

# F 120 GLOBETROTTER “GT”

## PAEDIATRIC VENTILATOR



## Operating instructions

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Subject to technical changes  
Status: February 2006  
Rev.: 2.1

## Content

1. NOTICE.....	5
2. PREFACE .....	6
Optional Monitoring .....	7
3. RANGE OF APPLICATION.....	8
4. SPECIFICATIONS OF THE REANIMATOR F 120 GT.....	9
5. PRINCIPLE OF PERFORMANCE.....	11
6. DESCRIPTION OF PERFORMANCE. ....	13
External Oxygen Supply – Incubator .....	19
7. DESCRIPTION OF CONTROL ELEMENTS AND ELEMENTS .....	20
7.1 Twin flowmeter.....	20
7.2 O <sub>2</sub> - Monitor .....	21
7.3 Control component and indicators .....	22
7.4 Monitor.....	23
7.5 Patient component P1 .....	24
7.6 Patient tube system.....	27
8. TESTING PRIOR TO OPERATION.....	29
8.1 Monitoring .....	29
8.2 Inspiratory pressure (Plateau), expiratory pressure (PEEP).....	29
8.3 Tightness .....	29
8.4 Heater and tube heating system.....	30
8.5 O <sub>2</sub> -Monitor .....	30
8.6 Intake filter .....	30
9. DESCRIPTION OF MODES OF VENTILATION .....	31
9.1 Controlled ventilation, IMV .....	31

<b>9.2 Manual ventilation and inflation.....</b>	<b>32</b>
<b>9.3 CPAP - ventilation.....</b>	<b>33</b>
<b>10. CLEANING AND STERILIZATION .....</b>	<b>34</b>
<b>11. INSPECTION AND MAINTENANCE.....</b>	<b>35</b>
<b>12. ACCESSORIES LIST / SPARE PARTS F 120 GT .....</b>	<b>36</b>
<b>F120GT Ventilator Replacement Part.....</b>	<b>36</b>
<b>NeoSid Monitor Accessories + disposables.....</b>	<b>36</b>

## 1. NOTICE

1. Pursuant to Medical Device Directive 93/42, the apparatus must only be operated by trained personnel. Prerequisite is an exact knowledge of the operating instructions.
2. The apparatus is only intended for use as specified in the operating instructions.
3. The apparatus must be inspected periodically by trained personnel.
4. The F. STEPHAN GmbH prescribes a semi-annual inspection and maintenance by an authorised service technician.
5. A performance test has to be carried out prior to each putting into service.
6. The F. STEPHAN GmbH will not be liable for damages resulting from faulty operation due to non-observance of the operating-instructions or from use, for which the apparatus is not earmarked.
7. If possible, neither antistatic nor electrically conductive tubes should be used.
8. Prior to each putting into service a performance test has to be carried out by activating the key „AUTO TEST“. In doing so, all luminous fields must illuminate, an intermittent audible alarm must sound five times and the valve must be activated five times.
9. An apparatus for manual ventilation, independent from the Reanimator F 120 GT must be close at hand.
10. The Reanimator F 120 GT must only be operated with the genuine by-pack spare-parts of STEPHAN or with those parts, which are recommended by the manufacturer.
11. The conveying capacity of the built-in compressor changes with 12 V (DC) operation.

### **WARNING**

**The Reanimator must not be used with, respectively in connection with inflammable anaesthetic agents.**

**If the ambient temperature rises above 41°C the humidifier heater should be switched off**

**The Reanimator F 120 GT is provided with an internal battery. To guarantee an optimum charge of the battery, the apparatus must always be connected to the current supply and mains switch on the apparatus plug must be in „ON“-position during stand-by periods.**

**With an optimum charge of the battery, an operating time of at least 2 hours is secured. The time to recharge the discharged battery takes at least 20 h.**

### **NOTE:**

**An external 12v supply can be connected using the external dc cable.**

## 2. Preface

The STEPHAN Reanimator is a ventilator unit for neonatal and perinatal short-term ventilation. It operates time-controlled, flow-constant and pressure-limited for controlled IMV-ventilation as well as flow-constant and pressure-limited for CPAP-ventilation and manual ventilation.

Inspiration time is adjustable from 0.25 to 2 seconds; expiration time is adjustable from 0.25 to 30 seconds. Flow is adjustable from 0 to 20 l/min; respiratory pressure is adjustable from 15 to 60 cmH<sub>2</sub>O

The frequency indicator (digital) indicates, according to the setting, with controlled ventilation (IMV) the respiratory rate of 2 to 120 breaths per minute (BPM). In operating mode CPAP the display shows three bars (---).

Oxygen and air are mixed in the attached twin flowmeter. Oxygen concentration is adjustable from 21 to 100% O<sub>2</sub>. An O<sub>2</sub>-monitor with adjustable minimum- and maximum **alarm-value** monitors the oxygen concentration with visual and audible signals.

The monitor supervises visually and audibly failure of mains power and gas supply as well as disconnection and stenosis. As well as the Auto-Test system the electronics of the respirator are permanently supervised by a Watchdog system.

The apparatus is provided with a heater for warming the respiratory gas. The heater consists of the heater cartridge for humidification of the respiratory gas as well as of the heated tube system to stabilise temperature and to prevent forming of condensate water. The heating system can be switched on and off.

The patient component P 1 consists of the heated humidifier for the respiratory gas, PEEP- and inspiration-pressure valve and can be autoclaved at up 134°C. A compressor is integrated in the Reanimator F 120 GT, making a self-supporting supply with compressed air possible. It directly and permanently supplies the F 120 GT so that no external supply with compressed air need be connected. In addition to the 230 V mains supply it is possible to connect the F 120 GT to an external electric board network and to operate the Reanimator on 12V (DC). An internal battery provides the power supply, when no mains supply, respectively board network is available. Switching over to the available power supply ensues automatically and is indicated.

### **Optional Monitoring**

The F 120 GT can be equipped with an optional Monitor NeoSid plus. This monitor is able to measure heart- and respiration signs of the patient during transportation.

The EKG- and respiratory signals are detected due to electrodes attached to the body of the patient.

By using the unique Massimo technology oxygen saturation of the patient is detected and controlled.

The large, backlit display is able to show digital information as well as graphical indication by means of SpO<sub>2</sub>-, EKG- and respiration-impedance curves.

### 3. Range of application

The Reanimator F 120 GT is a ventilator for short-term and emergency ventilation of premature infants, neonates and infants.

It is used in the case of insufficiency in the lungs of neonates due either to immaturity, disease or failure of the respiratory system.

Due to the independence of any distribution voltage the Reanimator F 120 GT is designed to be operated as part of the **TI 5000 Globe Trotter Neonatal Transport System**.

The internal battery provides an operation-time of at least 2 hours independent from distribution voltage at max loading capacity.

**Caution:**

**The Reanimator F 120 GT is not designed for long term intensive care ventilation.**

## 4. Specifications of the Reanimator F 120 GT

**Modes of operation:**

- IMV (controlled ventilation)
- CPAP (spontaneous respiration)

**Possible settings:**

Inspiration time adjustable	0,25 to 2 seconds
Expiration time adjustable	0,25 to 30 seconds
O <sub>2</sub> -flow (constant) adjustable	0 to 10 l/min
Air-flow (constant) adjustable	0 to 10 l/min
Oxygen concentration adjustable	21 to 100% O <sub>2</sub>

Patient component

Expiratory pressure (PEEP) adjustable	0 to 15 cmH <sub>2</sub> O
Inspiratory pressure (Plateau) adjustable	15 to 60 cmH <sub>2</sub> O
Heated humidification	12 V 10 Watt

Heated tube system

Power consumption	12 V 10 Watt
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Monitor

Disconnection	Visual and audible alarm in case 12 cmH <sub>2</sub> O are not reached after expiration time + maximum inspiration time
Stenosis	Visual and audible alarm if respiratory pressure does not fall below 12 cmH <sub>2</sub> O 2,2 seconds after end of inspiration time
Failure of power supply:	Audible alarm for 120 seconds
Fault of Reanimator-electronics:	Visual and audible alarm until fault has been eliminated.
Distribution voltage:	Indication of the actual distribution voltage
Testing program „AUTO-TEST“:	Performance test of all indicators, alarms and of the valve.
Mute of alarm:	2-min suppression of audible alarm

**Oxygen-monitor**

Digital display:	21 to 99% O <sub>2</sub> of the respiratory gas
Maximum O <sub>2</sub> -limitation adjustable:	21 to 99% O <sub>2</sub> , visual and Audible warning in case of exceeding.
Minimum O <sub>2</sub> -limitation adjustable:	21 to 99% O <sub>2</sub> , visual and audible warning in case of falling below.
Automatic calibration:	Only in case of saturation with compressed air.

**Indicators:**

Respiratory pressure, gauge	-10 to 60 cmH <sub>2</sub> O
Frequency with IMV (digital)	2 to 120 respirations per minute (BPM)

**Power supply:**

230V/50 mains  
12V (DC) external  
12V (DC) internal by battery

**Protective transformer:**

Single phase separating transformer, power consumption 70 VA

**Protective class:**

I Type B

**Protective category:**

IP20

**Weight:**

app. 18 kg

**Measurements:**

L 120 x H 300 x D 210 mm

## 5. Principle of performance

The Reanimator F 120 GT primarily works time-controlled and pressure-limited according to the continuous-flow-principle. The fresh gas, as set on the flowmeter unit, flows during inspiration and expiration. To avoid unintended adjustments of the gas flow the knobs of the flow control valves are different due to the gas type and are covered by a metal frame.

The filling of the lungs during inspiration is accomplished by closing of the expiration valve. For manual ventilation, the expiration valve can be closed by hand pushing the red button of the expiratory valve. If the set inspiratory pressure limit - inspiratory pressure plateau - is reached prior to the end of the selected inspiration time, the surplus gas is evacuated via the mechanical inspiratory pressure valve.

A second safety valve to avoid excessive patient gas pressures is positioned at the rear of the F 120 GT. It is set to 40 cmH<sub>2</sub>O at a gas flow of 5 l/min.

Expiration is effected by opening the expiration valve. Hereby the lungs evacuate due to the decrease of pressure. Expiratory gas and fresh gas together are evacuated via the expiration valve.

From this results the following important consistency, common to all constant-flow-appliances:

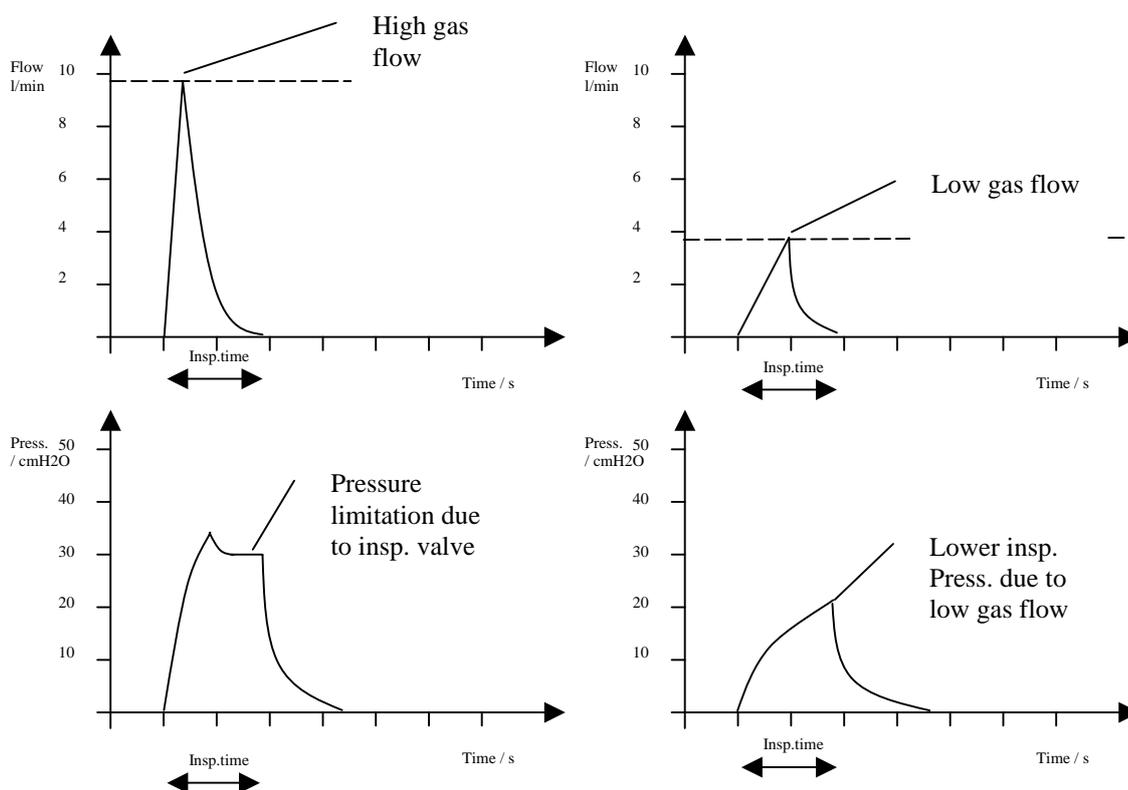
The set continuous gas flow bypasses even during the expiration cycle the y-piece of the patient. That bypass flow washes out the exhaled carbon dioxide (CO<sub>2</sub>) of the patient.

The rate of the gas flow should be adjusted minimum to the inspiratory peak flow of the patient (approx. 2-5 l/min ). Excessive gas flows will increase the work of breathing of the patient, as does too low a gas flow.

The minute volume as set on the flowmeter unit is the maximum quantity of fresh gas available to the patient for the period of one minute. Dependent on the set respiratory cycle (inspiration time + expiration time, respiratory time ratio) the patient receives only part of the set minute volume, since part of the fresh gas is lost during expiration and when the pressure plateau has been reached and consequently is no longer available to the patient. From this follows, that the set minute volume on the flowmeter unit must always be higher than the inspiratory minute volume that the patient is supposed to receive.

Dependent on the system this results, according to the set flow, in an increase of the end-expiratory pressure, indicated on the pressure gauge.

Due to the danger of hyperextension of the lungs of babies and infants, ventilation with pressure limitation is decisive. To administer a sufficient volume of gas under this limitation, a constant flow is offered. This may be more than the patient is able to take in. Therefore, different respiratory patterns may result.

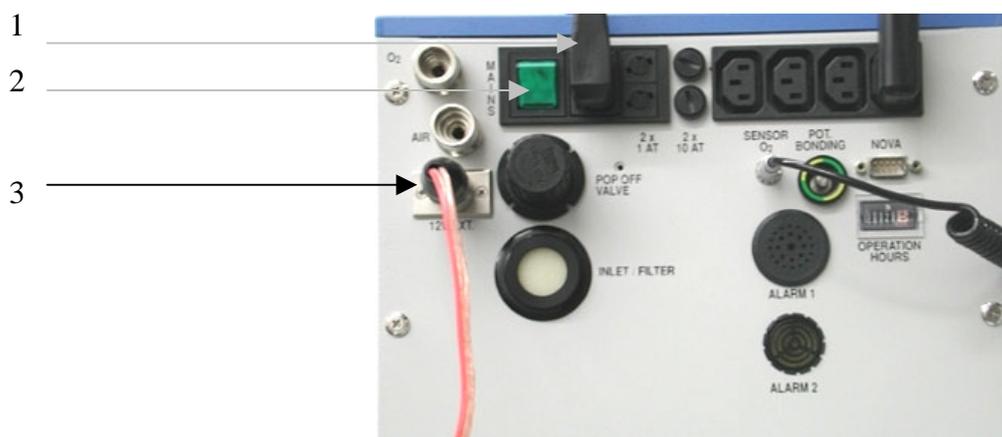


With an increased offer of flow, the pressure limit is reached fast; here the airway resistance caused by the development of turbulences becomes especially perceptible. Flow in the trachea remains on a uniform high level only for a short period of time, since the lungs with low compliance keep filling.

With a low offer of gas flow the set pressure limit is reached later. Here the compliance of the lungs is decisive. It takes a longer time until the pressure limit is reached and the flow, which in this case develops less turbulence, remains almost constant through a long period of the inspiration time.

## 6. Description of performance.

The Reanimator must be connected to the mains 230 V by means of the apparatus plug (picture1/item1) and the attached connecting cable. The mains switch (1/2) should always be switched on, so that the internal battery can be charged during endurance.



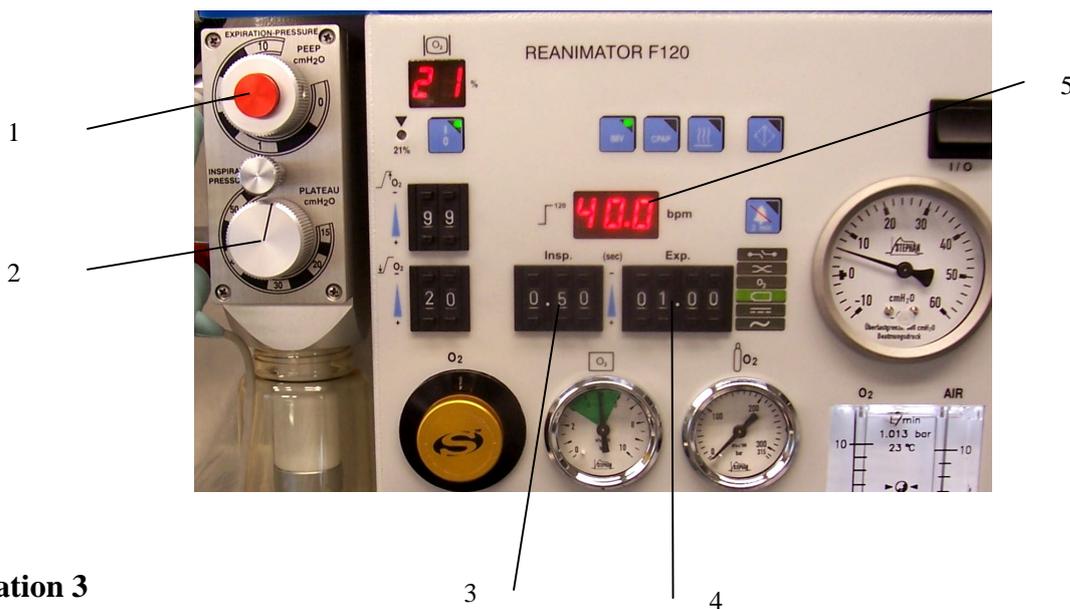
**Illustration 1**

Additionally the F 120 Mobil can be connected to a 12V onboard supply by means of the 12V-plug (1/3) with the by-packed connection cable.

With the reception coupling and the connecting tube the F 120 Mobil must be directly connected to the oxygen supply. The air pressure supply is provided by the built-in compressor. With the ON/OFF switch the apparatus is switched on.

The Paediatric-Reanimator F 120 GT is a time-controlled and pressure-limited constant-flow ventilator, developed for first care and emergency ventilation of babies and infants.



**Illustration 3**

A positive end-expiratory pressure (PEEP) can be set by means of the expiration valve (3/1). It acts mechanically via the set force of pressure of a spring.

The inspiration valve (3/2) is a purely mechanical valve and serves to limit the respiratory pressure (Limitation of inspiratory pressure). If the set pressure is exceeded, the inspiration valve opens (inspiratory plateau) and the surplus fresh gas can escape into ambient air and no longer reaches the lungs of the patient.

The switching cycle of the expiration valve can be set by means of coding switches for inspiration (3/3) and for expiration (3/4). The respiratory time ratio results automatically from the settings of inspiration and expiration. Respiratory frequency is calculated from the set parameter and displayed digitally in the three-digit display (3/5).

**Illustration 4**

The keys 4.1 and 4.2 serve to change the mode of ventilation. By depressing the key for CPAP (4/2), the apparatus is switched over into the spontaneous breathing mode. In doing so, the expiration valve is always open. The patient can now breathe spontaneously, using the offered flow of fresh gas. Furthermore, an end-expiratory pressure (PEEP) can be adjusted by means of the expiration valve (3/1, shown on the previous page). After depressing the key IMV (4/1) the ventilation mode returns to controlled ventilation (“Intermittent Mandatory Ventilation” = IMV).



**Illustration 5**

With the key for the heater (5/1) the heater cartridge (5/2) in the humidifier for respiratory gas and the heated tube (5.3) are switched on and off. The fresh gas is warmed by the heater cartridge (5/2) and is conducted through the humidifying bottle (5/4), which is filled with distilled, demineralised water. The heated tube system maintains a constant temperature of the warmed and humidified respiratory gas and thus prevents forming of condensate water in the tube. The elements of the heater cartridge and of the tube heating system are dimensioned so that a temperature of app. 35-36°C results.

The Reanimator is provided with a monitor for supervising the respiratory pressure (5/5) and with a monitor for supervising the oxygen concentration (5/6).

The pressure monitor (5/5) warns in case of failure of power supply, gas supply, disconnection and stenosis. The failure-of-gas-supply-alarm, respectively the stenosis alarm sounds, if the permanently installed pressure limit is not exceeded by the respiratory pressure after the set expiration time + maximum inspiration time (2 seconds).

Stenosis alarm activates, if respiratory pressure does not fall below the permanently installed pressure limit 2,2 seconds after end of inspiration. The oxygen monitor (5.6) supervises the concentration of oxygen in the respiratory gas.



Illustration 6

The O<sub>2</sub> monitor can be switched on and off by means of the ON/OFF-key.

The O<sub>2</sub>-sensor is plugged into the gas stream at the front. An upper alarm limit and a lower alarm limit can be set with the help of the coding switches. The alarm limits are activated only with the

O<sub>2</sub>-monitor switched on. In the event that the oxygen concentration level rises above or falls below the selected set points an audible and visual alarm occurs

The O<sub>2</sub> monitor has to be calibrated anew from time to time for 21% oxygen, using the Cal.-key. To do so, it is necessary to place the O<sub>2</sub>-sensor in ambient air.



Oxygen sensor  
replacement plug

**Note: If it is necessary to measure the O<sub>2</sub>-concentration of the incubator you can remove the sensor from its measurement socket and close the socket with the blue replacement plug.**

The audible alarm of all monitor functions can be muted for 2 minutes by means of the „2-min-key“.

Prior to every putting into service, a performance test has to be carried out by depressing the key „AUTO TEST“. Hereby all luminous fields must illuminate, intermittent audible alarms must sound five times and the valve must activate five times.

The loading capacity of the internal battery as well as the 12 V-on-board-supply is supervised.

When the minimum supply is falling short, every 30 seconds a warning tone is released. It can not be suppressed and the equivalent potential indicator starts flashing.

As of this time, 20 minutes operation time remains. If the power supply falls below a critical level, the apparatus is automatically shut off.

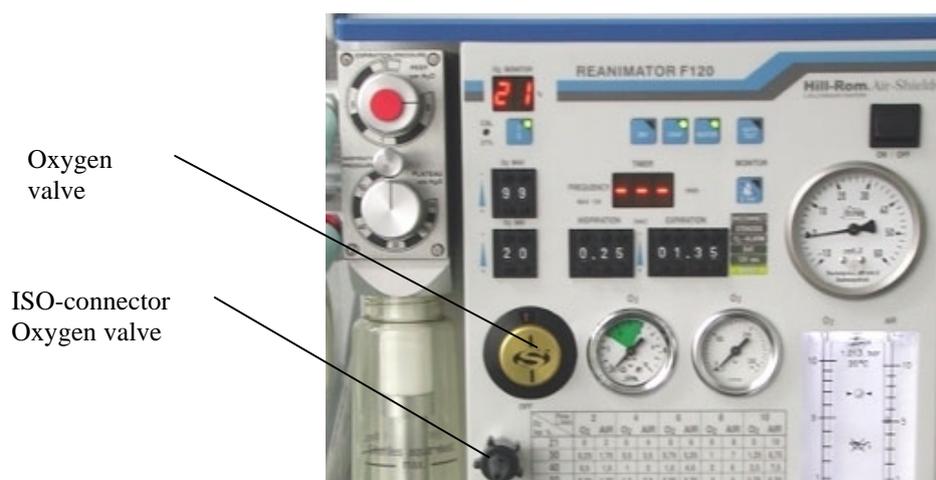
### ***External Oxygen Supply – Incubator***

It is possible to adjust an oxygen flow to the incubator or any other application where an adjustable oxygen flow is needed.

To do so you can open the additional oxygen valve at the front of the F 120 GT. It will allow the application of oxygen flows stepwise from 0.5 l/min up to 25 l/min.

An ISO-connector can be directly screwed to the outlet of the oxygen valve.

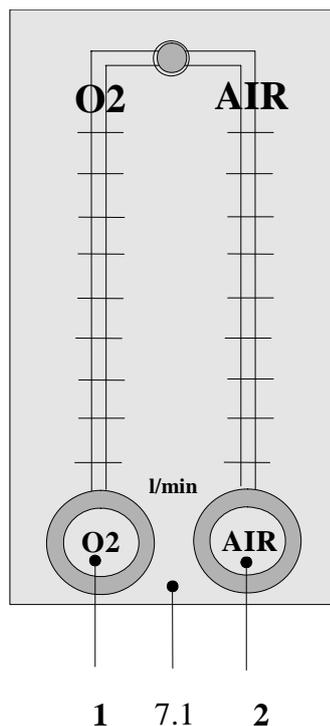
**If the air inside of the incubator should be enriched with oxygen, it is possible to measure the concentration with the oxygen monitor of the F 120 GT.**



## 7. Description of control elements and elements

### 7.1 Twin flowmeter

Illustration 7.1



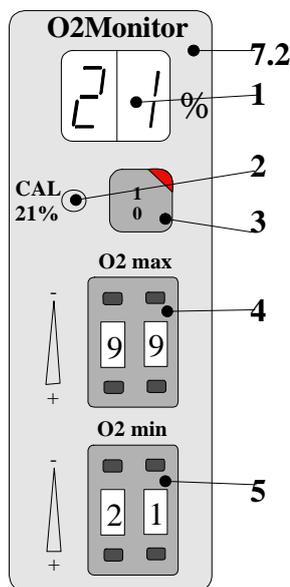
7.1 Twin flowmeter for mixing the respiratory gas and for setting of flow.

7.1/1 Proportioning valve for setting oxygen concentration of the respiratory gas. With increased flow the oxygen concentration increases automatically. I.e. in case of constant flow, compressed air must be reduced proportionally to the increase of oxygen flow. O<sub>2</sub>-concentration can be monitored on the O<sub>2</sub>-monitor.

7.1/2 Proportioning valve for setting the fresh gas flow. With increase of the fresh gas flow by means of the Proportioning valve (7.1/2) oxygen concentration decreases.

To reach the optimum mixture of respiratory gas with a determined flow, the correct setting must be found by alternating rotation of the proportioning valves (Control of the O<sub>2</sub>-monitor).

## 7.2 O<sub>2</sub>- Monitor



7.2 O<sub>2</sub>-monitor for monitoring of oxygen concentration in the fresh gas.

7.2/1 Digital display of O<sub>2</sub>-concentration.

7.2/2 Calibration key for adjusting the sensor to 21% O<sub>2</sub> with ambient air. The sensor is permanently installed in the Reanimator. During calibration the sensor must only be saturated with compressed air. I.e. the proportioning valve for oxygen on the flowmeter (2/5 shown on page 14) must be rotated to its right stop, so that the supply with oxygen is cut off.

7.2/3 ON/OFF-switch of O<sub>2</sub>-monitor.

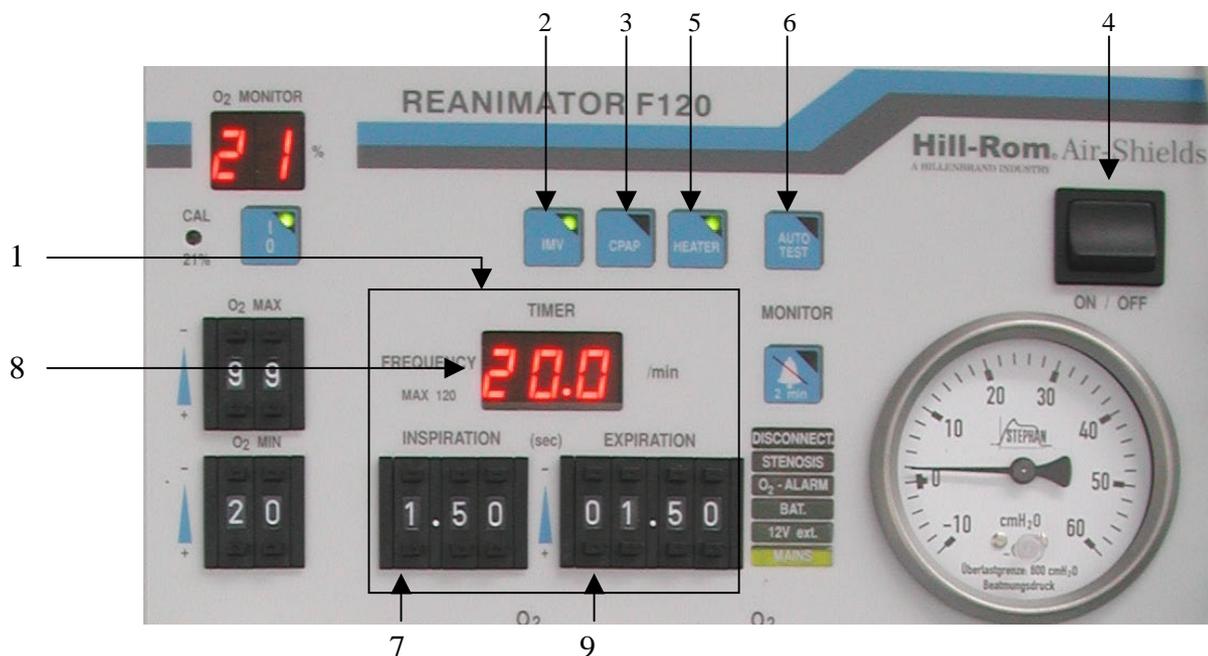
**Illustration 7.2**

7.2/4 Coding switch for setting the minimum oxygen concentration. If the oxygen concentration falls below the selected set point an audible and visual alarm occurs.

7.2/5 Coding switch for setting the maximum oxygen concentration. In case of exceeding this limit a visual and audible alarm occurs.

**A visual and audible alarm ensues, if the set limit values are exceeded or fallen below. By means of the key "2 min" the audible alarm can be muted for 2 minutes. The visual alarm ceases only after the fault has been eliminated.**

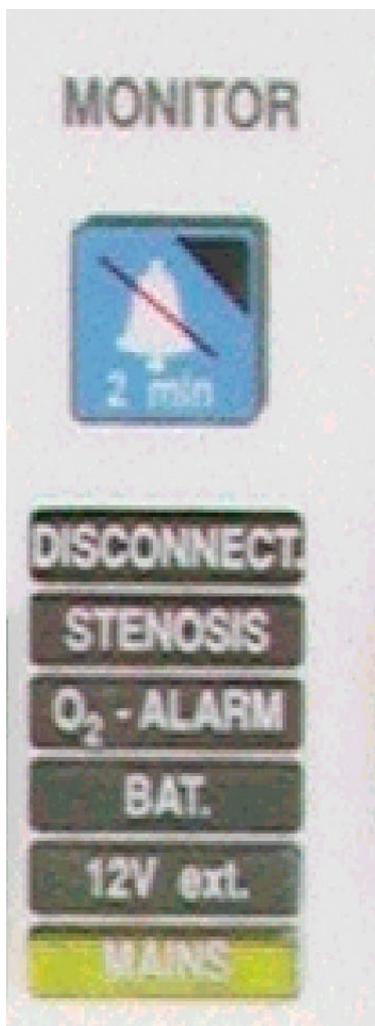
### 7.3 Control component and indicators



- 7.3/1** Timer for setting the respiration times (inspiration and expiration) as well as indication of the respiratory frequency. Setting of the respiration times and indication of the respiratory frequency is activated only in connection with the ventilation mode IMV (7.3/2). With ventilation under CPAP (7.3/3) the display shows three bars (---).
- 7.3/2** Key for changing to ventilation mode of controlled ventilation (IMV)
- 7.3/3** Key for changing to ventilation mode of spontaneous ventilation (CPAP)
- 7.3/4** ON/OFF-switch of Reanimator F 120
- 7.3/5** Key for switching the heater on and off (humidifier of the respiratory gas, tube heating system)
- 7.3/6** Key for starting AUTO-TEST of Reanimator. Hereby the performance of all input- and output elements is tested.
- 7.3/7** Coding switch for setting the inspiration time.
- 7.3/8** Indication of respiratory frequency with IMV. The frequency is calculated from the settings of inspiration time and expiration time.
- 7.3/9** Coding switch for setting the expiration time.

## 7.4 Monitor

Monitor for supervision of the respiratory pressure. Activated only with ventilation mode IMV.



### Stenosis

Visual alarm occurs if the pressure does not fall below the limit of 12 cmH<sub>2</sub>O 2.2 seconds after the end of inspiration

### Disconnection

Visual alarm ensues, if the permanently installed pressure limit of 12 cmH<sub>2</sub>O is not exceeded after the set expiration time + maximum inspiration time (2.0 sec), (Failure of gas supply, disconnection).

### O<sub>2</sub>-Alarm

Visual alarm occurs when the set values for oxygen concentrations are violated. Alarm activates only when the oxygen monitor is switched on.

### Mute

Key for muting the audible alarm for 2 minutes. By pressing, all audible alarms are muted for 2 minutes, whereby the visual alarms remain active. If the alarm condition still persists after 2 minutes, the audible alarm will be released again. Audible and visual alarm cease only, when the cause for the alarm has

been eliminated.

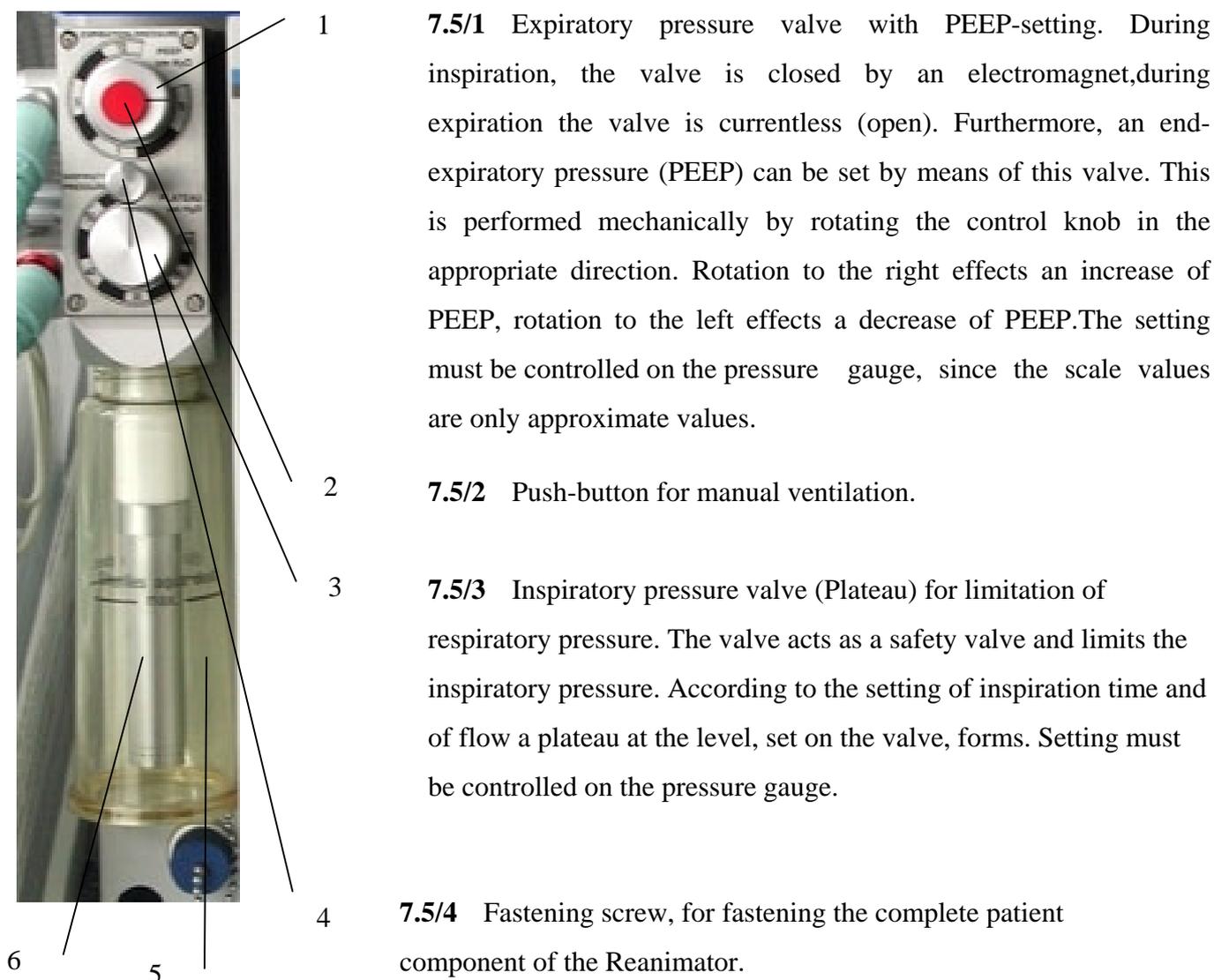
**BAT.** Indication of supply voltage for 12V (DC), internal accumulator.

**12 V ext.** Indication of supply voltage for 12V (DC), external.

**Mains** Indication of supply voltage for 230V/50 Hz (AC)

## 7.5 Patient component P1

Patient component with limitation of inspiratory pressure, expiration pressure valve and humidification of the respiratory gas.



### Illustration

#### 7.5

**7.5/5** Humidifier bottle for saturation of the warmed fresh gas with water vapour. The relative humidity then amounts to approximately 85 to 95% at the outlet of the humidifier.

**7.5/6** Heater cartridge with bubbling tube for warming the fresh gas. Hereby the fresh gas is conducted through the bubbling tube and past the heater cartridge, where it is warmed and then led into the humidifier bottle.

**Only distilled and demineralised water must be used.**



If the patient component is removed a protective cap to prevent damages to the connections and contacts during cleaning and transportation should be used. For attachment of the patient component to the Reanimator, the protective cap has to be removed.

The Connection taper for the inspiration and expiration tubes are positioned at the left side of the patient component.

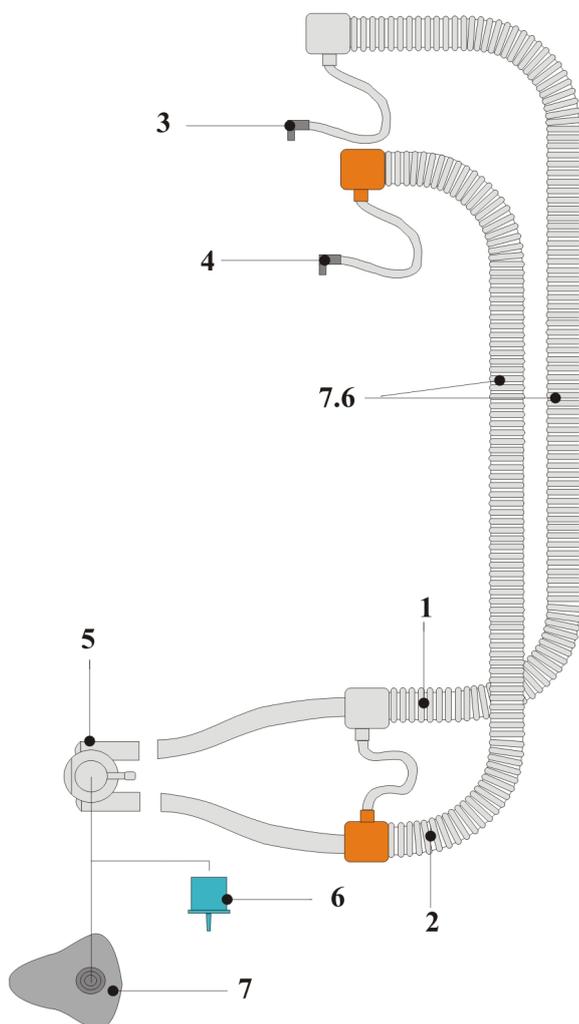
Between the tapers are the sockets to connect the heating of the tube system.

**Notice:**

Use only distilled water for the humidifier bottle. Do not fill beyond the filling mark. Do not fill with inflammable anaesthetic agents. Test humidifier bottle for tightness after disinfection or sterilisation.

## 7.6 Patient tube system

2



7.6 Heated patient tube system, consisting of the two silicone tubes with heater spiral for inspiration (7.6/2) and expiration (7.6/1). The heater spiral serves to stabilize temperature and to prevent the formation of condensate water. For ventilation in the incubator, only the unheated ends of the tube system are introduced in the incubator. If the temperature of the incubator is lower than the nominal temperature of the respiratory gas, condensate water may form in the unheated ends of the tube system. The tube heating system is plugged into the patient component by inserting the plugs 7.6/3) and (7.6/4) into the sockets of the patient component.

### Illustration 7.6

- 7.6/1 Heated expiration branch of the tube system.
- 7.6/2 Heated inspiration branch of the tube system.
- 7.6/3 Connection plug of heater spiral of the expiration branch. To be inserted into the provided connection socket of the patient component.
- 7.6/4 Connection plug of heater spiral of the inspiration branch. To be inserted into the provided connection socket of the patient component.
- 7.6/5 Y-piece, connects inspiration branch and expiration branch of the tube system with the patient.
- 7.6/6 Tube connector for connection of ventilation tube with the Y-piece. With the help of it, the ventilatory deadspace is significantly reduced.
- 7.6/7 Face mask for short-term ventilation and reanimation. Available in sizes 1 to 3.



## 8. Testing prior to operation

### **8.1 Monitoring**

After switching the reanimator on and depressing the test-key, all indicator elements and the performance of the expiration valve (switching on five times) are tested. The disconnection monitor activates visually and audibly, after 20 seconds, a short continuous tone sounds. In case of a fault, the audible alarm persists and is illuminated.

The disconnection monitor is permanently set at 12 cmH<sub>2</sub>O this pressure value must be exceeded with every respiratory cycle performed by the apparatus, otherwise alarm is released. With help of the Stand-by-key the audible alarm of the monitor can be muted for 2 minutes. The stenosis monitor is tested by means of building-up of pressure. If the pressure does not fall below the pressure limit of 12 cmH<sub>2</sub>O 2.2 seconds after the end of inspiration, visual and audible alarm ensues.

### **8.2 Inspiratory pressure (Plateau), expiratory pressure (PEEP)**

The plateau regulator, limiting the inspiratory pressure, is tested by connecting the tube system to the Y-piece.

The pressure gauge then must indicate the set inspiratory pressure.

PEEP is set on the inspiration valve by means of the control knob. The tube system is occluded on the Y-piece.

At the end of inspiration, the pressure gauge must then indicate the set PEEP.

### **8.3 Tightness**

Especially in the paediatrics, the tightness test is of great importance. With the Y-piece occluded, the inspiratory pressure, set at min. 40 cmH<sub>2</sub>O with a flow of 5 litres per minute, must exceed 30 cmH<sub>2</sub>O in the set inspiration time of 1,0 seconds.

#### **8.4 Heater and tube heating system**

Test of the heating system can only be performed by manual control. After switching the heater on, the humidifier and the tube heating system will feel warm to the touch (33 to 34°C).

#### **8.5 O<sub>2</sub>-Monitor**

The oxygen concentration set on the flowmeter is displayed digitally. To test the visual and audible alarm, the oxygen concentration is first adjusted to a value exceeding the set maximum limit value and then to a value falling below the set minimum limit value. In both cases visual and audible alarm must be released.

#### **8.6 Intake filter**

Prior to any putting the apparatus into service, the intake filter should be checked and if required exchanged.

## 9. Description of modes of ventilation

### 9.1 Controlled ventilation, IMV

Inspiration- and expiration times are pre-selected by the user in values of seconds. From this result the respiratory frequency (RF= 60 seconds/(inspiration time + expiration time)) and the respiratory time ratio (I/E inspiration time/expiration time).

The following settings are possible:

Inspiration time of 0,25 to 2 seconds

Expiration time of 0,25 to 30 seconds

From this result the possible respiratory frequencies of 2 to 120 BPM. This value is displayed digitally.

#### Example

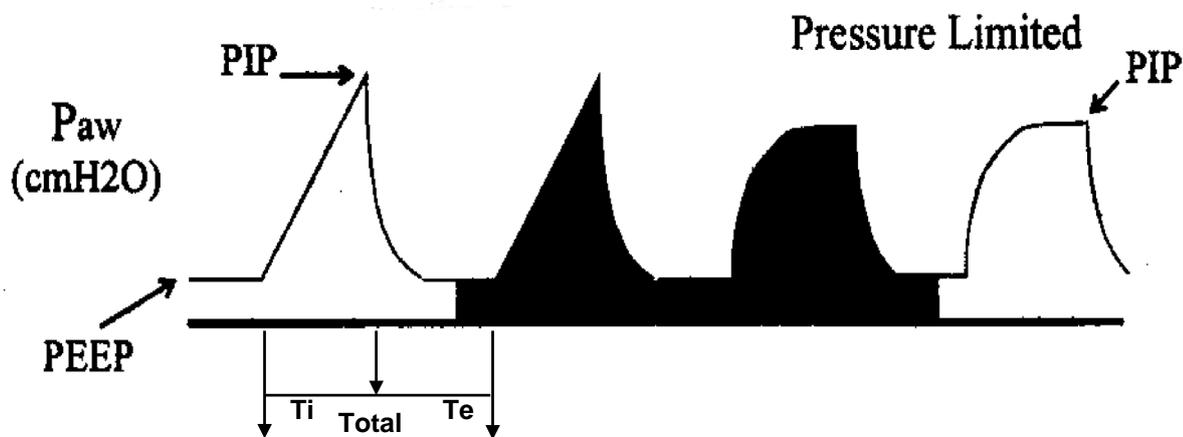
Insp. time 1,0 sec. exp. time 2,0 sec.:      RF (l/min) = 60 sec. / (1,0 sec. + 2,0 sec.) = 20/min

2 x Inspir. = 1 x Expir.

Inspiration/expiration = 1/2

I : E ratio = 1 : 2

Since the flow of gas is not interrupted during expiration, the patient is able to breathe spontaneously at any time. The controlled respirations released by the apparatus ensue unsynchronised, i. e. also during spontaneous inspiration, respectively expiration. Premature infants and neonates easily tolerate this.



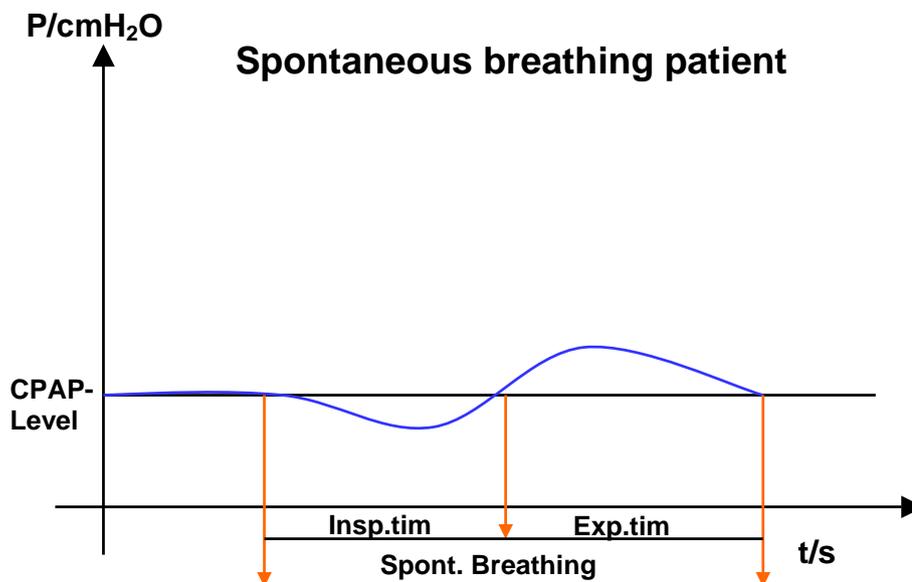
In ventilation mode IMV the expiration valve is closed during the set inspiration time and is opened after elapse of the set expiration time. Frequency is displayed digitally. Level of the respiratory flow is set on the flowmeter in relation to the lungs to be ventilated. The flow is constant during inspiration- and expiration phase. The resulting positive insp pressure PIP can be limited by means of the inspiratory pressure valve (Plateau). This inspiratory pressure plateau remains constant for the duration of inspiration. During this time, the gas can spread in the lungs under a constant pressure. The patient is able to breathe spontaneously between the respirations delivered by the apparatus (IMV). If the expiration time ( $T_i$ ) is further extended the portion of spontaneous respirations increases. An expiration time ( $T_e$ ) of maximum 13 seconds results in a frequency of about 4 to 5 respirations per minute. The built-in monitor adapts itself automatically to the change of expiration time. This means however, that alarm, for example in case of disconnection, is released then only after 15 seconds. Nevertheless, just for this reason an IMV-ventilation with a frequency of 4 to 5 BPM should be preferred to the normal CPAP-ventilation, since the pressure monitor of the F 120 GT is not activated during CPAP-ventilation and also no apnoea-alarm will be released. During controlled ventilation, depressing the key for manual ventilation can produce an artificial sigh or a prolongation of inspiration.

## **9.2 Manual ventilation and inflation**

By depressing the red push-button the expiration valve is closed mechanically for the duration of depression. During CPAP-ventilation the patient can be ventilated manually or inflated by depressing the push-button. Hereby the respiratory pressure as set on the inspiratory pressure valve (Plateau) is built up.

### 9.3 CPAP - ventilation

Due to the continuous-flow principle, a genuine CPAP-ventilation is possible. The PEEP-mechanism in the expiration valve always maintains the set end-expiratory pressure in the constantly flowing gas.



With this flow of gas, the patient is able to breathe spontaneously under a positive pressure. This PEEP-valve can be used for all modes of ventilation.

With sufficient spontaneous respiration the patient can breathe spontaneously in the CPAP mode of ventilation. After depressing the key CPAP the expiration valve is switched currentless (open) and the monitor is out of operation. The flow is adapted to the spontaneous respiration, so that the motions of inspiration and expiration can be read off at the pressure gauge. Expiratory pressure PEEP is set at the desired pressure of 1 to 10 mbar. A monitor should be used to supervise apnoea and disconnection.

If the disconnection monitor of the respirator is supposed to keep operating, switching over to IMV with long expiration time if necessary.

## 10. Cleaning and sterilization

All components that have contact with the patient like the patient component and the patient tube system are detachable for cleaning purposes.

The following parts can be autoclaved at 134°C:

- Patient component P1, complete with heater cartridge and humidifier bottle.
- the heated tube system of the patient tube system .
- the Y-piece

The following parts can be sterilized in a sterilizing solution or by means of gas sterilization:

- the tube connector
- - the face mask

When the patient component is unscrewed from the F 120 GT for cleaning or sterilization (loosening of the fastening screw ), the protective cap must be fastened to the patient component with the fastening screw . The humidifier bottle must be unscrewed to make a separate sterilization possible.

The intake filter for the compressed-air-supply at the rear of the apparatus must be checked prior to any putting into operation. In case of accumulation of dirt it must be cleaned, respectively exchanged.

### **Important:**

**Especially after sterilization in a dissolvent, care has to be taken that no sterilizing agent remains in the component parts.**

**All parts must be allowed to drip off and dry.**

## 11. Inspection and maintenance

### Maintenance by operating technicians

The silicone-ring on the connection nipple of the patient component must be checked and exchanged if defective.

The intake-filter must be cleaned, respectively exchanged.

### Service and repairs

Service and repairs must only be carried out by the

**F. Stephan GmbH**

**Medical Engineering**

**Kirchstr. 19**

**D - 56412 Gackebach**

or by personnel who have been trained and authorized by the F. Stephan GmbH.

## 12. Accessories list / spare parts F 120 GT

Part No.	Accessories
1-002-61-001	Patient component P1 (heated)
1-002-61-512	Patient hose system w/y piece (heated)
1-705-50-056	power pack-Atmos suction pump
1-950-60-003	O-ring 4 x 1.5
1-951-60-001	Flat gasket humidifier bottle 300 ccm
1-002-61-020	Teflon sleeve long complete for patient comp. P1/P2/P3
1-650-40-005	Humidifier bottle 300 ccm
1-002-61-016	Protection cap P1/P2/P3 complete
1-701-60-416	Y-Piece with rubber cap

### ***F120GT Ventilator Replacement Part***

1-804-60-002	Set of fuses 5x20 mm
1-802-60-406	Power connection cable 230 V
1-34-61-412	Power connection cable 12 V
1-107-60-008	Connection cable for oxygen sensor
1-107-60-009	Oxygen sensor
1-107-60-010	Diffuser for oxygen sensor
1-950-60-009	O-Ring for diffuser

### ***NeoSid Monitor Accessories + disposables***

1-702-60-010	Gel electrodes (VE 240 pc(s)) 30mm
1-702-60-011	Gel electrodes for allergic persons (VE 240 pc(s)) 30mm
1-702-60-013	electrodes without gel (VE 240 pc(s)) 30mm
1-702-60-025	Patient cable for NeoSid
1-702-60-020	Long-life electrodes (VE 3 pc(s))
1-702-60-019	Adhesive rings for Long-life electrodes (VE 500 pc(s))
1-704-60-122	Flexsensor for infants < 10kg, disposable
1-704-60-123	Flexsensor for infants with sensitive skin < 1kg-disposable
1-704-80-124	Flexsensor for paediatrics 10-50kg-disposable