Ventilation Parameter setting:

• Select desired ventilation mode first

**Important**: By pushing the button, the parameters of the ventilation mode can be preset. (button turns yellow), the new ventilation mode is only activated by re-tapping! As long as mode is not confirmed, ventilator will continue ventilation in previous mode.

- Select parameter you wish to change > button turns green > Adjust parameter by turning the rotary knob and confirm setting either by tapping respective button or rotary knob > parameter button turns blue again
- Only parameters necessary for selected mode, will appear on the screen
  Trigger button for instance is only visible in modes were trigger is used
Ventilation modes

Description of the ventilation modes on fabian HFO ventilator:
Available modes are:

**IPPV (CMV)**  Intermittent Positive Pressure Ventilation
**SIPPV (ASSIST)**  Synchronised Intermittent Positive Pressure Ventilation  
(  Assist Controlled Ventilation)
**SIMV**  Synchronised Intermittent Mandatory Ventilation
**SIMV+PSV**  Synchronised Intermittent Mandatory Ventilation  
with Pressure Support
**PSV**  Pressure Support Ventilation
**CPAP**  Continuous Positive Airway Pressure Ventilation
**nCPAP**  Nasal CPAP with Flow Generators
**duoPAP**  Two Level Nasal CPAP with Flow Generators
**HFO**  High Frequency Oscillatory Ventilation
**O₂ Therapy**  High or Low Flow Oxygen Therapy (with nasal cannulas)
**VG**  Volume Guaranteed Ventilation
**VL**  Volume Limited Ventilation

**IMPORTANT:**
Volume Guarantee function is available in the following modes:

IPPV, SIPPV (ASSIST), SIMV, SIMV+PSV, PSV and HFO

In the SIMV modes, the Volume Guarantee function is only valid for the SIMV breath and not  
for the PSV breath.

In PSV mode, the VG function is active for the PSV breath as well as for the back up breath  
in case of APNEA.

The backup ventilation will start after the set apnea time. If apnea alarm is set to OFF,  
the backup ventilation starts right after one period of expiratory time (Te).
To access the alarm limits screen, push the alarm limits button.

To adjust alarm limits, move cursor to the parameter, push rotary knob and adjust value according your clinical guidelines.

Note!
In PSV mode, the apnea delay time determines after which delay the backup ventilation will start. To allow the baby breathing with short periods of apnea, the apnea time should be set somewhere in between 3 seconds and 6 seconds.

**Autoset**
Sets the alarm limit automatically based on measured value.

**MV**
Upper limit 80% above measured value, lower limit 50% below measured value.

**Frequency**
50% above measured value

**Apnea**
10 seconds

**Ppeak**
3 cmH₂O above measured value

**PEEP**
3 cmH₂O below measured value

Alarm loudness can be set in 3 different levels.
Show Log opens the alarm history logfile.
 IPPV (CMV)

In IPPV, there is no synchronisation with patients breathing pattern. This mode should only be used for patients without spontaneous breathing efforts. Sedated patients for instance.

Settings to start with:
- **I-Flow**
  - between 8 LPM
- **E-Flow**
  - same as I-Flow
- **Rate**
  - between 55 and 60 bpm
- **Inspiratory time**
  - between 0.3 sec and 0.4 sec
- **Ti P**
  - between 15 – 18 cmH2O
- **PEEP**
  - 4 - 6 cmH2O

To adjust wave form, use I-Flow. For square waveform increase, for decelerating or sine wave decrease I-Flow.

Recommended alarm settings:
- Low minute volume
- Low PEEP
- **Ppeak**
Every inspiratory effort triggers a breath with a fixed inspiratory time and inspiratory pressure. The minimum rate per minute is the preset one. A patient triggered breath is coloured green, a none triggered is grey.

Note: It is important that the Ti is watched carefully in this mode – too long a set Ti in an infant with tachypnoea will result in a short expiratory time (Te) and leads to air trapping, with the risk of air leak.

Settings to start with:
- I-Flow: 8 LPM
- E-Flow: same as I-Flow
- Rate: 40 bpm
- Inspiratory time: between 0.3 sec and 0.4 sec
- P: between 16 – 18 cmH₂O
- PEEP: 4 - 6 cmH₂O

Recommended alarms:
Same as IPPV but in addition Respiratory Rate to alert in case of Hyperventilation

Try to achieve an exhaled tidal volume of about 5 – 6 ml/kg bodyweight. To increase Tidal Volume, increase P_{insp} and eventually rise PEEP
SIPPV (ASSIST) with VG (Volume Guarantee)

If VG is added to the SIPPV (ASSIST) ventilation, each breath is maintained at same exhaled tidal volume. In case of an improvement of lung compliance, the $P_{\text{insp}}$ is automatically reduced.

Every single inspiratory effort of the patient is supported with a mechanical breath with fixed inspiratory time and fixed Inspiratory Pressure. If the breath was triggered by patient, it is coloured green, if none triggered, grey. The baby controls the rate of ventilation.

Settings to start with:
- I-Flow: 8 LPM
- E-Flow: same as I-Flow
- Rate: between 35 and 40 bpm
- Inspiratory time: between 0.3 sec and 0.4 sec
- $P_{\text{insp}}$: between 16 – 18 cmH$_2$O
- PEEP: 4 - 6 cmH$_2$O

How to start VG function:
Step 1
Setup ventilator in SIPPV (ASSIST) and start ventilation Step 2
Once the Exhaled Tidal Volume $V_{Te}$ reading is constant, press Vguarant button > turns green
Step 3
Turn rotary knob clockwise > current Tidal Volume $V_{Te}$ is taken from readings. $P_{\text{insp}}$ button changes to orange colour and $P_{\text{insp}}$ is automatically increased by 5 cmH$_2$O to allow ventilator to compensate for a changing lung compliance. Confirm setting by pushing rotary knob. Setting is accepted if button turns to blue colour again. Triggered and none triggered breath are independently supported based on lung compliance.

Step 4
If Volume Guarantee function is deactivated, the $P_{\text{insp}}$ pressure which was necessary to deliver preset target volume, will be used. In case of a flow sensor failure, the ventilator automatically memorizes the last correct $P_{\text{peak}}$ value and continues ventilation at this level, until flow sensor problem is solved.

Meaning of the orange $P_{\text{insp}}$ button:
Maximum pressure to achieve target volume, allowed by the user, but ventilator will always use lowest possible $P_{\text{peak}}$ to deliver the target volume.
The following graphic shows different support of triggered and none triggered breath. To maintain the preset exhaled tidal volume, the ventilator changes the $P_{\text{peak}}$ breath to breath by maximum change of 3 cmH$_2$O.

**Note:**

If the preset target volume is not achievable within the set $P_{\text{insp}}$, a warning message „Tidal Volume not reached“ is displayed in the status line underlined by an acoustic beep every 10s. An arrow in the $P_{\text{insp}}$ button pointing upward indicating use of a higher $P_{\text{insp}}$ is necessary to achieve target volume.
The ventilator synchronizes patient's inspiratory efforts and delivers a fixed amount of synchronised mechanical breath with preset inspiratory time. Spontaneous inspiratory efforts in between mechanical breath are supported with pressure support level $P_{PSV}$. Patient determines begin and end of PSV breath depending on the preset flow termination criteria. The I-Time button has changed to orange, indicating that the set I-Time is only valid for SIMV breath and represents maximal I-Time in case flow termination criteria isn't met. (i.e. in case of high ET tube leakage)

Settings to start with:

- **I-Flow**: 8 LPM
- **E-Flow**: same as I-Flow
- **Rate**: between 20 to 30 bpm
- **Inspiratory time**: between 0.3 sec and 0.4 sec
- **Pinsp**: between 16 – 18 cmH$_2$O
- **P psv**: 16 – 18 cmH$_2$O
- **PEEP**: 4 - 6 cmH$_2$O

The minimum pressure difference between PEEP and $P_{PSV}$ is always 2 cmH$_2$O and $P_{PSV}$ is max same level as $P_{insp}$.

If Volume Guarantee is added, the VG criteria is only valid for the SIMV breath. Not for the PSV breath.
The ventilator synchronizes the patients inspiratory effort and delivers a breath at fixed pressure levels but variable I-Time is controlled by patient based on preset flow termination criteria. The rate is controlled by the patient.

Settings to start with:

- **I-Flow**: 8 LPM
- **E-Flow**: same as I-Flow
- **Rate**: between 30 to 40 bpm
- **Inspiratory time**: between 0.3 sec and 0.4 sec
- **Pinsp**: between 16 – 18 cmH₂O
- **P psv**: 16 – 18 cmH₂O
- **PEEP**: 4 - 6 cmH₂O

**Important:**

In PSV mode, the apnea backup ventilation will start after the preset apnea delay set in the alarm menu. Make sure to set this apnea delay to about 4 – 6 seconds, because babies tend to have short periods of apnea and you don’t want the ventilator to kick in to early. If apnea is set to OFF, the ventilator starts backup after E-Time.

The minimum pressure difference between PEEP and P_{psv} is always 2 cmH₂O and P_{psv} is max same level as P_{insp}.

The PSV breath is terminated at one of the following criteria:
- Airway pressure exceeds a pressure setting P_{psv}
- Inspiratory flow has dropped to 5-35% of the max. inspiratory flow
If Volume Guarantee is added to PSV, the ventilator automatically is adjusting the $P_{PSV}$ level necessary to maintain preset target volume. In case of an apnea, the ventilator will start cycling at preset rate and $P_{Backup}$. As soon as spontaneous activity restarts, the backup stops.

Settings to start with:
- I-Flow: 8 LPM
- E-Flow: same as I-Flow
- Rate: between 30 to 40 bpm
- Inspiratory time: between 0.3 sec and 0.4 sec
- $P_{backup} = P_{insp}$: between 16 – 18 cmH2O

$P_{PSV}$: 16 – 18 cmH2O
$PEEP$: 4 - 6 cmH2O

The minimum pressure difference between $PEEP$ and $P_{PSV}$ is always 2 cmH2O and $P_{PSV}$ is max same level as $P_{insp}$.

Note:
PSV breath as well as apnea backup breath are volume targeted breath in this mode. The delay to start backup ventilation is set with the apnea time in alarm limit screen. If apnea is set to OFF > backup starts after E-Time.
HFO Ventilation

High Frequency Oscillatory ventilation uses the following settings:

Settings to start with:
Flow: 8 LPM
MAP: about 2 cmH\(_2\)O above MAP used for conventional ventilation
Amplitude: start at about 22 cmH\(_2\)O
Frequency: 12 to 15 Hz for babies below 1kg and 8 – 12 Hz for babies above 1kg
1kg I:E Ratio: 1:2
P: If used in your clinical guidelines for lung recruitment, otherwise deactivate in ventilation menu
V: Set at 2 ml per kg bodyweight depending your clinical guidelines
The CPAP mode can be used for intubated patient as well as for nasal CPAP. If used with nasal CPAP systems like F&P bubble CPAP, Hudson or similar, the Flow Sensor must be deactivated manually in the calibration screen.

The ventilator automatically compensates leaks by increasing flow to max Flow$_{\text{min}}$ plus 100% to avoid CPAP pressure drop.

Settings to start with:
- Flow$_{\text{min}}$: 8 LPM
- CPAP: 5 cmH$_2$O
- P: 12 cmH$_2$O
- Backup: OFF

**Important:**
Make sure the flow sensor is deactivated, otherwise the apnea alarm is triggered all times. Use alternative system for apnea detection.

For Variable Flow systems like Infant Flow®, Inspire™ or MediJet®, please use the option NCPAP and DUOPAP if available in your unit.
O₂ Therapy

O₂ Therapy is an option which allows use of a continuous flow of blended gas, from 1 – 15 LPM. Nasal cannulas of various makes like F&P, Atom or similar can be used. There are no alarm functions active in this mode, except for the set FiO₂.

For weaning purposes, this mode can also be used in conjunction with variable flow systems like Infant Flow®, Inspire™ or MediJet®, however there won’t be any alarm settings on pressure monitoring.

Note:
This mode can also be used to put the ventilator in standby mode. By setting a flow of 4 LPM, the humidifier dual servo temperature controls remain active, so no need to switch it off in case of short term standby mode.
Features

**Graphics:**
- **Waves:** Displays 3 waveforms, Pressure, Flow and Volume simultaneously
- **Freeze:** Freezes the waves or Loops
- **Loops:** Pressure-Volume and Flow-Volume Loops
- **Trends:** up to 5 days trending of measured values
- **Save Loop:** The save Loop function stores one Loop and keep it as reference until a new Loop is saved

**Waves:**
- Manual scaling mode. Use up and down keys for scaling graphics

**Loops:**
Trends:

Sub Menu:
The submenu allows access to fine-tune some of the ventilation modes, i.e.:
- Manual breath
- Flow termination criteria for PSV ventilation
- Flush time
- .............