VM-2500 series CO2 / SpO2 monitors

Intended Use

Monitor

- Monitoring of end-tidal CO_2 concentration ($EtCO_2$)
- Monitoring of inspired CO_2 concentration ($FiCO_2$)
- Monitoring of functional arterial oxygen saturation (SpO_2),
- Monitoring of respiration rate (RR) and pulse rate (PR)

Patients

- Adult, pediatric, infant and neonatal

Units

- Mainstream method using → VM-2500-M
- Sidestream method using → VM-2500-S

VM-2500-M - mainstream CO_2 monitor

Key features

- Warm-up time < 10s
- Direct measurement without time delay
- Small, light-weight and shock-resistant:

  IRMA™ CO_2 analyzer weighs less than 30 g
- Adult/paediatric and infant IRMA™ airway adapters available
- Easy plug and measure technology
- IRMA™ airway adapter with XTP™ non-condensing light transmission window
- Maintenance and calibration-free technology
- Wide range of high-quality SpO_2 sensors available

Mainstream capnography accessories

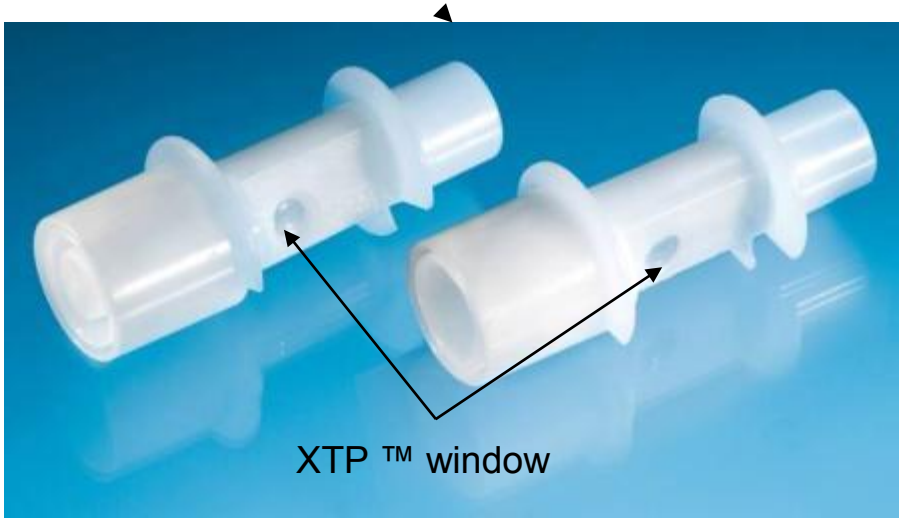
IRMA™ CO_2 analyzer

- Ultra compact
- Adapter can be replaced without recalibration
- Rugged mechanical design
- Airway adapter connects securely in place
- Analyzer is positioned between endotracheal tube and Y-piece

Mainstream capnography accessories

IRMA™ CO_2 airway adapter

- Designed as single-patient-use, disposable product
- Adult and pediatric use: (over 1 year or 10 kg bodyweight)
- Infant use: (up to 1 year or 10 kg bodyweight) minimizes the dead space



- XTP ™ windows – special features that prevent a decrease in performance when vapour is present
- Attention: not be placed between an endotracheal tube and an elbow

VM-2500-S - sidestream CO_2 monitor

Key features

- Warm-up time < 10s
- Specially designed for all applications using low flow sampling (50 ml/min); from adults to neonates
- For intubated and non-intubated patients
- VersaStream sampling lines remove water and water vapour
- Hydrophobic bacterial filter incorporated into VersaStream sampling lines reduces the potential for water intrusion and cross contamination
- Maintenance and calibration-free technology
- Wide range of high-quality SpO_2 sensors available

Sidestream capnography accessories

VersaStream sampling lines

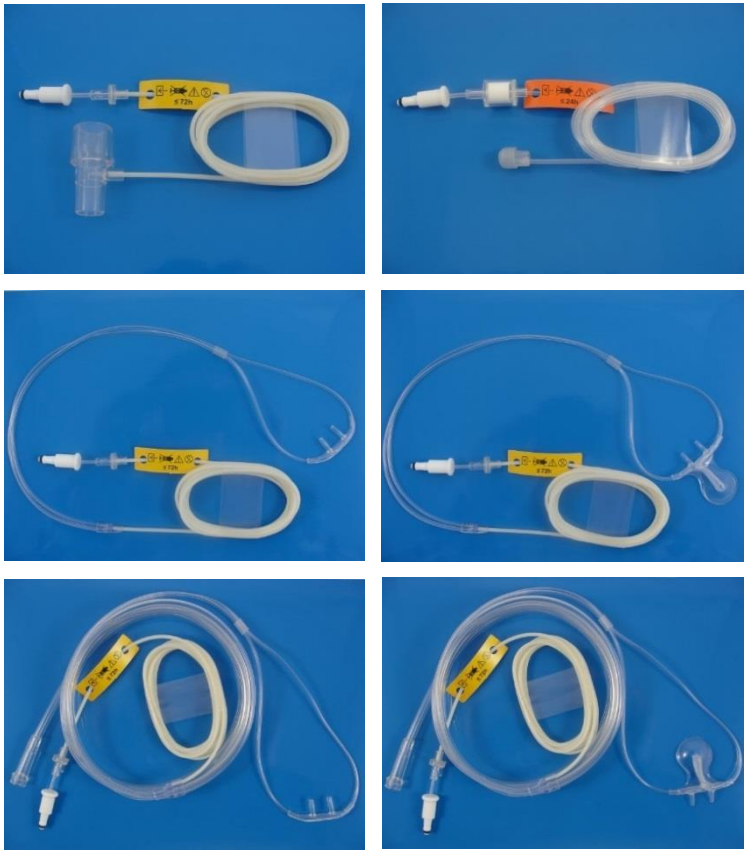
- Low sampling flow of 50ml/min
- Very low dead space
- VersaStream water separation and hydrophobic bacterial filter technology
- Water vapour passes through a membrane and evaporates into surrounding air
- Bacterial filter efficiency of > 99.998%
- Single-patient use, available in 24h and 72h versions
- Displays “Sampling system occlusion” when replacement is required

Sidestream capnography accessories

VersaStream sampling lines

A range of 1-piece sampling lines including:

- Airway adapter sampling line
- CO_2 nasal sampling line (single nostril)
- CO_2 nasal cannula: adult, paediatric, infant
- CO_2 nasal/oral cannula: adult, paediatric
- CO_2 nasal cannula with O_2 adult, paediatric
- CO_2 nasal/oral cannula with O_2 adult, paediatric

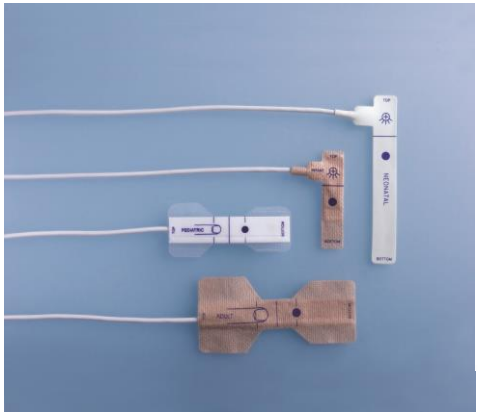


Pulse Oximetry Sensors – Reusable

- Soft silicone sensors; adult and paediatric
- Adult finger sensor with traditional finger clip
- Multi-site silicone wrap sensor
- Ear sensor

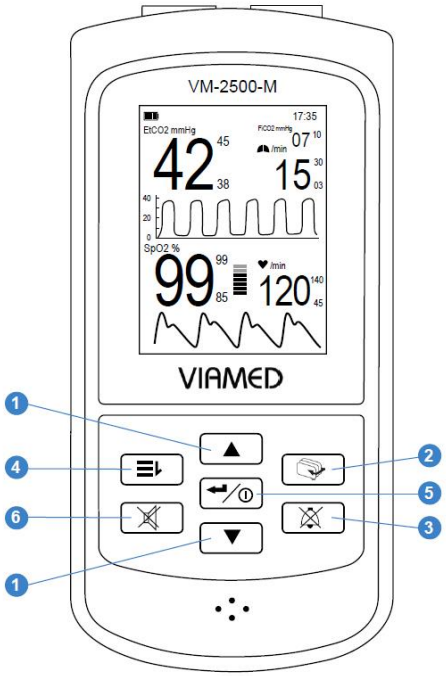
Pulse Oximetry Sensors - Disposable

- Adult, paediatric, infant and neonatal disposable sensors

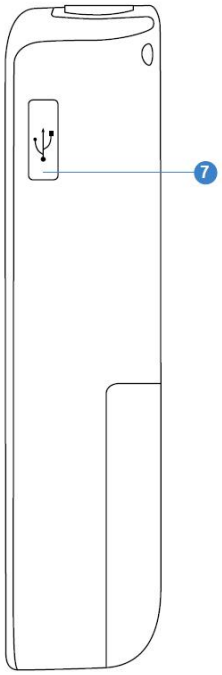


Exterior view, controls and connectors - VM-2500-S / VM-2500-M

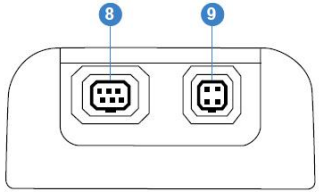
1. Arrow buttons (up/down)
2. Display mode
3. Alarm silence/reset
4. Menu
5. On/Off and Enter button
6. Pulse tone
7. USB
8. SpO_2 Sensor Port
9. CO_2 Mainstream Port



Front view



Side view



Top View

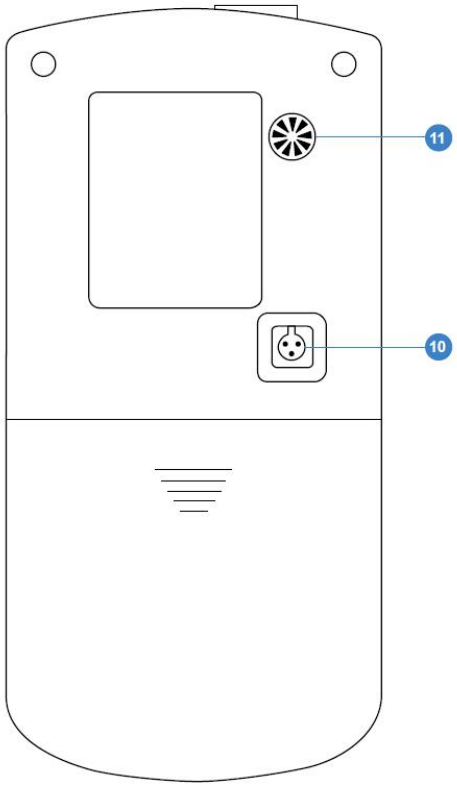
Exterior view, controls and connectors - VM-2500-S

10 Power input

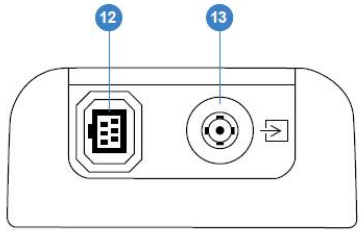
11 Gas output port (vents to atmosphere)

12 SpO_2 sensor port

13 CO_2 sidestream gas inlet port



Rear view



Top View

Symbols and buttons

Symbol	Feature / Button	Function
	Arrow buttons (up/down)	Multifunction buttons used for: 1. Scrolling through menu items 2. Increasing/decreasing parameters 3. Shortcuts to volume/brightness control during monitoring
	Display mode	Toggles between various display modes. Shortcut to return to display mode during menu mode
	Alarm silenced	The audible alarm can be silenced for a maximum period of two minutes. Optical alarm remains activated
	Menu	Menu selection. Shortcut to return to the previous menu level during menu mode.

Symbols and buttons

Symbol	Feature / Button	Function
	ENTER button	Confirms selection
	Pulse tone	Turns pulse tone on/off
	USB	USB 2.0 interface
	On/Off	To turn on the device: press and hold power button briefly. To turn off the device: press and hold power button for approx. 3 seconds
	Power input	Port to connect the external power supply (100-240V AC / 50-60Hz, Model No. FW 7660M/06)

Sense of the symbols and buttons

Symbol	Feature / Button	Function
	SpO_2 sensor port	Port to connect the SpO_2 sensor
	CO_2 mainstream port	Port to connect the IRMA™ CO_2 analyzer
	Gas outlet port	Gas outlet of the sidestream module (not applicable for mainstream)
	SpO_2 sensor port	Port to connect the SpO_2 sensor
	CO_2 side stream gas inlet port	Port with Light Emitting Gas Inlet (LEGI™) to connect the sampling line

Selecting Power Supply

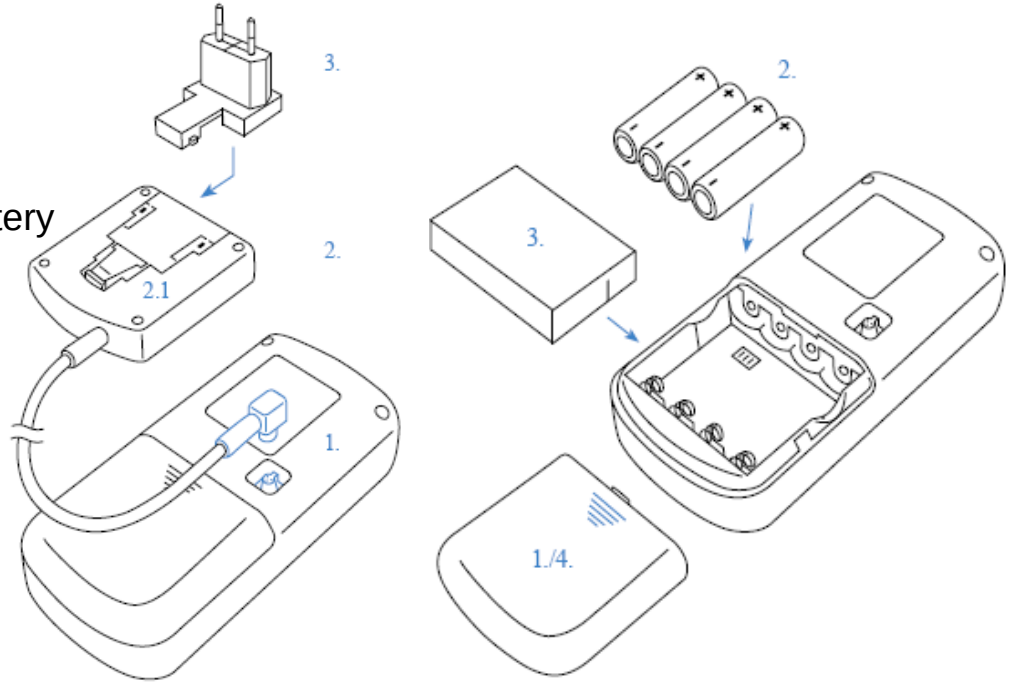
External power supply, rechargeable Li-ion battery, 4 x AA alkaline batteries

- External power supply,

  100-240 VAC / 50-60 Hz / 250 mA

  continuous use or charge Li-Poly battery
- Li-Poly battery: 3.7V / 2500 mAh
- 5-6 hrs charging and working time
- Alternatively can be powered by

  4x AA 1.5V alkaline batteries



Connecting sensors to the VM-2500-S

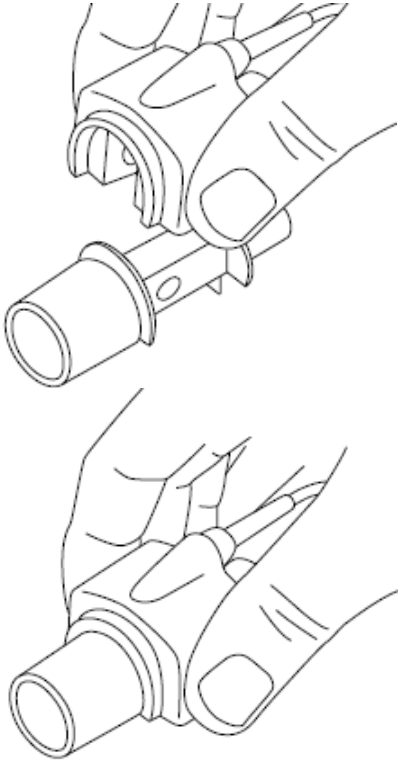
VersaStream sidestream sampling line configuration

- Single-patient use sampling line
- Simple, 1-piece sampling line configuration
- Connects directly into sidestream inlet port

Connecting sensors to the VM-2500-M

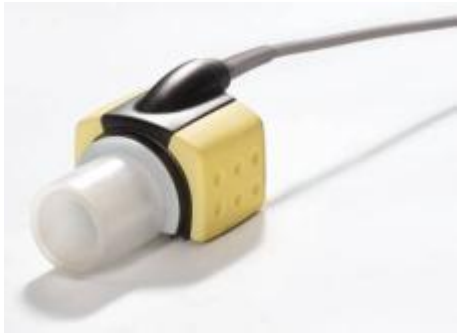
IRMA™ CO2 Analyzer (mainstream)

- Secure the IRMA™ CO_2 analyzer on top of the IRMA™ airway adapter
- Do not use the IRMA™ airway adapter (adult/paediatric) with infants as the adapter adds 6ml dead space to the patient circuit
- Do not use the IRMA™ airway adapter (infant) with adult or paediatric patients as this may cause excessive flow resistance



Connecting sensors to the VM-2500-M

IRMA™ CO_2 Analyzer (mainstream) function check

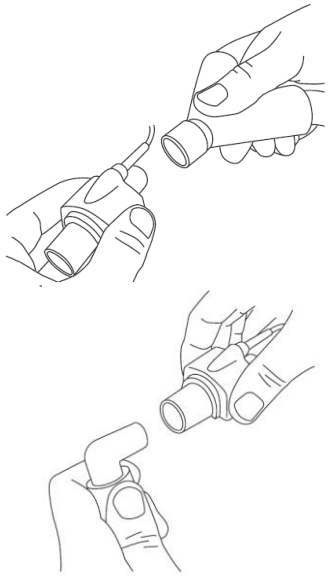


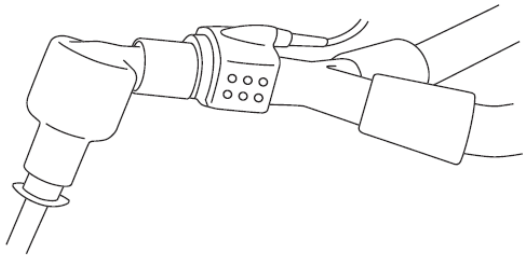
- A green LED indicates that the IRMA™ CO_2 Analyzer is powered and ready for use; to test the function, breathe into the airway adapter and check that valid CO_2 waveforms and values are displayed on the monitor
- Remove the airway adapter and wait for 5 seconds
- Check that the airway adapter alarm is displayed and that the LED at the IRMA™ CO_2 Analyzer displays a flashing red light

Connecting sensors to the patient

IRMA™ CO_2 Analyzer (mainstream) connect in circuit

- Connect the 15 mm male connector of the IRMA™ airway adapter to the breathing circuit Y-piece
- Connect the 15 mm female connector of the IRMA™ airway adapter to the endotracheal tube with or without an angled connector.
- Alternatively, connect a HME (Heat Moisture Exchanger)

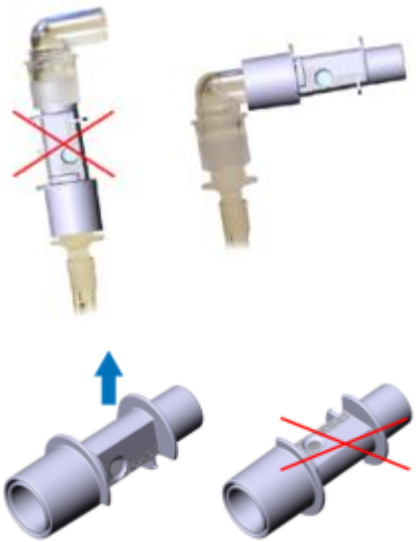




Connecting sensors to the patient

IRMA™ CO_2 Analyzer (mainstream) connect in circuit

- Do not place the IRMA™ airway adapter between the endotracheal tube and an elbow as this may allow patient secretions to block the adapter windows and result in incorrect operation
- To prevent secretions and moisture from pooling on the windows, always position the IRMA™ CO_2 analyzer vertically in relation to the airway adapter

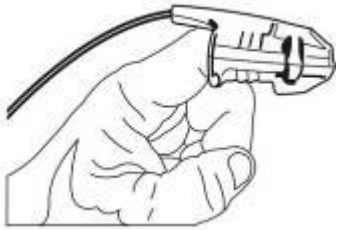


Connecting sensors to the patient

SpO_2 sensors should be selected as appropriate for the patient

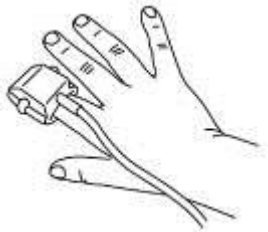
- Adult use: finger clip sensor, soft silicone sensor,

  ear sensor, wrap sensor, disposable sensor

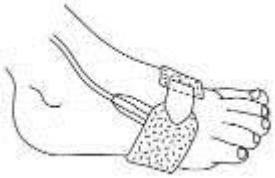


- Paediatric use: soft silicone paediatric finger sensor,

  ear sensor, wrap sensor, disposable sensor

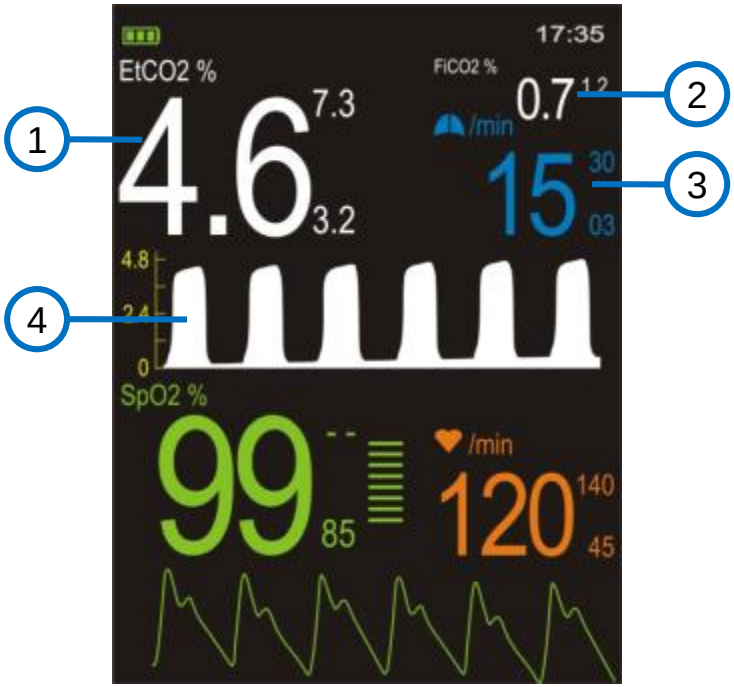


- Infant / Neonatal use: silicone wrap sensor, disposable sensor



Display modes and displayed data

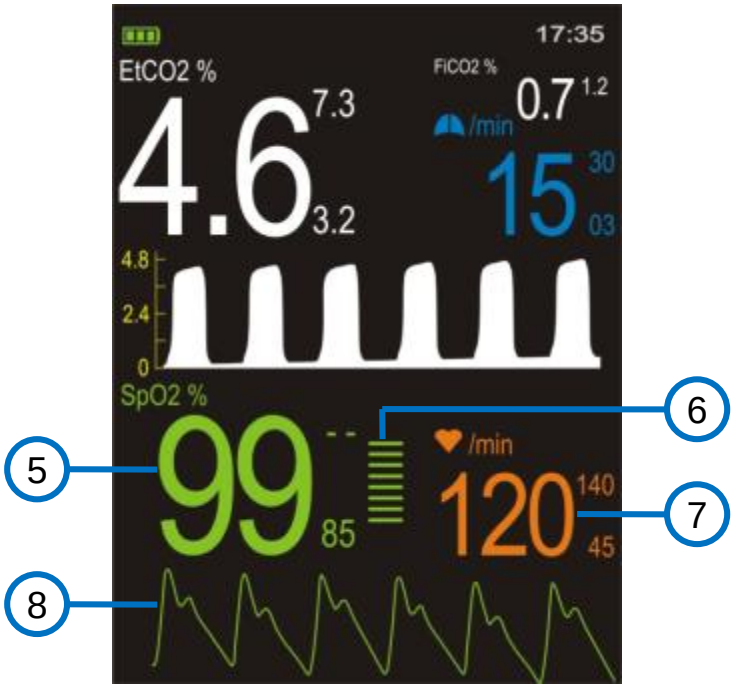
Standard display



No.	Function
1	End-tidal expired CO_2 gas concentration in Vol %, kPa or mmHg
2	Inspired CO_2 gas concentration in Vol %, kPa or mmHg
3	Respiration rate in breaths per minute (bpm)
4	CO_2 waveform (Capnogram) Default setting of the amplitude scale: auto scaling - automatically adjusted to the signal strength. The scale can also be defined by the user

Display modes and displayed data

Standard display



No.	Function
5	Functional blood oxygen saturation ($SpO_{2)}$ in %
6	Bar graph for pulse amplitude: indicates the dynamic pulse amplitude and rate. As the detected pulse becomes stronger, more bars light with each pulse. The reverse is true for weak pulses
7	Pulse rate in beats per minute
8	Pulse waveform (plethysmogram) Automatically adjusted to the pulse strength

SpO_2 Sensors

Numerical display

No.	Function
1	End-tidal expired CO_2 gas concentration in Vol %, kPa or mmHg, which can be defined by the user
2	Inspired CO_2 gas concentration in Vol %, kPa or mmHg
3	Respiration rate in breaths per minute bpm.

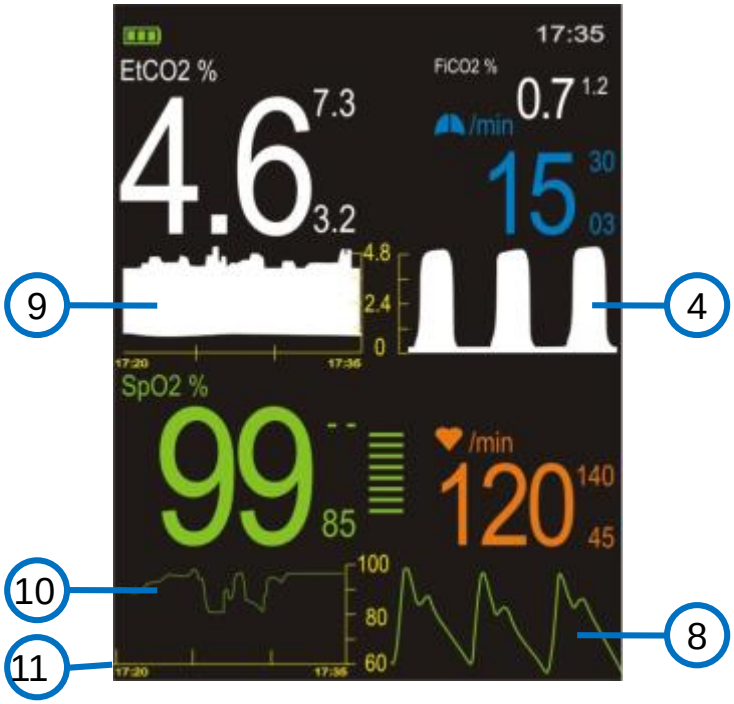
SpO_2 Sensors

Numerical display

No.	Function
5	Functional blood oxygen saturation ($SpO_{2)}$ in %
6	Bar graph for pulse amplitude Indicates the dynamic pulse amplitude and rate. As the detected pulse becomes stronger, more bars light with each pulse. The reverse is true for weak pulses
7	Pulse rate in beats per minute

Display modes and displayed data

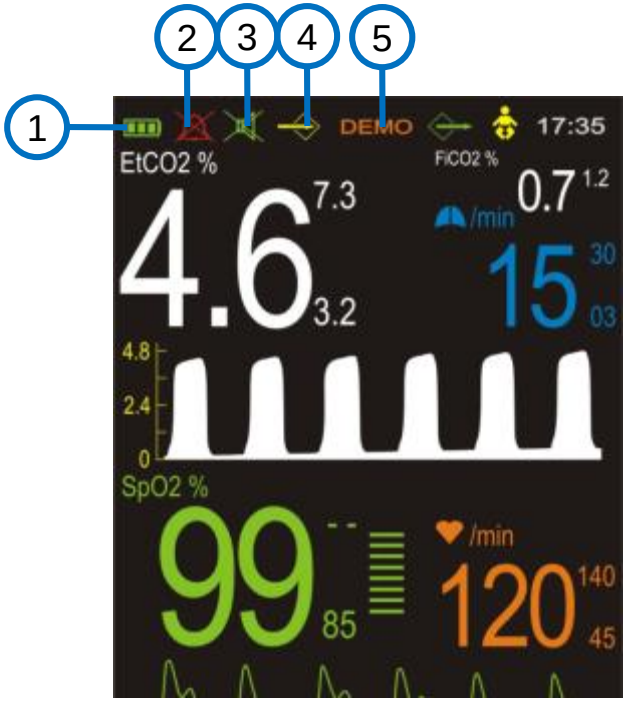
Trending Displays: 15 min, 1 h, 6 h

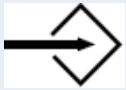


No.	Function
4	CO_2 waveform (Capnogram) Default setting of the amplitude scale: Auto scaling -automatically adjusted to the signal strength Scale however can also be defined by the user
8	Pulse waveform (plethysmogram) Automatically adjusted to the pulse strength
9	Combined $EtCO_2$ and FiO_2 trend waveform
10	SpO_2 trend waveform
11	Start and end times

Display modes and displayed data

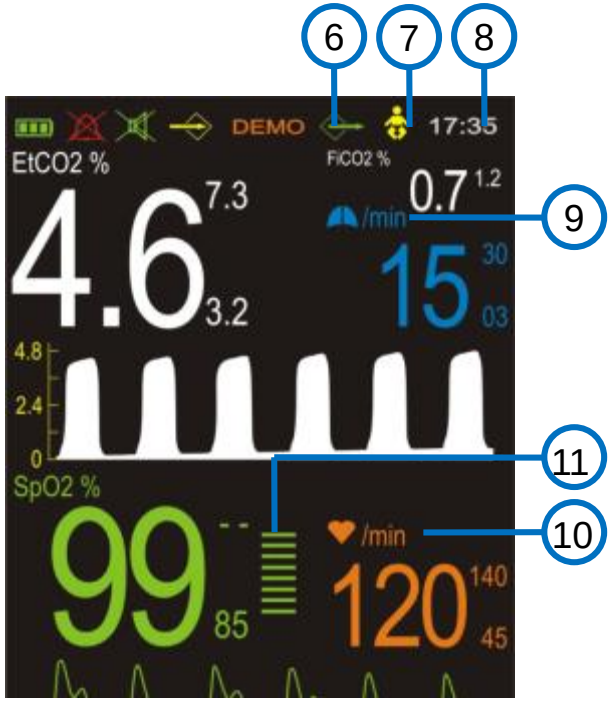
Symbols and indicators



No.		Function
1		Battery level indicator
2		Alarm silence indicator
3		Pulse tone off
4		Memory full indicator
5	DEMO	Demo mode indicator

Display modes and displayed data

Symbols and indicators



No.		Function
6		Real-Time mode indicator
7		Neonatal mode
8	17:35	Current time
9	/min	Respiration rate (Breaths per minute)
10	/min	Pulse rate (beats per minute)
11		Bar graph signal quality

Alarms

Alarm priority and appearance

Priority level	Audio signal sequence	Visual alarm	Condition
High (warning)	5 tone beep + 2 second pause 5 tone beep + 3 second pause	● ! ! !	Potentially life-threatening situation
Medium (caution)	3 tone beep + 5 second pause	● ! !	Potentially serious problems, presumed to be life-threatening
Low (advisory)	2 tone beep + 16 second pause	● !	Advisory alarms

Alarms

Default alarm limits

Limit	Unit	Range	Adult	Neonatal
$EtCO_2$ high	%	0.1 …9.9 / off	7.3	7.3
$EtCO_2$ low	%	off / 0.1 …9.9	3.2	3.2
$FiCO_2$ high	%	0.1 …9.9 / off	1.2	1.2
RR high	1/min	4 … 150 / off	off	off
Apnoea	s	20, 40, 60	20	20
SpO_2 high	%	1 … 99 / off	off	95
SpO_2 low	%	off / 1 … 99	85	85
PR high	1/min	1 … 250 / off	140	150
PR low	1/min	off / 1 … 250	45	30

Alarms

Limit alarm

Limit alarm	Condition	Priority
$EtCO_2$ high	$EtCO_2$ value above set alarm limit	Medium
$EtCO_2$ low	$EtCO_2$ value below set alarm limit	Medium
$FiCO_2$high	$FiCO_2$ value above set alarm limit	Medium
RR high	Respiratory rate above set alarm limit	Medium
Apnoea ! !	No breath detected within set terms (if ≤ 1min)	Medium
Apnoea ! ! !	No breath detected within set terms (if > 1min)	High
SpO_2 high	SpO_2 value above set alarm limit in standard mode	Low
SpO_2 high (neonatal mode)	SpO_2 value above set alarm limit in neonatal mode	Medium
SpO_2 low	SpO_2 value below set alarm limit	Medium
PR high	Pulse rate above set alarm limit	Medium
PR low	Pulse rate below set alarm limit	Medium

Alarms

Limit alarm

Limit alarm	Condition	Priority
Bad signal quality !!!	Poor-quality pulse signal, e.g. result of low perfusion	High
No CO_2 Sensor !	No connection to mainstream IRMA™ CO_2 analyzer	Low
Check CO_2 Adapter !	IRMA™ adaptor is dirty, not positioned correctly etc.	Low
No Nomo Adapter !	No connection to the sidestream sampling line	Low
Sampling system occlusion !	A component of the sidestream sampling system is blocked (occluded)	Low
CO_2 Over range !	Measured CO_2 concentration is outside of the specified accuracy range	Low
No SpO_2Sensor !	No connection to the SpO_2 sensor	Low

Alarms

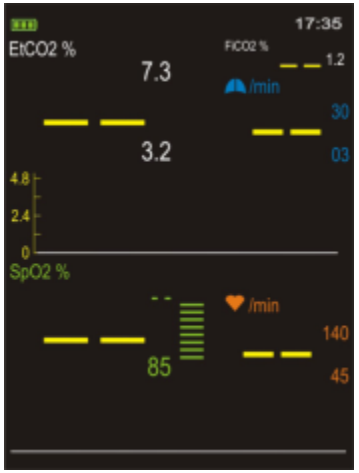
Limit alarm

Limit alarm	Condition	Priority
SpO_2 Probe off !	SpO_2 sensor is connected to the device, a signal was detected and then the finger has been removed or the sensor has come off the patient	Low
Excess light !	High ambient light sources near the SpO_2 sensor, e.g. surgical lights	Low
Battery low !	Low battery level at start up results in error message. Critical battery level during monitoring results in audible alarm and the battery indicator flashes yellow. After 3 minutes, the device switches off.	Low

Alarms

Reset of alarm signals

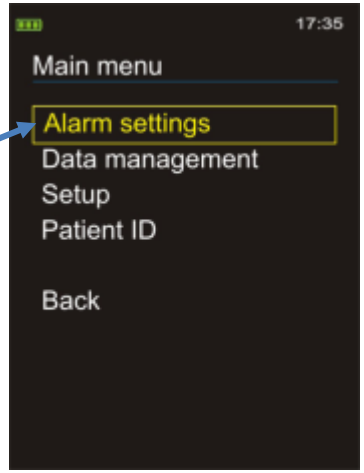
- Press and hold button  for 3 seconds
- If the initial condition for the warning is still present after resetting the alarm, the alarm will return immediately
- Parameters which have been set by the user will remain once an alarm is reset.



Menu structure

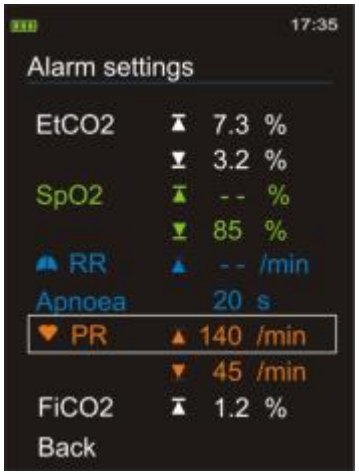
Main menu

- Use the button  to get into the main menu
- Use the buttons  to scroll through menu items
- The currently selected menu item is highlighted
- Press the button  to confirm your selection
- Select the menu item ‘Back’ to return to the previous menu level, or alternatively use the menu button  as shortcut for “Back”.



Alarm settings

Adjusting Settings

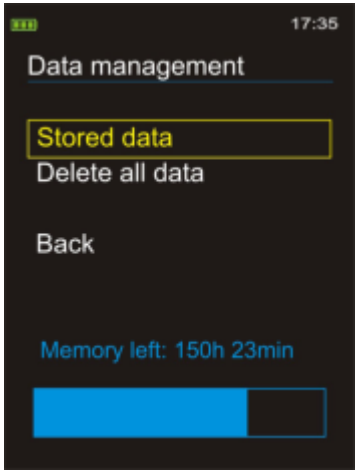


- Use the button ↵ to get into the Alarm settings menu
- Use the buttons ▲▼ to scroll through setting items
- Use the Alarm settings menu to set the upper and lower alarm limit with the ▲▼ buttons
- Select “- -” to deactivate the respective alarm limit
- Use the button ☰↓ to get into the last menu or use ⌂ to get into the main menu
- After restarting the device, the default alarm limits will be reset

Data management

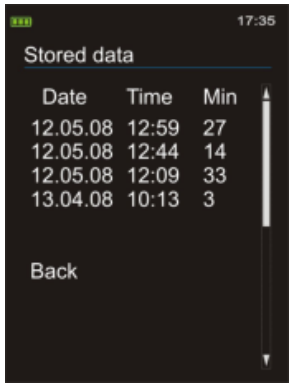
Stored Data and Delete All Data

- Use the button  to get into the submenu
- Use the buttons  to scroll through the stored data
- Use the button  to get into the last menu or use  to get into the main menu



Stored data

Detailed information



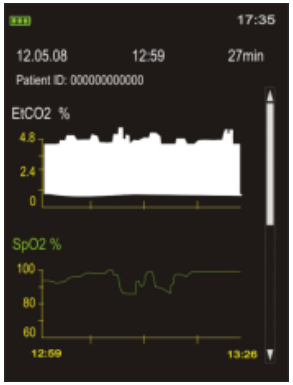
- Retrieve the selected data set by pressing the ↵ button
- The stored measurements are displayed in graphic form together with the date, start time, duration of the recording and Patient ID
- The colour code of the displayed data is:

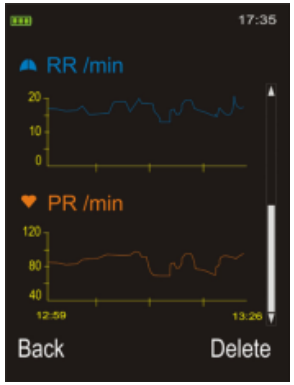
  $EtCO_2$ – white

  SpO_2 – green

  Respiration rate – blue

  Pulse rate - orange

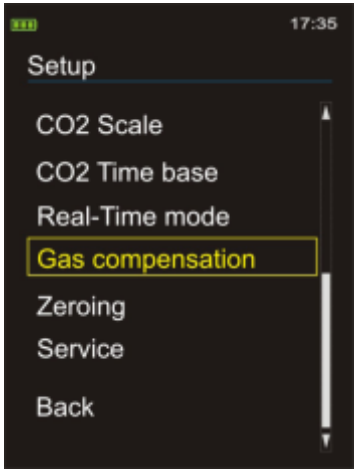


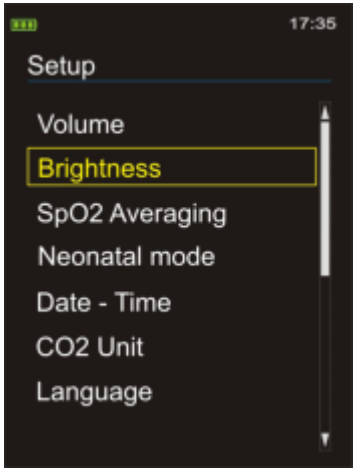


Set up

Adjusting parameters

- Use the buttons ▲▼ to scroll through the menu items
- This submenu offers access to various device settings; confirm selection by pressing the ↵ button

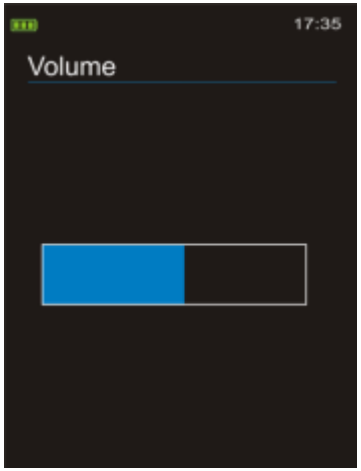




Parameter

Volume

- Adjust the pulse tone volume using the ▲▼ buttons
- Confirm the new setting by pressing the ↵ button



Volume Control Shortcut

- If the ▲ button is pressed during any monitoring display mode, the volume control screen will open.

  Adjust the volume using the ▲▼ buttons.

  Confirm the new setting by pressing the ↵ button

Parameter

Brightness

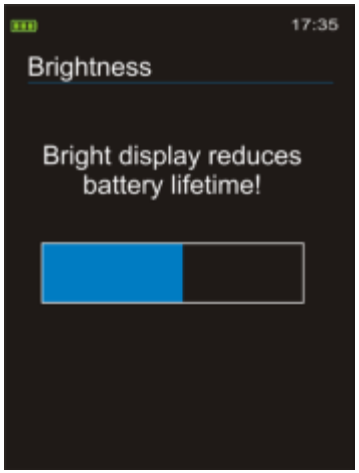
- Adjust the display brightness using the ▲▼ buttons
- Confirm the new setting by pressing the ↵ button

Brightness Control Shortcut

- If the ▼ button is pressed during any monitoring display mode, the brightness control screen will open.

  Adjust the brightness using the ▲▼ buttons

  Confirm the new setting by pressing the ↵ button



Note: high brightness settings will shorten the battery life.

Parameter

Power save mode

- The device's display can be turned off to save power and extend battery life. This can be accomplished by pressing and holding the ▼ button: a countdown will start, after which the display will be switched off.

  The device is now in economy power mode.

- Press any button to reactivate the display

Parameter

SpO_2 Averaging

- **Stable:** When this setting is selected, sudden variations in data will not immediately affect the reading; data is averaged over a longer period to smooth out minor irregularities
- **Standard:** Averaging parameters used for this setting are between those of the stable and sensitive settings
- **Sensitive:** The reading is more sensitive to irregularities but reacts very quickly to any changes in measured parameters

Parameter

SpO_2 Averaging

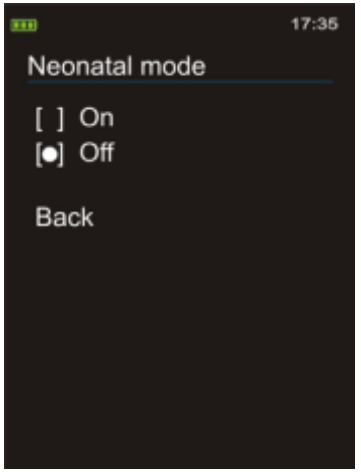
- Pulse oximeter parameter renews

Measurement dynamics		Beat to beat min / max	Sensitive min / max	Standard min / max	Stable min / max
SpO_2	First reaction after	n/a	1 sec	2 sec	4 sec
	Determined value after another	n/a	4 sec	8 sec	12 sec
Pulse Rate	First reaction after	1 sec / 7 sec	1 sec / 7 sec	1 sec / 7 sec	1 sec / 7 sec
	Determined value after another	n/a	1 sec / 4 sec	1 sec / 6 sec	1 sec / 8 sec

Parameter

Neonatal mode

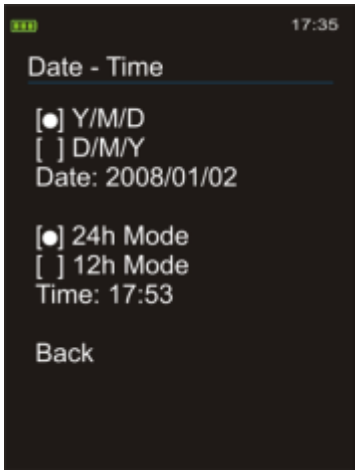
- The neonatal symbol indicates that the neonatal mode is activated
- In this mode the default alarm limits are adjusted to neonatal default settings



Parameter

Date and Time

- Select between Y/M/D and D/M/Y mode
- Select between 12h mode and 24h mode
- Set the date and time
- Settings for the date and time are not erased when the batteries are temporarily removed



Parameter

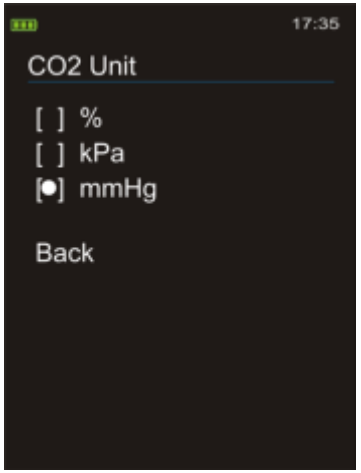
CO_2 unit

- By changing the CO_2 unit, the measurement values and default limits of EtO_2 and $FiCO_2$ are converted accordingly
- For conversion to the units kPa and mmHg an automatic barometric pressure compensation is performed:

  1 mmHg = 1.33 mbar = 133 Pa = 1.33 hPa

  1 mbar = 100 Pa = 1 hPa = 0,75 mmHg

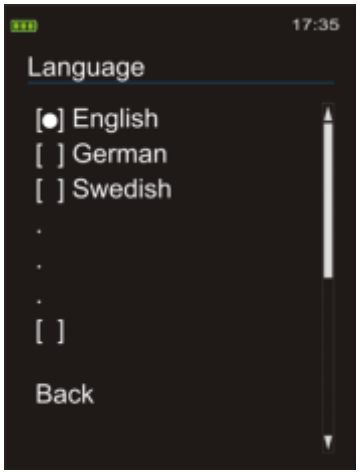
  1 Vol% is approximately 7 mmHg



Parameter

Language

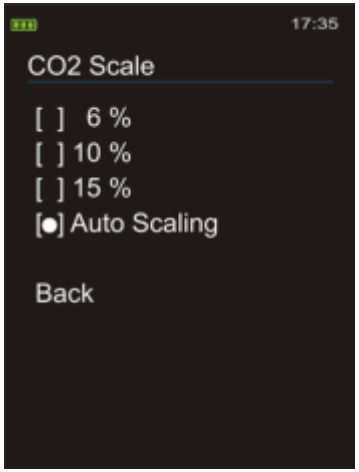
- All messages and menus will be displayed in the selected language
- The standard language package comprises up to 16 languages



Parameter

CO_2 Scale

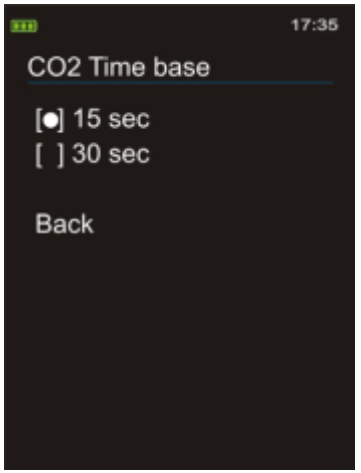
- The scale maximum of the capnogram and CO_2 trend can be fixed to 6 %, 10 % or 15 %
- Select the option “Auto Scaling” for optimal amplitude scaling of the data
- Depending on the selected CO_2 scale, the values will be adjusted accordingly



Parameter

CO_2 Time base

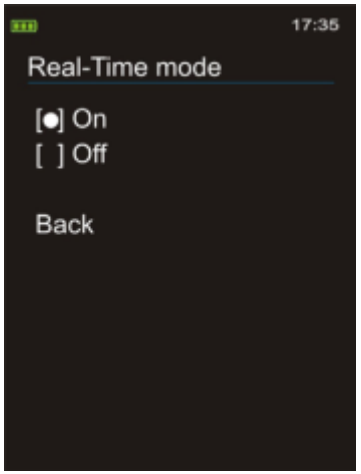
- For an optimal time resolution the time base of the capnogram can be adjusted to 15 seconds or 30 seconds



Parameter

Real-Time mode

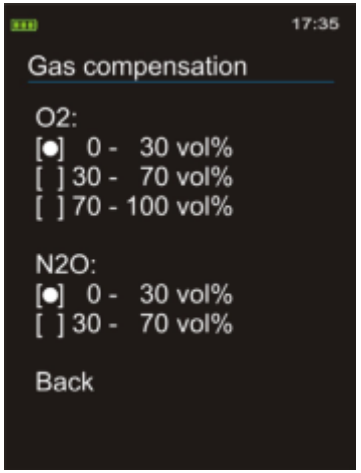
- The Real-Time mode symbol indicates that the Real-Time mode is activated
- Activation of the Real-Time mode enables visualization and storage of measurement data on a PC
- In this mode the ongoing measurement values of $EtCO_2$, $FiCO_2$, SpO_2, respiration rate and pulse rate are available every second at the USB port for download to the PC



Parameter

Gas compensation

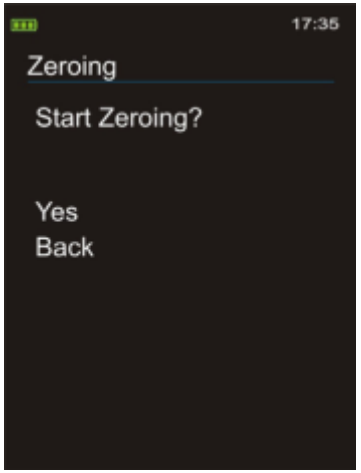
- The presence of oxygen and nitrous oxide can cause some interference in the CO_2 measurement
- These interferences are compensated by setting the range of O_2 and N_2O concentration under the menu point “Gas compensation”



Parameter

Zeroing

- Zeroing needs to be performed only when an offset in $EtCO_2$ and $FiCO_2$ values is observed, or when an unspecified accuracy message is displayed
- Warning: incorrect zeroing will result in false CO_2 gas readings



Settings

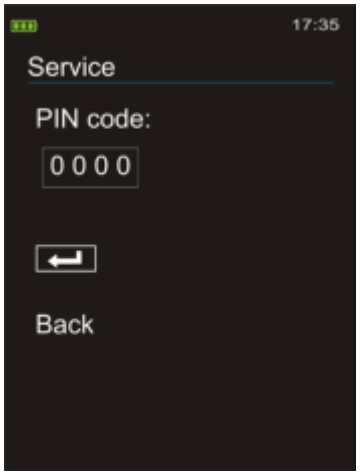
Default start settings

- Changed settings are in effect only as long as the VM-2500 remains switched on.
- Once the VM-2500 has been switched off, at the next start up, the default settings will be in effect.
- The start up defaults can be changed in the PIN protected Service Menu.
- Only authorized service personnel can access this menu.

Parameter

Service menu

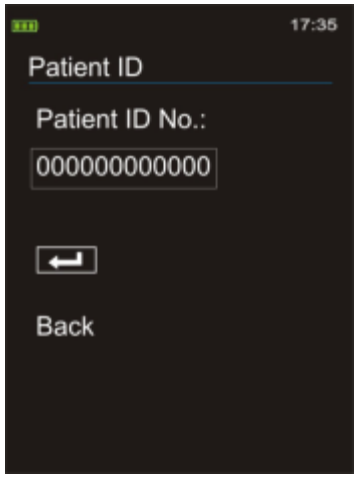
- The Service submenu is protected by a PIN code; only authorized service personnel can access this menu
- The service menu is available only in English
- Device languages settings have no effect on the service menu



Parameter

Patient ID

- The VM-2500 features the possibility of saving a 12-digit numerical patient ID together with every created data file
- If the Patient ID is changed via the menu during measurement, the current data file is closed and a new data file with the new Patient ID is opened
- A message is displayed to inform the user



Technical specifications

Parameters displayed

- Numerical: End-tidal CO_2 concentration ($EtCO_2$)
  Inspired CO_2 concentration ($FiCO_2$)
  Oxygen saturation (SpO_2)
  Respiration rate (RR)
  Pulse rate (PR)
- Graphical: Capnogram
  Plethysmogram
  Trends of numerical data (15min / 1h / 6h)

Technical specifications

Alarms

- Limits: Adjustable limits for all numerical parameters
- Alerts: Audible and visual alarms (**complies with EN 60601-1-8**)

Storing data

- Communication interface: USB 2.0
- Data memory on device: up to 400 hours in total, sampled every 8 seconds
- Real-Time mode: sends and stores numerical parameters every second on PC
- PC Software: VM-2500 Windows PC software (for data download and Real-Time)

Technical specifications

Warm up time

- < 10 seconds (concentrations reported and full accuracy)
- **Measurement range**
- $EtCO_2$ and $FiCO_2$: 0 - 15%
- Respiration rate: 0 - 150 breaths/min
- **Accuracy**
- $EtCO_2$ and $FiCO_2$: +/- (0.2 Vol%. + 2% of reading),

  +/- (0.3 Vol% + 4% of reading.) incl. interfering gases
- Respiration rate: +/-1 digit

Technical specifications

Parameter renews

- $EtCO_2$ and $FiCO_2$: Displayed after one breath and then a continually updated breath average
- Respiration rate: Displayed after three breaths and then average value updated every breath

Measurement Range

- SpO_2: 0 - 100%
- Pulse Rate: 20 - 300 beats/min

Technical specifications

Accuracy

- SpO_2: +/- 2% (70 to 100%)
- Pulse Rate: +/- 1 digit (up to 100 beats/min) or +/- 1% (> 100 beats/min)

Parameter renews

- First displayed value after application: SpO_2: between 3 seconds and 7 seconds, depending on measurement conditions
- Pulse rate: between 5 seconds and 8 seconds, depending on measurement conditions

Technical specifications

Display

- Active OLED colour graphic display, 262,000 colours, 240 x 320 pixels

Dimensions

- (L x W x H): 15 cm x 7.5 cm x 3.5 cm

Weight

- < 400 g (complete device with batteries)

Operating conditions

- 0 - 50°C, 15 - 95% R.H. (non-condensing), 60 - 120 kPa (excl. Li-Poly battery)

Storage conditions

- -30 - 70°C, 10 - 95% R.H. (non-condensing), 60 - 120 kPa (excl. Li-Poly battery)

Technical specifications

General Classification

- The device is not suitable for use in the presence of a flammable anaesthetic gas mixture
- No sterile parts are included
- Mode of operation: Continuous operation

Construction

- Water-resistant construction of class IPX1 (with silicone cover)

Classification (according to MDD 93/42/EEC)

- Class IIb

Electrical safety

- Class of protection II / Type BF – Type and degree of protection against electrical shock

Maintenance

Calibration-free

- The monitor requires no routine calibration
- If service is necessary, contact qualified service personnel or your local sales representative
- There are no user-serviceable parts within the VM-2500. The cover should only be removed by qualified service personnel.
- The VM-2500 requires no routine calibration. A basic planned preventative maintenance programmed conducted by qualified service personnel is recommended.
- Please refer to the Service Manual for detailed information

Cleaning

Surface clean

- The VM-2500 and its accessories should be cleaned on a regular basis. Use a soft cloth dampened with either a commercial, non-abrasive cleaner, or a solution of 70% alcohol in water to clean the device. Lightly wipe the surface of the monitor.
- Do not allow liquids to enter the VM-2500 sidestream device through the gas input.
- Do not immerse the VM-2500 or its accessories in liquid.
- Do not spray, pour, or spill any liquid on the VM-2500, its accessories, connectors, switches, or openings in the enclosure as this may result in damage to the unit.

Disinfection

Disinfection of unit and accessories

- Use a soft cloth saturated with a solution of 10% chlorine bleach in tap water to disinfect the device housing.
- Use 70% alcohol to disinfect the IRMA CO_2 Analyzer and the SpO_2 sensor.
- Do not autoclave or steam sterilize the VM-2500 device, or its disposable accessories.
- Do not autoclave or steam sterilize the IRMA CO_2 Analyzer or sampling lines.

Testing

Test of the alarm system

- Test for disconnection alarms by disconnecting CO2 sampling system or SpO2 sensor
- To trigger an alarm for test purposes during monitoring, set the upper alarm limit for a parameter below the currently indicated measurement value, the device will react with a visual and audible alarm

Testing

Test of the measurement accuracy CO2 and SpO_2

- The CO_2 and SpO2 modules of the VM-2500 are permanently factory calibrated, should verification of accuracy be required, please contact Viamed.

Zeroing the capnograph

Mainstream VM-2500-M

- Zeroing needs to be performed only when an offset in gas values is observed, or when an unspecified accuracy message is displayed. To zero the device:
- First connect a new IRMA™ airway adapter onto the IRMA™ CO_2 analyzer, without connecting the airway adapter to the patient circuit.
- Allow 10 seconds for warm up of the IRMA™ CO_2 analyzer after power on or after changing the IRMA™ airway adapter before proceeding with the zeroing procedure.
- Select MAIN MENU > SETUP > ZEROING at the monitor
- Ensure that ambient air (21% O_2 and 0% CO_2) is present in the IRMA™ airway adapter

Zeroing the capnograph

- cont.

- Start the zeroing by selecting “Yes” when the message “Start Zeroing?” is displayed.
- The message “Zeroing completed !” indicates that the zeroing was successful.
- Special care should be taken to avoid breathing near the airway adapter before or during the zeroing procedure.
- Always perform a pre-use check after zeroing the IRMA™ CO_2 analyzer.
- A successful zeroing requires the presence of ambient air (21% O_2 and 0% CO_2) in the IRMA™ airway adapter during zeroing. Incorrect zeroing of the IRMA™ CO_2 analyzer will result in false gas readings

Zeroing the capnograph

Sidestream VM-2500-S

- The VM-2500-S performs zeroing automatically by switching the gas sampling from the respiratory circuit to ambient air. The automatic zeroing is performed every 24 hours and takes less than 3 seconds
- Manual induced zeroing is also possible, however, this needs to be performed only when an offset in gas values is observed, or when an unspecified accuracy message is displayed:
- First connect a VersaStream sampling line to the VM-2500-S
- Allow 10 seconds for warm up of the ISA™ module after power on or after changing the sampling line before proceeding with the zeroing procedure.

Zeroing the capnograph

Sidestream VM-2500-S

- Select MAIN MENU > SETUP > ZEROING at the monitor.
- Ensure that the monitor is placed in a well ventilated environment. Avoid breathing near the monitor housing
- Start the zeroing by selecting “Yes” when the message “Start Zeroing?” is displayed.
- The message “Zeroing completed !” indicates that the zeroing was successful.
- Since a successful zeroing requires the presence of ambient air (21% O_2 and 0% CO_2) in the device, ensure that the VM-2500-S is placed in a well ventilated environment. Avoid breathing near the VM-2500-S before or during the zeroing procedure.
- Incorrect zeroing of the integrated ISA™ CO_2 analyzer will result in false gas readings

VM-2500 PC-Software

Download of records and Real-Time-Monitoring

- With the user-friendly VM-2500 PC-Software, all measurement data, selected alarm limits and alarm messages can be stored on a PC via the USB interface
- The data can be viewed and patient data added on the PC
- The file can be printed or exported as CSV file for processing with additional software
- Furthermore the software can be used to display and save measurement values and alarm messages on a PC, parallel to ongoing measurements
- To enable this function the Real-Time mode has to be selected on the device
- During this mode the device sends the current $EtCO_2$, $FiCO_2$, SpO_2, respiration rate and pulse rate measurement values every second via USB to the PC

Component list and ordering information

Packing list for VM-2500-M

- Mainstream device
- IRMA™ CO_2 analyzer
- IRMA™ airway adapter (adult/paediatric)
- Reusable SpO2 sensor (selectable)
- USB data cable
- Power supply

- Power supply adapter (UK plug)
- Power supply adapter (European plug)
- Li-Poly battery (CT-2500)
- 4 x Batteries (AA)
- Silicone protective cover
- User manual + PC software (CD-ROM)

Component list and ordering information

Packing list of VM-2500-S

- Sidestream device
- Disposable sampling line
- Reusable SpO_2 sensor (selectable)
- USB data cable
- Power supply

- Power supply adapter (UK plug)
- Power supply adapter (European plug)
- Li-Poly battery (CT-2500)
- 4 x Batteries (AA)
- Silicone protective cover
- User manual + PC software (CD-ROM)

Accessories

A wide range of accessories and sampling lines are available, including:

- Pole mounting clamps
- Rail mounting clamps
- Universal mounting clamps
- Protective silicone covers
- Protective rubber boot / instrument case
- Padded carrying bags

Please see supporting product literature or contact Viamed for further information.

For customer service and technical support, please contact Viamed:

01535 634542

info@viamed.co.uk