MEDUMAT Standard a

Ventilator

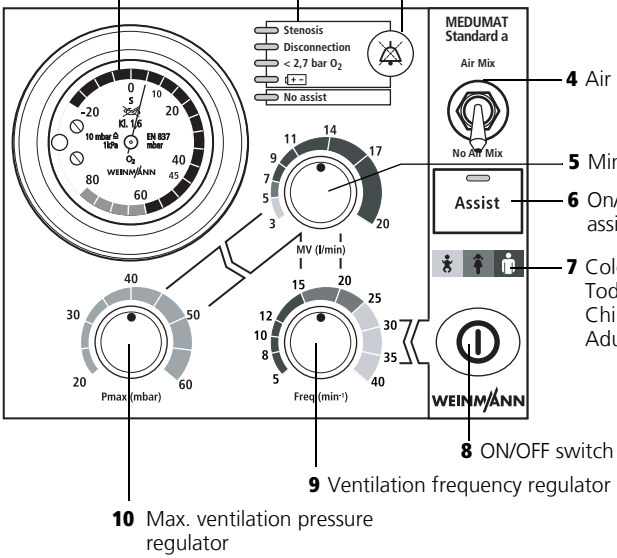
Description and instructions for use

Contents

1. Overview

1.1 Device

Control panel MEDUMAT Standard a



1 Ventilation pressure gauge

2 Alarm panel

3 Alarm acknowledgement

4 Air Mix/No Air Mix switch

5 Minute volume regulator

6 On/Off switch, assisted ventilation

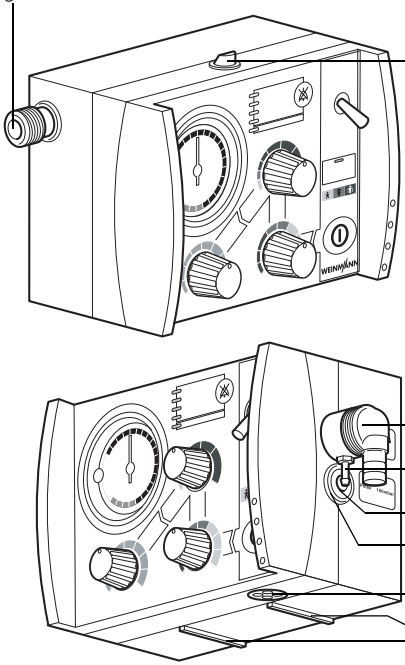
7 Colour code
Toddler (yellow, 10 kg to 30 kg)
Child (orange, 30 kg to 60 kg)
Adult (brown, 60 kg to 110 kg)

8 ON/OFF switch

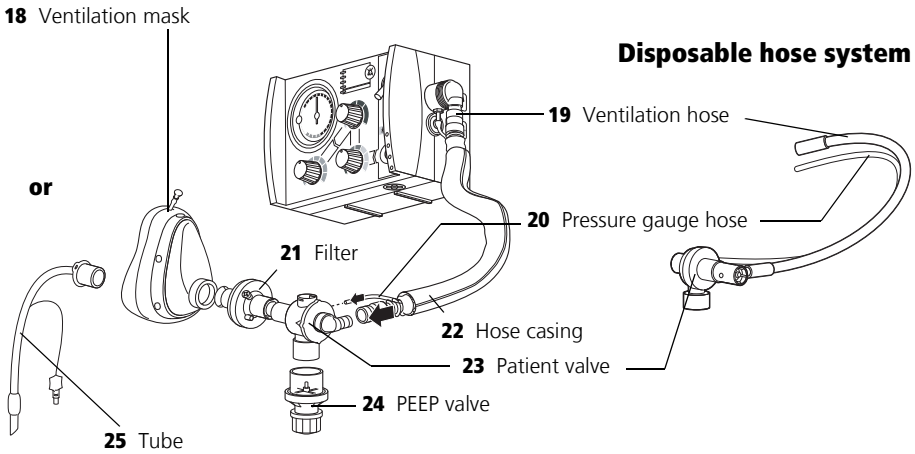
9 Ventilation frequency regulator

10 Max. ventilation pressure regulator

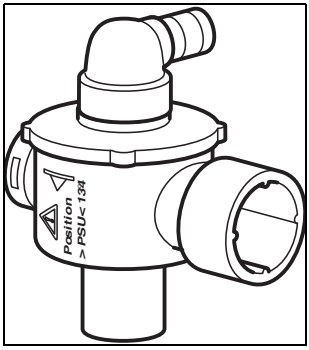
MEDUMAT Standard a connections

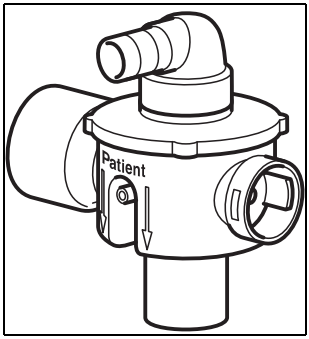


MEDUMAT Standard a device combinations



1.2 Symbols used on the ventilator





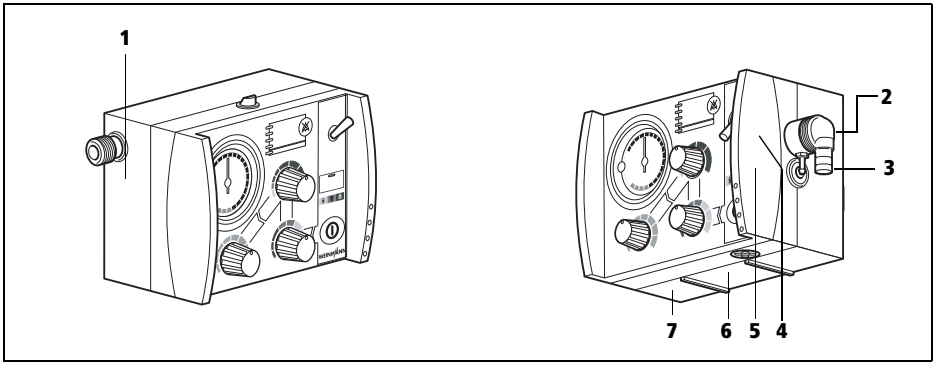
Patient valve

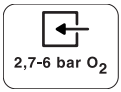
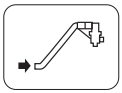
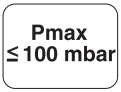
The symbol ⚠ on the patient valve indicates that the lip and valve membranes in the expiration and spontaneous breathing arms must be changed immediately if they are crinkled, sticky or misshapen. Under no circumstances continue to use the patient valve for ventilation in this case, as malfunctions are likely (note "7.4 Check of patient valve" on page 48).

The symbol ▽ indicates the correct position for insertion of the lip membrane.

When connecting the patient valve, take care to ensure that the direction of respiratory gas flow is correct.

MEDUMAT Standard a



1		Inlet 2,7 - 6 bar O_2.
2		Tube system connection
3		Maximum pressure ≤100mbar
	Safety check and servicing label	
4		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.
5		Servicing label: indicates when the next service is due.

6	**MEDUMAT Standard a device information plate**	
	SN	Serial number of device
		Date of manufacture
		Direct voltage
		3,6 V lithium battery
		Do not dispose of device in domestic waste
	CE 0197	CE symbol (confirms that the product conforms to the applicable European directives)
		Type BF application part
	IP24	Degree of protection – against the ingress of solid particles – against access to hazardous parts – against the ingress of water with a harmful effect
Other markings		
7		Follow instructions for use

2. Description of ventilator

2.1 Uses

The MEDUMAT Standard a is an automatic (short-term) ventilator with the option of assisted ventilation.

You can use MEDUMAT Standard a:

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

You can use MEDUMAT Standard a while 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:

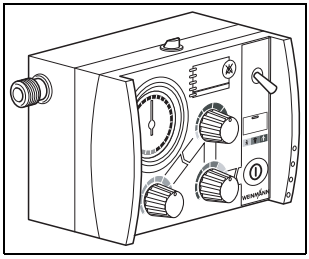
- is designed to provide controlled ventilation to persons of approx. 10 kg body weight or more, or in the case of assisted ventilation, of approx. 15 kg body weight or more.
- is used to treat respiratory arrest;
- can be preset to parameters that ensure evenly balanced ventilation provided that the 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 Owner/operator and user qualification

As an owner/operator or user, you must be familiar with the operation of this medical device. Observe the legal requirements for operation and use (in Germany, the regulations governing owner/operators of medical devices apply in particular). Basic recommendation: get a person authorized by Weinmann to provide you with proper instruction about the handling, use and operation of this medical device.

2.3 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 an in-built power pack.

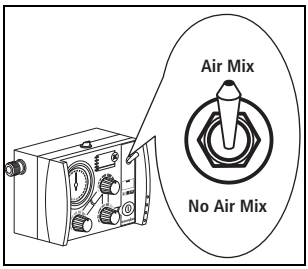
It uses high-pressure, medicinal-grade oxygen. An external pressure reducer brings this down to the required operating pressure. The oxygen supply is fed in at input valve.

Both the infinitely variable ventilation frequency and the inspiration/expiration ratio of 1:1.67 in the case of controlled ventilation are regulated by internal electronic control mechanisms.

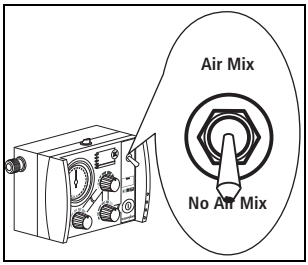
The gas for inspiration is routed to the patient through the ventilation tube via the patient valve and the ventilation mask or hose. A lip membrane

in the patient valve ensures that the expiration gas can be exhaled through the expiration arm.

Regardless of the ventilation mode selected, the patient has the option of breathing spontaneously between ventilation strokes via the patient valve. In this case, the patient draws air for breathing from the ambient air.



With the **Air Mix** setting, in the case of mechanical ventilation, atmospheric air is admixed to give an O_2 concentration generally of between 55 % and 85 % at 10 mbar ventilation pressure (note "11.5 O_2 content when using Air Mix" on page 72).



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**.

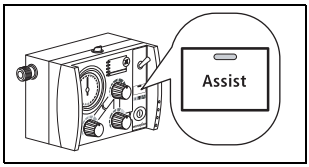
In the opposite instance, in other words when switching from **No Air Mix** to **Air Mix**, the injector unit is switched on. This reduces minute volume which can lead to the set pressure limit being **undershot**. In this case, set minute volume correspondingly **higher**.

2.4 Controlled ventilation

Mandatory ventilation stroke: the device, not the patient, determines the time of the next breathing stroke.

After being switched on, the MEDUMAT Standard a is automatically in Controlled Ventilation mode. This administers mandatory ventilation strokes to the intubated patient according to the ventilation values set on the device.

2.5 Assisted ventilation



In addition to Controlled Ventilation mode, the MEDUMAT Standard a also has an Assisted Ventilation mode.

After you have switched on Assisted Ventilation mode by pressing the **Assist** key, a flashing green LED indicates this mode.

Triggered ventilation stroke: the patient can trigger a ventilation stroke by his own breathing efforts.

The patient now has the option of triggering a triggered ventilation stroke within a time window of 40 % of expiration. To do so, the patient must generate a flow of over 6 l/min. by his own breathing efforts.

If the breathing efforts of the patient are not sufficient to trigger, the patient automatically receives a mandatory ventilation stroke at the end of the time window, so that the set minute volume is guaranteed.

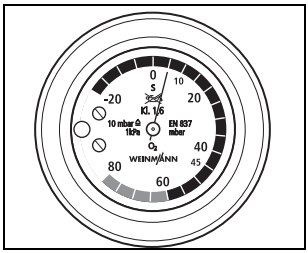
With this function, the ventilation strokes of the device can be synchronised with the breathing efforts of the patient.

IPPV: intermittent positive pressure ventilation (= controlled ventilation).

Between the mandatory ventilation strokes of the device, the patient has the option of breathing in air from the surrounding atmosphere via the patient valve.

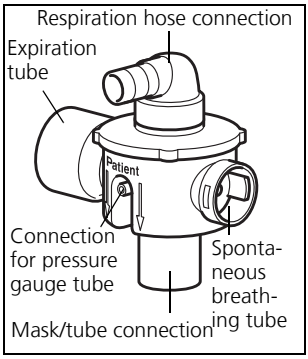
If the patient does not trigger the device, an alarm is triggered. The patient continues to receive controlled ventilation.

2.6 Check ventilation curve



The ventilation curve is checked at ventilation pressure gauge.

2.7 Patient valve



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

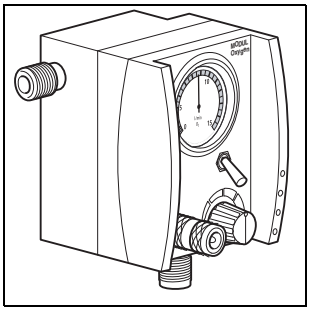
It is designed so that spontaneous breathing is possible, even if the MEDUMAT Standard a fails, regardless of which ventilation mode you have selected.

2.8 Modules

Modules with additional functions can be attached to MEDUMAT Standard a.

Please refer to the directions for use enclosed with the modules for exact details of how to fit and operate these. It is essential to read these directions carefully before using the modules. The most important points are listed below:

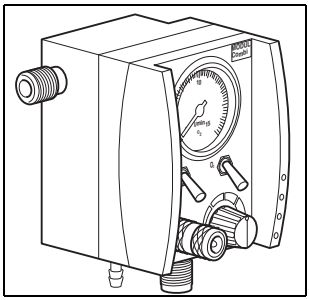
Oxygen MODULE



The Oxygen MODULE enables you to apply oxygen inhalation.

Put the switch marked **O_2** into the "**I**" position. Select the desired oxygen volume by turning the knob marked **l/min** to a setting between 0 and 15 l/min. You can check this setting on the volume manometer.

Combi MODULE



The Combi MODULE enables you to apply both oxygen inhalation and suction.

For inhalation put the switch marked **O_2** into the "**I**" position. Select the desired oxygen volume by turning the knob marked **l/min** to a setting between 0 and 15 l/min. You can check this setting on the volume manometer.

For suction switch the tumbler marked **Vac** to the "**I**" position. The suction pressure is locked at -0.5 bar.

3. Safety instructions

3.1 Safety regulations

For your own safety, the safety of your patients, and to comply with the requirements of EU Directive 93/42/EEC, please observe the following points:

General

- Please read the directions for use carefully. They are an integral part of the ventilator and should be available for reference at all times.
- Before starting to work with MEDUMAT Standard a, you must understand how to operate it.
- Please comply with section "6. Hygienic preparation" on page 39 to prevent infection or bacterial contamination.
- MEDUMAT Standard a should be used only by medically qualified personnel who have had training in ventilation techniques. Incorrect use can cause severe physical injury.
- It is advisable for you to have servicing and repairs carried out only by the manufacturer, Weinmann, or by qualified technicians expressly authorized by Weinmann.
- If third-party items are used, functional failures may occur and fitness for use may be restricted. Biocompatibility requirements may also not be met. Please note that in such cases, any claim under warranty and liability will be voided if neither the accessories nor genuine replacement

parts recommended in the instructions for use are used.

- MEDUMAT Standard a should be used only for the purposes for which it is designed (note "2.1 Uses" on page 10).
- MEDUMAT Standard a is not designed for use under hyperbaric conditions (pressure chamber).
- MEDUMAT Standard a should never be used with flammable anaesthetics.
- In the case of use in poisoned or low-oxygen atmospheres, do not operate the MEDUMAT Standard a with the „Air Mix" setting or in Assist mode.
- A back-up ventilator should always be available in case of technical failure.

Warning:

- Modifications may not be made to the device. Have modifications to the device carried out only by the manufacturer, Weinmann, or by specialist staff expressly authorized by the manufacturer.

Oxygen

Highly-compressed oxygen can lead to spontaneous explosive reactions in combination with flammable substances (fat, oil, alcohol, disinfectants, etc.):

- All screw connections and other components of the ventilator must be kept absolutely free of oil and grease.
- Always wash your hands before starting to work on the oxygen supply.
- Smoking and open flames are strictly prohibited in the vicinity of all fittings containing or transporting oxygen.
- During assembly and when changing the oxygen cylinder, only hand pressure should be used

when tightening the screw connections to the cylinder and to the pressure reducer. Never use tools for this purpose. Excessive tightening damages the screw threads and seals and can cause leaks.

- Protect oxygen cylinders from accidental falls. If a cylinder falls, the pressure reducer or the valve may break off and cause a violent explosion.

Important note

- Always open the valve of the oxygen cylinder slowly to prevent pressure damage to the other fittings.
- The oxygen cylinder should never be completely emptied as this may allow moisture-containing air to enter the cylinder and cause corrosion.

Operation

- Both the patient and the ventilator must be kept under constant observation during ventilation.
- Make sure that neither the expiration tube nor the spontaneous breathing tube on the patient valve is blocked or impeded in any other way, e.g. by the patient's position.
- MEDUMAT Standard a must never be used simultaneously with a module as this would make it impossible to work to the selected parameters.

Note

- Disposable hose systems WM 28110 (2 m) and WM 28188 (3 m) are only intended to be used once.

Software

- Extensive validation tests have been performed to minimize risks arising from software errors.

Accessories

- Please protect the silicone and rubber components against UV radiation and prolonged exposure to direct sunlight, as this can make them brittle and friable.

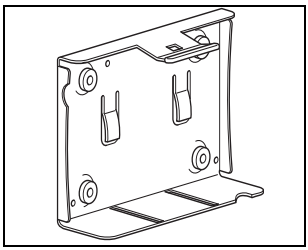
4. Installation

A permanent mounting is usually necessary only when MEDUMAT Standard a is installed as a fixture in rescue vehicles, helicopters or aircraft. In these cases either the STATION MEDUMAT or installation kits are available as accessories.

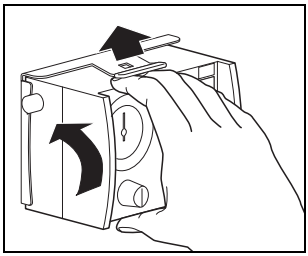
If MEDUMAT Standard a is supplied complete with carrying platform, it is ready for use and requires no further installation. Separate directions for use are supplied with the carrying platform.

Functional tests must be carried out after installation (note "7. Functional checks" on page 45).

4.1 Wall mounting for STATION MEDUMAT



The wall mounting for the STATION MEDUMAT should be installed at an appropriate place, e.g., on a side panel inside the vehicle. Please refer to the sheet enclosed with the STATION MEDUMAT for details of dimensions and the installation procedure.



To place MEDUMAT Standard a in the wall mounting, first insert the slides on the underside of the ventilator into the matching grooves in the STATION MEDUMAT and then press the MEDUMAT Standard a inwards until the catch snaps into the fastening at the top of the STATION MEDUMAT.

4.2 Installation kit for the wall mounting

A number of kits are available for installing a wall mounting, e.g. on a panel inside a vehicle. The kit size varies according to the number of modules attached to the MEDUMAT Standard a.

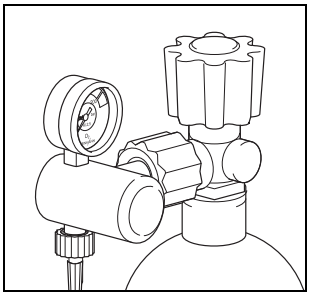
Please refer to the sheet enclosed with each installation kit for details of dimensions and installation procedure.

4.3 Connecting up the oxygen cylinder

Wash your hands thoroughly before any work on the oxygen supply. Hydrocarbon compounds (e.g. oils, greases, alcohol for cleaning, disinfectants, hand cream or sticking plaster) can lead to explosive reactions if they come into contact with highly-compressed oxygen.

Never use wrenches or similar tools to tighten or loosen the screw connections.

Removal of empty cylinder



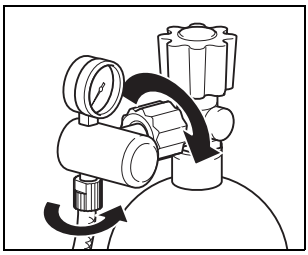
1. Close the valve of the oxygen cylinder.

   Switch on MEDUMAT Standard a with ON/OFF switch. This exhausts any residual oxygen and depressurizes the ventilator. Wait until the pressure gauge on the pressure reducer shows **0** bar oxygen content before uncoupling the screw connection by hand.
2. First switch off MEDUMAT Standard a again.
3. Then loosen the screw connection to the cylinder.

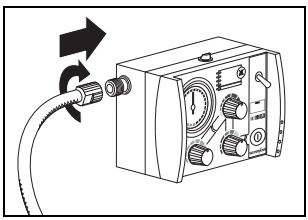
Connecting up new cylinder

1. First open the valve of the new oxygen cylinder and close it again quickly. This will blow out any particulate matter.

   Keep the valve opening away from the body, making sure that neither yourself or other persons can be injured by escaping particles!

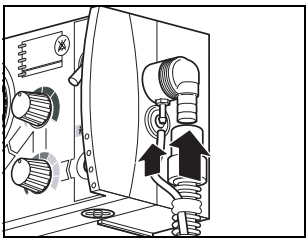


2. Next couple the pressure reducer to the valve on the oxygen cylinder with the fluted connecting nut. Tighten up the nut by hand.
3. If the pressure hose is not already connected to the exit valve of the pressure reducer, make this connection with the G 3/8 connecting nut.



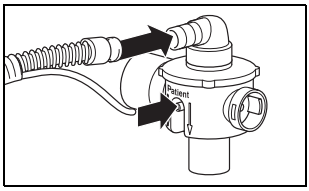
4. Screw the other end of the pressure hose on to pressure gas connection on the MEDUMAT Standard a if this has not yet been done.

4.4 Ventilation hose

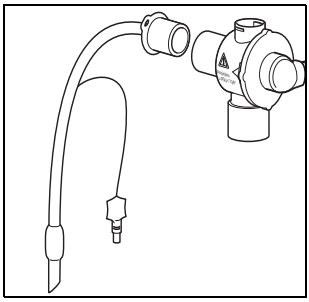


1. Slide the pressure gauge hose onto the connection.
2. Slide the ventilation tube onto the connection. Make sure that the pressure gauge hose already connected is not kinked. If necessary, turn the ventilation tube while sliding on as appropriate.

Do solely grasp the ventilation tube by its end (position of arrow in adjacent drawing). Otherwise the hose may become damaged or tear.

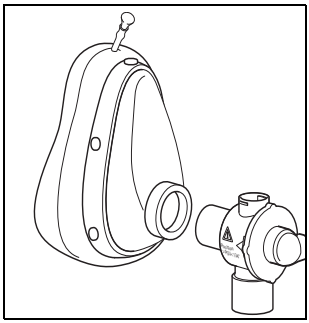


3. Plug the other end of the ventilation tube and the pressure measurement tube onto the patient valve.



4. If the patient is intubated, insert the patient valve into the tube,

   or



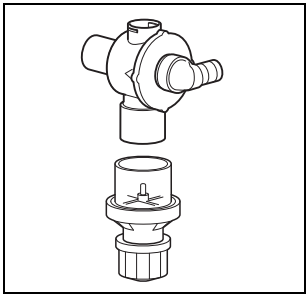
   if a mask is being used for ventilation, insert the patient valve into the connector on the mask. (This is identical with the connector on the tube.)

HME-Filter

If a heat and moisture exchanger (HME) filter is required, this should be installed between the patient-side connector on the patient valve and the tube or mask.

Always follow the manufacturer's directions for use.

PEEP Valve



If a PEEP valve is needed, this should be inserted into the expiration tube on the patient valve.

Always follow the manufacturer's directions for use.

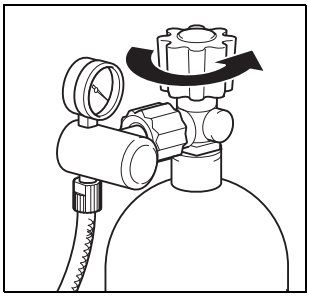
Bacteria filter

If a bacteria filter is used, fit it between the device outlet port and the ventilation tube.

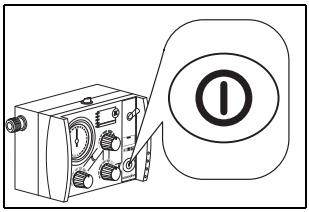
Always follow the manufacturer's directions for use.

5. Using the ventilator

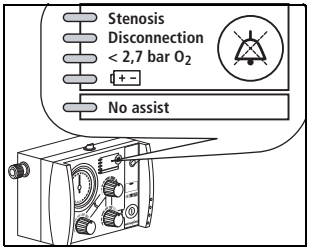
5.1 Switching on/self test



1. Open the valve of the oxygen cylinder **slowly.** The pressure gauge will now show the pressure in the cylinder.
2. Where appropriate, calculate how long the remaining oxygen will last (note "5.11 Calculation of oxygen content/remaining operating time" on page 37). Always change the cylinder in good time, e.g., when the pressure is lower than 50 bar, to ensure that oxygen is available for an adequate period.
3. Select the desired settings for the ventilation (note "5.2 Selecting the ventilation settings" on page 26).



4. Switch on the MEDUMAT Standard a with ON/OFF switch. The ventilator will then run a self test lasting approx. 2 seconds.



If no fault is detected, the five LEDs in alarm field come on and a brief alarm sounds. After that, the MEDUMAT Standard a starts working with the set ventilation values in „Controlled Ventilation" mode.

If an error is found, the LED's in alarm panel will start to flash. If this happens, MEDUMAT Standard a must not be used for ventilation.

5.2 Selecting the ventilation settings

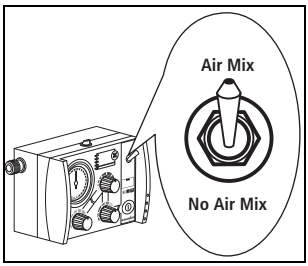
Attention

MEDUMAT Standard a must never be used simultaneously with a module as this would make it impossible to work to the selected parameters.

The settings can be selected either before or after the MEDUMAT Standard a is switched on. We recommend selection before switching on to prevent unnecessary waste of oxygen.

Air Mix/No Air Mix

In the case of a given indication, it is possible to ventilate using pure oxygen or using mixed air.

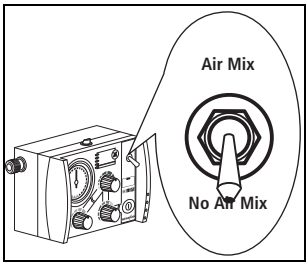


1. For mixed air, set switch to **Air Mix.**

   The oxygen concentration administered will normally lie somewhere between 55% and 85% at a ventilation pressure of 10 mbar. You can read off the exact figure from relevant diagram (note "11.5 O_2 content when using Air Mix" on page 72).

Attention

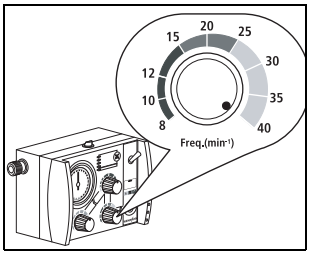
The **No Air Mix** setting should be used when the surrounding atmosphere is polluted or has a low oxygen content or when the indication requires this.



2. Set Switch to **No Air Mix.**

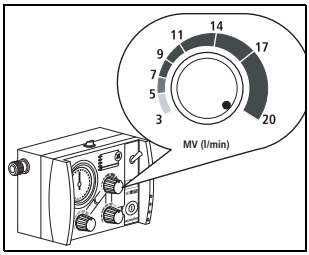
   When the ventilator is switched from an air/oxygen mixture (**Air Mix**) to pure oxygen (**No Air Mix**), the minute volume will vary only within the set tolerances (note "11. Technical data" on page 68).

Respiratory frequency



1. The respiratory frequency can be set with regulator knob.

Minute volume



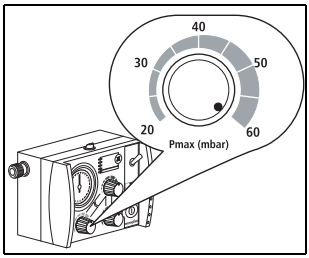
1. The minute volume can be set with regulator knob.

Recommendation for breathing frequency and minute volume in the case of controlled ventilation:

	Toddler yellow	Child orange	Adult brown
Body weight	10 - 30 kg	30 - 60 kg	60 - 110 kg
Respiratory frequency	25 - 40 min^{-1}	15 - 25 min^{-1}	8 - 15 min^{-1}
Minute volume	3 - 5 l/min	5 - 7 l/min	7 - 13 l/min

The values given in the table are recommendations. Deviating values are possible for certain indications.

Maximal ventilation pressure



1. The ventilation pressure can be set with regulator knob max. ventilation pressure.

Recommendations for the Maximal ventilation pressure:

Intubation	Mask ventilation
45 mbar	20 mbar

The values given in the table are recommendations. Deviating values are possible for certain indications.

If the set level is reached, e.g. in cases where compliance is inadequate, MEDUMAT Standard a sets off a stenosis alarm (note " Stenosis alarm" on page 34).

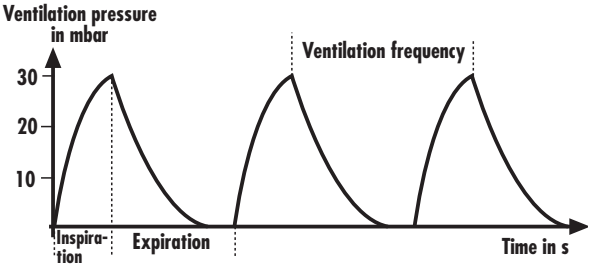
5.3 Select ventilation method

Ventilation in Controlled Ventilation mode

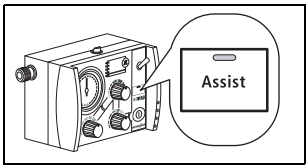
The MEDUMAT Standard a is automatically in Controlled Ventilation mode when switched on. The LED in key **Assist** does not come on.

The patient is supplied with air for breathing at an inspiration/expiration ratio of 1: 1.67 according to the set ventilation parameters (note "5.2 Selecting the ventilation settings" on page 26).

Example of a ventilation curve in Controlled Ventilation mode:



Ventilation in Assisted Ventilation mode



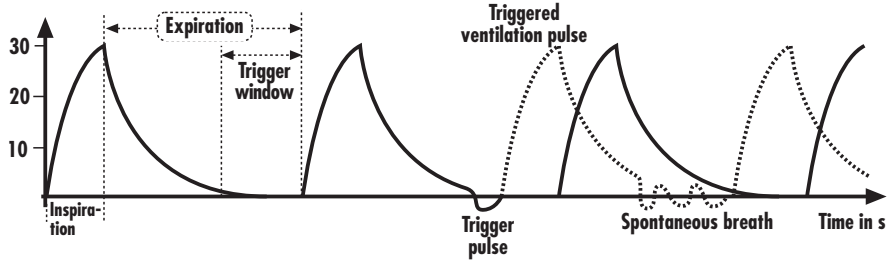
To switch on „Assisted Ventilation" mode, please press key **Assist**.

„Assisted Ventilation" mode is indicated by the green LED in key **Assist** flashing.

During assisted ventilation, the patient likewise receives a controlled ventilation stroke in accordance with the ventilation frequency set.
In addition, the patient is given the option of triggering the device himself before a controlled ventilation stroke. This synchronises the controlled ventilation strokes with the breathing efforts of the patient.

Triggered ventilation stroke: the patient triggers a ventilation stroke through his own breathing effort.

Example of a ventilation curve in Assisted Ventilation mode:



Note:
different trigger points in consecutive phases can lead to a change in the inspiration/expiration ratio. The set values for breathing frequency and minute volume are maintained.

The patient furthermore has the option of performing a spontaneous breath via the patient valve between triggered ventilation strokes. In this case, the patient draws air for breathing from the ambient air.

If the patient fails to trigger the device within the time window in two consecutive phases, i.e., is making no more breathing effort, the **No Assist** alarm is triggered (note "5.10 Alarm signals" on page 33).

You end „Assisted Ventilation" mode by pressing key **Assist**. The MEDUMAT Standard a then continues working in "Controlled Ventilation" mode. The LED in key **Assist** goes out.

5.4 Performing ventilation

Intubation

The patient will normally be intubated before the patient valve is connected to the tube.

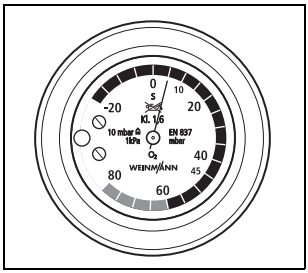
1. Attach the patient valve to the connector of the tracheal tube.
2. Monitor the respiratory parameters during ventilation, e.g., with Weinmann's CAPNOCOUNT mini WM 97144. This will indicate whether the tube is correctly positioned and ventilation is adequate.

Ventilation mask

1. Attach the mask to the patient valve.
2. Place the mask over the patient's mouth and nose.
3. Stretch the mask over the head and use Esmarch's grip to seal it hermetically.

If necessary, insert a Guedel tube to keep the airways open before putting on the mask.

5.5 Monitoring ventilation



The patient must be monitored constantly during ventilation.

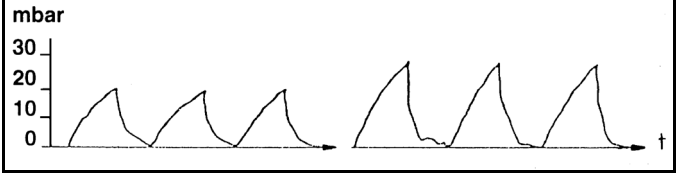
Ventilation pressure gauge shows the ventilation sequence.

High airway resistance, e.g., caused by obstructions or external cardiac massage, tend to affect minute volume (exact details can be obtained from the

manufacturer Weinmann on request). If the preset maximal ventilation pressure is exceeded in two successive inspiration phases (note " Stenosis alarm" on page 34) you should use a respirometer to check the ventilation volume actually being received by the patient. The respirometer can be attached to the expiration tube on the patient valve with an adapter. Monitor the respiratory parameters during ventilation, e.g., with Weinmann's CAPNOCOUNT mini WM 97144.

If lung compliance diminishes during ventilation in the **No Air Mix** setting, the ventilator will react with an increase in ventilation pressure at constant volume. For details of how MEDUMAT Standard a reacts in the **Air Mix** setting, please refer to Section "11.5 O_2 content when using Air Mix" on page 72.

Example for the ventilation sequence before and after the lung compliance diminishes



5.6 Ventilation with PEEP Valve

A PEEP valve can be fitted to the expiration tube on the patient valve with an adapter.

This valve makes it possible to use positive end-expiratory pressure (PEEP). Please see the PEEP valve instructions for details of settings.

5.7 Ventilation with HME filter

A conventional heat and moisture exchange (HME) filter with standard 15/22 mm connectors can be fitted on the inspiration tube of the patient valve for hygienic purposes and to condition the inspired air. This will increase both inspiratory and expiratory resistance. You should therefore monitor ventilation pressure and ventilation volume very carefully.

A close watch must be kept for any increase in dead space, especially in children.

Always read and follow the manufacturer's directions for use.

5.8 Ventilating with bacteria filter

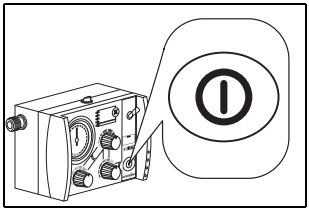
To protect the patient and the environment from infection, you can connect the upgrade set for the device outlet port filter between the device outlet port and the ventilation tube. Always monitor the exchange of air at the device inlet carefully.

Follow the instructions for use for the device outlet port filter upgrade set.

5.9 Terminating ventilation

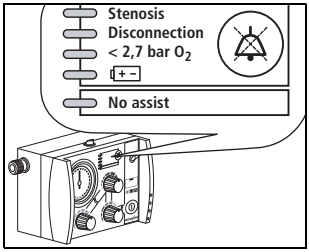
Important note!
Never empty the oxygen cylinder completely. Return the cylinder for filling while it still contains residual pressure. This prevents entry of moist atmospheric air that can cause corrosion.

1. Check the oxygen supply on the gauge on the pressure reducer gauge. If the pressure has dropped to 50 bar or less, the cylinder should be refilled or a reserve cylinder should be available in order to ensure that the ventilator will be able to function properly.
2. Close the valve of the oxygen cylinder.



3. Switch off MEDUMAT Standard a. ON/OFF switch must be kept pressed down for at least 2 seconds until the LEDs in the alarm panel light up. This is a safety device to prevent the ventilator from being switched off unintentionally.

5.10 Alarm signals



Alarm panel signals the following alarms:

Stenosis: Stenosis or a rise to maximal ventilation pressure P_{max} in two successive inspiration phases

Disconnection: Disconnection between MEDUMAT Standard a and the patient in two successive inspiration phases

< 2,7 bar: Drop in oxygen pressure to below 2.7 bar

+ −: Battery charge inadequate

No Assist: in „Assisted Ventilation“ mode, patient fails to trigger within the time window in two consecutive phases.

In addition to all the visual alarms, an acoustic alarm is triggered. Only in the case of the **No Assist** alarm, is the acoustic alarm triggered with a delay of 1 minute.

The patient valve is designed to enable spontaneous breathing in case of equipment failure.

When is the alarm set off?

An alarm signal is given as soon as any one of the aforementioned functional failures occurs. The relevant LED starts to flash and an acoustic signal sounds.

Simultaneous disconnection and drop in oxygen pressure will initially set off only the **< 2,7 bar** alarm.

Stenosis alarm

Actual ventilation pressure exceeds the level set with regulator knob max. ventilation pressure.

Up to Serial No. 1799 MEDUMAT Standard a switches to expiration immediately if the maximum ventilation pressure is exceeded. This does not affect the set frequency. Old appliances (up to serial no.1799) that have been given a new board in the course of repairs or servicing behave in the same way as appliances from serial no. 1800 onwards.

From Serial No. 1800 MEDUMAT Standard a briefly switches to expiration whenever the maximum ventilation pressure is exceeded but 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 device finally switches to expiration and vents the patient tube system completely. The next inspiration starts with the following ventilation stroke according to the frequency selected. The frequency is not affected.

The alarm is set off when airway resistance is exceeded in **two** successive inspiration phases. This is to prevent false alarms, alarms caused by coughing for example.

Disconnection alarm

The rise in pressure during the inspiration phase is less than 5 mbar. This is generally due to an interruption in the breathing system.

The alarm is set off when the rise in pressure is less than 5 mbar in **two** successive inspiration phases.

< 2,7 bar O_2 alarm

Oxygen pressure at the pressure connection to MEDUMAT Standard a has dropped to less than 2.7 bar. The reason is usually an almost empty oxygen cylinder.

In this case MEDUMAT Standard a will no longer function correctly because the operating parameters will not lie within the permissible limits.

Alarm 

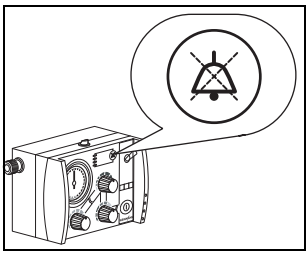
The battery is failing. Failure of the automatic ventilation function must be expected. Immediate steps must be taken to provide alternative ventilation (note "5.12 Alternative ventilation procedures" on page 38).

No Assist Alarm

In "Assisted Ventilation" mode, patient fails to trigger within the time window in two consecutive phases.

The LED in alarm field flashes and the acoustic alarm is triggered after a 1-minute delay.

Cancelling acoustic alarm



The acoustic alarm can be temporarily cancelled by pressing alarm acknowledgement:

Stenosis: 30 Seconds
Disconnection: 30 Seconds
< 2,7 bar: 30 Seconds
+ –: 120 Seconds
No Assist: 120 Seconds

The optical alarm will continue to flash.

If the cause of the alarm is not eliminated, the acoustic alarm will start to sound again after a short interval.

Both the optical and the acoustic alarm are cancelled automatically as soon as the cause is eliminated.

5.11 Calculation of oxygen content/remaining operating time

Oxygen content of cylinder

Oxygen volume = Volume of cylinder x cylinder pressure.

	Cylinder volume	**x cylinder pressure**	**= oxygen content**
Example 1	10 l	x 200 bar	= 2000 l
Example 2	10 l	x 100 bar	= 1000 l

Real ventilation time

$$\text{Real ventilation time(min)} = \frac{\text{oxygen content (l)}}{\text{MV (l/min)}} \times \frac{100}{(O_2\text{-concentration})}$$

Example 1:

O_2-content = 1000 l; MV = 11 l/min; 100% O_2 (**No Air Mix**).

This gives the following equation:

$$\text{Real ventilation time(min)} = \frac{1000\ \text{l}}{11\ \text{l/min}} \times \frac{100}{100\%} = 91\ \text{min} = 1\ \text{h}\ 31\ \text{min}$$

The real ventilation time is prolonged when MEDUMAT Standard a is switched to **Air Mix.**

5.12 Alternative ventilation procedures

If MEDUMAT Standard a ceases to function during a ventilation procedure, the following alternatives can be applied:

Ventilation bags

1. Remove the patient valve from the tube or the mask.
2. Replace it with the ventilation bag, e.g. a Weinmann COMBIBAG WM 11000, and perform manual ventilation.

A ventilation aid

Alternatively, you can perform mouth/mask ventilation with a Weinmann LIFEWAY WM 10580.

Exhaustion of oxygen supply

In emergency situations when the oxygen supply runs out, MEDUMAT Standard a can also function with compressed air.

6. Hygienic preparation

Whenever MEDUMAT Standard a and accessories have been used, they must undergo a hygienic preparation. Observe the instructions regarding use of disinfectant. We recommend gigasept® FF (new) for disinfecting by immersion and terralin® protect for disinfecting by wiping.

Make sure you perform a functional check after every hygienic preparation (note "7. Functional checks" on page 45).

This product may contain disposable items. Disposable items are intended to be used only once. So use these items only once and do **not** reprocess them. Reprocessing disposable items may impair the functionality and safety of the product and lead to unforeseeable reactions as a result of ageing, embrittlement, wear, thermal load, the effects of chemical processes, etc.

6.1 MEDUMAT Standard a

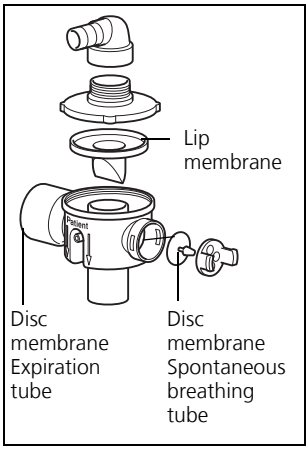
MEDUMAT Standard a's outer casing simply needs to be wiped with a dry or damp cloth.

Never immerse MEDUMAT Standard a in disinfectant or other fluids. Just wipe over with disinfectant. Otherwise damage may be caused to the device, thus endangering users and patients (note "6.6 Cleaning, disinfecting and sterilizing" on page 44).

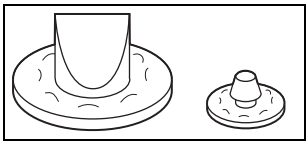
6.2 Patient valve

Always grasp the hoses by their ends. Otherwise you might damage or tear them.

1. Disconnect the patient valve from the hoses.
2. Dismantle the patient valve as shown in the adjacent diagram. It is neither necessary nor permissible to remove the membrane in the spontaneous breathing nozzle for cleaning and disinfection.
3. Clean the components under running water.
4. Brush the parts of the patient valve inside and outside thoroughly, using a normal soft laboratory bottle brush.
5. Carry out sterilization/disinfection.
6. Make sure all internal and external surfaces are thoroughly wetted and free from bubbles. Wait for the full disinfection time to elapse.
7. Then rinse the components thoroughly inside and out with distilled water.
8. Dry the components thoroughly.
9. Reassemble the patient valve.



When reassembling, make sure that the lip membrane is correctly positioned. The patient valve may not function properly if it contains residual water!



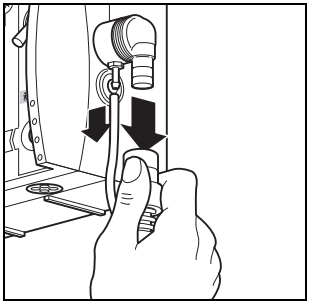
Crinkled, misshapen and sticky lip and valve membranes must be replaced.

10. Always perform a functional check before reusing the valve (note "7.4 Check of patient valve" on page 48).

6.3 Hose system

Caution! Only reusable hose system WM 22520 (scope of supply) is suitable for the hygienic preparation described here. Do **not** subject disposable hose systems WM 28110 (2 m) and WM 28188 (3 m) available as accessories to hygiene preparation. Replace it with a new one.

Ventilation hose



1. Take the ventilation tube and the pressure gauge hose off both connection ports.
   Warning! Take hold of the hoses **at the end** as shown in the drawing, otherwise the hoses may be damaged or pulled off. Seal both ends of the pressure gauge hose.
2. Carry out sterilization/disinfection.
3. Make sure all internal and external surfaces are thoroughly wetted and free from bubbles. Wait for the full disinfection time to elapse.
4. Rinse the ventilation tube thoroughly inside and out with distilled water.
5. Dry the components thoroughly.
6. For reassembling see "4.4 Ventilation hose" on page 22.

Pressure gauge tube

To disinfect the pressure gauge tube of the ventilation tube, proceed as follows:

1. Connect one end of the pressure gauge tube to a sterile disposable 20-ml syringe.

2. Immerse the other end in the dilute disinfectant solution (for gigasept® FF: 6% solution, residence time 15 minutes).
3. Draw the disinfectant solution through the pressure gauge tube into the syringe until the latter is full. Do not flush through the pressure gauge tube in the opposite direction!
4. Detach the syringe from the pressure gauge tube and empty it out completely.
5. Repeat the procedure 5 more times.
6. After disinfection, the pressure gauge tube must be rinsed with distilled water at least 8 times using the same principle.

You can support the subsequent drying process with medical compressed air or medical oxygen.

Then allow the component to dry thoroughly. If any water is left in the pressure gauge tube of the ventilation tube, the device may not function correctly!

6.4 Components and accessories

Masks, hoses and all rubber components should be cleaned in a disinfectant solution:

1. Make sure all internal and external surfaces are thoroughly wetted and free from bubbles. Wait for the full disinfection time to elapse.
2. After disinfection always rinse the components thoroughly with distilled water to prevent any adverse effects from disinfectant residues.
3. Always let the rubber components dry out in the air.

4. Carry out a visual check of the masks and hoses and replace any damaged components.

Silicone ventilation tubes, patient valves (see preceding section) and ventilation masks can also be autoclaved.

This does **not** apply to disposable hose systems WM 28110 (2 m) and WM 28188 (3 m).

6.5 Fittings

In cases where external cleaning of fittings (e.g., pressure reducer, valve) becomes absolutely essential, use only a clean cloth which should either be dry or moistened with clean water.

Never immerse fittings in disinfectant or other fluids. Just wipe over with disinfectant. Fluids must not get into the pressure reducer. Otherwise explosions might occur.

If in exceptional cases you have no alternative but to disinfect by wiping, take particular care to prevent any fluid getting into the pressure reducer.

In addition to the risk of explosion, there is also the risk of disinfectant getting into the patient's respiratory tract with the oxygen and leading to injury.

6.6 Cleaning, disinfecting and sterilizing

The hygienic preparation should be performed on MEDUMAT Standard a and the accessories used as described in the following table.

Always follow the directions for use supplied with the disinfectant. We recommend gigasept® FF (new) for disinfecting by immersion and terralin® protect for disinfecting by wiping. You are recommended to wear suitable gloves (e.g. household or disposable gloves) during disinfection procedures.

For further information on hygiene treatment and a list of all cleaning agents and disinfectants which can be used, please see our Internet brochure at www.weinmann-emergency.com.

Description of component	Cleaning	Disinfection	Rinsing in washing machine	Sterilization
MEDUMAT Standard a	With a dry or damp cloth	Wiping	Not permissible	Not permissible
Patient valve	In warm water with a mild household detergent	Immerse in a weak solution (1)	Rinse program at 95 °C (2)	Steam sterilization at up to 134 °C (3)
Silicone ventilation mask				
Ventilation hose				
Oxygen fittings	With a dry or damp cloth	Wiping	Not permissible	Not permissible
Device outlet port filter upgrade set	Follow the instructions for use for the device outlet port filter upgrade set			
Hose casing, reusable	Wipe with a dry or damp cloth	Rinse cycle 30°C, no spin	Possible during cycle	Not permitted

(1) After disinfection rinse the components thoroughly with distilled water and allow them to dry.
(2) Thermal disinfection in automatic cleansing device.
(3) Steam sterilization at 134 °C with devices to EN 285, dwell time 5 minutes (or 18 minutes at 121 °C).

7. Functional checks

MEDUMAT Standard a must not be used if the functional checks reveal defects or deviations from the selected parameters.

First try to correct the error with the help of the information provided in section "8. Troubleshooting" on page 57. If this is not possible, have the device repaired by the manufacturer Weinmann or by specialists explicitly authorised to do so by same.

7.1 Preparation for functional check

For the functional check, you require:

- patient's hose system
- test bag
- oxygen cylinder
- soap-and-water solution made from non-perfumed soap
- adapter from test set WM 15357

We recommend that you hold reserve stocks of the following items:

- washers for the connections;
- dust filters;
- lip membranes for the patient valve;
- membrane for spontaneous breathing arm;
- membrane for expiration arm.

1. Connect the device to the oxygen cylinder.
2. Connect the patient's hose system to the device.

Note Check the test bag before each functional check. The balloon of the test bag must be undamaged and firmly connected to the connector. Have the test bag serviced at the same time as the device.

7.2 Obligatory checks

Before each use:

- Carry out a functional check.

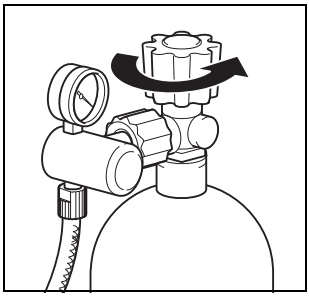
After each use or dismantling:

- Clean, disinfect or sterilize the ventilator and its components (note "6. Hygienic preparation" on page 39);
- Check the:
  - lip membrane in the patient valve
  - valve membrane in the expiration arm
  - valve membrane in the spontaneous breathing arm (note "7.4 Check of patient valve" on page 48). They may be neither crinkled, sticky or misshapen.
- Carry out a functional check.

At least every 6 months, if the ventilator has not been used in the intervening period:

- Carry out a functional check.

7.3 Check for leaks in the system



1. Open the valve of the oxygen cylinder **slowly**. You will now be able to read the pressure in the cylinder from the gauge on the pressure reducer. For example, a reading of 200 bar means that the cylinder is full, 100 bar that it is half full.

   Always change the cylinder in good time, e.g., when the pressure is lower than 50 bar, to ensure that oxygen is available for an adequate period.
2. Close the cylinder valve again.
3. Watch the needle of the gauge on the pressure reducer for approx. 1 Minute. If it stays in the same place, the system is free of leaks. If the needle drops steadily, there is a leak somewhere.

Repairing leaks

Always keep a stock of washers for the connections available.

1. Prepare a soap/water solution using non-perfumed soap.
2. Wet all the screw and hose connections with the solution. Bubbles will form at the site of the leak.
3. Depressurise the system:

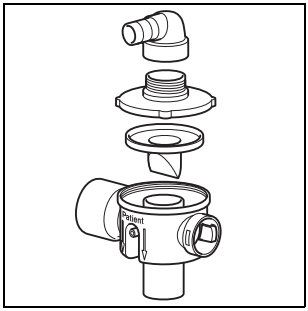
   To do this, first close the oxygen cylinder. Switch on MEDUMAT Standard a briefly until the pressure gauge on the O_2 cylinder reads "**0**". Then switch MEDUMAT Standard a off again.

Important note!
The screw connections on the oxygen supply system must be tightened by hand only.

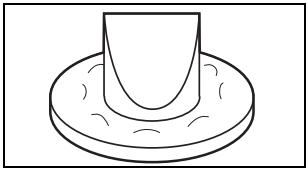
4. If leaks are discovered, the defective components must be changed.
5. After changing, recheck the seal.
6. If it proves impossible to eliminate the leak, the ventilator will have to be repaired.

7.4 Check of patient valve

Checking reusable hose system

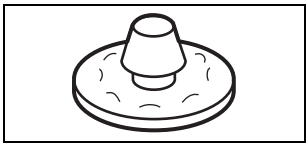


1. Dismantle the patient valve.



2. Carry out a visual check of all the components for cracks or other physical damage.

   Crinkled, sticky or misshapen lip membranes must be changed immediately. They must never be used during ventilation as they can cause serious functional disturbances.



   Also perform a visual check of the valve membranes in the expiration and spontaneous breathing arms. To do so, there is no need to dismantle the valve membranes. Crinkled, misshapen or sticky valve membranes must be replaced, however, as they can lead to considerable malfunctions.

3. Reassemble the patient valve.

   When reassembling, make sure that the lip membrane is correctly positioned.

Checking disposable hose system

Visual inspection

Check the following items by inspecting the patient hose system:

- the patient valve and the connectors may not exhibit any external damage, cracks or dirt.
- the hose connections must be located firmly and securely on the connecting pieces.
- the patient valve and emergency air membranes may not exhibit any damage or deformation.

7.5 Checking the minute volume

Check the ventilation frequency

1. Open the valve of the oxygen cylinder **slowly**.
2. Switch on MEDUMAT Standard a.
3. Select the following settings.
   – Frequency: 8 min^{-1}
   – MV: 5 l/min
   – Ventilation pressure (P_{max}): 60 mbar
   – Air Mix: switched on.
4. Count the number of inspiration phases over a period of one minute exactly. The number should lie between 7 and 9.
5. Turn up the frequency to 40 min^{-1}(right limit).
6. Count the number of inspiration phases over a period of one minute exactly. The number should lie between 38 and 42.
7. Switch MEDUMAT Standard a off again.

Check the breath volume

1. MEDUMAT Standard a must be switched off and the oxygen cylinder must be open.
2. Place the bag from test kit WM 15382 on to the patient valve.
3. Select the following settings:
   – Frequency: 8 min^{-1}
   – MV: 8 l/min
   – P_{max}: 60 mbar
   – No Air Mix

Note

For the test, place the test bag on a firm base. During the expiration phase, press the test bag with the flat of your hand until the volume is completely expelled through the patient valve.

Inspiration stroke = MV/frequency = 8/8 = 1

4. Switch on MEDUMAT Standard a. The test bag must be completely inflated at the end of the inspiration phase. This ensures a breath volume of 1 litre per inspiration stroke. At all events the test bag is not sufficiently inflated if a disconnection alarm is set off. During the expiration phase you must simulate the expiration stroke of the test bag by hand.
5. Switch off MEDUMAT Standard a.

Risk of injury if test bag removed incorrectly!

If the test bag is removed incorrectly, the connector of the test bag may remain on the patient's hose system. The increased airway resistance on inspiration which results may injure the patient.

   – When removing the test bag, always take it off at the connector.

6. Detach the test bag from the patient valve.
7. Select the following setting:

- Frequency 30 min^{-1}
- MV 3 L/min
- P_{max} 60 mbar
- No Air mix

8. Switch on MEDUMAT Standard a and close the patient connection to the patient valve. A stenosis alarm should be set off.
9. Switch MEDUMAT Standard a off again.

Note Instead of the test bag you can also use a respirometer (see accessories) to check the breath volume.

7.6 Check of maximal ventilation pressure

Important note!
For this test, always set the tumbler switch to "No Air Mix". For physical reasons, losses occur at the injector if the switch is set to "Air Mix".

1. MEDUMAT Standard a must be switched off and the oxygen cylinder must be open.
2. Check that the needle of the manometer on MEDUMAT Standard a is standing at "**0**" (note "8.3 Adjustment of manometer" on page 61).
3. Place the bag from test kit WM15382 on to the patient valve.
4. Select the following settings:
   - Frequency: 8 min^{-1}
   - MV: 7 l/min
   - P_{max}: 20 mbar
   - No Air Mix

Important note!
Use the test bag. If you try to keep the tube connector closed with your hand, the needle will swing over and it will be impossible to obtain an accurate reading.

5. Switch on MEDUMAT Standard a.

   During this test you must not assist the expiration stroke. The oxygen must remain unpressurized in the test bag. In this way the pressure gradually builds up. Between 15 and 25 mbar MEDUMAT Standard a should set off the **Stenosis** alarm.
6. Switch off MEDUMAT Standard a.

Risk of injury if test bag removed incorrectly!

If the test bag is removed incorrectly, the connector of the test bag may remain on the patient's hose system. The increased airway resistance on inspiration which results may injure the patient.

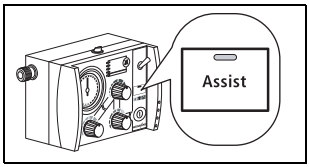
– When removing the test bag, always take it off at the connector.

7. Detach the test bag from the patient valve.
8. Repeat this test for a maximum ventilation pressure of 60 mbar with the following setting:
   – Frequency: 8 min^{-1}
   – MV: 9 l/min
   – P_{max}: 60 mbar
   – No Air Mix

   During this test you must not assist the expiration stroke. The oxygen must remain unpressurized in the test bag. In this way the pressure gradually builds up. Between 55 and 65 mbar MEDUMAT Standard a should set off the **Stenosis** alarm.

7.7 Check assisted ventilation

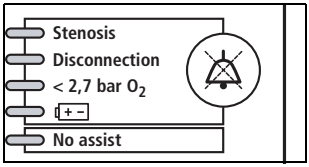
1. The MEDUMAT Standard a must be switched off and the oxygen cylinder must be open.
2. Plug the test bag with adapter of test set WM15382 onto the patient valve.
3. Select the following setting:
   – frequency: 8 min^{-1}
   – MV: 8 l/min.
   – P_{max}: 60 mbar
   – Air Mix



4. Switch on the MEDUMAT Standard a.
5. Press the **Assist** key to switch on „Assisted Ventilation“ mode.

   „Assisted Ventilation“ mode is indicated by the flashing green LED in the **Assist** key.
6. Wait 2 inspiration phases.

   The **No Assist** alarm should then be triggered: the yellow **No Assist** LED in alarm field flashes. The acoustic alarm comes on only after 1 minute.



7. Simulate inspiration pulses with one hand by pressing the test bag together several times.
   - The pointer of ventilation pressure gauge **1** must go into the negative range during the simulation. Negative pressure must be at least – 0.8 mbar;
   - As soon as the MEDUMAT Standard a detects the pulse within the time window, the yellow **No Assist** LED goes out. This ensures that the MEDUMAT Standard a recognizes trigger pulses.
8. Switch the MEDUMAT Standard a off again.

Risk of injury if test bag removed incorrectly!

If the test bag is removed incorrectly, the connector of the test bag may remain on the patient’s hose system. The increased airway resistance on inspiration which results may injure the patient.

- When removing the test bag, always take it off at the connector.

9. Detach the test bag from the patient valve.

7.8 Check of alarm systems

Stenosis

Important note!
The stenosis and disconnection alarms are set off only when the cause of the alarm is repeated in two successive inspiration phases. This prevents triggering of the alarm by a very short-lived dysfunction.

1. Open the oxygen cylinder.
2. If necessary: Remove the tube or the ventilation mask from the patient valve.
3. Switch on MEDUMAT Standard a
4. Set max. ventilation pressure regulator at 60 mbar.

Important note!
In this test the rise in pressure is strong enough to make the manometer needle overswing considerably. There are technical reasons for this and it does not indicate any malfunction.

5. Keep the ventilation connector on the patient valve closed with the flat of your hand during two successive inspiration phases. The **Stenosis** alarm should be set off.
6. Switch the MEDUMAT Standard a off again.

Interruption of breathing system (Disconnection)

1. Open the oxygen cylinder.
2. If necessary: Remove the tube or the ventilation mask from the patient valve.
3. Switch on MEDUMAT Standard a
4. Set max. ventilation pressure regulator at 60 mbar.

Important note!
In this test the rise in pressure is strong enough to make the manometer needle overswing considerably. There are technical reasons for this and it does not indicate any malfunction.

5. Keep the ventilation connector on the patient valve closed with the flat of your hand during two successive inspiration phases. The **Stenosis** alarm should be set off.
6. Then remove your hand. The **Stenosis** alarm should cease (LED stops flashing, acoustic alarm stops sounding).

   After two successive inspiration phases the **Disconnection** alarm should be set off.

7. Switch the MEDUMAT Standard a off again.

Drop in O_2 pressure (<2,7 bar O_2)

1. Open the valve of the oxygen cylinder **slowly**.
2. Switch on MEDUMAT Standard a.
3. Close the valve on the oxygen cylinder. When the oxygen pressure in the system has sunk below 2.7 bar, the **<2,7 bar O_2** alarm should be set off.
4. Switch the MEDUMAT Standard a off again.

Energy supply ( )

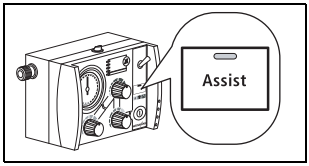
The alarm signalling a failing battery is checked automatically in the self test that runs when MEDUMAT Standard a is switched on.

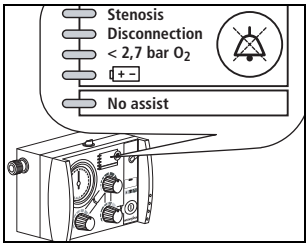
The energy supply is in order if no alarm is set off when the valve on the oxygen cylinder is opened and MEDUMAT Standard a is switched on and starts to function correctly.

Failure to trigger (No Assist)

1. The oxygen cylinder must be open.
2. Switch on the MEDUMAT Standard a.
3. To switch on „Assisted Ventilation“ mode, press key **Assist**.

   „Assisted Ventilation“ mode is indicated by the flashing green LED in key **Assist**.





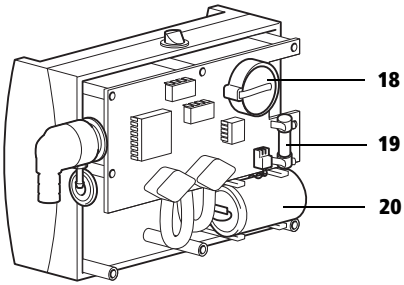
4. After the second ventilation stroke, the yellow alarm message „No Assist“ must flash in alarm field. The acoustic alarm sounds after a delay of 1 minute if the fault has not been eliminated in the meantime.
5. Switch the MEDUMAT Standard a off again.

8. Troubleshooting

Defect	Cause of defect	Elimination
MEDUMAT Standard a cannot be switched on	MEDUMAT Standard a defective	Arrange for repair
	Battery failure	Replace both batteries (8.1, page 59)
Stenosis alarm (excessive airway resistance)	Obstruction of airways	Remove obstruction.
	Tube incorrectly positioned	Correct tube position.
	P_{max} set too low	Adapt P_{max}.
	Kink or obstruction in ventilation hose/mask/tube	Remove kink or obstruction; if necessary replace parts.
	MEDUMAT Standard a defective	Arrange for repair
Disconnection alarm (interruption of breathing system)	Ventilation hose leaking/slipped out	Check connections
	Tube/mask incorrectly positioned	
	Pressure gauge hose leaking/ slipped out/not connected	
	MEDUMAT Standard a defective	Arrange for repair
< 2,7 bar alarm (oxygen pressure too low)	Oxygen cylinder nearly empty	Change O_2 cylinder (4.3, page 21)
	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 (8.1, page 59)
	Fuse defective	Replace fuse (8.2, page 60)
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 (8.4, page 61))

Defect	Cause of defect	Elimination
Visual alarms flashing but no acoustic alarm.	Short-term electronic disruption	Switch off and on again. If error recurs, arrange for repair.
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 low	Wrongly selected ventilation parameter	Check ventilation parameters
	MEDUMAT Standard a defective	Arrange for repair
Unusually high oxygen consumption	Leak in oxygen supply	Seek and eliminate leak (7.3, page 47)
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 (8.3, page 61)
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(see "7.5 Checking the minute volume", item 6–9)	Patient valve not working properly	Check lip membrane

8.1 Batteries



18: Button cell for auxiliary power

19: Fuse protecting against internal short circuit

20: 3.6 V lithium battery for main power supply to MEDUMAT Standard a

Caution!
Batteries and rechargeable batteries do not belong in domestic waste! Every consumer is obliged by law to hand in all batteries and rechargeable batteries, regardless of whether they contain harmful substances or not, at a community/local collection point or at a store so that they can be disposed of in an environmentally-friendly way.

MEDUMAT Standard a is fitted with two batteries which should always be replaced simultaneously. A CR2430 button cell supplies auxiliary power to the electronics if the main batteries fail. This makes it possible to set off an alarm if the main batteries fail. At the same time, the MEDUMAT Standard a switches to expiration.

The battery capacity is calculated to be sufficient for power requirements under normal operating conditions for the full period between servicing every two years. All the batteries are replaced at every two years during servicing.

We recommend having the batteries changed only by Weinmann the manufacturer or by qualified persons expressly authorized by that company. Special precautions need to be taken during the change in order to prevent disruption of the electronics.

The following action should be taken in emergencies:

Battery replacement

Important note!
In order to prevent damage to the electronics, avoid all contact with the printed circuit board unless adequate protection against electrostatic charge is available.

1. Unscrew the back panel of MEDUMAT Standard a (6 cross-slotted screws).
2. Tilt the CR2430 button cell slightly to remove it.
3. Insert a new button cell.

Important note!
The 3.6 V lithium battery is specially designed for this ventilator. Only batteries supplied by Weinmann should be used.

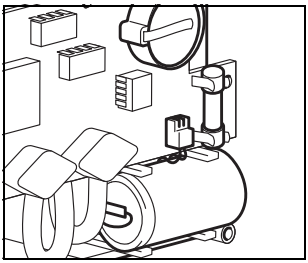
4. Remove the plug from the printed circuit board and lift the 3.6 V lithium battery out of its holder.
5. Insert the new battery.
6. Replace the back panel of MEDUMAT Standard a.

8.2 Cut-out system

MEDUMAT Standard a is fitted with a fusible cut-out to protect it against internal short circuits.

Changing a fuse

Important note!
In order to prevent damage to the electronics, avoid all contact with the printed circuit board.



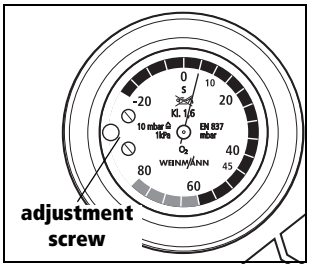
1. Unscrew the back panel of MEDUMAT Standard a (6 cross-slotted screws).
2. Remove the defective fuse.
3. Insert a new fuse. Use only officially approved fuses (see "11. Technical data" on page 68).

4. Replace the back panel and carry out a functional check (see "7. Functional checks" on page 45).

8.3 Adjustment of manometer

When MEDUMAT Standard a is switched off and the valve of the oxygen cylinder is closed, the manometer needle should read exactly "**0**".

Proceed as follows to adjust the needle:

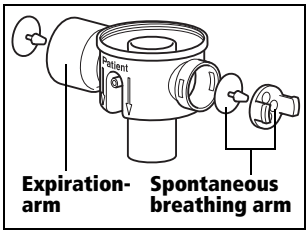


1. Carefully pry off the plastic cover of the adjustment screw.
2. Adjust the position of the needle by turning the adjustment screw with a small screwdriver (e.g. a watchmaker's screwdriver).
3. Reinsert the plastic cover.

8.4 Change valve membrane in patient valve

If one of the valve membranes in the expiration or spontaneous breathing arms of the patient valve is crinkled, sticky or misshapen, it must be changed.

Spontaneous breathing arm



1. Take the spontaneous breathing insert out of the patient valve. To do so, push the two locking lugs out of their seat, using a small screwdriver, for example.
2. Pull the defective valve membrane out of the spontaneous breathing insert using pointed tweezers.

3. Put in a new valve membrane.
4. Push the spontaneous breathing insert back into the patient valve.

Expiration arm

1. Use pointed tweezers to pull the defective valve membrane out of the expiration arm.
2. Insert a new valve membrane.

   Note:
   This applies only to the reusable system.

9. Servicing

9.1 Intervals

Have the cleaned and disinfected device serviced at regular intervals. Servicing, safety checks ([sicherheitstechnische Kontrollen or STKs] in accordance with §6 of the German law governing the owners/operators of medical devices - only applies to Germany) and maintenance measures such as servicing and repairs may only be performed by the manufacturer or by specialists expressly so authorized by the manufacturer.

Maintain the following intervals:

Interval	**Parts affected**	**Person to carry out**
Every 2 years (service and safety check)	– System components: e.g. carrying systems, tube connections – Accessories – Test bag – Oxygen fittings – Specified wear parts relevant to safety	Manufacturer or specialists expressly so authorized by the manufacturer
Every 4 years	– Oxygen fittings – Specified wear parts relevant to safety	
Every 10 years	Steel and aluminum oxygen cylinders	

* Disposable hose systems WM 28110 (2 m) and WM 28188 (3 m) do not require any maintenance.

9.2 Sending in device

Warning!
Risk of infection from contaminated parts during maintenance measures!

The device, components and accessories may be contaminated and infect specialist staff with bacteria or viruses when they are carrying out maintenance measures.

- Clean and disinfect device, components and accessories.
- Do not send in potentially contaminated parts.

1. Remove components and accessories.
2. Clean the device, components and accessories (note "6. Hygienic preparation" on page 39).
3. Send device, and if necessary components and accessories, to WEINMANN Emergency or to specialist staff expressly authorized by WEINMANN Emergency.

Note If you send in obviously contaminated parts, these will be disposed of by WEINMANN Emergency or by specialist staff expressly authorized by WEINMANN Emergency at your expense.

9.3 Storage

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

1. Clean and disinfect the ventilator (note "6. Hygienic preparation" on page 39).

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.

Note With disposable hose systems WM 28110 (2 m) and WM 28188 (3 m), observe the storage temperature of -40 °C to 70 °C at a rel. humidity of 15 % to 95 %. These products can be stored for a maximum of 2 years.

9.4 Disposal

Do not dispose of the device with domestic waste. For proper disposal of the device and its components, please contact a certified waste disposal site for electronic goods. Ask your Environmental Officer or local council for the address. The device packaging (cardboard and inserts) can be disposed of in paper recycling facilities.

Disposing of batteries/recheargable battieres

Used batteries/rechargeable batteries may not be disposed of in domestic waste. Contact Weinmann or your local authority waste disposal department.

10. Supply schedule

10.1 Standard supply schedule

1.	MEDUMAT Standard a, complete	WM	22800
	consisting of:		
–	MEDUMAT Standard a	WM	22810
–	Description and Operating instructions	WM	16677
–	Abbreviated directions for use	WM	16687
–	Set of mounting attachments	WM	15288
–	Ventilation hose and patient valve with spontaneous breathing facility (reusable)	WM	22520
–	Ventilation mask for adults, size 5	WM	5074
–	Testing kit for checking functions	WM	15382

10.2 Accessories

The following accessories are not included in the standard supply schedule.

1.	Oxygen cylinder, 2 liters	WM	1822
2.	Aluminium lightweight oxygen cylinder, 2 liters	WM	1814
3.	WM pressure reducer	WM	30301
4.	WM pressure hose 10 bar with G 3/8 connecting nozzle, at the other end optional G 3/8 connection nut or connector socket to oxygen supply		
5.	Permanent fixing kit for MEDUMAT Standard a	WM	15196
6.	Permanent fixing kit for MEDUMAT Standard a plus 1 module	WM	15198
7.	Permanent fixing kit for a second module	WM	15199
8.	Wall mounting for STATION MEDUMAT	WM	22550
9.	PEEP valve with connection socket	WM	3215

10. Patient hose system and patient valve 2 m (disposable)	WM	28110
11. Patient hose system and patient valve 3 m (disposable)	WM	28188
12. Ventilation mask, transparent with inflatable silicone rim		
– for children and adolescents, size 3	WM	5082
13. Rendell-Baker silicone ventilation mask:		
– for children aged approx. 3 – 12 years, size 3	WM	5063
14. Device outlet port filter upgrade set	WM	15780
15. Hose casing	WM	8297

10.3 Spare parts

You can order replacement parts separately if required. You can obtain a current list of replacement parts either on the Internet at www.weinmann-emergency.com or through your specialist dealer.

11. Technical data

11.1 Device

	MEDUMAT Standard a
Dimensions LxBxH in mm	190x110x90 inc. connections
Weight incl. accessories	approx. 1.1 kg
Prod. category 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/transport Temperature range Humidity Air pressure	 –40 °C to +70 °C 15 % to 95 % 70 kPa[(a)] to 110 kPa
Electromagnetic compatibility (EMC) following EN60601-1-2 and EN 794-3: – Interference suppression – Interference immunity	 EN 55011 EN 61000-4 Parts 2, 3 and 8
Control	Timing pulse, constant pressure, constant volume
Gas input	Medicinal oxygen
Operating pressure	2.7 to 6.0 bar [(b)]
Minimal gas volume required	70 l/min O_2
Insp-exp. ratio assisted ventilation	1:1.67 1:1 to 1:2.33 variable

	MEDUMAT Standard a
Ventilation frequency	infinitely variable from 5 to 40 min^{-1}
Minute volume (MV)	infinitely variable from 3 to 20 l/min
Tiidal volume	75 to 4,000 ml, infinitely variable
MV tolerances: room temp. (20 °C) –18 °C to +60 °C	 ±20% ±20%
max. ventilation pressure	infinitely variable from 20 to 60 mbar [(c)]
O_2 concentration – Air Mix – No Air Mix	 see page 72 100% O_2
High-pressure gas connection	External thread G 3/8
Connection to ventilation tube	External diameter 13 mm
Power supply life expectancy 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
F1 fuse	T500 L250V

(a.) Under normal atmospheric conditions, 70 kPa correspond to a maximum altitude for use of approx. 3,000 meters.
(b.) 1 bar ≙100 kPa
(c.) 1 mbar ≙1 hPa

	MEDUMAT Standard a
Degree of protection against water	IP24
Standards applied	EN 60601-1 EN 60601-1-2 EN 794-3 + A2
Alarm sound pressure	54 dB A
Manometer accuracy	Class 1.6

	MEDUMAT Standard a
Patient valve resistance (EN 794-3): Inspiration Expiration	 <6 mbar at 60 l/min <6 mbar at 60 l/min
Elasticity of breathing system	Negligible

CE 0197

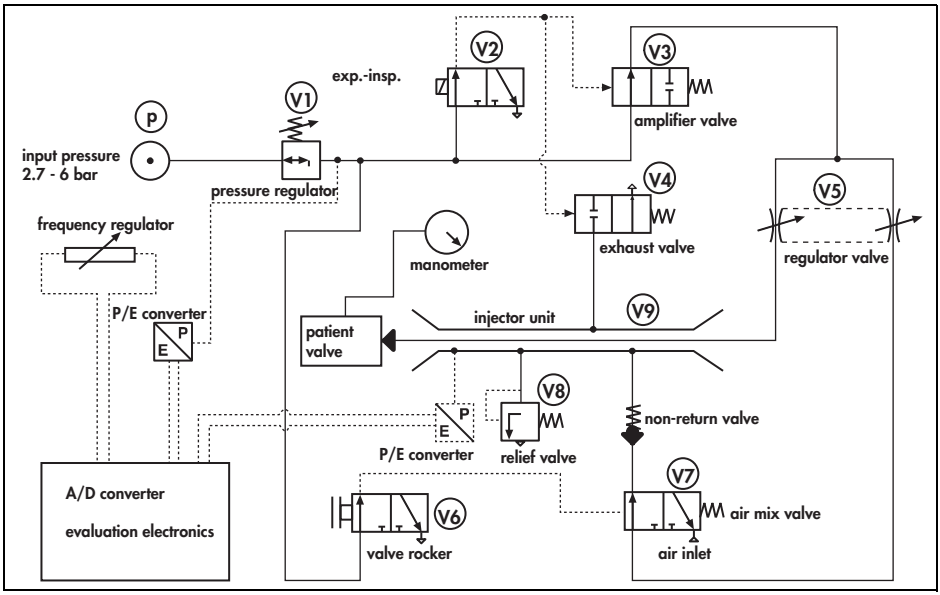
Subject to technical change without notice.

11.2 Patient's hose system

	Patient's hose system (reusable), 2 m WM 22520	**Patient's hose system (disposable), 2 m WM 28110**	**Patient's hose system (disposable), 3 m WM 28188**
Operation: Temperature range Humidity:	-18 °C to +60 °C 15% to 95%		
Storage	-40°C to +70°C		
Patient valve – inspiration tube – mask/endotracheal tube	15 mm internal tapered connector 22 mm external tapered connector EN 5356-1		
Patient valve – expiration tube	30 mm external tapered connector EN 5356-1		
Ventilation tube connection	WEINMANN Emergency-specific		
Standards applied	EN 794-3		
Patient valve resistance (as per EN 794-3): Inspiration Expiration Spontaneous respiration	 <6 mbar(1) at 60 l/min <6 mbar(1) at 60 l/min 1.5 mbar(1) at 30 l/min	 <6mbar(1) at 60 l/min <6mbar(1) at 60 l/min 1.36 mbar(1) at 30 l/min	 <6mbar(1) at 60 l/min <6mbar(1) at 60 l/min 1.51 mbar(1) at 30 l/min
Patient valve dead space	12.8 ml	8 ml	
Materials used	PSU, silicone	EVA, K-Resin®, PS, PVC (DEHP-free), silicone	
Elasticity of breathing system	negligible		

(1) 1 mbar ≙ 1 hPa

11.3 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 will open.

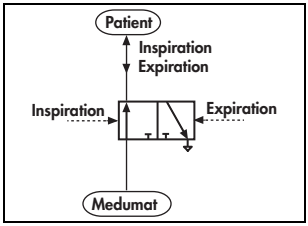
Inspiration/Air Mix

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



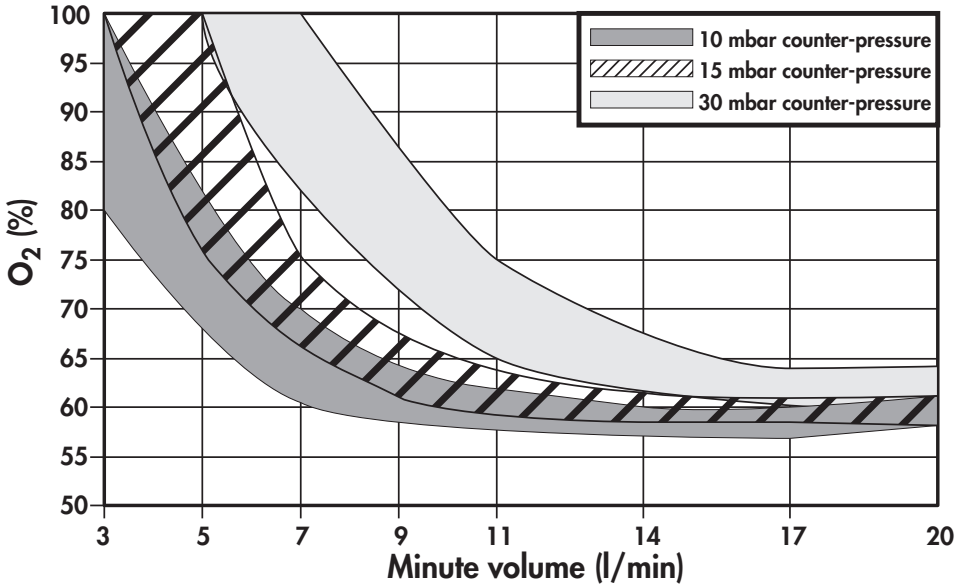
The respiratory gas flows into the patient's airways during inspiration. The expiratory pressure then switches the valve over and enables the patient to breathe out.

11.4 Resistance to interference

Resistance to radio interference is tested to EN 794-3 at 10 V/m. Malfunctions may occur at higher field strengths.

11.5 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.



11.6 Switching from Air Mix to No Air Mix

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**.

12. Warranty

WEINMANN Emergency gives the customer a limited manufacturer warranty on new original WEINMANN Emergency products and any replacement part fitted by WEINMANN Emergency in accordance with the warranty conditions applicable to the product in question and in accordance with the warranty periods from date of purchase as listed below. The warranty conditions can be downloaded from www.weinmann-emergency.com on the Internet. We can also send you the warranty conditions on request.

In the event of a claim under warranty, contact your specialist dealer.

Product	Warranty period
WEINMANN Emergency devices including accessories (except masks) for oxygen medicine and emergency medicine	2 years
Masks including accessories, rechargeable batteries, batteries (unless quoted differently in the technical documentation), sensors, tube systems	6 months
Disposable products	None

13. Declaration of conformity

WEINMANN Emergency Medical Technology GmbH + Co. KG declares herewith that the product complies fully with the respective regulations of the Medical Device Directive 93/42/EEC. The unabridged text of the Declaration of Conformity can be found on our website at www.weinmann-emergency.com

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WM 16677m 05/2016 EN