM 22809 with O-ring 5-1.2 WM 1145/90 into the upper part of the housing where the pressure sensor tube was previously fitted.

18. Remove the "**Sensor**" plate from the housing

19. Slide the suction connector **45** and the ventilation tube **46** with the spring **57** onto the corresponding connections on the pneumatic block **25** as far as they will go.

20. Slide the pressure tube **50** into the inlet of the pneumatic block as far as it will go.

21. Secure the circuit board (see „6.11 Replacing the circuit board" on page 29, steps **13.** to **20.**).

22. Push tube **47** onto sensor **B2**.

23. Close the device (see "6.5 Closing the device" on page 24).

24. Turn the MEDUMAT Standard a round.

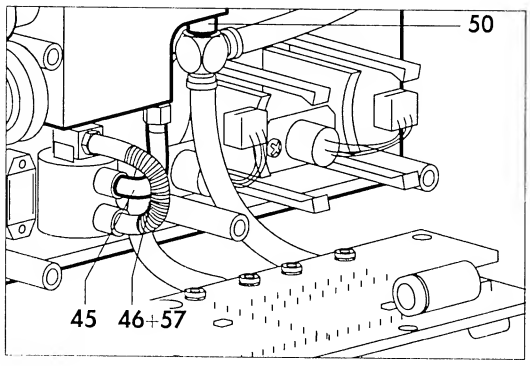
25. Secure the control knob **37**:
    - Slide the control knob onto the spindle as far as it will go.
    - Hold the knob steady with the special tool and screw it down.

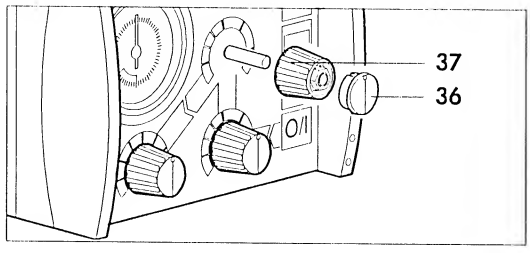
26. Check the display on the control knob: At the left limit, the white line must indicate the value **3**.
    If this is not the case, loosen the nuts and align the control knob.

27. Perform a calibration (see "6.10 Calibration after removal of PCB or Pot 28 (frequency)" on page 28).

28. Place the lid **36** on the control knob.

29. Perform a functional check (see "3. Final Check" on page 9).





6.15 Changing the Air Mix/No Air Mix switch

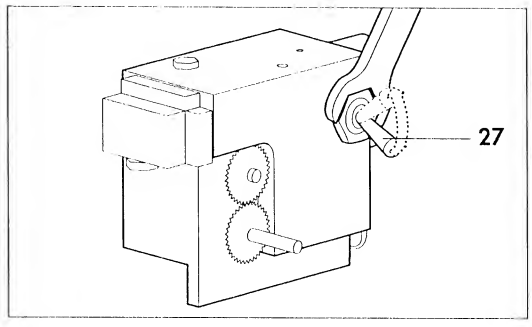
Tools required:

- Crosstip screwdriver, size 2,
- L-handled socket wrench 10 mm,
- Open-ended spanner SW 17,
- Special tool WM 22829 from special tool set WM 15349,
- If necessary, side nippers,
- If necessary, cable tie,
- Vice with protective jaws,
- Calibration device WM 22836.

1. **Up to appliance no. 1669:**
   Remove the pneumatic block from the housing (see „6.13 Replacing the pneumatic block" on page 32, steps **1.** to **10.**),
   From appliance no. 1670:
   Remove the pneumatic block from the housing (see „6.14 Replacing the pneumatic block with angled outlet" on page 34, steps **1.** to **10.**)
2. Clamp the pneumatic block in a vice with protective jaws.
3. Unscrew the rocker using an open-ended spanner (SW 17).
4. Screw in a new rocker **27** with the seal.

   Take care to ensure the correct installation position:
   The rocker must drop automatically into its end position. It must not become stuck in an intermediate position.

   Note:
   The rocker will tend to drop into the lower position.
5. **Up to appliance no. 1669:**
   Re-install the pneumatic block (see „6.13 Replacing the pneumatic block" on page 32, steps **13.** to **23.**).
   From appliance no. 1670:
   Re-install the pneumatic block (see „6.14 Replacing the pneumatic block with angled outlet" on page 34, steps **15.** to **28.**).
6. Perform a functional check (see "3. Final Check" on page 9).

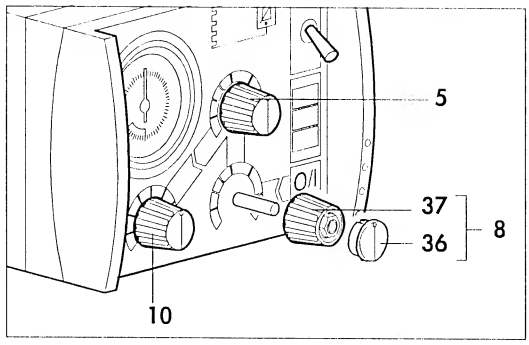


6.16 Replacing the upper housing section

Tools required:

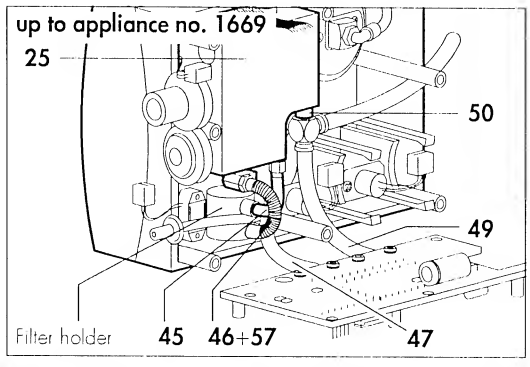
- Crosstip screwdriver, size 2,
- Crosstip screwdriver, size 1,
- L-handled socket wrench 10 mm,
- Special tool WM 22829 from special tool set WM 15349,
- Flat nose pliers,
- Side nippers,
- Cable tie,
- Calibration device WM 22836.

1. Remove the three control knob **5**, **8** and **10**. Please proceed as follows for **each** knob:
   - Twist the control knob **37** to the left limit so that you have a reference point when you come to re-assemble it.
   - Lift off the lid **36**.
   - Using the special tool, hold the control knob steady and loosen the nuts with an L-handled socket wrench (10 mm).
   - Pull off the control knob **37**.

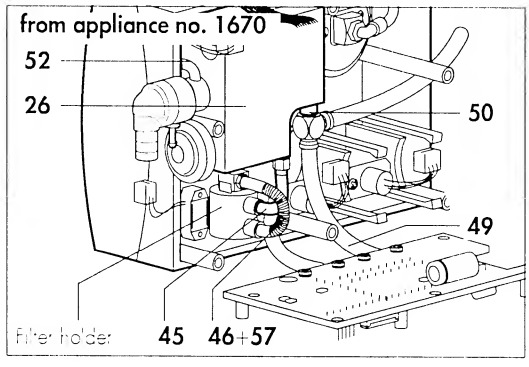


2. Open the device (see "6.4 Opening the device" on page 23).
3. Remove the circuit board (see „6.11 Replacing the circuit board" on page 29, steps **2.** to **10.**).

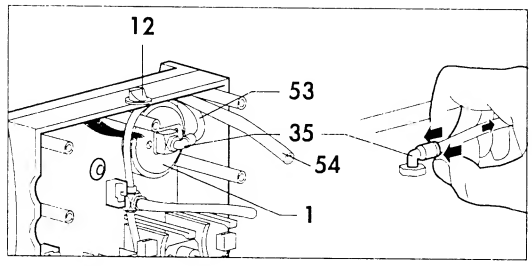
   The pressure measuring tube 49 may be left on the circuit board.
4. Pull the tube **47** from sensor **B2**.
5. Pull the ventilation tube **46** with the spring **57** from the pneumatic block **25/26** and the filter holder.
6. Pull the suction connector **45** from the pneumatic block **25/26** and the filter holder.
7. Release the pressure tube **50** by pushing back the sleeve of the inlet and pulling out the tube.
8. Carefully pull the pneumatic block upwards out of the housing.



9. Detach pressure measurement tube **52** from the tube connector on pneumatic block **25/26**.



10. Release the pressure gauge tube **53** by pushing back the sleeve of the swivel screw connection **35** and pulling out the tube.



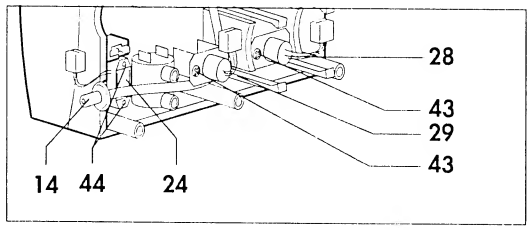
11. Using your fingers, press the pressure gauge **1** out of the pressure gauge holder.

    Tip:
    You will find the pressure gauge easier to remove if you dribble a small amount of spirit between the pressure gauge and the holder.

12. Press the pressure gauge holder out of the housing.

13. Pull the latch **12** out of the housing wall.

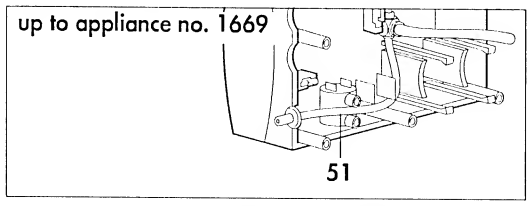
14. Unscrew the four screws **43** and remove the two potentiometers **28** and **29**.

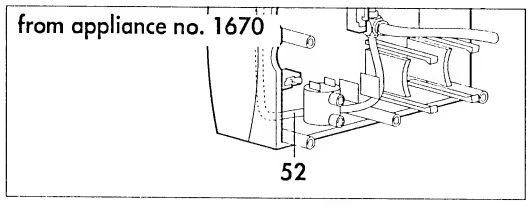


15. **For conversion up to appliance No. 1669:**
    Pull the pressure measurement connection **14** upwards out of the housing wall.

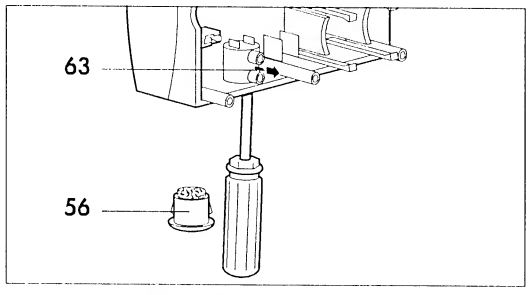
16. Unscrew both the screws **44** and remove the alarm signalling device **24**.

17. **For conversion up to appliance No. 1669:**
    The pressure measuring tube **51** is secured to the housing with a cable tie. Cut through the cable tie with side nippers and remove carefully the tube or pull the tube with the cable tie.

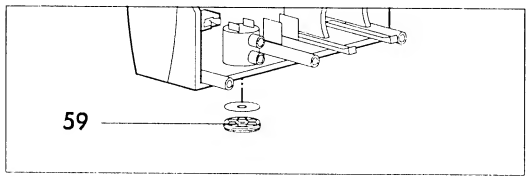




18. Remove the filter insert:
    - Pull the filter cap **56** out of the housing wall.
    - Using a screwdriver, press out the pin **63**.



    - Take the valve insert **59** out of the receptacle in the housing e.g. by tilting it with a small screwdriver then pulling it out with flat nose pliers.



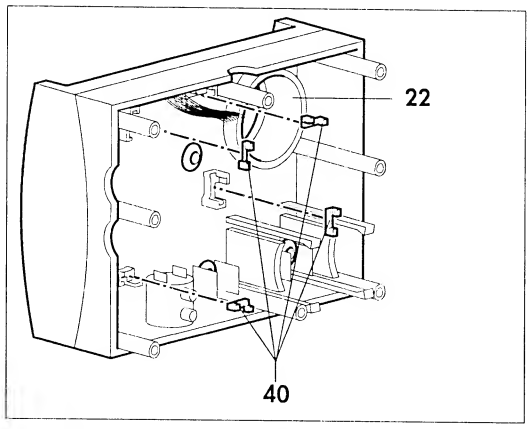
19. Finally, remove the four rubber buffers **40**.

You have now removed all the components. Now start assembly.

20. If your MEDUMAT Standard a is not to be updated (straight connection on pneumatic block), you will first have to file away a semicircle for the pressure measurement connection **14**.

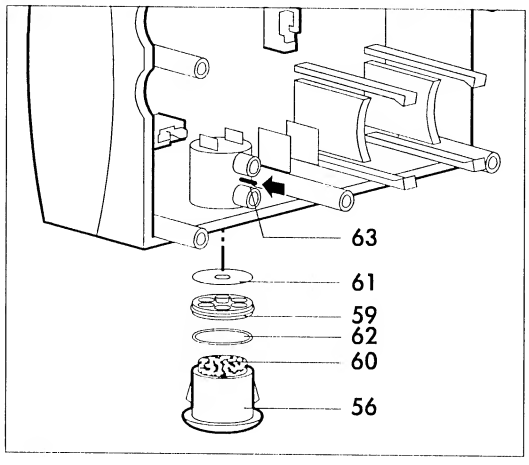
21 Push the pressure gauge mounting **22** into the new upper housing section **21**.

22. Wet the rubber buffers **40** with a little spirit and insert them.



23 Install the filter insert:

- Insert O-ring **62** in the corresponding groove in the valve insert.
- Check that the membrane **61** is lying flush and smooth against the valve insert **59**.
- Press the valve insert, membrane first, into the filter holder.
  After installing, make sure that the valve insert is lying straight in the holder.
- Take the pin **63** in your hand. The pin has a notched side and a smooth side. Press the pin with the **smooth** side forwards into the small hole on the top of the filter holder until it is flush with the holder. The pin holds the valve insert in position.
- Push the filter cap into the housing wall.



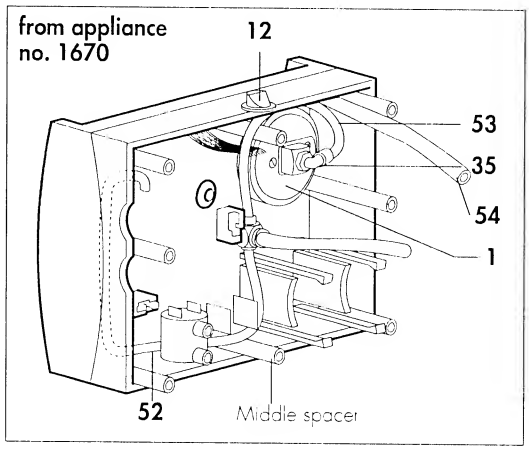
24. Wet the pressure gauge **1** with a small amount of spirit and press it into the holder.

    Observe the installation position so that the display remains clearly legible.

25. Push the pressure gauge tube **53** into the swivel screw connection **35** as far as it will go.

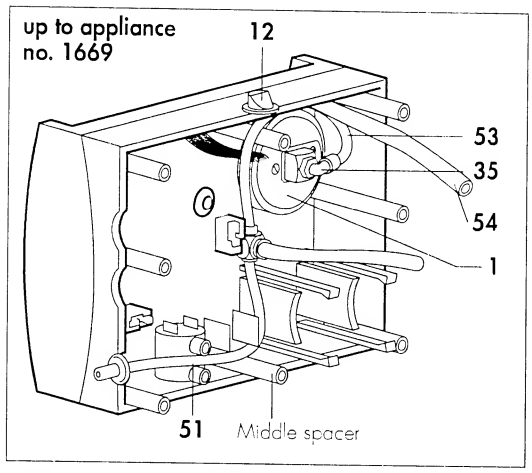
26. Place the pressure gauge tube **53** and the pressure measuring tube **51/52** into the housing as illustrated.

27. **For conversion up to appliance No. 1669:**
    Secure the pressure measuring tube to the middle spacer with a cable tie.



28. Push the latch **12** into the housing wall.

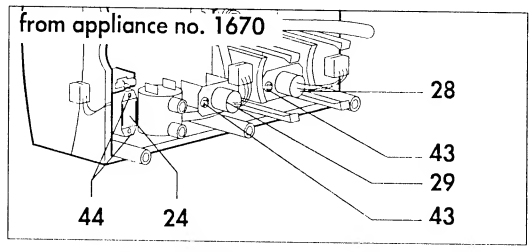
Remember that the slanted surface needs to be pointing towards the device base later.

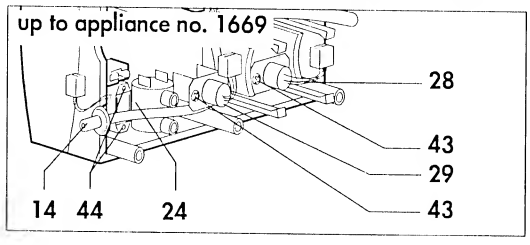


29. Install both potentiometers **28** and **29**:
   - Grease the spindles with oxygen lubricant.
   - Push the spindle of the potentiometer through the rubberised opening.
   - Secure the potentiometer using the screws **43**.

30. Insert the alarm signalling device **24** and secure it with the screws **44**.

31. **For conversion up to appliance No. 7253:** Push the connection **14** into the housing wall.



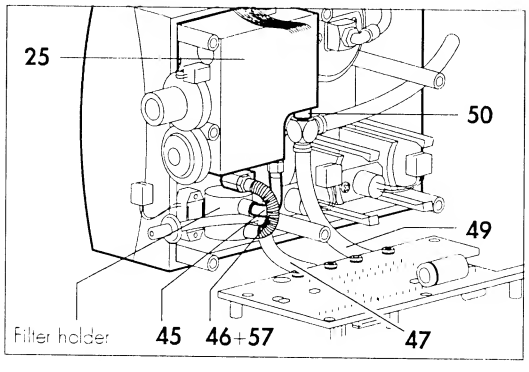


32. Insert the new pneumatic block into the housing.

Make sure

- That you push the rocker and the spindle through the corresponding holes in the housing
- That no tubes or leads are underneath the pneumatic block where they may be pinched
- That the grommet is positioned correctly in the housing wall (the housing wall must be in the groove)
- That the pneumatic block is resting on the four rubber buffers.

33. Make the tube connections:
   - Push the suction connector **45** onto the rear nozzle of the filter holder and onto the connection on the pneumatic block **25**.
   - Using the ventilation tube **46** with the spring **57**, connect the front nozzle of the filter holder to the pneumatic block **25**.
   - Make sure that all the tube ends are pushed on to the limits.



34. **For conversion from appliance No. 1670 onward:**
Slide pressure measurement tube **52** onto the tube connection of the angled outlet.

35. Slide the pressure tube **50** into the inlet of the pneumatic block as far as it will go.

36. Push tube **47** onto sensor B2.

37. Secure the circuit board (see „6.11 Replacing the circuit board" on page 29, steps **13.** to **20.**).

38. Secure the three control knobs **5**, **8** and **10**. Please proceed as follows for **each** knob:
    - Push the control knob **37** onto the spindle just short of the limit.
    - Twist the knob until the white line is pointing to the lowest value.
    - Hold the knob steady with the special tool and screw it down.

39. Check the display on the control knobs: At the left limit, the white line must indicate the lowest value.
If this is not the case, loosen the nuts and align the control knob.

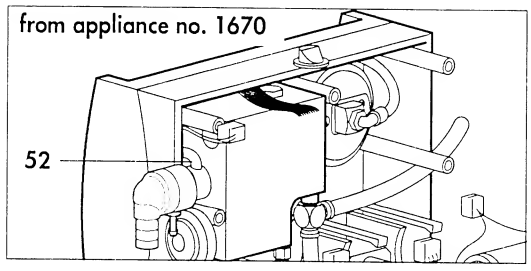
40. Place the lid **36** on the control knob.

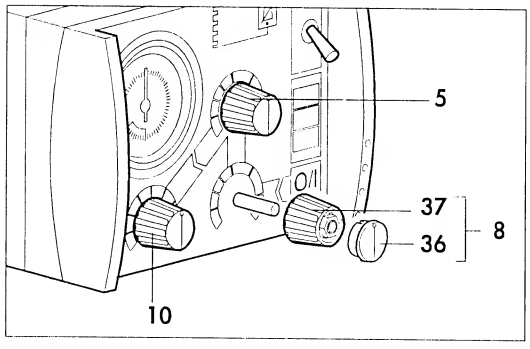
41. **Perform a calibration (see "6.10 Calibration after removal of PCB or Pot 28 (frequency)" on page 28).**

42. Close the device (see "6.5 Closing the device" on page 24).

43. Turn the MEDUMAT Standard a round.

44. Perform a functional check (see "3. Final Check" on page 9).



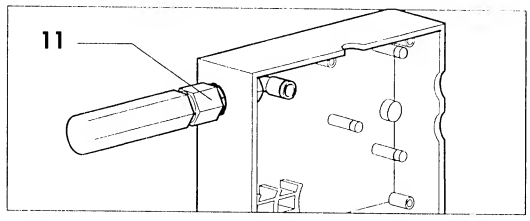


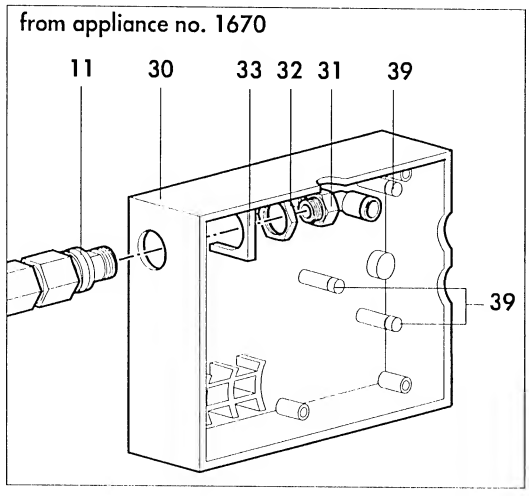
6.17 Replacing the housing base section

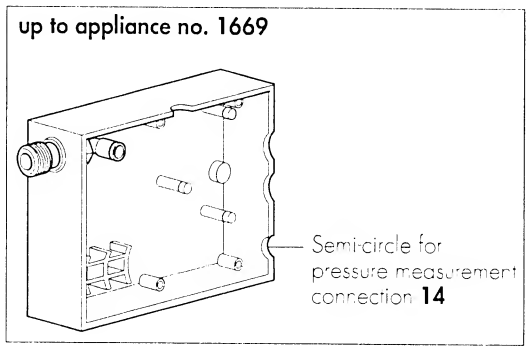
Tools required:

- Crosstip screwdriver, size 2,
- Open-ended spanner SW 13,
- Open-ended spanner SW 22,
- Special locknut tool G 3/8 WM 22827 and special spanner SW 17 WM 22828 from the special tool set WM 15349,
- Vice with protective jaws.

1. Open the device (see "6.4 Opening the device" on page 23).
2. Screw the special locknut tool onto the compressed gas connection **11**.
3. Clamp the special locknut tool in a vice.
4. Tighten the nuts of the special locknut tool against the pressure connection using an open-ended spanner (SW 22).
5. Unscrew the angular bush **31** using an open-ended spanner (SW 13).
6. Using the special spanner (SW 17), loosen the nut **32** and unscrew it.
7. Pull out the plate **33** upwards.
8. Remove the housing base section **30**.
9. Remove rubber buffer **39** from the old device.
10. Place a new housing base section **30** on the compressed gas connection **11**.
11. Slide the plate **33** on the inside of the housing onto the connection.
12. Tighten the nut **32** on the inside of the connection.
13. Secure the angular bush **31** to the connection.
14. Loosen the nuts of the special locknut tool using the open-ended spanner (SW 22).
15. Open the vice.
16. Unscrew the special locknut tool from the compressed gas connection **11**.
17. If your MEDUMAT Standard a is not to be updated (straight connection on pneumatic block), you will first have to file away a semi-circle for the pressure measurement connection **14**.
18. Moisten the rubber buffers **39** of the defective housing with a little spirit and insert them in the new housing.
19. Close the device (see "6.5 Closing the device" on page 24).
20. Perform a functional check (see "3. Final Check" on page 9).







7. Spare parts

7.1 List of spare parts

Note:

The item numbers in the following table match the numbers in the text of these service and repair instructions and the operating instructions.

Item no.	Designation	Order No.
1	Pressure gauge	WM 22539
11	Pressurised gas connection (threaded connection), pre-assembled	WM 22685
12	Latch (twistlock) for wall bracket	WM 22642
14	Pressure measuring connection, pre-assembled (up to appliance no. 1669)	WM 22527
15	Dust protector (foam insert) for pressure relief valve	WM 22585
	Battery set, consisting of:	WM 15186
18	– Button cell CR 2430	WM 22652
20	– Battery 3.6 V	WM 22615
19	Fuse insert F 0,5 L 250 V	WM 22651
21	Upper housing section, complete, new	WM 22814
	Upper housing section, complete, replacement	WM 22815
22	Pressure gauge mounting	WM 22504
23	Printed circuit board, MEDUMAT Standard a	WM 15452
24	Alarm signalling device	WM 22553
25	Pneumatic block, complete, new	WM 22639
	Pneumatic block, complete, replacement	WM 22687
26	Pneumatic block with angled outlet, complete, new	WM 22640
	Pneumatic block with angled outlet, complete, replacement	WM 22848
27	Set of rockers	WM 15193
28	Potentiometer, pre-assembled	WM 22522
29	Potentiometer, pre-assembled	WM 22522
30	Housing base section*, consisting of: – Housing – Notice	WM 22853
31	Angular bush 4/6	WM 22552
32	Nut M 14 x 1.5	WM 22586
33	Torque plate	WM 22509
34	Screw-in connection	WM 22596
35	Swivel screw connection 2/4	WM 22588
36	Lid, blue	WM 4896
	Lid, white	WM 22941
37	Short button	WM 4891

	Set of rubber parts, consisting of:	
38	– Grommet for potentiometer	
39	– Rubber buffer for housing base section	WM 15190
40	– Rubber buffer for upper housing section	
41	– Grommet for connections **13** (up to appliance no. 1669) and **15**	
	Set of screws, consisting of:	WM 15191
42	– Fillister-head screw KB 30 x 20	
43	– Fillister-head screw KB 30 x 8	
44	– Fillister-head screw 18 x 7,5	
45	Suction connector	WM 22598
	Set of tubes for MEDUMAT Standard a, consisting of:	
46	– Tube, silicon 4/7, 65 long	
47	– Tube, silicon 4/7, 85 long	
48	– Tube, PU 4/6, 95 long	
49	– Tube, PU 4/6, 82 long	
50	– Tube, PU 4/6, 25 long	WM 15383
51	– Tube, PU 2/4, 105 long	
52	– Tube, PU 1.6/1.6, 220 long (for angled connector)	
53	– Tube, PU 2/4, 75 long	
54	– Tube, PU 2/4, 80 long = 2x	
55	– Cable tie – T-Connector	
56	Cover cap, drilled	WM 4954
57	Spring	WM 22804
58	Filter insert set, consisting of:	
59	– Valve insert, complete	
60	– Dust filter	WM 15185
61	– Valve membrane	
62	– O-ring 13 x 1.25	
63	– Split taper pin 1,5 x 8	
64	Sieve set, consisting of: – Sieve – Seal 3,5 x 6 x 0,5	WM 15284
	Service label**	
	– for 2008	WM 0498
	– for 2009	WM 0499
65	– for 2010	WM 0300
	– for 2011	WM 0609
	– for 2012	WM 0610
	– for 2013	WM 0366
	Instructions for use	WM 16676
	T-Connector	WM 22594
	T-Connector	WM 7527
	T-Connector	WM 22613

* When ordering, please specify the model, device number and year of construction

** When ordering, please specify year of next maintenance

7.2 Maintenance set

Sets for devices already serviced with Set WM 15552 (pneumatic block replacement)

Years	2	4	6	8	10	12	14
Maintenance set	WM 15242	WM 15242	WM 15552	WM 15242	WM 15242	WM 15553	WM 15708

Sets for devices not yet serviced with Set WM 15552 (pneumatic block replacement)

Years	2	4	6	8	10	12	14	16
Maintenance set	WM 15242	WM 15242	WM 15242	WM 15552	WM 15242	WM 15553	WM 15242	WM 15708

Maintenance set 2 years

Set, WM 15242

consisting of:

- Battery
- Button cell
- Dust filter
- Foam insert for pressure relief valve
- Lip membranes
- Membrane for spontaneous breathing arm
- Seal 3.5 x 6 x 0.5
- Sieve
- Membrane for expiration arm
- O-ring 1.5 x 1.5
- Valve membrane

Maintenance set 8 years

Set, WM 15552

consisting of:

- Set WM 15242
- Rubber buffer pad
- Rubber buffer receptacle
- Set of tubes
- Potentiometer
- Pneumatic block, replacement
- Suction connector
- O-ring 13 x 1.25
- Sealing plug
- O-ring 5 x 1.2

Maintenance set 12 years

Set, WM 15553

consisting of:

- Set WM 15242
- Printed circuit board / PCB MEDUMAT Standard a
- Alarm signalling device
- Cable tie

Maintenance set (14) 16 years

Set, WM 15708

consisting of:

- Set WM 15242
- Rubber buffer pad
- Rubber buffer receptacle
- Set of tubes
- Potentiometer
- Pneumatic block
- Suction connector
- O-ring 13 x 1.25
- Sealing plug
- O-ring 5 x 1,2

8. Tools and test equipment

Below is a list of all tools and test equipment used in these service and repair instructions.

The particular tools and test equipment required are outlined in the respective chapter.

Special tools can be purchased from the manufacturer Weinmann.

8.1 General tools

- Slotted screwdriver size 0.5 x 3 x 100;
- Crosstip screwdriver, size 1;
- Crosstip screwdriver, size 2;
- Open-ended spanner SW 7
  for tube connection of pressure gauge;
- Open-ended spanner SW 13,
  for elbow connector at O_2 inlet;
- Open-ended spanner SW 17
  for rocker valves;
- Open-ended spanner SW 22
  for special locknut tool,
- L-handled socket wrench 10 mm
  for control knob;
- Tweezers
  for sieve set;
- Side nippers;
- Flat nose pliers.

8.2 Special tools

The following tools are available from the manufacturers Weinmann:

• Special tool set, consisting of:	WM 15349
– Special locknut tool G 3/8 for unlocking the threaded connection on the O_2 inlet	WM 22827
– Special spanner SW 17 for lock nut on O_2 inlet	WM 22828
– Special tool for holding the control knob	WM 22829
– Set: hose with injector	WM 15359
– Special pliers	WM 22928
• Set, supply test Medumat / Modules	WM 15440
• Set, test set respiration and pressure reducer flow	WM 15443
• Calibration device	WM 22836

8.3 Test equipment

- Oxygen concentration measuring device, Type Miniox WM 91810, or Oxycontrol WM 13550
- Volumetric flowmeter

  Type RT 200 (Timeter)

  obtainable from:
  Allied Healthcare Products Inc.
  1720 Sublette Avenue
  St. Louis, Missouri, MO 63110
  USA

  Tel.: 001-800-444-3954
  Fax: 001-314-771-5183

  or

  Type EKU VIP-Ventilatortester

  obtainable from:
  EKU Elektronik GmbH
  Feldstrasse 9a
  56291 Leiningen

  Tel.: 06746-1018
  Fax: 06746-8484
  www.eku-elektronik.de
- Test set for final check WM 15382
- Adjustable orifice, e.g. ball valve,
  internal diameter ≥ 10 mm
- Pressure gauge 0 to 6.3 bar, class 1.6;
- Pressure gauge 0 – 100 mbar, class 1.6

  Type WIKA

  obtainable from:
  Alexander Wiegand GmbH & Co.
  Alexander-Wiegand-Straße 30
  63911 Klingenberg am Main
  Tel. 09372/1320

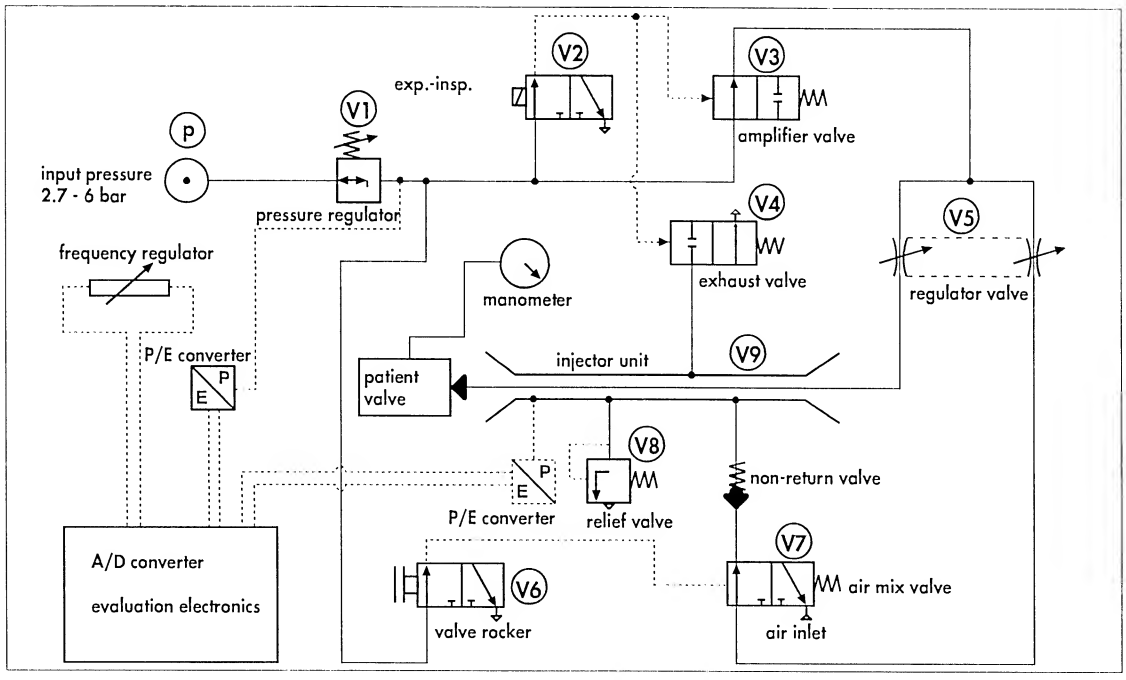
9. Technical data

	MEDUMAT Standard a
Device dimensions D x W x H in mm	190 x 110 x 90 inc. connections
Weight incl. accessories	approx. 1.1 kg
Product category according to 93/42/EEC	II b
Operating parameters – temperature range – humidity – air pressure	 –18 °C to +60 °C 15 % to 95 % 70 kPa to 110 kPa
Storage	–40 °C to +70 °C
Electromagnetic compatibility (EMC) in accordance with EN 60601-1-2 and EN 794-3: – interference suppression – interference immunity	 EN 55011 EN 61000-4-2 to 3
Control	Timing pulse, constant volume
Gas input	Medicinal oxygen
Operating pressure	2.7 to 6.0 bar
Minimal gas volume required	70 l/min O_2
Insp.-exp. ratio assistierte Beatmung	1:1.67 1:1 to 1:2.33 variable
Ventilation frequency	infinitely variable from 5 to 40 min^{-1}
Minute volume (MV)	infinitely variable from 3 to 20 l/min
Trigger sensitivity assisted ventilation	Flow ≥ 6 l/min
MV tolerances: room temp (20 °C) -18 °C to +60 °C	 for 3 l/min = ±20% for >3 l/min = ±15% for 3 l/min = ±35% for >3 l/min = ±20%
max. ventilation pressure	infinitely variable from 20 to 60 mbar
O_2-concentration – Air Mix – No Air Mix	 see page 52 100% O_2

	MEDUMAT Standard a
High-pressure gas connection	External thread G 3/8
Connection to ventilation hose	External diameter 13 mm
Patient valve – inspiration tube	15 mm socket 22 mm plug ISO 5356-1
Patient valve – expiration tube	30 mm socket ISO 5356-1
Power supply life expectation max. storage:	maintenance-free lithium battery 3.6 V; 5.2 Ah > 2 years 10 years after delivery
Auxiliary energy for alarm system max. storage:	Button cell CR2430 10 years after delivery
Fuse F1	T 500 L 250 V
Ventilation hose	Spiral silicone NW 10
Degree of protection against water	IPX 4
Standard complied with	EN 794–3; EN 60601–1; prEN 1789
Alarm sound pressure	54 dB (A)
Manometer accuracy	Class 1,6
Patient valve resistance (complied with EN 794-3): – Inspiration – expiration – spontaneous breathing	 <6 mbar at 60 l/min <6 mbar at 60 l/min <1.5 mbar at 30 l/min
Elasticity of breathing system	Negligible
Patient valve dead space	12.8 ml

CE 0197

9.1 Pneumatics



The input pressure at **p** is max. 6 bar. This is reduced by **V1** to 2.7 bar dyn. This is the input pressure at **V6**, **V2** and **V3**.

Inspiration/No Air Mix

Valve rocker **V6** is opened and switches over **V7**. An electrical impulse to **V2** opens **V3** and closes **V4**. Oxygen flows through **V5** into injector unit **V9** and onwards to the patient valve. If the ventilation pressure in the patient valve rises above 100 mbar, the relief valve **V8** will open.

Inspiration/Air Mix

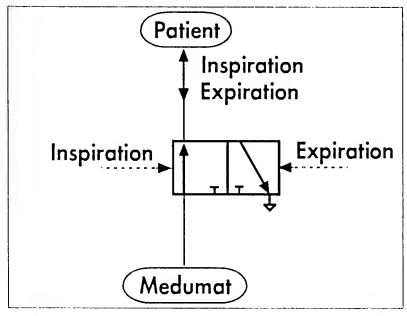
Valve rocker **V6** is closed. This closes **V7**. O_2 flows into injector unit **V9** through **V5** and sucks in air through **V7**. The air-oxygen mixture flows to the patient valve.

Expiration/Air Mix or No Air Mix

Another electrical impulse closes **V2**. Exhaust valve **V4** opens and exhausts injector unit **V9**. The patient breathes out through the patient valve.

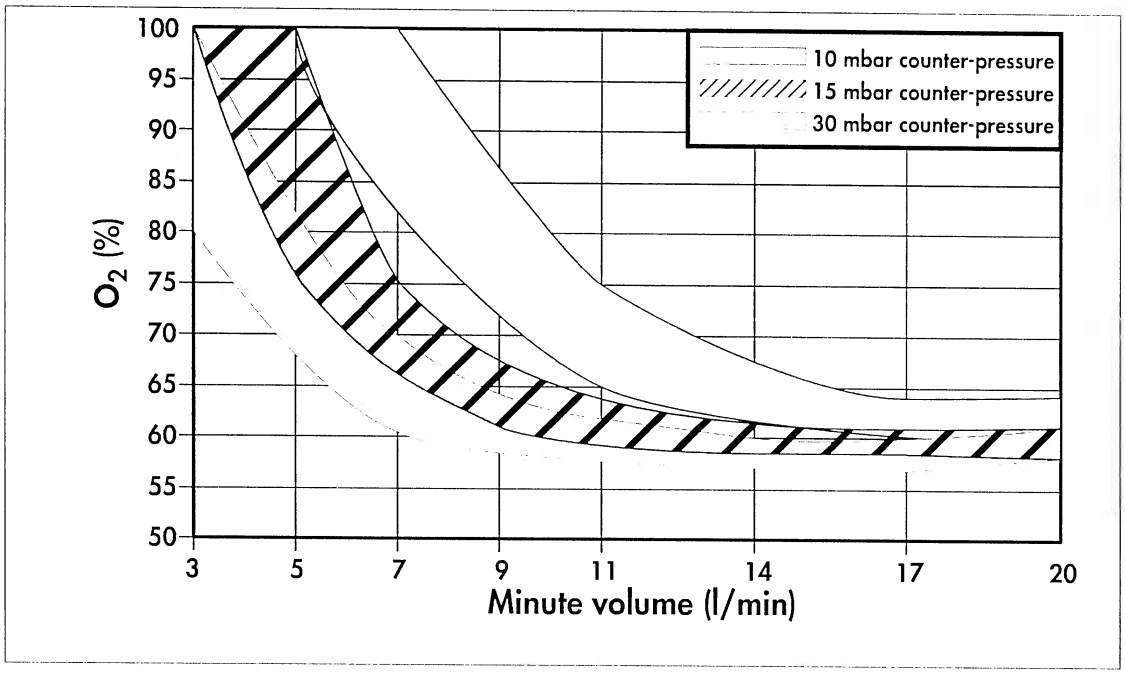
Patient valve

The respiratory gas flows into the patient's airways during inspiration. The expiratory pressure then switches the valve over and enables the patient to breathe out.



9.2 O_2 content when using Air Mix

The following diagram shows the oxygen concentration prevailing at various counter-pressures and minute volumes when **Air Mix** is switched on.



In isolated cases the minute volume (MV) deviations may be higher at ventilation pressures in excess of 30 mbar.

10. Technical Changes

Technical change	From Device No.	Date
Angled outlet	1670	04.08.03
Software modification for cardiac massage and stenosis alarm	1800	04.12.03
Housing parts, reinforced	1860	12.04.04

11. Repair and inspection log

Device master data	Inspections and repairs carried out in accordance with the service instructions	
Manufacturer: **Weinmann** Device model: **MEDUMAT** ❑ WM 22500 MEDUMAT Standard ❑ WM 22800 MEDUMAT Standard a ❑ WM 22600 MEDUMAT Basic ❑ WM 22650 MEDUMAT Basic-p Serial no. _____ Date of manufacture _____ Functional check: Safety check-2 years_____ Safety check-4 years_____ Safety check-6 years_____ Safety check-8 years_____ Safety check-10 years_____	**Measures / Comments**	Service performed in accordance with MEDUMAT service instructions Company Date Signature
		Company Date Signature
		Company Date Signature
		Company Date Signature
		Company Date Signature

Inspection log – safety check in accordance with EEC - Directive WM 22805

Device: MEDUMAT Standard a **WM-No.**: 28000 **Device-No.**: . . . **Date of manufacture**: . . .

1. Test equipment
- Test pressure 6 ± 0 15 bar, pressure gauge 0 – 6 3 bar, class 1,6
- Volumetric flow measuring device RT 200; adjustable diaphragm 10 mbar, test set WM 15382
- Oxygen measuring device

2. Preparation for testing
- Connect MEDUMAT to the test unit.
- Set MEDUMAT to the "No Air Mix" setting at f = 40/min, MV = 5 l/min and p_{max} = 60 mbar.

3. Input the device data
- Enter the above device data

	Measurement	OK	not OK
4. Leak tests at 6 bar			
• Pressure drop, inlet side with lever set to "No Air Mix" ≤ 0 2 bar/min		☐	☐
• Pressure drop, inlet side with lever set to "Air Mix" ≤ 0 2 bar/min		☐	☐
• Pressure drop in pressure measuring segment ≤ 2 0 mbar/min		☐	☐
• Pressure reading deviation less than ±1 5 mbar		☐	☐
5. Self-test after switching on the device			
• All 6 LEDs are illuminated simultaneously and the alarm sounds		☐	☐
6. Functional check and alarms			
• With lever set to "Air Mix", Stenosis alarm is triggered		☐	☐
• With lever set to "No Air Mix", Stenosis alarm is triggered		☐	☐
• Alarm acknowledgement function		☐	☐
• Disconnection alarm is triggered		☐	☐
• Pressure alarm is triggered		☐	☐
7. Functional check assisted ventilation (Assist function)			
• Green LED flashes after activation of Assist function		☐	☐
• "No Assist" alarm is actuated		☐	☐
• Assist function correct (triggering / no triggering)		☐	☐
8. Frequency check – frequency setting			
• Frequency 5 / min ± 2	☐	☐	☐
• Frequency 15 / min ± 2	☐	☐	☐
• Frequency 25 / min ± 2	☐	☐	☐
• Frequency 40 / min ± 2	☐	☐	☐
9. Tidal volume check at 4.5 bar admission pressure and 10 mbar counterpressure	Air Mix / No Air Mix		
• f = 15 / min , MV = 20 l/min: AV = 1300 ± 200 ml	☐ ☐ ml	☐	☐
• f = 15 / min , MV = 11 l/min: AV = 730 ± 110 ml	☐ ☐ ml	☐	☐
• f = 40 / min , MV = 5 l/min: AV = 125 ± 25 ml	☐ ☐ ml	☐	☐
10.Check O_2 concentration at f = 10 / min and MV = 11 l/min			
• O_2 concentration with "No Air Mix" > 98 Vol.%		☐	☐
• O_2 concentration with "Air Mix"" > 50 – 65 Vol.%		☐	☐
11.Functional check – pressure limit with No Air Mix			
• Pressure limit responds at 20 ± 5 mbar, f = 8/min and MV = 9l/min	☐ mbar	☐	☐
• Pressure limit responds at 60 ± 5 mbar, f = 8/min and MV = 7l/min	☐ mbar	☐	☐
12.Functional check – ventilation valve without patient valve at f = 8/min and MV = 7 l/min			
• Test bag is inflated completely, respirator is then vented audibly		☐	☐
13.Check the equipment and accessories (system components)	present / yes / no		
• Respiration tube with patient valve undamaged and fully functional	☐ ☐	☐	☐
• Test set for functional check fully functional	☐ ☐	☐	☐
• Pressure-reducer fully functional	☐ ☐	☐	☐
• O_2 cylinder within the inspection limits; valve fully functional	☐ ☐	☐	☐
• Support plate complete and fully functional	☐ ☐	☐	☐
• Medcal products book	☐ ☐	☐	☐
• Instructions for use	☐ ☐	☐	☐
14.Check external condition			
• Zero setting of manometer		☐	☐
• Connection thread and knobs fully functional		☐	☐

Servicing carried out: yes ☐ no ☐ Final inspection carried out: _____ (date) _____ (inspector no) _____ (signature)

For decades Weinmann has been developing, producing and marketing medical devices for markets around the world. In cooperation with our partners we design economic health systems for diagnosis and therapy in Sleep Medicine, Home Mechanical Ventilation, Oxygen Medicine and Emergency Medicine.

WEINMANN

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