



Tafonius Training

Objectives

1. To inform the user about the salient points of the machine in terms of hardware
2. To inform the user of the basic operating principles of the machine
3. To instruct the user in the correct setup and closing-down procedures of the machine including cleaning
4. To instruct the user in the normal operation of the machine
5. To instruct the user in the advanced use of the machine
6. To instruct the user where to look and how to look for trouble shooting of the machine

This training program will run through the machine in Auxiliary mode discussing all of the features. PC Mode will then be covered as a separate section.

The Anatomy of the machine will be discussed first. Please see the document **"The Parts of Tafonius"**

1. Salient points of the Tafonius machine in Auxiliary & PC Modes

Auxiliary Mode

Power connections

- Mains power should be connected during use
- There is a small RCD (Residual Current Device) situated at the rear of the machine. This must be set to ON so that the small green light is showing
- The indicator "MAINS" will appear at the top centre of the Auxiliary screen when power is applied. If mains power is absent, the word "BATT" will appear instead
- A green A/C ON icon will appear in the lower left hand corner of the PC screen when power is applied. If mains power is absent the text will show A/C OFF in red and will flash once a second.
- The status of each battery is indicated at the top left of the screen by a voltage and then a condition status. With mains applied the voltage should be greater than 13v for each battery. If the batteries are charging then the legend "CHG+" will appear after the battery. The machine will not run with both batteries showing a voltage of less than 11v each

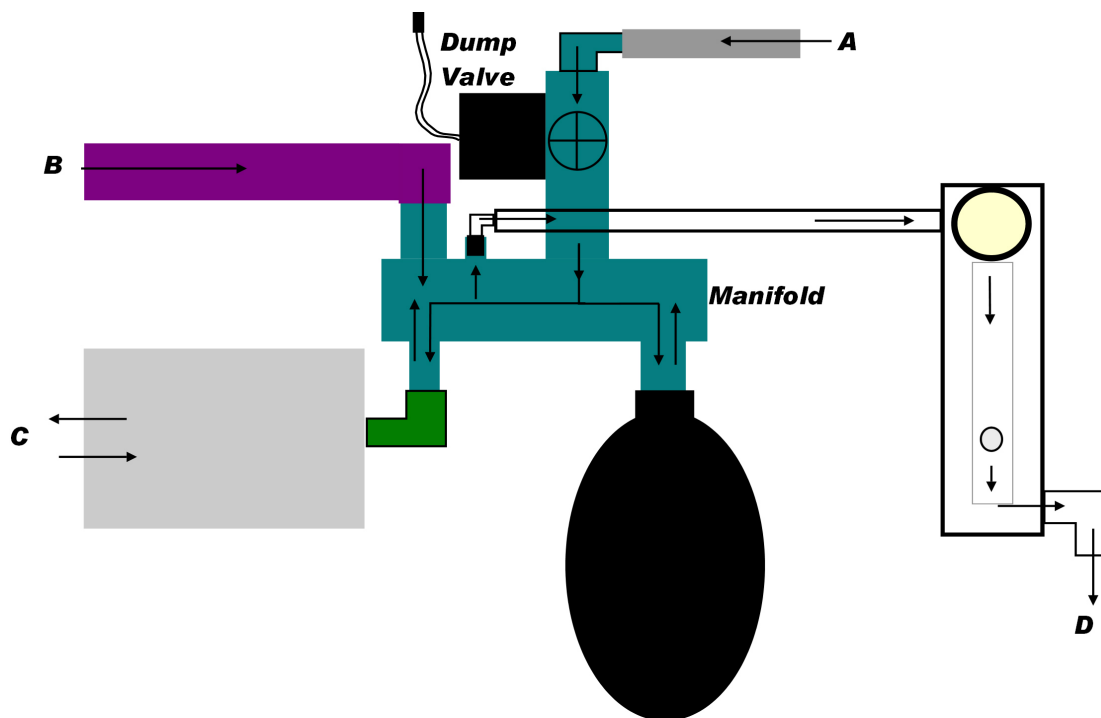


Gas connections



- Hospital supply oxygen is supplied via a white hose to the back of the machine
- The Hospital Oxygen supply pressure should be between 35 and 60 psi and is shown on the Hospital Oxygen Pressure gauge. Pressures outside this range may cause running/performance problems
- If the hospital or the bottled oxygen supply should fall below 35 psi then the machine will emit an audible warning and the text " OXYGEN SUPPLY PRESSURE LOW" will appear on the Auxiliary screen
- Two Size E oxygen cylinders (680L) can be connected at the side of the machine using the pin-indexed connectors. When connected the cylinder operating pressure is shown on the left-hand gauge (Oxygen Cylinder Pressure)
- NOTE: when oxygen cylinders are connected and their valves opened, they will supply oxygen to the circuit in preference to the hospital supply as their operating pressure is highest. To avoid this, make sure the cylinders are turned off when not required
- Oxygen flow is controlled by a 0-10L Oxygen Flow meter. With the control fully open it will take nearly 2 minutes to fill the cylinder using this method. All oxygen flow controlled by this meter goes through the vaporiser
- There is an Oxygen Flush button that delivers pure oxygen to the patient circuit and does **not** go through the vaporiser. The delivery rate of this oxygen flush is nominally 70L/min, meaning it will take at least 20 seconds to fill the cylinder using this method.
- Scavenging of waste gases from the patient circuit is done through the waste manifold situated inside the back door. All excess gas is delivered to this manifold by the action of the Dump Valve. Removal of gas after that depends on the scavenging system employed. See the section below **" Operation of the Dump valve and gas scavenging systems from Tafonius"**
- Unless an active scavenging system using a piped vacuum circuit is used then the Scavenging flow meter should be turned off (fully clockwise)
- If an active scavenging system using a piped vacuum circuit is in use, then the flow meter should be set to 6-10L/min
- The patient circuit pressure is indicated by an analogue pressure manometer gauge labelled "Breathing System Pressure". The pressure is actually measured in the valve block and not at the Y-piece where the fine control pressure sensor makes its measurement. For this reason the deviations of the manometer gauge will be greater than the measured digital gauge.

Operation of the Dump valve and gas scavenging systems from Tefonius



The Dump Valve represents the only exit point for gas from the patient circuit (A). This valve is normally closed so the patient circuit is a closed system. When the Dump Valve is opened, pressure in the patient circuit causes gas to flow through the valve to the manifold.

Gas from the manifold can then leave by three routes:

- Through the active scavenging circuit via the Scavenge flow meter and thence to the hospital scavenging system
- Through the Charcoal absorber canister, where volatile agents are scrubbed before entering the room air
- Through the port where the bag is connected. This is typically used in passive scavenging systems where a 22mm scavenging hose is connected to the bag port. It may also be used with active scavenging systems that incorporate an air brake

Action of the Active scavenging circuit

When the Dump valve opens, gas from the patient circuit is dumped into the black reservoir bag. The continual gas draw of the active scavenging circuit removes this gas into the hospital scavenging system. How quickly this gas is removed is determined by the position of the flow control knob.

Once the patient gas has been dumped the Dump valve closes again, sealing the patient circuit. When the excess gas from the reservoir bag and the manifold has been removed, the active scavenging circuit then draws air back through the



Charcoal canister. Air cannot be drawn from (B), the manual bag circuit because of the pressure relief valve, and air cannot be drawn from the patient circuit because the Dump valve is closed. Even if the scavenging rate is turned up full there is no problem as air will be simply pulled in through the Charcoal canister until the next time the Dump valve opens. If the scavenging system fails or is temporarily unavailable excess gas leaves via the Charcoal canister. This might also occur if a large volume of gas was dumped from the patient circuit that exceeded the capacity of the reservoir bag and the scavenge rate of the hospital scavenging system.

Action of the circuit with Passive Scavenging systems

Without a bag attached

Excess gas is dumped from the patient circuit, typically towards the end of expiration. The increased pressure of the gas will drive this waste gas down the attached 22mm scavenging tube to either an agent scrubber or to an open-air discharge site. If this method is insufficient to remove all the dumped gas quickly enough then excess gas will pass through the Charcoal Absorber to the atmosphere.

With a bag attached

Excess gas is dumped from the patient circuit, typically towards the end of expiration. This gas fills the reservoir bag and then leaves via the Charcoal Absorber to the atmosphere.

With Passive Scavenging systems the Charcoal Absorber ***must be weighed regularly*** to ensure that it does not become depleted and no longer able to remove anaesthetic agents



Instrument identification and location

The front of Tafonius has an Auxiliary screen, 3 pressure gauges, 1 or 2 Flow meters, 4 control knobs and 5 control buttons

The Auxiliary screen is a 6" Monochrome display used to control and display the status of the machine. The screen is situated on the left next to the Oxygen flow meter and has a back light for night use and improved viewing

The three pressure gauges and flow meters have already been discussed

The 4 control knobs are situated immediately under the Auxiliary screen. Their action and behaviour is context-dependant and will be discussed later.

The 5 control buttons are

- **Mains ON/OFF** button. When this button is illuminated the machine is powered. It takes only a momentary push to start the machine but a prolonged (3 second) hold to turn the machine off
- **RUN/IPPV** button - this button will be illuminated during IPPV only. When the button is not illuminated the machine is in Standby mode
- **Assist Button** - the illumination of this button will depend whether the machine is in Standby or Ventilate mode. This will be discussed fully under the Assist Mode function.
- **PEEP/CPAP** button - this button enables the setting of CPAP (Standby mode) or PEEP (Ventilate mode). This will be discussed fully under the CPAP/PEEP function
- **Dump Valve** button - this button allows the user to manually open the Dump valve to get rid of gas from the patient circuit. At the same time that the valve is opened a slight pressure is applied to force gas from the circuit. Pushing and holding this button will evacuate all the gas in the cylinder via the waste circuit.

Soda Lime location, changing and filling

The Soda Lime is located in a dedicated tray found at the bottom of the cylinder assembly. Normally the Soda Lime tray is locked in position by the cylinder and can only be released by raising the cylinder lever arm. Because of the use of rolling diaphragms and the need for a vacuum between them, **THE CYLINDER SHOULD ONLY BE RAISED AND LOWERED WHEN A VACUUM IS PRESENT.**



Failure to observe this rule may result in the diaphragms being caught and torn. In practice this means that the cylinder must be opened within a minute of turning the machine off and only closed when the machine is ON and a vacuum established.

The Soda Lime tray has two halves and is symmetrical so it can be fitted either way round. The half of the soda lime over the Expiratory pipe entrance will turn colour first and will turn colour from the bottom upwards. Use this as a guide to renewal. Allow one side to turn colour until it reaches the top of the first side. Then turn the tray around so that the second side turns colour from the bottom upwards. Once both sides have turned colour at the top level, the soda lime should be discarded and replaced.

Filling the Soda Lime tray

Fill the Soda Lime tray with absorbent to the level of the central divider. If the central divider has a notch in it then fill only to the level of the bottom of the notch. **Filling above these levels will prevent proper initialisation of the cylinder.**

Changing to Manual Mode

Should an un-recoverable fault occur such as loss of power or a vacuum fault the machine can be quickly converted to a manual system where manual IPPV can be given and normal anaesthesia maintained.

There are now two ways to change to manual mode; either by fitting the 2" manual breathing pipe to the connector at the bottom of the absorber pan or by pulling the lever on the manual change-over valve. The change-over valve is a new addition and can be fitted to any older style Tafonius. When change over is by manual means, this should be practiced by all concerned so that they are familiar with the procedure. With experience it can be done efficiently in 20 seconds or so.



2. Basic Operating principles of Tafonius

Tafonius is not a bag-in-a-bottle ventilator. There is no need for a source of pressurised gas to drive air into the patient. Tafonius uses a motor to drive a huge 'syringe' backwards and forwards to allow spontaneous and mechanical ventilation.

However, the best way to think about Tafonius is as a fully controllable rebreathing bag. A bag that can be set to any size and that can be 'squeezed' in different manners to deliver a breath. Continuing with this concept, the animal can freely breathe out into, or from this bag as it offers no resistance. Because Tafonius is essentially a 'virtual rebreathing bag', what can you do with it?

- Allow free spontaneous breathing
- Administer forced inspiration by 'squeezing the bag'
- Allow un-restricted expiration by allowing the patient to breathe into the 'bag'
- Provide CPAP or PEEP by keeping the 'bag' slightly squeezed during spontaneous breathing (CPAP) or at the end of expiration during IPPV (PEEP).

The way this virtual bag works is as follows: there is a pressure sensor located at the Y-piece that measures the airway pressure to within 0.2cm H₂O pressure. In spontaneous mode, as soon as any pressure change in excess of 0.5cm is detected the piston moves to negate the change in pressure. So if the animal breathes out, the increase in pressure makes the piston move upwards thus expanding the 'bag'. Because the piston does all that is necessary to return the pressure at the Y-piece to zero the patient does not see any of the resistance offered by the valves, tubing, soda lime or other restrictions. In other words the Work of Breathing is reduced to an absolute minimum. The piston appears to float in response to normal breathing efforts and behaves like a perfect re-breathing bag.

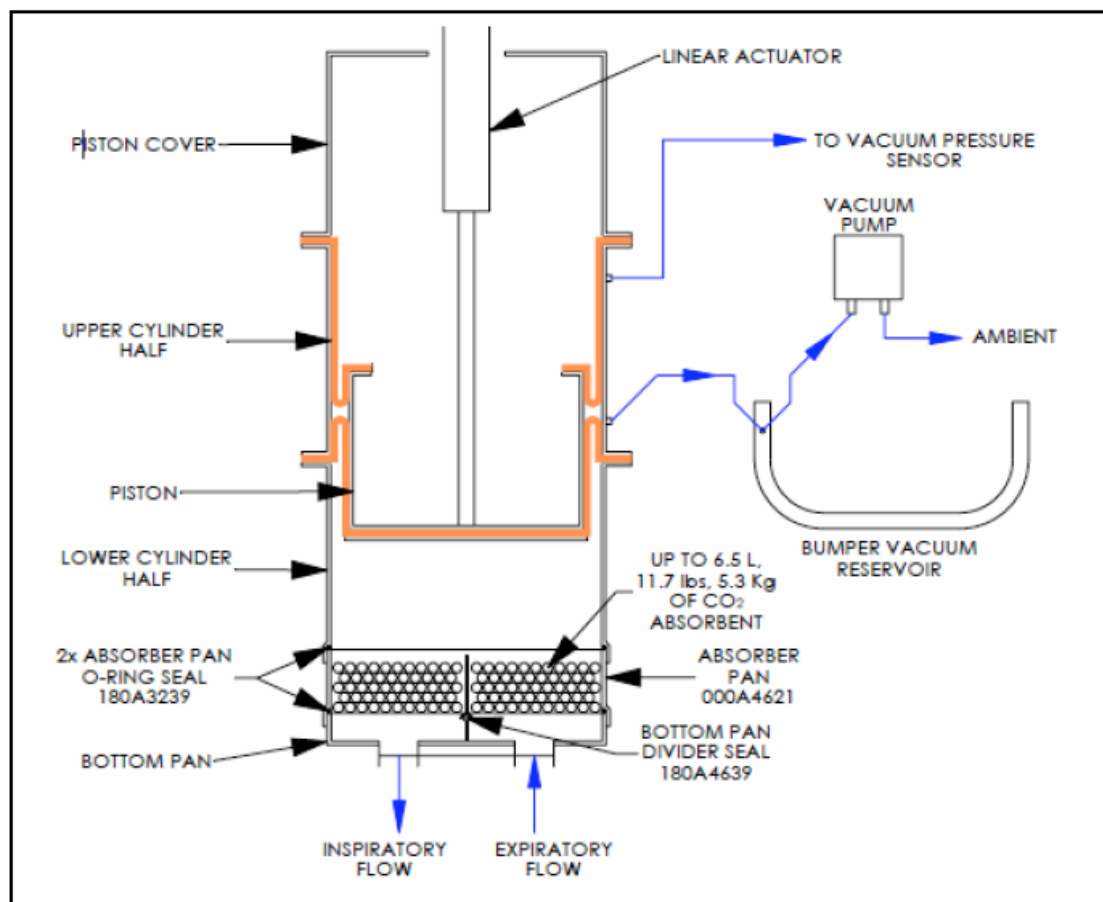
Because of this the system will support animals in spontaneous breathing mode as small as 10kg quite happily. A change in the patient tubing to the foal circuit (22mm) is recommended for patients under 100kg.

Changing the bag size

The size of the bag equates to the total volume in the cylinder and is comprised of two distinct volumes. The first volume is the set Tidal Volume as indicated by the Tidal Volume value on the screen. The second volume is the Buffer volume as indicated by the BV value on the screen. When the cylinder is filled with gas it will fill to a maximum volume of TV + BV. When a mechanical breath is delivered it will deliver only the TV. This allows variation in breath size without losing gas through the spill (Dump) valve or running out of gas during inspiration. It also allows the total volume to be reduced during surgery to minimise the circuit volume and enable low-flow anaesthesia.

Typically for a 500kg horse the settings at the start of surgery will be $TV=5.0$ and $BV=10.0$. This means the cylinder will be pre-filled to a volume of 15L. Attempting to fill any further than this will just result in the Dump Valve opening and voiding gas to the waste circuit. Once anaesthesia is settled the BV can be reduced to 5 or even 2.5 litres to present a very rapid responsive circuit.

The reason that the Tefonius cylinder can behave like a bag and respond so rapidly is because the cylinder has near zero friction. This reduced friction state in a piston system is unusual and is achieved by means of a unique double rolling diaphragm assembly shown in diagram form below:



The lower diaphragm keeps the patient circuit gas from escaping up the sides of the piston and theoretically it only takes one diaphragm to achieve this. However the rolling action of the diaphragm can be much improved and predicted if the diaphragm is itself held tight against the piston. This can be achieved by having a second rolling diaphragm attached to and sealed against the top of the piston and then evacuating the air from between the two diaphragms. Atmospheric pressure then acts to push the diaphragms against the piston and the sides of the cylinder allowing them to roll freely with no



friction. The vacuum is achieved using a small pump that can be heard to run intermittently during normal use.

Please note that the vacuum circuit and the patient circuit are two different circuits and leaks in the patient circuit will have no effect on the vacuum in between the two diaphragms.

3. Setting up Tafonius for first use and closing down after use:

Pre-op Checks - Initialising the Machine - Closing down the machine

Pre-op Checks

Before starting Tafonius make the following checks:

Are both drainage stoppers fitted?

Is the manual take-off port closed and sealed?

Is the Soda-lime fresh?

Is the valve block assembled and tightened down?

Are the Patient hoses and Y-piece attached?

Make sure the Y-piece is **not** stoppered.

Is the Pressure sensor connected to the Y-piece?

Is the sidestream sampling port either stoppered or connected to the sampling line?

Is the Salbutamol port stoppered?

Is the oxygen supply connected?

Is the mains power connected AND the trip switch set to ON?

Initialising the Machine

Press the square Mains ON/OFF button to start the machine

Watch the small screen for any warning or error messages. Each test passed is indicated by a double-beep. If a long beep is heard, check the screen for the explanatory message

At the end of all the pre-run tests you can run a leak Test* by pushing any knob when the message:

“PUSH ANY KNOB FOR SYSTEM LEAK TEST” appears

After this stage the system will then halt, flash the RUN button and display the message:

PISTON NOW NEEDS TO BE INITIALISED

DISCONNECT PATIENT AND PUSH RUN BUTTON

If the cylinder is still open, then fit the absorber pan and close the cylinder

Press the Run button.

The piston will move slowly to the bottom position and stop

Now fit the stopper to the Y-piece



Set the Vaporiser to your required pre-fill setting
Set your patient Tidal Volume
Set the Buffer Volume to 10
Pre-fill the Cylinder to the required level using the manual Gas flow meters.
Turn off the gas flow
The system is now primed, ready for use

Disconnecting the Patient

Before disconnecting the patient, first check that there is no PEEP or CPAP value selected. If there is, set it to zero
Remove any monitoring lines as appropriate
Set the operating mode to Standby to stop any IPPV
Disconnect the patient and quickly fit the stopper to the Y-piece and hang the Y-piece on the right hand side of the machine
Turn off the gas flow of Oxygen, Nitrous or Air.
Turn off the vaporiser

Closing down the machine

Fit the stopper to the Y-piece
Push the Dump Valve control button to push the gas out of the piston through the scavenging system
Open the cylinder
The piston will withdraw
Remove the absorber pan and soda lime
Press and hold the green square Mains ON/OFF button to shut down the Auxiliary system
Remove the stoppers from the drainage tubes on the absorber pan
Undo the screws from the valve block and remove the valve block, valves and orange O-rings
Disconnect the sidestream monitoring line and the Pressure Sensing line from the Y-piece. Remove the patient tubes from the valve block, flush them through with water/cleaner and then hang up the Y-piece and patient tubes to dry.
Flush water/cleaner through the valve block down to the absorber pan and clean inside the cylinder with a brush. Flush out the absorber pan
Leave the cylinder open and allow to drain and dry



*** Performing a leak test**

At the point in the start up procedure where the screen shows the following text:

PUSH ANY KNOB FOR SYSTEM LEAK TEST, push and hold in any one of the 4 control knobs.

The system then enters a procedure to allow leak testing of the machine.

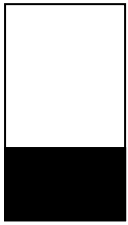
Fit a stopper to the Y-piece and introduce gas into the cylinder by turning on the oxygen flow. The piston is now held steady and so the pressure will rise as indicated by the manometer gauge. To test the system at 20cm H₂O pressure, turn off the gas flow when the pressure on the manometer reaches 20. To test at 30 cm H₂O turn off the gas flow when the gauge reaches 30 cm H₂O. If there is a leak in the system then the needle on the manometer will start to fall. Slowly introduce gas again using the oxygen flow until the needle stops falling. At the point where the incoming FGF matches the leak then the pressure will be held constant and the FGF indicates the leak from the system at that pressure.



4. Normal Operation of the machine

The Auxiliary screen

Starting from the top left hand side of the screen, the features of the screen will be described

B1: 13.3V - (CHG+)		MAINS		RELEASE: 6012	
B2: 13.1V - OK				(210s) Vacuum:- 25	
* OXYGEN SUPPLY PRESSURE LOW*					
		4.8L		MV (LPM) 100	
		BV:10.0		IF (LPM) 300	
		MWPL: 35		IE RATIO 1:2.0	
		ASST: 60		ET (S) 8.0	
		CPAP: 0			
(3.2)	(12)	(1.9)	(23)		
TV	RR	IT	MWPL		
20.0	5.0	4.0	35		

Battery Voltages

There are 2 battery voltages; B1 and B2. The text next to each battery shows the voltage and state of the battery. CHG+ indicates that the battery is being charged. OK means the battery is fully charged.

At the centre of the screen at the top is either the word **MAINS** or **BATT** to indicate the source of the machine's power. In normal use, make sure that the mains is connected and that MAINS is showing.

Version Number

In the top right of the screen is the current working version number of the firmware e.g. 6012.

Vacuum Value

Below the version number is a vacuum value. This indicates the vacuum level in the space between the two rolling diaphragms and is a negative number. The system works continuously to keep this value between -10 and -30 cm H₂O. To the left of this value is another number in parentheses. This is the last vacuum timed interval and represents how long since the last time the vacuum pump was active. This value should typically be greater than 60



seconds and is usually 100-200. If this value should fall below 30 seconds an Alert will appear on the screen accompanied by a long 2-second beep.

Alarms and Alerts

In the space between the vacuum value and the main screen with all of its values and piston representation is an area reserved for Alarms and Alerts. Alerts are announced by a single 2 second beep and are then silent. The cause of the Alert will be displayed in the space normally occupied by the name JUNIOR or TAFONIUS. Alerts are for information only and just keep you informed of such things as reducing gas volume in the cylinder, an over-full cylinder, a reduction in the vacuum timing interval etc

Alarms are messages accompanied by a repetitive 1 second beep and a flashing message on the screen. Alarms are critical messages that have serious implications for the efficient running of the ventilator. Each Alarm will have an asterisk at the beginning and end of the message and will be flashed on the screen to distinguish it from an Alert. Such Alarms are Oxygen Pressure Loss, Vacuum Loss, Battery too low etc. If these messages persist and cannot be resolved the user should switch to manual ventilation.

The central area of the screen shows a diagrammatic representation of the piston on the left hand side and a series of values to the right of that. The volume in the cylinder under the piston is shown by the shaded region and the actual volume is shown as a value at the top right of the cylinder e.g. 4.8L

B1: 13.3V - (CHG+)		MAINS		RELEASE: 6012	
B2: 13.1V - OK				(210s) Vacuum:- 25	
* OXYGEN SUPPLY PRESSURE LOW*					
		4.8L		MV (LPM) 100	
		BV:10.0		IF (LPM) 300	
		MWPL: 35		IE RATIO 1:2.0	
		ASST: 60		ET (S) 8.0	
		CPAP: 0			
(3.2)	(12)	(1.9)	(5)		
TV	RR	IT	MWPL		
20.0	5.0	4.0	35		

BV is the set Buffer Volume. MWPL is the set Maximum Working Pressure Limit. ASST is the set Assist Trigger Value. CPAP is the set CPAP value.



MV, IF, IE RATIO and ET are all dependant values and will change as the independent values (TV,RR and IT) are changed.

In the lower portion of the screen are the independent variables and their associated settings. Above them, for each setting is a value in brackets. The value in the brackets is the measured value. For example, in the diagram above, the patient is breathing spontaneously inspiring a volume of 3.2L, at a respiration rate of 12 breaths per minute, with an IT time of 1.9 seconds and a maximum circuit pressure on expiration of 5 cm H₂O. These figures can be used as an indication of the adequacy of spontaneous ventilation of the patient. They are updated at the end of each breath.

Setting the initial values

Before beginning to fill the cylinder for use, set the Tidal Volume (TV), Inspiratory Time (IT), Respiratory Rate (RR) and Maximum Working Pressure Limit (MWPL). These 4 parameters relate directly to the knobs on the front of the machine. To set a parameter turn the knob until the correct value is reached and then press that knob to commit the value. A beep will be heard and the value set. If a value is not committed then the setting will return to its last saved value.

Tidal Volume should be set for the patient based on 1L/100kg

Inspiratory Time should be set for a nominal value of 2.0 for a 500kg horse

RR should be set between 6 and 15 depending on your requirements

MWPL should be set around 10cm above normal anticipated working PIP. A typical value is 35 cm H₂O

Buffer Volume should be initially set at around 10L

Setting the Buffer Volume

Press and hold the TV (tidal Volume) knob. The machine will beep several times and then the label will change from TV to BV.

Adjust the value to the required setting and then press the knob to commit the value. The BV setting is shown towards the top of the screen to the right of the piston. After 4 seconds the BV label will revert to TV

Now set your vaporiser to the appropriate setting and turn on the Fresh Gas Flow to fill the cylinder. Once the 15L point has been reached you will hear the Dump Valve begin to start dumping gas. Turn off the Fresh Gas Flow.

With these settings and a cylinder filled to 15L the machine is primed and ready for connection to a patient. As soon as the animal is connected it can breathe spontaneously



Safety Features

Safety is threatened during use of a mechanical ventilator if circuit pressures are not controlled. There are 2 conditions that require action to protect the patient: a) excessive positive pressure and b) negative pressure

Protection from excessive positive pressure is achieved by the setting of the MWPL control. This control serves to limit the maximum pressure allowed in the patient circuit at any time whether this is during spontaneous ventilation or mechanical ventilation. If at any time the pressure in the patient circuit reaches the value set by the MWPL then the Dump Valve will open to allow release of that pressure. The Dump valve will remain open until the circuit pressure has fallen below the set MWPL value. Please note that setting a CPAP/PEEP value in excess of the MWPL will result in the whole contents of the cylinder being voided through the Dump valve in an effort to control the 'excessive' circuit pressure.

Protection from negative pressure is also very important. If a horse is allowed to breathe in against a closed system, negative pressures can quickly develop in the lung leading to severe damage and pulmonary oedema. Tafonius protects against this by limiting the maximum negative pressure allowed to -8cm H₂O. As soon as this negative limit is reached the Dump Valve will open and air from the Manifold will be drawn back in to provide gas for the patient. This -8cm value is fixed and not controllable by the user.

Both protective measures are easily tested by the user.

Checking the action of the MWPL

Use the following settings:

TV=0.5, IT = 4.0, RR = 10, MWPL = 35

CPAP: OFF

Assist Mode: OFF

Connect the stopper to the Y-piece and press the RUN button. Watch the pressure manometer. The pressure will slowly rise until the pressure reaches 35 cm H₂O at which point the inspiration will terminate, the MWPL Alarm will sound and a warning will appear in the status area of the Auxiliary screen.

Checking the action of the Negative Release

Push the Dump Valve button to take the piston all the way to the bottom of the cylinder. Once at the bottom, breathe in through the Y-piece to create a negative pressure. Watch the pressure manometer. As soon as the pressure value reaches -8 the Dump Valve will open allowing gas into the system.



5. Advanced use of the machine - CPAP/PEEP and Assist modes

CPAP or PEEP??

CPAP is Continuous Positive Airway Pressure and is a term used to describe the maintenance of a constant airway pressure during *spontaneous* breathing. With CPAP the patient can breathe in or out at will, but the airway pressure is maintained as tightly as possible to the CPAP value. This can be seen on the pressure manometer for the patient circuit, but note that the variations seen here will be much larger than those occurring at the Y-piece. The pressure will be held at the CPAP value with slight variations in pressure as the patient breathes in or out. This has the effect of keeping airways open during spontaneous breathing.

PEEP is Positive End Expiratory Pressure and is a measure of the minimum pressure that the system will return to at the end of expiration in an animal receiving IPPV. The pressure manometer will show the rising pressure with each delivered breath and the pressure returning not to zero but to the set PEEP value. This has the effect of preventing airway closure during IPPV

It is easy to set a CPAP or PEEP value using Tafonius. The basis of the bag control is to keep the pressure in the Y-piece at atmospheric pressure. This is done by using atmospheric pressure as the reference. Any deviation away from this reference and the piston moves to correct the error. If the reference is changed to another value then the piston will behave in the same way to keep the pressure in the Y-piece at this new reference value. In this manner Tafonius could be set to achieve any pressure, positive or negative at the Y-piece. In typical use this reference pressure will be either zero or positive.

Setting the CPAP/PEEP value

Pushing the CPAP button will cause the MWPL label to change to CPAP. Keeping the CPAP button pressed, adjust the value to the required setting. Push the knob to commit the value. Release the knob. The CPAP setting is shown underneath the BV setting. To cancel CPAP, push the CPAP button and set the CPAP value to zero. Push the knob to commit the change. The legend will change from CPAP to PEEP if ventilation is started.

Assist Mode

An Assist mode allows a patient to make or initiate breaths so that a mechanical ventilator can augment that breath. Typically a ventilator performing this function is said to be set for Synchronised Intermittent Mandatory Ventilation or SIMV.

In Tafonius the trigger for an assisted breath is inspiratory flow. That is, the patient must make a sufficient inspiratory effort to match the trigger flow rate before the ventilator will deliver the set tidal volume. This makes predicting a trigger setting easier than with a negative pressure system. In a negative pressure system the drop in airway pressure will depend on the patient circuit



volume and will therefore vary with circuit set-up. In a flow-triggered system the flow will always be the same irrespective of circuit set-up.

What settings to use?

Inspiratory flow rate is typically around 150 - 200L/min in a spontaneously breathing horse. This will be somewhat subdued by anaesthesia and significantly subdued by moribund conditions such as sepsis and shock. Therefore in estimating the trigger value to set for a given patient take into account its physical fitness as well as its size. A fit healthy 80kg foal may be able to easily make an inspiratory effort of 150L/min, whereas a shocked 500kg horse may struggle to make an inspiratory effort of 60L/min.

What happens if the patient repeatedly fails to trigger a breath?

When Assist mode is selected, the displayed Respiratory Rate changes value to one third of the original setting. For example if the RR was set at 6 Breaths Per Minute then pressing the Assist button will change the RR value to 2. This means that Tafonius will deliver a minimum mandatory respiration rate of one breath every 30 seconds. Should the patient fail to trigger a breath in 30 seconds a full mandatory breath will be given. A beep will be heard if a mandatory breath is given instead of a triggered breath. Timing will begin again from this point. If a patient does trigger a breath, timing begins from the end of the triggered breath. If the RR value is unchanged during Assist mode then when Assist mode is exited the RR value will revert to the original value. However, during Assist mode the user may change the minimum RR value to any value within the normal range. If this is done then the value of RR will not change when Assist mode is exited.

Setting the Assist Mode

In Standby (Spontaneous breathing) mode, push the ASSIST button. The MWPL label changes to SENS (Sensitivity) and the Assist button flashes slowly at about once per second. Adjust the Sensitivity value (using the MWPL knob) to the required setting and then push the knob to commit the value. This sets the system up ready for Assist mode but because the system is in Spontaneous breathing mode, no change is made.

When the RUN/IPPV button is pressed the ASSIST light will change to permanently ON. If the patient inspires at a flow rate greater than or equal to the Assist Trigger setting then Tafonius will deliver a full breath in time with the patient's inspiration.

Press the ASSIST button at any time to turn Assist Mode off.



6. Troubleshooting

For general help on troubleshooting, see the pdf document "Tafonius Troubleshooting guide Ver 2"

Leaks in the Patient Circuit

The most common cause of an error during initialisation is an excessive leak from the Patient Circuit. Follow the instructions for performing a Leak Test to determine the size of the leak. Some leaks can be hard to find. This task can be made much easier by introducing gas to achieve a pressure of 40cm H₂O and keeping the FGF constant while searching for the leak. At this pressure leaks can usually be heard or felt quite easily.

Check the following:

- Absorber Pan Stoppers
- Manual take-off stopper or Manual shut-off valve fully closed
- Correct positioning of the valve block cover
- Sidestream take-off port at Y-piece
- If you suspect the Y-piece circuit, swap it for the Foal Circuit and repeat the test.
- Patient circuit pressure sensor connection at Y-piece
- Full and proper closure of the cylinder - look for small pieces of absorber stuck to the black seals at the bottom of the cylinder and the bottom of the absorber pan
- Correct alignment of the absorber pan in the absorber tray.
- Patient tubing connection at Y-piece and valve block
- Patient tubing along its length for splits - especially near the collars at ends
- The connection of the vacuum sensing line to the vacuum sensor (see below)

Leaks in the Vacuum Circuit

Leaks in the vacuum circuit are not common. This will be apparent either at initialisation where the machine will halt the initialisation process, or during use where an Alert is seen because vacuum timings are less than 30 seconds.

Check the following

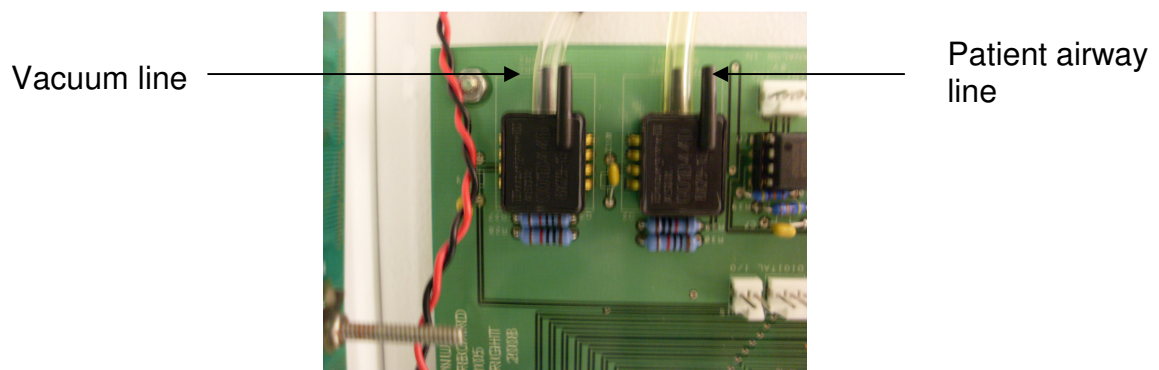
- The tubing connections where they enter the cylinder
- The tubing connections where they enter the metal frame at the back of the machine
- Tubing connections to the vacuum pump located near the hinge inside the back door.



- There is a small non-return valve just below the pump. Check that the connections to this are secure.
- The connection of the vacuum sensing line to the vacuum sensor (see below)

If you need to check the ends of the vacuum and patient circuit sensing lines, open the back door and inspect the circuit board found on the right-hand side of the machine, looking in from the back.

Check that the vacuum sensing line and Patient airway lines are securely connected on the main PIC motherboard, which lies inside the main cabinet of Tafonius.





7. Running Tafonius in PC Mode

When Tafonius is fitted with a touch-screen PC and monitoring system then the startup procedure is slightly different compared to the Auxiliary only system.

Starting the system

Before turning on the machine follow the pre-op checks outlined before:

Pre-op Checks

Before starting Tafonius make the following checks:

Are both drainage stoppers fitted?

Is the manual take-off port closed and sealed?

Is the Soda-lime fresh?

Is the valve block assembled and tightened down?

Are the Patient hoses and Y-piece attached?

Make sure the Y-piece is **not** stoppered.

Is the Pressure sensor connected to the Y-piece?

Is the sidestream sampling port either stoppered or connected to the sampling line?

Is the Salbutamol port stoppered?

Is the oxygen supply connected?

Is the mains power connected AND the trip switch set to ON?

Turn the machine ON

Turn the machine on by pressing the green square Mains ON/OFF button located on the right of the machine. This button will light up and the machine will begin its series of startup procedures.

Initially this is the same as described in the Auxiliary section and the status of the machine is reported on the Auxiliary screen. The difference is that this time at the end of the startup checks the Auxiliary screen will show the word "TAFONIUS" and below it "(PUSH THE RUN BUTTON TO BYPASS HC).

HC is the host computer, which in this case is the Touch Screen PC. If you were in a hurry and did not want to wait until the PC started, you could push the RUN button and start ventilating your patient straight away in Auxiliary mode, while the PC and Windows booted up.

In normal use you will just wait as the PC starts and then arrives at the screen known as the Tafonius Shell, as shown below:

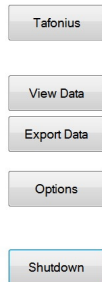


The Tefonius 'Shell'

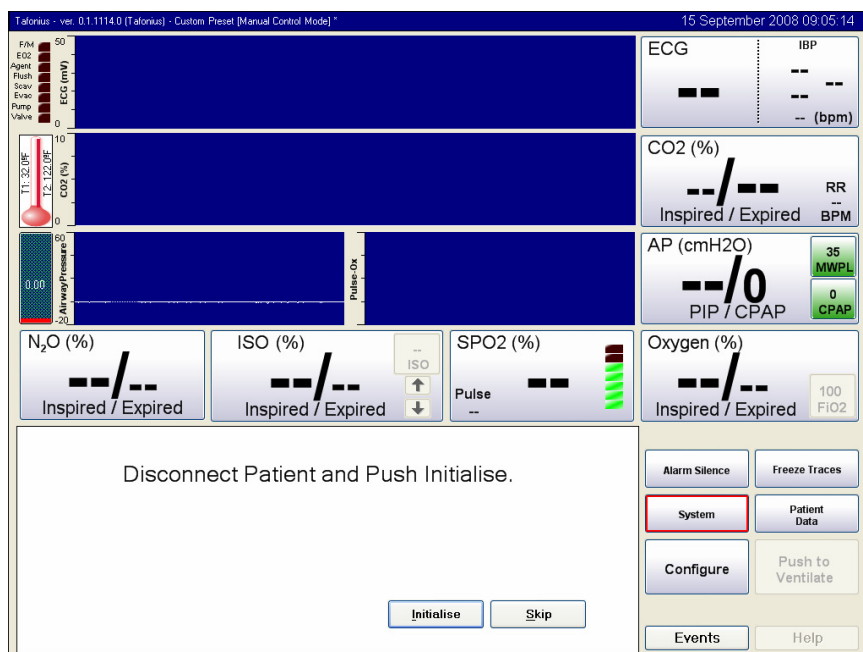


TAFONIUS

Hallowell EMC

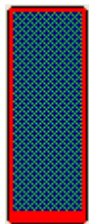


Start the Tefonius program by touching the **Tafonius** button. After about 15-20 seconds a new screen appears and at this point the PC and Auxiliary system synchronise and establish communication. Once communication is established, the lower panel will show "Disconnect Patient and Push Initialise". There may be no patient connected but make sure that any stopper is removed from the end of the Y-piece. Then push **Initialise**





During initialisation the piston is taken to the bottom of the cylinder and zeroed. This zeroing procedure must be done every time the machine is turned on. If the piston is not initialised the machine will not work and ventilate options will be grayed out. The piston volume indicator on the left of the screen will turn a solid green colour after initialisation.



Before
Initialisation



After
Initialisation

This leads into a screen for leak and compliance testing. It is recommended that a leak and compliance test be performed at least at the start of each day. To perform a Leak and Compliance test the stopper must be fitted to the Y-piece.

Follow the prompts on the screen to perform the leak and compliance test. In the event of a leak follow the section on "Leaks in the Patient Circuit" in section 6 of this document.

A leak value of less than 500mls is normal. If it is in excess of this the source of the leak should be found.

In times of haste the Leak and Compliance test can be skipped or aborted. In that instance the values for compliance will be the last ones measured, even if the machine has been turned off in the meantime.

Whenever the patient circuit is changed, for example from the standard 2" tubing to the Foal Circuit a Leak And Compliance measurement should be performed. Use System --> Leak\Compliance at any time to run a Leak And Compliance test.

Manual Leak test

At any time a 'manual' leak test can be performed using the CPAP feature of the machine. With a stopper fitted to the Y-piece, fill the cylinder to half-full (about 10L). Then select a CPAP of 20cm and observe the volume of gas below the piston as shown by the numbers in the green piston area. If the volume is falling this indicates a leak. The size of the leak can be found by turning on the oxygen flow meter and adjusting the flow until the piston is held steady. The leak is then equal to the flow meter setting.

After the leak testing procedure the main screen of Tafonius is shown. The screen combines all patient monitoring with ventilator control and has several traces, several monitoring buttons and some green ventilator control buttons.



Following Initialisation and the Leak & Compliance test, the piston is now at the bottom of the cylinder and the system can be pre-filled with oxygen and/or air mix plus agent ready for your patient. To do this set the Vaporiser to the desired pre-fill setting and turn on the Oxygen/Nitrous/Air gas flow. As the gas fills the cylinder the piston will be seen to slowly rise. At some point equal to the Tidal Volume + Buffer volume (see later) the piston will stop rising and the Dump Valve at the rear of the machine will open and let out the excess gas. Turn off the gas flow. The machine is now pre-filled and ready to use.

Monitoring Buttons

The following monitoring buttons are displayed:

ECG/IBP

CO₂

AP - Airway Pressure

Oxygen

SPO₂

Agent

N₂O

Temperature (Appears as a thermometer bulb)

All monitoring buttons behave in the same way. Touching any monitoring button will show the display attributes (speed, size, form) and the Alarm options for that button. Customise the attributes of a monitored parameter and then select **Close** to again reveal the ventilator control buttons.

Traces

The display of traces on the screen is configurable, as are many visual parameters. For this reason a specific setup can be saved as a 'Preset' (see 'Presets' below).

If you touch any trace in its centre a list of Traces and Trends appears at the bottom of the screen and the trace just touched is in a selected state. Wherever you touch next will place your selected trace in that location. If there is an existing trace on that line the selected trace will be put on the left of the existing trace. Using this touch-and-place procedure the screen layout of traces can be changed to suit your individual preference. Traces can be removed from the screen entirely by selecting them and then 'dropping' them into the Traces/Trends area at the bottom of the screen.

The 'standard' configuration is:

Single ECG trace at the top

Single IBP trace in the middle

CO₂ and AP with/without SPO₂ at the bottom



Presets

Presets 'remember' how you like Tafonius to be configured. Presets control how the screen is laid out and what any initial values will be. You can have Presets for different reasons; some may be as per a persons desired layout, so would be e.g. '**Dr Smith's Preset**' and some may be as per a specific animal type. e.g. '**Foal Preset**' or '**Thoroughbred Preset**'.

All the initial values can be changed by touching the Configure button and then choosing 'Initial Settings'. After any screen changes or initial settings have been made, choose the Presets button and then with the active Preset highlighted, select to either 'Save', 'Save as New' or even 'Rename'. To change between different Presets highlight the Preset you want to make active and then use the 'Switch To' button.

Ventilator Control Buttons (Green)

Any button coloured green is involved in ventilator control. These are known as the independent ventilator control buttons as they can be changed at any time and their setting or value is not affected by any other button or control. The independent ventilator control buttons are:

- **Tidal Volume**
- **Respiratory Rate**
- **Inspiratory Time**
- **MWPL**
- **CPAP**
- **Assist**

The dependent ventilator buttons are normal colour and their values cannot be set but are determined by the settings in the independent buttons. The dependent buttons are:

- **Minute Volume**
- **Inspiratory Flow**
- **I:E Ratio**
- **Expiratory Time**

In the centre of the ventilator buttons are numbers in blue. These numbers only appear during use in Standby mode and are the actual measured values taken from the patient's spontaneous breathing efforts. The smaller black numbers on the ventilator buttons are the values that will be used during IPPV. The measured values can be used as a guide to setting the ventilator values and also as a guide to the respiratory performance of the patient. For example if a 500kg horse is showing a Tidal Volume of 2.1L and a Minute



volume of 11L/min this would indicate hypoventilation and IPPV should begin. The initial values in black on the ventilator buttons are those values saved in the Preset. These values can be changed at any time by touching the button. When this is done a keypad appears on the right of the screen and the new value can be entered. Any violation of acceptable ventilation parameters will be announced by a warning beep and a message in a small yellow status bar that appears to the left of the keypad. The message in this status bar explains why the value is unacceptable. For example it is not possible to set an Inspiratory Time in excess of 4 seconds. All values in black are updated following any change in an independent button.

Buttons Special Functions

Tidal Volume Button

Tidal Volume

This button can be used to set the delivered tidal volume to a patient. Using compliance compensation, the piston stroke volume will be in excess of this, so that the actual delivered volume to the patient is as shown on the button.

Buffer Volume

The Tidal Volume button also has another button inside it labelled BV. This is the Buffer Volume button. Buffer Volume was described in the earlier section 'Changing the Bag Size' in the Auxiliary section. To recap, the Buffer volume is the additional volume that the system will fill to, over and above the Tidal Volume. The Buffer Volume can be set to any value between 0.1L and 20L. Typically the Buffer Volume will be set to 10L for a 500kg horse. This will allow a total cylinder volume of $10L + 5L = 15L$ before the Dump Valve opens and releases circuit gas. Having a value of this size in the early stages of the anaesthetic is useful as often this is when the patient takes a maximal breath. A 500kg horse can have a maximal breath of around 12L in the early stages. Once the patient is settled, the Buffer Volume can be decreased to improve circuit responsiveness to changes in anaesthetic concentration.

The Buffer Volume allows the system to be set up to behave like a virtual bag of configurable volume, whilst allowing only the preset Tidal Volume to be delivered during IPPV.

Inspiratory Time Button

Inspiratory time

The inspiratory time can be set to any value between 0.6 and 4.0 seconds. Setting a value outside of this range will result in a brief on-screen error message.

Inspiratory Pause Time

This button inside the Inspiratory Time button allows a fixed period of time for a pause at the end of inspiration. The time may be set as an absolute time in seconds or as a percentage of the Inspiratory time. Pushing the Pause button



opens the numeric keypad. Pushing it again toggles the button between Time and Percentage. The value required is entered using the keypad.

Note that changing the Pause value does not alter the I:E ratio or respiratory rate. This is because the Pause time is taken off the total Inspiratory time. For example an Inspiratory time of 4 seconds with a Pause of 1 second will have an actual delivery time of 3 seconds. At the end of inspiration the piston will be held at that position for 1 second before the expiratory phase begins.

Inspiratory Time, $I_t = I_f + I_p$

where I_t = total inspiratory phase time

I_f = inspiratory flow time and I_p = inspiratory pause time.

Airway Pressure Button

Strictly, the Airway Pressure button is not a button because you cannot set the Airway Pressure. However within the AP button are two true buttons coloured green. These are the MWPL and the CPAP/PEEP buttons.

Oxygen

Again, not strictly a button in its own right but when touched it does open the Oxygen attributes panel. On this panel is an FiO₂ Enable tick-box. Placing a tick in this tick-box will result in two new green buttons appearing on the Oxygen button. Those buttons are labelled FGF and FiO₂

With Tefonius it is possible to use the measured Oxygen value from Solomon and the control of an in-built air pump and an in-built oxygen control valve to automatically blend any FiO₂ mixture between 21 and 100%. To use this system turn off the Oxygen and Air flow meters. Set the required FGF and the required FiO₂ using the two buttons and the numeric keypad.

By default this feature is OFF at turn-on and must be enabled before use.

MWPL

The MWPL is the Maximum Working Pressure Limit and is the greatest pressure that the system will allow. The pressure is in cm H₂O. Pressures above this value will cause any inspiratory phase of IPPV to stop and the Dump Valve to open, thus immediately avoiding any pressure level beyond the MWPL setting. Be careful when setting a high CPAP or PEEP level that exceeds the MWPL. The system will try to establish a pressure in excess of the MWPL so the Dump valve will open and empty some of the cylinder until the pressure falls below the MWPL when it will close, at which point the pressure rises again and the Dump Valve opens. This will be repeated in a fairly noisy procedure until the cylinder is empty.



CPAP

The CPAP button will change its label to PEEP during IPPV to reflect the change in behaviour.

CPAP will maintain an airway pressure of the set value during spontaneous efforts of breathing from the patient. So with a CPAP of 8 cm H₂O you will see some slight variation around this pressure as the animal breathes in and out and the piston moves to maintain the pressure.

With PEEP, the end-expiratory pressure is held at the set level. The pressure is allowed to rise above the PEEP level but will not drop below it. The Airway Pressure is shown on the Airway Pressure trace.

Inspiratory Flow button

This is a dependent button, so you can't set the Inspiratory flow directly. However, touching this button reveals a new green button labelled "Assist". When this Assist button is visible the machine for IPPV purposes is in Assist mode. This means that if the machine detects an inspiratory flow rate equal to or greater than the flow rate set in the box, then a full normal breath will be delivered. In Assist mode the mandatory minute volume is set to one third of the existing minute volume. This is done automatically through the Respiratory Rate control which reduces to a third of its existing value when entering the Assist mode. If the Respiratory Rate is not changed during Assist Mode then the Respiratory Rate will return to the original value when Assist mode is turned off.

In Assist Mode if the Ventilate button is pressed

Other buttons...

Ventilate/Standby button

Once the machine has been initialised the Ventilate button will be active. Pressing this starts IPPV immediately and the button will then have the label 'Standby'. Pressing the Standby button stops IPPV immediately and the patient can then breathe spontaneously

Alarm Silence button

This has 4 states; OFF, Timed, Locked and Permanent.

When it is in the OFF state the label on the button says "Alarm Silence" and any alarm will cause the System button to flash and an audible alarm to sound.

If the button is pushed once it will change to the Timed mode, where a count-down from 60 seconds is displayed. During that time the current alarm is silenced, A new alarm however will sound the audible alarm again and flash the System button.

If the button is pushed and held for about 2 seconds, the label changes to show the "(Locked)" condition. In this state any current alarms will be silenced



indefinitely. However, any new alarm conditions will break this locked state and the audible alarm will sound and the System button will flash. If the button is pushed and held for 3-4 seconds then the label changes to "(Permanent)". In this state ALL alarms are suppressed audibly. The System button will still flash in the presence of an alarm condition but no audible alarm will be heard.

Freeze traces button

This button allows the traces on the screen to be frozen for inspection. Normal monitoring and SD data file collection will continue during this period. There is a maximum freeze period of 60 seconds as indicated by a countdown timer. Normal traces can be resumed at any time before the end of the countdown by pressing the Freeze button again.

System button

The System button opens a display over the ventilator control buttons that has 4 different buttons.

The System Errors button shows a list on any errors that are currently active on the machine. The description of the error will point you or the support person helping you to the correct action. This is the place to start if the machine beeps at you or does not do what you expect it to do. If an error is resolved spontaneously it will be cleared from the system. Errors can be cleared from the log using the Resolve All button. However, they will return unless the actual cause has been resolved.

The leak/Compliance button has already been discussed and can be accessed at any time. This button will however remain greyed out until the piston has been initialised.

The Language and User Manual buttons are not currently in use. They are for planned future use.

The Exit button is used for shutting down the PC. Clicking this button will result in a series of dialog boxes checking the state of saved data before exiting the Tafonius Software and returning to the Tafonius Shell.



Patient Data button

This button opens another display box over the ventilator control buttons and allows all data relating to the Patient and the case to be recorded. There are usually 6 tabs available:

Case, Patient Data, Notes, At Presentation, Logging and View Trends

The data entered into these tabs will be used for the generation of the Anaesthetic Record Chart (see later).

The display box opens to the **Patient Data** tab where hospital and owner information can be inputted.

Use the **Notes** tab to enter any free-form text relating to the case. This may indicate for example that the patient has just arrived in a horse-box with a broken leg and list the drugs already given.

Use the **Cases** tab to pre-enter a series of cases for the day. Once a patient has finished and the data finalised, use the Cases tab to select the next patient.

Use the '**At Presentation**' tab to input information on the patient's condition and the Procedure it is about to undergo. The name of the anaesthetist and surgeon can also be pulled from a list and linked to this patient.

In the **Logging** tab choose how often to save data to the SD (Slow Data) file. The default is 5 seconds as this is a good balance between the size of the data file and accurate capturing of events. The heart rate for the Anaesthetic Record chart can potentially be obtained from 3 different sources, not all of which may be in use during all procedures. Select the one required here. The check boxes for recording of Spontaneous and Ventilated breaths should normally be left un-checked. For research or trouble-shooting reasons it can be useful to have each breathing phase recorded in the SD file but this does result in a lot of entries which can make it difficult to read.

The "Anaesthetic Record Start" button can be used in situations where there is a long non-clinical time between the starting of the machine and the attachment of a patient. This is not unusual where the machine is prepared before the patient reaches the induction box. For this reason there may be a lot of redundant data in the SD file that is not required. Pressing the Anaesthetic Record Start button clears all that previous data and starts the SD file recording from the point at which this button was pressed.

When the patient has been removed from the machine use the "Finalise Recording" button to close that case and stop any further entries to the SD file. On closing the case a default Anonymous patient will be setup. Either enter new data using the Patient Data tab or select the next case from the Cases tab.



The **View Trends** is a very useful tab. This gives a visual trend record of all the monitoring modalities along with time and parameter information. Use the drop-down box to select the required parameter and then touch the screen at any point to see the instantaneous values.

Configure button

We have previously touched on the **Configure** button when we discussed Presets. The **Configure** button opens a display box over the ventilator control buttons that has the following buttons in it:

Presets, Initial Settings, Gas Monitoring SPO₂ and Security.

The **Security** button is used and represents future software development. The **Presets** button allows you to create, swap and copy existing Presets. The **Gas Monitoring** button provides full information on the status of the gas analyser used in the Solomon multi-parameter monitor. This information is of no relevance to normal clinical use. It is however most useful when there are any error messages related to the sidestream analyser. A technical support person will often require you to look at this tab to report the values there. The **SPO₂** button provides similar information on the Pulse-Ox module within the Solomon monitor.

Events button

The Events button allows you to enter an event record during a procedure. Events can be entered as free text or as pre-saved phrases. The date and time of the entry is recorded automatically, although the time can be changed to reflect for example a drug given 5 minutes previously.

Touching the Events list opens a display box over the ventilator control buttons. In this display box new Events are added using the Add button. Clicking/touching the Add button opens an Event Details box where free text or standard phrases or both may be added. When you are happy with the entry touch the "Accept" button and then Close the Event box. Events are listed in reverse chronological order based on the time of the event, with the most recent event at the top of the list. Events will be used in the automatically generated Anaesthetic Record chart.



Valve and System Status

At the top left hand area of the PC screen is a column of LED's with associated labels. These LED's give information on the state of valves or solenoids within the system

They are listed and described here:

F/M - Flow meter. When green the oxygen flow meter is active. When blank, the oxygen flow meter is shut off (as during leak testing)

Agent - Electronic Oxygen/Agent valve. This valve opens to allow oxygen through the vaporiser at a rate of 10L/min. The system will automatically add 1L of gas if the piston enters the lower reserve area of the cylinder and there is a system pressure in excess of 2cm H₂O. This lower reserve volume is 1 L and this mechanism serves to automatically add gas if the piston enters the reserve area during spontaneous or controlled ventilation. The Agent valve will also be active during automatic FiO₂ control.

EO₂ - electronic Agent valve adds oxygen bypassing the vaporiser. Not used
Flush - electronic Flush valve. Will be green when 70L/min electronic flush is active. Not currently used.

Scav - electronic scavenge control. Not currently used

Evac - This is the electronic scavenging valve or Dump Valve. Will be green when the Dump Valve is open.

Pump - will be green when the Air Pump is running (FiO₂ mixing)

Valve - will be green when the Air Pump is running (FiO₂ mixing)



The Tafonius Shell

There are 5 buttons on the Tafonius Shell

Tafonius - this is the main button to run the Tafonius Software.

View Data - this button allows previous recordings to be viewed. Touching this button opens a 'Record Picker' dialog box that lists Records in reverse chronological order, i.e. with the newest Records at the top. Highlight the Record of interest and then touch the Select button. There will then be an option to highlight either an AR file (Anaesthetic Record) or a Slow Data (SD) file.

Choosing an AR file will open Adobe pdf viewer and show the automatically completed Anaesthetic Record complete with notes, events and patient details.

Choosing an SD file will open a spreadsheet viewer that will organise the Slow Data into rows and columns. Touching data cells in columns for e.g. Oxygen or Agent levels will automatically open a trend viewer to allow viewing of the data over the entire recording period,

Export Data - use this button to export data to an external drive or USB stick. Make sure the drive/USB stick is connected before running this option or it may not appear on the list of devices. Touching the Export Data button opens another file list box similar to the Record Picker. Select the required patient and then click Next. Click on the required Drive and then use Open or double-click/touch to select sub-directories. New Folders can be created as well. Once the destination has been chosen, click on the Export button and the data will be exported. The data will be saved as either pdf files or csv files.

Options - this button allows the setup of 3 different parts of the system. Firstly the name that will appear at the head of the Anaesthetic Record charts and at the top of the Tafonius Shell window is entered into the Company Name edit box. The Touch Screen Alignment button allows the touch screen routine to be run if the touch screen needs re-aligning. Touch the button and follow the prompts. The Recover Anaesthetic Records is used to generate the AR files if they have been lost, damaged or are missing. After touching this button, select the required patient and then the Slow Data file that you wish the Record to be created from. After recovery the file may be viewed using View Data.

Shutdown - use this button as a short cut to closing down the PC. It will not turn off the Auxiliary system.

Exiting to the Desktop. If you wish to exit the Tafonius Shell and go back to the desk top, make sure the Shell is active by touching the screen anywhere in the centre. Then press and hold the Alt button while pressing the F4 button once. This will close the Tafonius Shell.