Breath is Life
we can help you

MPV TRUMA
10 years

Ventilation

ClevAir®

… for clever and safe home ventilation

ClevAir® – the modular concept

A modular and safe device flexible for most applications

The ClevAir® home ventilator can be configured according to the needs of various types of patients and their pathologies.

Flexible for if the patient requires invasive or non-invasive ventilation, continuous or intermittent, child or adult care, ClevAir® always offers the optimum solution. Even if you establish with the basic device only, it can always be upgraded according to the patient's needs.

A change in a patient's state of health therefore no longer requires a necessary change of the device.

This saves time and money and also enhances therapeutic management.

ClevAir® – the modules

- Module for intermittent ventilation
- Module for continuous ventilation
- Module volume ventilation
- Module PRVC
- Module inhalation
- Module SpO_2 monitoring
- Module FiO_2 monitoring
- Module respiratory mechanics
- Module pediatric flow ventilation
- Module mobile

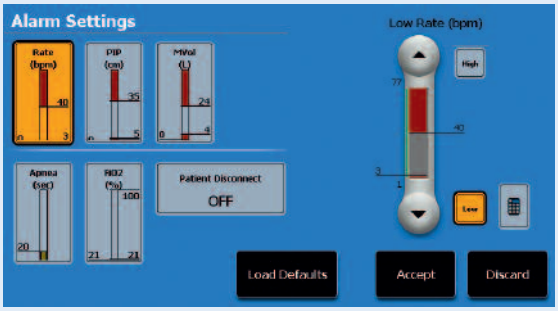
Basic device

Accessories:

- communication software
- tubing systems
- suction pumps
- memory card
- remote alarm
- active and passive humidification systems
- ventilation masks

ClevAir® – alarm monitors

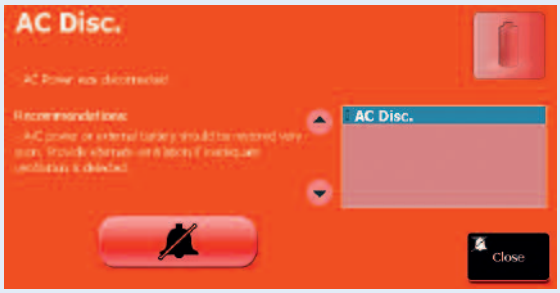
Alarm settings



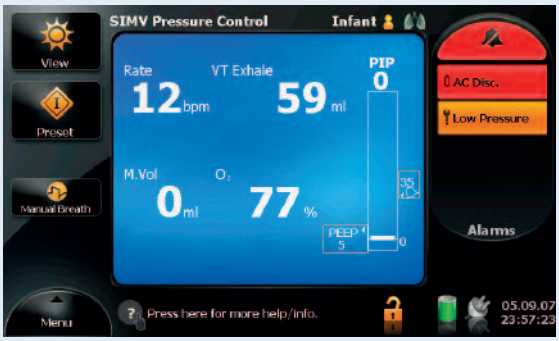
For all ventilation modes	
Breathing frequency	1 to 80 bpm
Pressure alarm	1 to 60 mbar
Minute volume	0 to 60 l/Min.
Apnea time	5 to 120 sec.
Alarm noise level	0 to 15
FiO_2	21 to 100
Patient disconnection	on

All alarms can be adjusted individually or automatically.

Alarm interpretation



Alarm window with interpretation

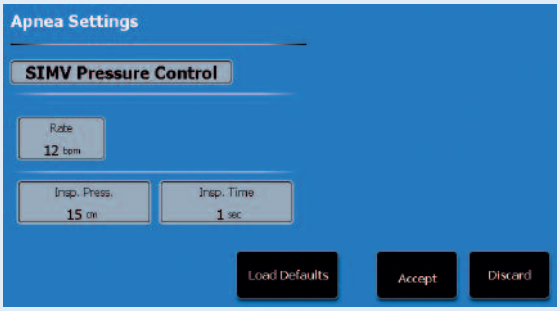


Alarm display during operation

Log book

Alarm log book with 72 h memory

Apnea ventilation

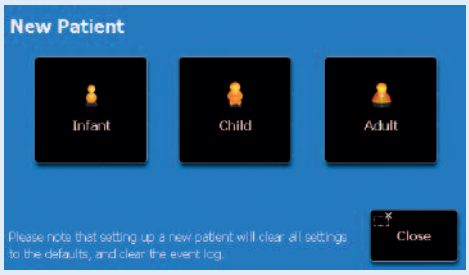


Adjustable apnea ventilation via inspiration time control

ClevAir® – monitoring that leaves no wish ungranted

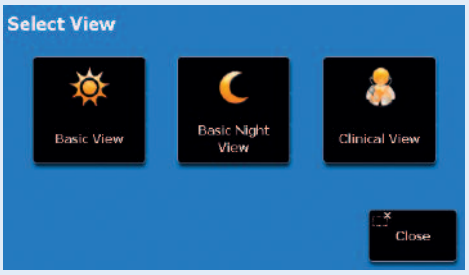
Settings can be easily adjusted by simply touching the screen

Selection patient



A pre-selection can be made between infant, child and adult leading to appropriate ranges for ventilation and alarms.

Selection monitoring

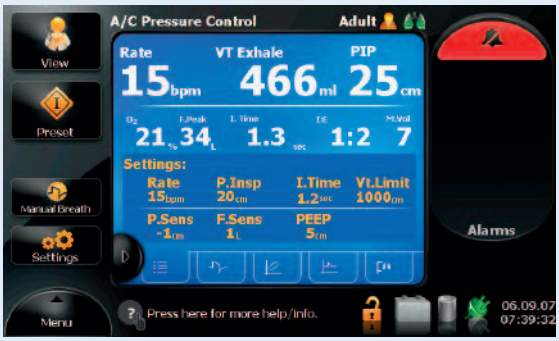


Three different views allow for appropriate information on the screen depending on the chosen environment.

Basic monitoring

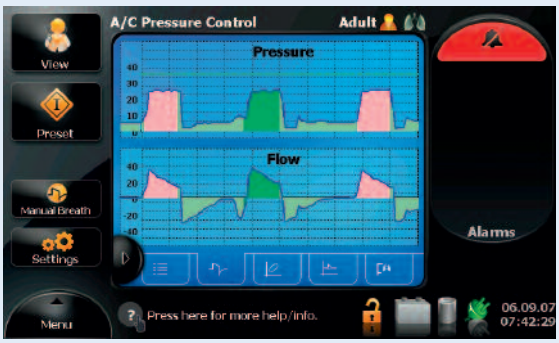
Basic monitor (day) for patient at home. Settings changes require changing to clinical monitoring screen to make inadvertent changes less likely.

Clinical monitoring



Numerical display for those users who want more information readily available. Settings change screen is accessible from this screen.

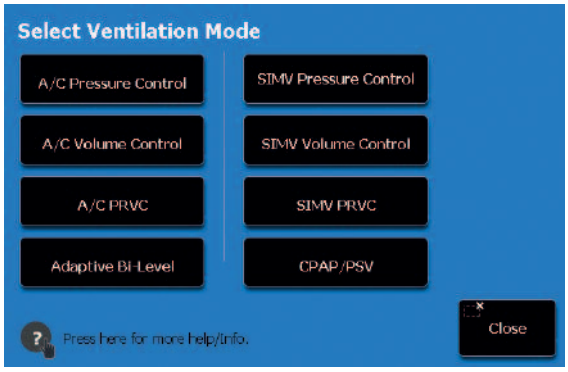
Basic monitor (night) for patient at home



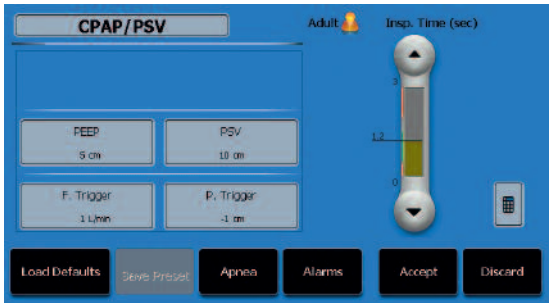
Pressure and flow curve display is available as one of the choices from the clinical monitoring screen.

ClevAir® – the modes

A wide selection of modes

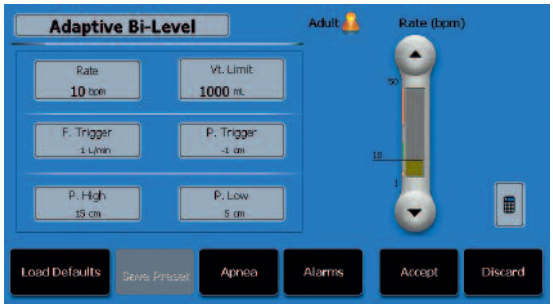


Parameter settings in CPAP/PSV



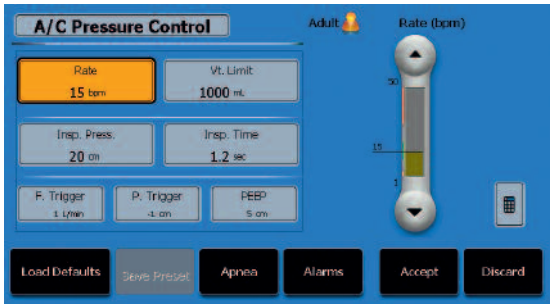
PEEP = CPAP	0 to 45 mbar
PSV	0 to 60 mbar
Trigger sensitivity	1 to 6
Apnea ventilation	SIMV/PCV free configuration

Parameter setting in adaptive bilevel



Rate = Safety frequency	1 to 60 bpm
Vt (limit)	40 to 2000 ml
Trigger sensitivity	1 to 6
P. High = IPAP	0 to 60 mbar
P. Low = EPAP	0 to 45 mbar
Inspiration time	0.2 to 3 sec.
Expiration trigger	90% to 10% of peak flow
Flow Rise	0.1 to 1.5 sec. or automatic

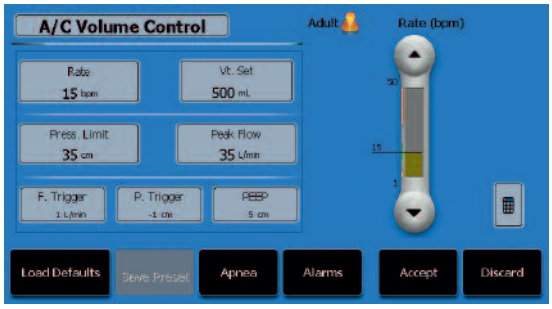
Parameter settings in A/C PCV



Rate	1 to 60 bpm
Vt (limit)	40 to 2000 ml
Insp. Press.	5 to 60 mbar
Inspiration time	0.2 to 3 sec.
Trigger sensitivity	1 to 6
PEEP	0 to 45 mbar
Pressure delta	min. 5 mbar
Flow Rise	0.1 to 1.5 sec. or automatic

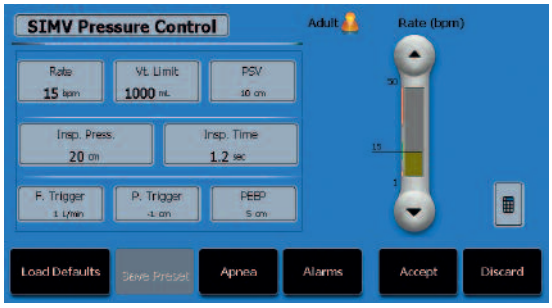
ClevAir® – the modes

Parameter settings in A/C VCV



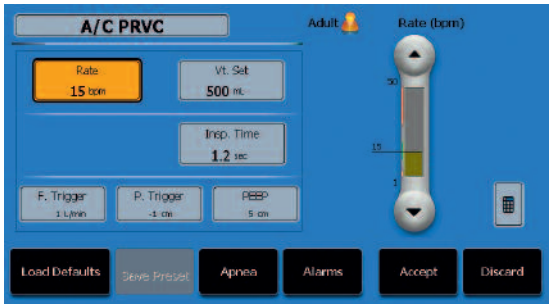
Rate	1 to 60 bpm
Vt Set	40 to 2000 ml
Press Limit	5 to 60 mbar
Peak Flow	1 to 200 l/Min. or adaptive
Trigger sensitivity	1 to 6
Inspiration time	0.2 to 3 sec. or adaptive
PEEP	0 to 45 mbar

Parameter settings in SIMV/PVC



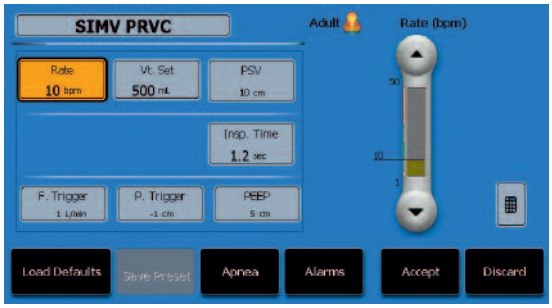
Rate = SIMV frequency	1 to 60 bpm
Vt (limit)	40 to 2000 ml
PSV (pressure support – spontaneous)	0 to 60 mbar
Insp. pressure	5 to 60 mbar
Inspiration time	0.2 to 3 sec. or adaptive
Trigger sensitivity	1 to 6
PEEP	0 to 45 mbar

Parameter settings in A/C PRVC



Rate	1 to 60 bpm
Vt Set	40 to 2000 ml
Inspiration time	0.2 to 3 sec.
Trigger sensitivity	1 to 6
PEEP	0 to 45 mbar

Parameter settings in SIMV/PRVC



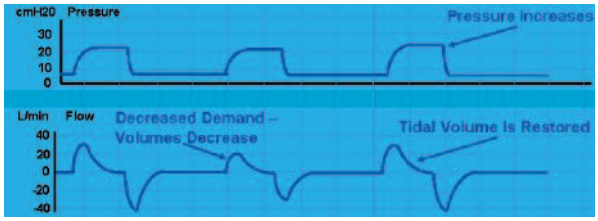
Rate	1 to 60 bpm
Vt Set	40 to 2000 ml
PSV (pressure support – spontaneous)	0 to 60 mbar
Inspiration time	0.2 to 3 sec. or adaptive
Trigger sensitivity	1 to 6
PEEP	0 to 45 mbar

ClevAir® – PRVC
pressure regulated volume control breath

Problems during ventilation

- Modified lung compliance during long term ventilation
- Patient changes position during ventilation – insufficient aeration of one lung side
- Leakages and inappropriate ventilation settings
- Problems to correctly adjust the minute volume to all situations

PRVC is the solution



PRVC advantages – increased comfort and synchrony

- Patients are allowed to take more or less volume on each breath
- Free breathing (active exhalation) is allowed during inspiration and exhalation due to a pressure based breath type
- Tidal and minute volumes are maintained in the face of changing patient conditions

How to get there

- In PRVC the patient is given 3 test breaths with the pre-set tidal volume. The pressure is then set according to the highest inspirational pressure of the last breath.
- The ventilator then constantly monitors the tidal volume and the ventilation pressure.
- The adaptive mechanism for pressure adaptation gets activated, if the measured tidal volume differs more than 10 % from the target tidal volume.

The advantages for doctor and patient

- Less air can be pumped into the lungs, if the amount of sputum in the respiratory tracts increases. PRVC will compensate within given limits. However, this does not render endotracheal suction unnecessary.
- If the patient's lung is aerated pathologically differently on the two sides, the minute volume will change depending on the position (on the back, on the side, lying or sitting). PRVC compensates this difference unnoticed by the patient.
- Changes in volume during ventilation because of physical changes (e.g. diaphragm paralysis) are compensated.
- Leakages or inappropriate pressure settings are compensated by two set pressure limits, Pmin. basis IPAP and Pmax. peak IPAP. Within this range the patient is supplied with a constant tidal volume and gets ventilated with the necessary pressure.
- The ventilator automatically adapts the pressure within these limits and works very smooth on the patient.

ClevAir® – features

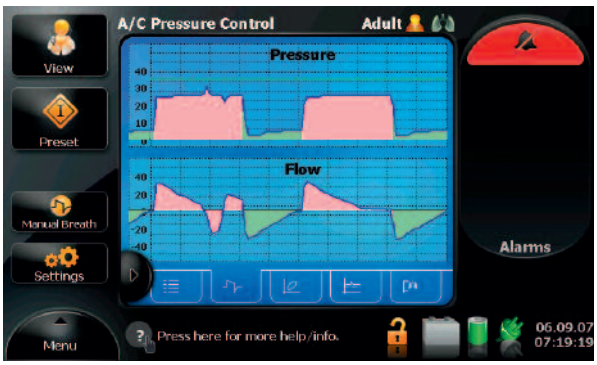
ClevAir® – safe

- High reliability thanks to a backup redundant system (Emergency Backup)
- Disconnect protection is always active and monitoring
  - maintains disconnect alarm while eliminating small nuisance alarms.
  - shut down "PEEP shower spray" during disconnect
- Remarkable degree of user-friendliness prevents misunderstanding
  - large clear display – easy to read
  - 3 different views (day/ night + clinical)
  - adjustable screen lock
  - 3-step shut down procedure reduces the risk of dangerous incidents
- Comprehensive alarm management
  - large color coded multiple priority alarms
  - alarm troubleshooting recommendations
  - easy distinguishable alarm tones from mid-range to very loud

Like in space shuttles, redundant emergency backup systems allow patient ventilation in the unlikely event of failed sensors

ClevAir® – sync

- Very sensitive triggers
- Easy Exhale
- PRVC – volume targeted
- CPAP / PSV
- Adaptive Flow & Adaptive Time
- Extensive leak compensation in NIV – breath by breath



ClevAir®'s active exhalation valve allows free breathing during both, the inspiration as well as exhalation phase of the breath. Asynchrony is minimized by releasing pressure during patient coughing or splinting without terminating inspiration or causing nuisance alarms.

ClevAir® – simple and intuitive handling

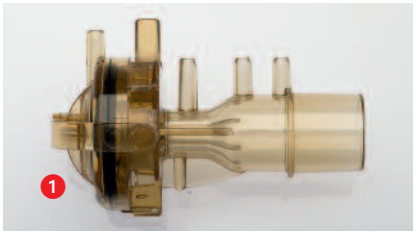
front view

1. air inlet filter
2. inspiration connection
3. expiration connection
4. touch screen display

back view

1. carrying handle
2. RS 232 connection
3. USB connection
4. network connection
5. slot for memory card
6. remote alarm connection
7. on/off switch with protective cover
8. low pressure oxygen supply connection
9. external battery connection (24 V DC)
10. power cord connection
11. mains fuse
12. internal battery compartment

bottom view



1. **optional expiration valve and flow sensor**
   all components can be easily disassembled and are autoclavable. Allows the use of various and even low-priced double circuit systems.
2. **O_2 Sensor**
   safely integrated, still easy to change; does not interfere with daily handling of the device
3. **damper for pneumatic block**
   making the device quiet and shock resistant

Order Information

pre-configured ventilators	Article No.
ClevAir® S	M 86100-02
ClevAir®	M 86100-03
ClevAir® Plus	M 86100-04
modular concept	
ClevAir® basic device	M 86100-05000
module intermittent ventilation	M 86100-01200
module continuous ventilation	M 86100-01300
module volume ventilation	M 86100-01400
module PRVC	M 86100-01500
module SpO_2	M 86100-01600
module FiO_2	M 86100-01700
module respiratory mechanics	M 86100-01800
module pediatric ventilation	M 86100-01900
module mobile	M 86100-02000
module inhalation	M 51903-00
circuit systems	
breathing circuit	M 86100-00600
one limb disposable patient circuit	M 86100-04400
two limb disposable patient circuit	M 86100-04500
one limb reusable patient circuit	M 86100-04600
two limb reusable patient circuit	M 86100-04700
one limb kit ClevAir®	M 86100-03100
two limb kit ClevAir®	M 86100-04900
22 mm adaptor	M 86100-03300
exhalation valve ClevAir®	M 86100-03900
exhalation membrane ClevAir®	M 86100-04000
filters	
inlet filter	M 86100-02100
inlet filter (6-pack)	M 86100-02200
manuals / quick user guides	
quick guide	M 86100-02300
operator manual	M 86100-02500
service manual	M 86100-03200
cables	
AC cable	M 80060-21200
car adapter cable	M 86100-03600
cable nurse call ClevAir®	M 86100-03800
transport	
trolley hard case	M 86200-05000
soft case ClevAir®	M 86100-03700
mounting wheelchair	M 86100-04200
trolley ClevAir®	M 86100-04300
4 hours battery	M 86100-02600
8 hours battery	M 86100-02700
external charger	M 86100-03400
other accessories	
O_2 male connector (5-pack)	M 80060-22400
O_2 sensor	M 86100-02900

ClevAir® – technical highlights

Technical Data

Basic Description
Ventilation Modes:
Assist Control (A/C):
- Volume Controlled A/C · Pressure Controlled A/C* · PRVC
Synchronized Intermittent Mandatory Ventilation (SIMV):
- Volume Controlled SIMV · Pressure Controlled SIMV* · PRVC
Continuous Positive Airway Pressure (CPAP)
Pressure Support Ventilaton (PSV)
Adaptive Bi-Level
Special Modes of Operation:
Preset Parameters by Patient type
Adaptive Flow™
Easy Exhale™
Apnea Backup Ventilation

Ventilation Performance and Controlled Parameters

Respiratory Rate:	1 to 80 BPM
Tidal Volume:	40 to 2.000 ml
Inspiratory Pressure Limit:	5 to 60 cm H_20
Inspiratory Time:	Adaptive Time™ or 0.2 to 3 seconds
Peak Flow:	Adaptive Flow™ or 1 to 120 L/min Spontaneous Flow up to 230 L/min
Oxygen Mix (FiO_2):	*21% to 100% (dependant upon minute ventilation)
PEEP:	0 to 45 cm H_2O
Trigger Sensitivity:	1 to 6
PSV:	5 to 60 cm H_2O

Monitoring and Displayed Parameters
Airway Pressure (analog bar graph & numerical)
Total Breath Rate
I:E Ratio
Exhaled Tidal Volume
Exhaled Minute Volume
Peak Flow
Electrical Power Source (external / internal)
Battery Level
Waveforms
Software Package:*Real time pressure and flow curves

User Adjustable Alarms
Respiratory Rate (high / low)
Minute Volume (high / low)
Pressure (high / low)
Apnea (0 to 120 seconds)
FIO_2 (high / low)
Vti Volume Limit

Additional Alarms and Indicators

Alarms:	Indicators:
AC Disconnect	Alarm Silence Icon & Timer
Low Battery	A/C, Internal, or External Battery Use
Over Temperature	Date and Time
Service Notice	Hour Meter
Patient Disconnect	Battery Charge Level
Occlusion	Need Calibration
Volume Not Delivered	LED: On, Charge, Alarm

Size and Weight
Dimensions:
Height 13" / 33 cm
Width 9.5" / 24 cm
Depth 10.3" / 26 cm
Screen 6.4" diagonal
Overall Weight 11 lb / 5.2 kg

Power Supply

External AC:	110 to 230 V, 50 to 60 Hz, Max 2.0 A
External DC:	12 to 24 V, Max 8.5 A
Internal Battery:	Standard 4 hours (rechargeable)
Extended / External battery Use:	Extended 8 hours / External 20 hours (depending on ventilation parameters)

Oxygen (enrichment) Supply
Low Pressure

External Interface

Remote Monitor (USBLAN)	Remote Alarm Connector
RS-232 Serial Port, 9 Pin	Memory Card Reader
SPO_2	

Environmental Specifications

Operating Temperature:	0 to 50° C / 32 to 120° F
Storage Temperature:	–15 to 70° C / –4 to 140° F
Relative Humidity:	15 to 95% at 30° C / 85° F
Water / Dust Resistance:	IP54 (Splash Proof)
Atmospheric Pressure:	430 to 825 mm Hg (15,000 feet)
Vibration:	IEC 68-2-6 and IEC 68-2-34 MIL-STD-810E
Shock:	IEC 68-2-27 (100g) MIL-STD-810E
Total External Sound Level:	40-45 dBa at one meter

Standards and Safety Requirements
Meets the requirements of:
ASTM F1100-90
ASTM F 1246-91
CSA C22.2 No. 601.1 / 601.2
IEC 60601-1
IEC 60601-1-2
EN 60601-2-12
EN 794-1 / 2 / 3
ISO 10651-1 / 2 / 3
UL 2601.1

Ventilator Configurations
Standard circuit single limb
Standard circuit double limb

Manufacturer:
VersaMed

Technical changes reserved!

Sales:

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