



VET-PRO

VIP 2000

Veterinary Infusion Pump Operator's Manual



Manufacturer:
Caesarea Medical Electronics Ltd.

23 Staufenburg st.
72805 Lichtenstein, Germany
T: +800-323-575-00
E: sales@cme-infusion.com
W: www.cme-infusion.com

CME
Caesarea Medical Electronics

LIMITED WARRANTY

The *VET-PRO* Infusion Pump has been carefully manufactured from the highest quality components.

Caesarea Medical Electronics Ltd. (CME) guarantees the pump against defects in material and workmanship for twelve (12) months from date of purchase by the original purchaser.

CME's obligation, or that of its designated representative under this Limited Warranty, shall be limited, at CME's option, or that of its designated representative, to repairing or replacing pumps, which upon examination, are found to be defective in material or workmanship. The repair or replacement of any product under this Limited Warranty shall not extend the above-mentioned Warranty period.

All repairs under this Limited Warranty should be undertaken only by qualified, trained service personnel. In the event that a pump is found to be defective during the warranty period, the purchaser shall notify CME or its designated representative within thirty (30) days after such defect is discovered.

The defective pump should be sent immediately to CME or its designated representative for inspection, repair or replacement. Shipping costs are the purchaser's responsibility.

Material returned to CME or its designated representative should be properly packaged using CME shipping cartons and inserts. Inadequate packaging may result in severe pump damage.

This Limited Warranty shall not apply to defects or damage caused, wholly or in part, by negligence, spilled fluids, dropping of the pump, misuse, abuse, improper installation or alteration by anyone other than qualified, trained personnel; or to damage resulting from inadequate packaging in shipping the pump to CME or its designated representative.

If, after inspection, CME or its designated representative is unable to identify a problem, CME or its designated representative reserves the right to invoice purchaser for such inspection.

This Limited Warranty is the sole and entire warranty pertaining to CME's products and is in lieu of and excludes all other warranties of any nature whatsoever, whether stated, or implied or arising by operation of law, trade, usage or course of dealing, including but not limited to, warranties of merchantability and warranties of fitness for a particular purpose. Purchaser expressly agrees that the remedies granted to it under this limited warranty are purchaser's sole and exclusive remedies with respect to any claim of purchaser arising under this Limited Warranty.

Managing Director

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Introduction

This Manual Provides directions for the setup and operation of the **VET-PRO** Pump

VET-PRO Features

- ◆ Small, light and compact pump.

- ◆ Multi Programs:

CONTINUOUS

Continuous program.

Infusion Rate: 0.1 to 1200 ml/hr.

Volume: 0.1 to 9999 ml.

25 STEPS

User can design a specific protocol, for drug delivery, which contains up to 25 steps.

Infusion Rate: 0.1 to 1200 ml/hr.

Volume: up to 9999ml., For each step.

Accumulated Volume for all steps – up to 10 liters.

TPN

Rate Taper program, with programmable up and down times

INTERMITTENT

A set Dose delivered in set intervals. Between Intervals the pump will allow a base rate or KVO.

PCA




Patient Control Analgesia, continuous delivery plus /or programmed boluses.

Bolus Rate: 0.1-1000 ml/h

- ◆ Highly accurate fluid delivery.
- ◆ Operated with a customized safe administration set
- ◆ Rechargeable internal battery
- ◆ Can be latched into a Charger, which is mounted on an IV pole
- ◆ A.B.S. Anti-Bolus System
- ◆ Silent operation

Glossary

Terms used in manual:

 Note:	Essential operating procedure or condition.
 Caution:	A precaution which, if not followed, could result in extensive damage to the equipment.
 Warning	A precaution, which, if not followed, can result in personal injury or loss of life.

Safety Precautions




Warning


To avoid possible personal injury or loss of life, observe the following:

 **Note:** Read the entire Operation Manual before using the pump, since the text includes important precautions.

- Disconnect the Charger from the mains, prior to opening the casing. Voltage present on internal components may cause severe shock or death on contact. Only trained service personnel should open the pump cover.
- Before servicing pumps connected to mains via the Charger - remove rings, watches, and other jewelry, which may present a shock / burn hazard.
- To prevent a fire hazard, replace blown fuses on the Charger only with fuses of the same type and rating (see fuse values on the Charger PCB).
- The equipment is not suitable for use in the presence of flammable gases – e.g. air/oxygen/nitrous oxide mixture.
- Watch your fingers / nails when opening the pump door.

To avoid possible injury to patient, observe the following:

 **Warning** Battery charging is enabled as long as the charger cord is connected to the mains and the pump is in the charger. **Switching the pump off does not disconnect it from the mains.** In order to disconnect from the mains, take the charger cable out of the mains. In order to disconnect pump from the mains, take it out of the charger.


 **Note:** To avoid battery damage do not leave the pump battery in a temperature more than 50⁰C

- Make sure the pump is attached securely to the Charger, which is connected snugly to an IV pole.
- If the pump is dropped, return the pump for inspection by qualified service personnel.
- Before operation, verify that administration set tubing is not kinked or occluded.

- This pump should be operated **only** with *the IV set that the pump is calibrated for*.


Use of incorrect administration sets may impair the operation of the pump and the accuracy of the infusion.


 **Warning:** **The BodySet is not suitable to use with Taxol.**


 **Note:** The maximum volume that may be infused under SINGLE FAULT CONDITION is 0.1 ml

 **CAUTION** **To avoid possible damage to the equipment, observe the following:**


- Do not immerse the pump in liquids.
- Clean solution spills on the pump immediately. Use a damp cloth or sponge. A cleaning disinfectant may be used. Wipe thoroughly with a dry cloth.
- Do not clean pump with chemicals such as Xylene, Acetone or similar solvents. These chemicals cause damage to plastic components and paint.

 **Warning:** Any adjustments, maintenance, or repair of the uncovered pump while connected to the power should be avoided. If necessary, these repairs should be carried out by skilled technicians who are aware of the hazards involved.

 **Warning:** The pump should be operated within a temperature range of 15°C to 35°C. and at up to 85% humidity

 **Warning:** Do not operate the pump near high-energy radio-frequency emitting equipment, such as electro-surgical cauterizing equipment, and cellular telephones. False alarm signals may occur.

Specifications

Pumping Mechanism:	Piston Mechanism
Flow Rate:	PCA: 0 to 100 ml/hr in 0.1ml increments All other programs: 0.1 to 1200 ml/hr in 0.1ml or 1 ml increments.
Total Infused Volume:	PCA: 0.1 to 1,000 ml. Continuous, TPN, Intermittent: 0.1-9999 ml 25 Steps: 0.1 to 9999 ml. for each step Accumulated volume for all steps- up to 10 liters.
Total Time Setting	100 hours
Accuracy:	± 5 %.
KVO rate:	0.1 to 5 ml/hr. (to be set)
Air Sensor:	Ultrasonic, adjustable air bubble size
Maximum Pressure:	0.7 bar or 10 psi Adjustable (high/normal/low)
Power Supply:	110-240 VAC, 50/60 Hz. 20 W
Battery:	Li-Ion 7.2V, 1800mA. (Rechargeable)
Battery Operation at 125 ml/hr	15 hours
Battery Charging:	Automatic when latched into the Charger connected to an AC power source (4 hours)
Alarms:	End Program Low & End Battery Air in line Down Occlusion Door Open Pump Unattended Internal Malfunction Locking state Missing Key
Dimensions:	112 x 89 x 32mm. (L x w x h).
Symbol 	Attention (Consult accompanying documents)

Classification	Type CF Equipment (degree of protection against electrical shock)
Housing:	ABS (fire retardant)
Weight	280 gr. without battery 390 gr. with battery
Electrical Safety	Complies with: EN 60601-1 (Medical Electrical Equipment Safety), IEC 60601-2-24 (Infusion pumps and controllers), IEC 60601-1-4 (Programmable Electrical Medical System), UL 2601- 1 and CAN/CSA C22.2 No 601.1 .
Standards	Manufactured in accordance to ISO 9001:2000 and ISO 13485:2003 CE marked (In accordance with the Medical Devices Directive 93/42/EEC)
EMC	The <i>BodyGuard</i> Infusion System is designed to be in compliance with EN 60601-1 (safety) and IEC 601-1-2 (EMC).
Environmental Specifications	Non Operating Conditions (Transportation and Storage): Temperature: -25°C to 50 °C (-13 °F to + 122 °F) Humidity: 5 % to 100% R.H., non-condensing Air pressure: 48kPa to 110kPa Operating Conditions: (The system may not meet all performance specifications if operated outside of the following conditions) Temperature: +15°C to +45 °C (+59 °F to + 113 °F) Humidity: 20 % to 90% R.H. at +40 °C, non-condensing Air pressure: 70kPa to 110kPa

Technical Description

The following details outline the safety checks designed into the *VET-PRO* infusion pump, to minimize the possibility of under / over infusions.

Anti-Bolus Function

The anti-bolus function is designed to reduce the bolus that may occur upon the release of an occlusion following a downstream occlusion alarm. Upon the detection of a downstream occlusion, the alarm is activated and the pump returns the IV set line pressure to neutral within 15 seconds. Neutral line pressure is achieved by the reverse operation of the pumping mechanism, and measurement of the IV set line pressure through the in-line pressure detection system. This feature prevents an inadvertent fluid bolus to the patient, which may occur upon the release of an occlusion, caused by a downstream clamp.

Air-in-Line Accumulation

To improve the detection of air in the IV administration set, the *VET-PRO* Infusion Pump utilizes an air-in-line accumulation detection system in addition to the standard single bubble detection. This feature monitors the volume of air that passes through the IV administration set by accumulating the volume of individual bubbles over a moving 0.5 milliliter window. The limit is configurable. Although an individual bubble may not exceed the pre-programmed threshold, the cumulative volume of bubbles in a 0.5 milliliter volume may exceed that limit and initiate an air-in-line alarm. This accumulation feature is particularly useful with infusions for patients who are highly sensitive to air (i.e. infants, neonates, children) or when infusing products that create significant volumes of small air bubbles

Trumpet and Flow Rate

In *VET-PRO*, as with all infusion systems, the action of the pumping mechanism and variations cause short – term fluctuations in rate accuracy.

The following curves show typical performance of the system in two ways:

1. The accuracy of fluid delivery over various time periods is measured (Trumpet curves).
2. The delay in onset of fluid flow when infusion commences (Start up curves).

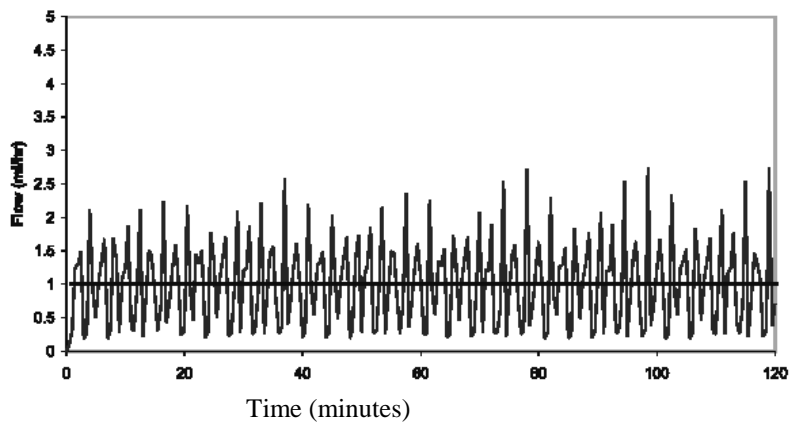
Trumpet curves are named for their characteristic shape. They display discrete data averaged over particular time periods or “Observation windows”, not continuous data versus operating time. Over long observation windows, short-term fluctuation has little effect on accuracy as represented by the flat part of the curve. As the observation window is reduced, short-term fluctuations have greater effects as represented by the “mouth” of the trumpet.

Knowledge of system accuracy over various observation windows may be of interest when certain drugs are being administered. Short term fluctuations in rate accuracy may have clinical impact depending on the shelf-life of the drug being infused and the degree of intravascular integration, the clinical effect cannot be determined from the trumpet curves alone.

The Start-up curves represent continuous flow versus operating time for two hours from the start of the infusion. They exhibit the delay in onset of delivery due to mechanical compliance and provide a visual representation of uniformity. Trumpet curves are derived from the second hour of this data. Tests performed according to IEC 601-2-24 standard.

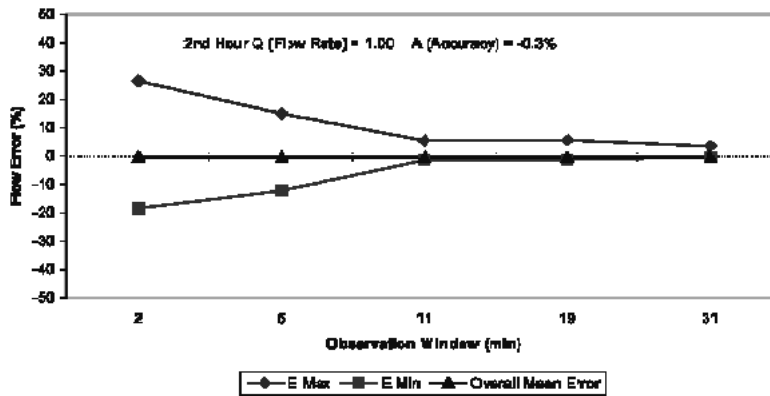
Start-Up Graph at 1.0 ml/h (Initial Period)

Using BodySet



Trumpet Graph at 1.0 ml/h (Initial Period)

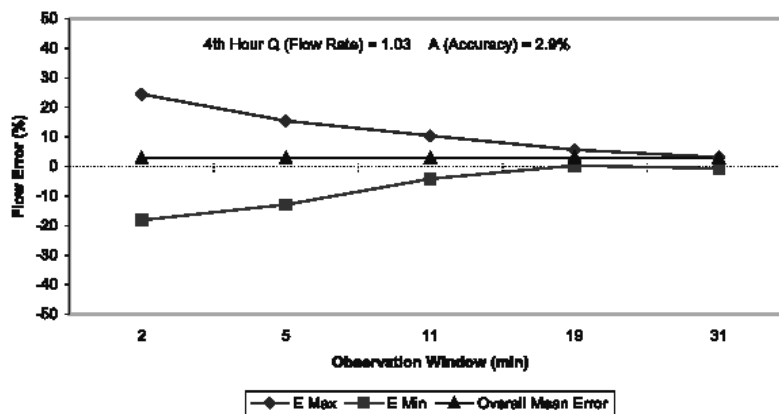
Using BodySet



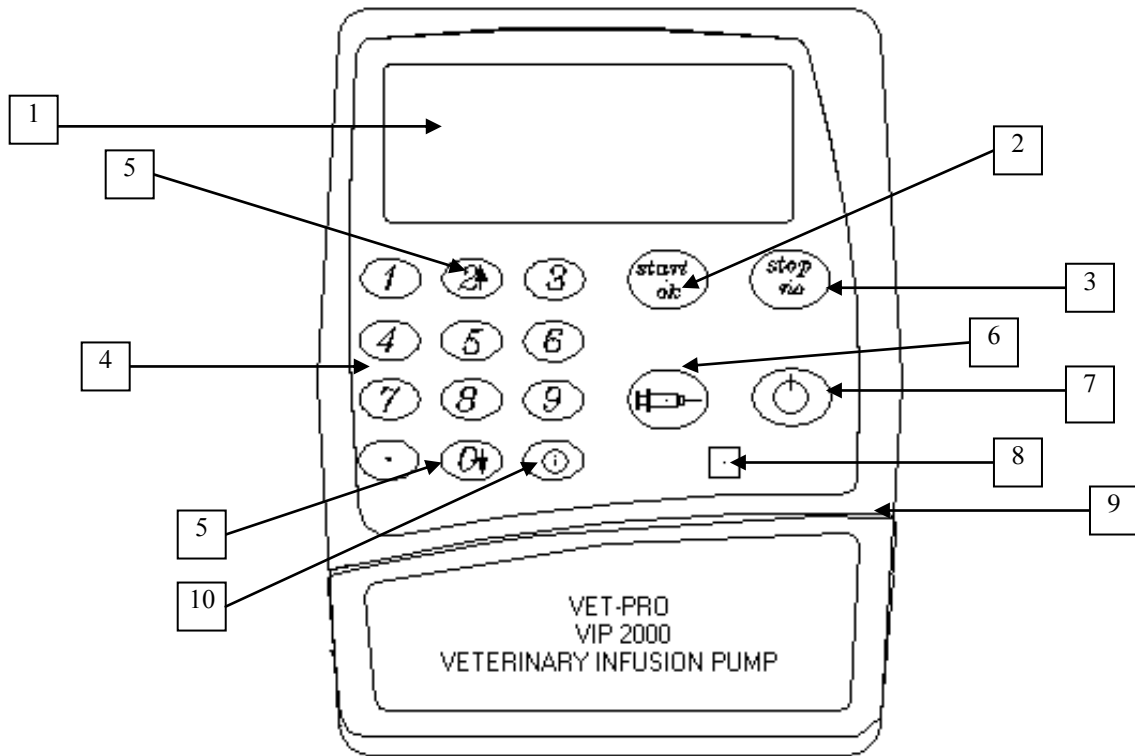
Overall Mean Error = -0.1% Max Rate Error = 8%





Trumpet Graph at 1.0 ml/h (After 4 Hours)



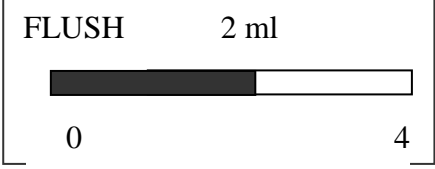
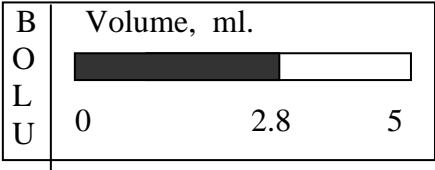
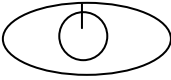

Using BodySet



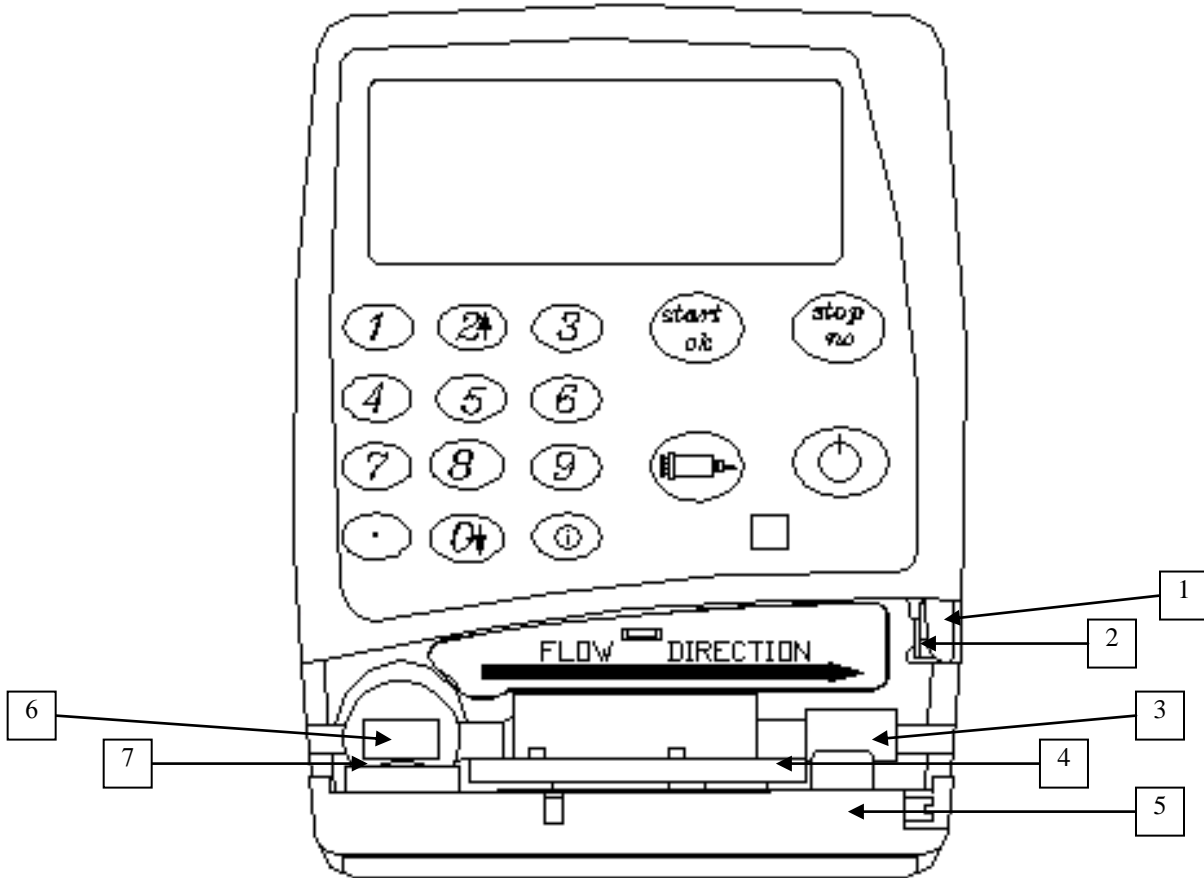
VET-PRO Front View




No.	Description	Function
1.	Display 	Displays: Selected Infusion Rate, Total Time, Time Delay, V olume T o B e I nfused and Volume Infused.
2.	START/ OK Key 	Starts pump operation and delivery. Confirms selection and setting.
3.	STOP/NO key 	<ul style="list-style-type: none"> • Silences an alarm condition and pauses operation. • Zeroes the displayed value during setting • Press to return to previous screen
4.	Numeric Keyboard 	Used to set the RATE, TIME limit and VTBI. Dial the required number. Pressing NO will erase the last digit.

5.	Arrow keys 	Enable scrolling through options.
6.	Syringe key 	<p>Pressing Syringe key <u>during data setting:</u> Enable Flushing procedure. Flushing default volume: 4 ml.</p>  <p>Pressing Syringe key <u>during PCA program operation:</u> Enable bolus procedure.</p> 
7.	On / Off key 	Turns the pump on and off. <ul style="list-style-type: none"> ▪ To turn the pump on press until the self- test screen appears ▪ To turn the pump off press until the OFF Graph is all black and a beep is sounded.
8.	Operation LED	Green Indicator: Lights during system self-test An intermittent green light indicates infusion delivery. Red Indicator: Indicates an alarm state with a continuous red light Lights when the pump is in a stand-by mode during programming.
9.	Door Latch	Opens the pump door. Lift to open the door.
10.	Info key 	Pressing Info key supplies information about the pump and its programs (see info mode chapter).

VET-PRO –with door open



<i>No.</i>	<i>Description</i>	<i>Function</i>
1.	Latch holder	Holds the door closed when latch is in vertical position.
2.	Pressure sensor	Detects downstream tubing restriction and occlusion. Alarm level can be adjusted to suit patient needs.
3.	Tubing Guide 	Guide the administration set
4.	Pressing Plate	Connected to the door by 2 springs.
5.	Pump door	Covers the pressing plate.
6.	Air sensor – front	Ultrasonic air detector, which is mounted on the front housing.
7.	Air sensor - door	Mounted on the door.

The Charger



No.	Description	Function
1.	Display	Display infusion data
2.	Release Handle	Push to release the pump from the Charger.

Note: The pump is protected against overcharging. In order to keep your battery fully charged, connect the pump to the mains via the Charger whenever it is used at home.

IV Set Requirements

The *VET-PRO* pump should be operated **only** with the *IV sets that the pump has been calibrated for*.

Warning: Do not operate the pump with any administration set, other than what it has been calibrated for as doing so will cause the rate and flow measurements to be incorrect.

Unpacking

1. Carefully remove the pump and Charger from the box.
2. Make sure no items were damaged during shipment
3. Make sure you have the following items:
 - **VET-PRO** Infusion Pump
 - Charger
 - Battery Pack
 - Operator's Manual

If any items are missing or damaged, contact your **VET-PRO** supplier.

Loading the Administration Set

☞ **Note:** Follow the Instructions supplied with the individual administration set.
Use of any administration set, other than the ***IV set that the pump is calibrated for***, may impair the operation of the pump and the accuracy of the Infusion.

1. Lift the door latch to open the pump door.
2. Insert the IV tubing into the tubing guide, following the direction flow label located above the tubing slot. Insert the tubing from left to right, and avoid stretching or pulling the tubing. Check key is located in correct position.
3. Close the pump door. Press on the door to close firmly, ensure that the latch is correctly applied.

☞ **Note:** Ensure that the tubing is inserted completely into the pumping channel.

Flush Function (Priming)

Flush Function is used:

1. Before starting a program (see instruction below);
2. After the **air in line** alarm, as follows:
Press **STOP/NO** key to mute the alarm. **Disconnect IV tubing from patient**; press the **SYRINGE** key to push air bubbles through.
When flushing is completed press **START/OK** key to resume program.

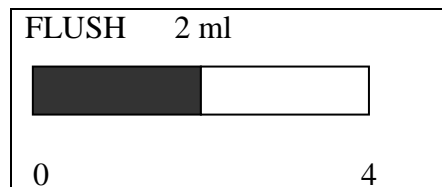
Flush operation

1. Switch on the pump using the **ON/OFF** key. (Press until the self-test screen appears). After a short self-test, the pump will display the program setting and status followed by the last setting rate.

2. Press the **SYRINGE** key to flush the administration set.
ENSURE THE SET IS NOT CONNECTED TO THE PATIENT !!



3. Press the **START/OK** key to start flushing.
4. The display will show a graph indicating the flush operation.



5. Once the flushing is completed, the display will change back to the previous screen the pump was in, before flushing.
5. **To stop** flushing, press the **STOP/NO** key.

Note: The flushing rate can be adjusted, in “adjust setting” options, up to 1200 ml/h. The default is 600 ml/hr. During flushing the air in line alarm is disabled.

Warning Always disconnect IV tubing from patient before starting flushing procedure.


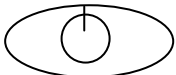
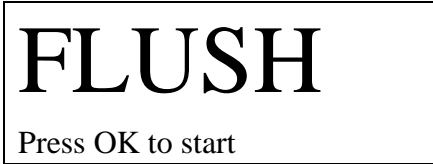
VET-PRO - Operation

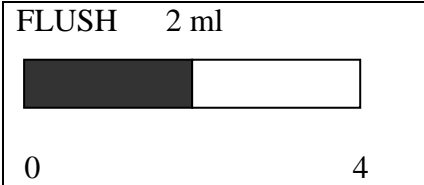
Before attaching the *VET-PRO* to a patient, run the following tests to verify that all indicators and alarms work properly.


When an alarm is activated the following will occur:

1. An alarm message will appear on the display.
2. An audible alarm will be sounded.
3. Infusion will cease.

Pump Operation Test

1. Click the pump into a Charger connected to AC power. Verify that the CHARGE indicator is on (on charger). 
2. Load an administration set in the pump (as described on page 21).
3. Switch on the pump using the **ON/OFF** key (press until the self-test screen appears). 
4. The pump will display "Self Test" followed by the program selected and its status. During the self-test a long beep will be performed. This procedure verifies that the pump's acoustic and visual features are working properly. After overview, the display will show the last rate setting.
5. Press the **SYRINGE** key to flush the administration set. 

The screen displays "FLUSH" in large letters, with "Press OK to start" below it.
6. Press the **START/OK** key to start flushing.
7. The display will show a graph indicating the flushing operation. 

The screen displays "FLUSH 2 ml" at the top. Below it is a progress bar with a black segment on the left and a white segment on the right. The numbers "0" and "4" are at the bottom corners of the bar.
8. When flushing is completed, wait without pressing any key. Verify that when two minutes have passed without any key being pressed an audible alarm is activated and a "Pump Unattended" message appears on the display. 

The screen displays "Pump Unattended" in large letters, with "Press start key" below it.
9. Press the **START/OK** key to silence the alarm.

Air in Line - Alarm Test

1. Lift the door latch to open the pump door. Insert the proper IV tubing into the guide of the pump (as described in page 21). Make sure direction of flow is correct.

2. Close the door. Press the door until a click is heard.

3. Set the infusion rate at 500ml/hr, using the Numeric keyboard.

Rate 500 ml/h
Press OK for Volume

4. Set Volume at 20 ml.

Volume 20 ml
Press OK to start

5. Press the **START/OK** key to start operation. Turn the drip chamber (applicable to BodySet only) upside down, to allow an air bubble greater than 5 mm to enter into the administration set.

6. AIR alarm will be activated as soon as the air bubble enters the set segment located behind the pump door.

Air in Line
Clean air

7. Press the **STOP/NO** key to turn the alarm off.

8. STOP appears on the display.

STOP
 2 min
Press OK to start

Door Open - Alarm Test

1. Insert an administration set into the pump (as described in page 21) and flush it.

2. Set the infusion rate at 500ml/hr, using the numeric keyboard.

Rate 500 ml/h
Press OK for Volume

3. Set Volume at 20 ml.

Volume 20 ml
Press OK to start

3. Press the **START/OK** key to start operation.

4. Open the pump door.

5. Door Open alarm will be activated at once.

Door Open
Close door

6. Close the door.

7. STOP appears on the display.

STOP
 2 min
Press OK to start

Down Occlusion - Alarm Test

1. Insert an administration set into the pump and flush it.

2. Set the infusion rate at 500ml/hr.

Rate 500 ml/h
Press OK for Volume

3. Set Volume at 20 ml using the numeric keyboard.

Volume 20 ml
Press OK to start

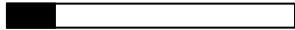
4. Occlude the administration set (between the pump and the patient).

5. After 10 seconds Down Occlusion alarm will be activated (At a rate of 60 ml/hr the Down Occlusion alarm will occur after 60 sec. at a rate of 1 ml/hr after 13 min.)

Down Occlusion
Press STOP to mute

6. Press **STOP/NO** key to silence the alarm.

7. STOP appears on the display.

STOP
 2 min
Press OK to start

Note: The pressure threshold can be changed to suit patient need

Charge Indicator Test

1. Click the pump into the Charger, connect the Charger to the mains and check on the Charger that the pump's battery is being charged (red led for charging and green led if the battery is full). Disconnect the power cord from the AC power outlet.

2. Verify that the CHARGE indicator is off.



3. Connect the power cord to the AC power outlet. Verify that the CHARGE indicator on the Charger is on.



Programs

The *VET-PRO* infusion pump features 5 different programs. Following are the specifications for each program:

CONTINUOUS program

Rate: 0.1 to 1200 ml/hr

Total volume to be infused: 0.1 to 9999 ml.

25 STEPS program

User can design a specific protocol, for drug delivery, which contains up to 25 steps.

Infusion Rate: 0.1 to 1200 ml/hr.

Volume: 9999 ml. For each step.

Accumulated volume for all steps- up to 10 liters.

TPN program

To be used for Total Parenteral Nutrition

The program has a taper up/taper down pattern. The parameters to be set are: Total Volume, Time Up, Time Down and Total Time. The pump will calculate the maximal rate for verification.

INTERMITTENT program

To be used for setting a Dose regiment, at set intervals.

PCA program

To be used for Pain Relief.

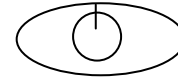
The PCA program combines basal rate and pre-programmed Boluses.

Rate: 0 to 100 ml/hr.

Total volume to be infused: up to 1000 ml

Changing Current Program

1. Switch the pump on by pressing **ON/OFF** key.



2. **When the screen of Rate appears, press info key twice.**

3. Use **ARROW** keys to scroll to "Adjust Setting" option.

Volume Infused Show Setting => Adjust Setting

4. Choose "Adjust Setting" with **START/OK** key.

5. Use **ARROW** keys (2↑, 0↓) to scroll to "More".

Buzzer level => More ... Show Setting

6. Confirm with **START/OK** key.

7. Set technician Code (Code 901), using the numeric keyboard and confirm with **START/OK** key.

Technician Code 901

8. Scroll through the presetting parameters, using the **ARROW** keys (2↑, 0↓), until the "Select Program" option. Confirm with **START/OK** key.

Pressure Default => Select Program Flushing Volume
--

9. Choose the required program, using the **ARROW** keys, and confirm with the **START/OK** key.

Select program: => CONTINUOUS TPN

10. Choose "Restart Pump" Option and confirm with the **START/OK** key.

History => Restart Pump Pressure Default
--

Note: The selected program will remain in the pump's memory until changed by the user.

☞ **Note:** User may change programs using the **Short Cut:**

1. When switching the pump on, after a short Self Test, the pump will display the last selected program for 5 seconds. During this time, press the **STOP/NO** key for 2 sec. (Pressing any other key will elapse the pump to the Rate screen).

C O N T	CONTINUOUS
	PROGRAM
	Press NO to change

2. The screen will show the “Select Program” menu.

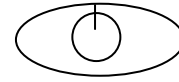
Select program:
=> CONTINUOUS
TPN

3. **Choose the required program, using the ARROW keys, and confirm with the START/OK key.**

☞ **Note:** If the current selected program is PCA, the Short Cut option is not available.

Down Occlusion Setting:

1. Switch the pump on, by pressing **ON/OFF** key



2. **When the screen of Rate appears, press info key twice.**

3. Use **ARROW** keys (2↑, 0↓) to scroll to "Adjust Setting" option.

Volume Infused
Show Setting
=> **Adjust Setting**

4. Choose "Adjust Setting" with **START/ OK** key.

5. The option selected is "pressure level".

Adjust setting:
=> **Pressure Level**
Buzzer Level

6. Confirm with **START/OK** key.

7. Choose the desired pressure level, using the arrow keys (2↑, 0↓).

Pressure setting
High 10 psi
Adjust ↑↓ & press OK

8. **Press the START/OK key to store the parameter in the pump's memory.**

☞ **Note:** The following pressure parameters can be set:

Low = 5 psi (0.3 bar)

Normal = 7.5 psi (0.5 bar)

High = 10 psi (0.7 bar)

☞ **Note:** The selected pressure setting will remain in the pump's memory only until turning off (and then return to the default - HIGH).

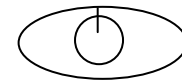
☞ **Note:** In the event a down occlusion situation occurs, the patient is protected by an anti-bolus feature, which prevents bolus delivery to the patient when the downstream occlusion is released.

Basic Operation

The *VET-PRO* pump was designed for the Veterinary market.

Connection of Pump to IV Pole

1. Connect the IV set to the medication bag. Mount the bag on an IV pole.
2. Click the pump into the Charger. Mount the Charger on an IV pole.
3. Connect the Charger via a standard power cord to a grounded AC outlet.
4. Open the door of the pump and insert the administration set into the pump's tubing guide .
5. Switch the pump ON using the **ON/OFF** key (press until the self-test screen appears).
6. The program and status will appear on the display followed by the last rate setting.
7. Flush the administration set by pressing the **SYRINGE** key, and confirm with **START/OK**.
8. Set the required program and continue as described for every program setting.
9. Verify that infusion proceeds normally before leaving the pump unattended.



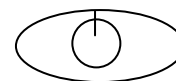
C O N T	CONTINUOUS PROGRAM Press NO to change
------------------	--

Portable Connection:

1. Connect the IV set to the medication bag.
2. Open the door of the pump and insert the administration set into the pump's tubing guide .
3. Switch the pump ON using the **ON/OFF** key (press until the self-test screen appears).
4. Flush the administration set by pressing the **SYRINGE** key, and confirm with **START/OK**.
5. Set the required program and continue as described for every program setting.
6. Verify that infusion is proceeding normally and insert the bag and pump into the carrying bag.

Continuous Program

Switch the pump ON using the **ON/OFF** key.



Pump displays program name and status. The status is either "Lock out" or "program" .

C	CONTINUOUS
O	PROGRAM
N	Press NO to change
T	

C	CONTINUOUS
O	LOCK OUT
N	
T	

Program Setting

☞ **Note:** Whenever you decide to set a new program, follow instructions at the bottom of screen.

Rate over Volume

1. The pump will display the last set rate. Use the **numeric keys** to change or press **START/OK** to confirm.

Rate	500 ml/h
Press OK for Volume	

☞ **Note:** During operation the pump allows rate titration, by pressing a numeric or digital point key.

Rate: 500	ml/h
Adjust & press OK	

The rate on the display will change during titration, however operation rate will change only if the **START/OK** key is pressed within 10 seconds confirming the rate change. If the rate change is not confirmed within 10 seconds, the pump will continue operation on the original rate, and the display will return to the previous rate set.

☞ **Note:** From the STOP mode, the user may return to the Rate screen by pressing twice on one of the numeric keys.

☞ **Note:** During stop or data setting mode, use the **STOP/NO** key to return one step backwards: First press will erase the last digit displayed, once all the digits are erased, pressing the **STOP/NO** key will display the previous screen .

2. When the Rate is confirmed, the pump will display the last set volume (if the time option is set off). Use the numeric keys to change the **Volume** or press **START/OK** to confirm and start the program operation.

Volume 456 ml Press OK to start

3. During program operation, the pump will display the rate in which the program is operating.

Rate 250 ml/h

Note: -If one of the values is changed during the programming mode, the pump will not store the new value, unless changes are confirmed by pressing the **START/OK** key.
-If the flush key is activated during data setting, the pump will return to the original (previous) screen, once flushing is completed.

In the event the program is in lock mode or if the time option is on and the previous program has been interrupted the pump will display the Repeat/Resume screen.

C O N T	Resume Press OK
	Repeat Press NO

To **continue** the previous program (from where it stopped) press the **START/OK** key.

To **repeat** the previous program from the beginning, **or start a new program** (if pump is not in lock mode) press the **STOP/NO** key.

Volume over Time

1. If time option is on (adjust setting – see p. 71) after displaying program name and status, pump will display last set volume, set or confirm the displayed number by pressing the **START/OK** key.

C O N T	Volume 456 ml
	Press OK key

2. The display will show the time screen, set the time, **for a volume over time program**, and press **START/OK** to start operation.

C O N T	Total Time 10:30
	Press OK key

Time setting options:

- A.setting 4 digits: 2 first digits will represent hours and the other 2 will represent minutes
 - B.setting 2 digits for full hours
 - C.setting 1 digit for hours and using the digital point to set minutes.
 - D.using the digital point to set only minutes.
-

3. During program operation, the pump will display the rate in which program is operating.

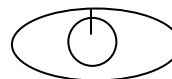
Rate
250 ml/h

Note: -If one of the values is changed during the programming mode, the pump will not recall the new value, unless changes are confirmed by pressing the **START/OK** key.
-If the flush key is activated during data setting, the pump will return to the original (previous) screen, once flushing is completed.

25 Steps Protocol

In the 25 steps program, the user can set up to twenty-five different steps. Each step has its own rate and volume. The steps accumulation is limited to a Volume of 10 liters. Protocol steps are delivered one after another, sequentially, until all steps are completed.

Switch the pump ON using the **ON/OFF** key.



Pump displays program name and status. The status is either "Lock out" or "program".

S T E P	25 - Steps PROGRAM Press NO to change
------------------	--

S T E P	25 - Steps LOCK OUT
------------------	-------------------------------

Program Setting

Note: Whenever you decide to set a new program, follow the instructions at the bottom of the screen.

Note: -If one of the values is changed during the programming mode, the pump will not store the new value, unless changes are confirmed by pressing the **START/OK** key.
 -If the flush key is activated during data setting, the pump will return to the original (previous) screen, once flushing is completed.

1. The pump will display the previous rate for the first step. Set a new rate, using numeric keys, or confirm pressing **START/OK**.

Step 1 Rate
100 ml/h
Press OK for Volume

2. Pump will display the previous volume for first step. Set a new volume, or confirm pressing **START/OK** key.

Step 1 Volume
1000 ml
Press OK to continue

3. Pump will display the rate for step 2. Repeat directions as for step 1 and repeat through all the steps required, up to 25.

4. After last required step, set rate to **zero**. This indicates that all data required for the protocol has been set. All protocols following the last set protocol, will be automatically zeroed .Press **START/OK** to confirm.

Step	11	Rate
	0	ml/h
Press OK for Volume		

5. After last step rate was set to zero or after 25 steps are completed, the pump will display the accumulated data setting, to enable comparison and verification. Press **START/OK** to start the program or **STOP/NO** to scroll through all the protocol settings again.

Total Steps	10
Total Volume	5000ml
Press OK to start	

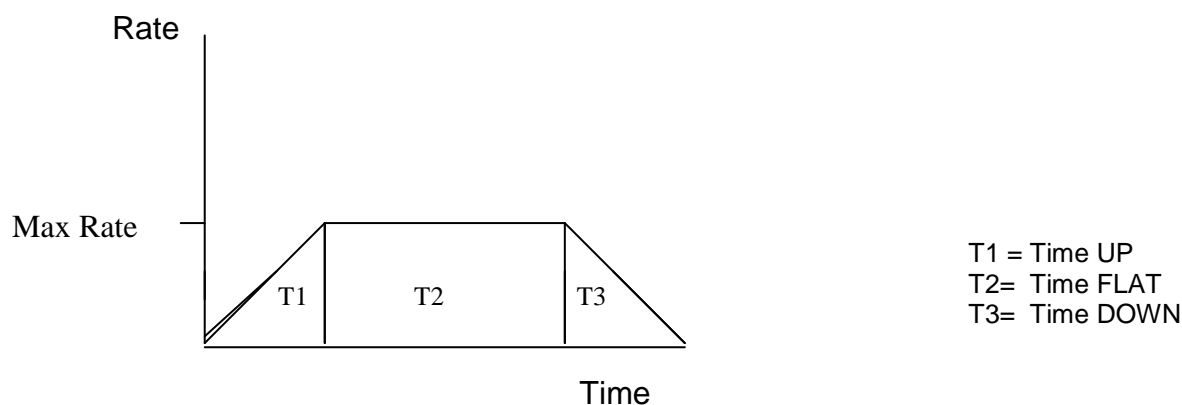
6. During the program operation, the display updates the user on which step the pump is running.

S T E P	Rate	Step 1 of 10
	100 ml/h	

☞ **Note:** Pressing the **STOP/NO** key shall erase the last digit. Once no digit is displayed, pressing the **STOP/NO** key will change the screen to show the previous display.

TPN Program

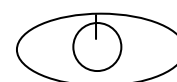
Total Parenteral Nutrition - This mode delivers an infusion while automatically tapering up and down. The pattern of the program is a trapezoid.



On a TPN Program the user may set the total volume which corresponds to the size of the bag to be infused, the total time, and the up and down time. The pump displays the maximal rate, as calculated, from the set parameters. The maximal rate display is used to verify that the setting corresponds to the requested data, and to ensure that the maximal rate is suitable to the patient.

Up and down time can be set to zero. A TPN program with up and down time set to zero, is a **continuous** program.

Switch the pump ON using the **ON/OFF** key.



Pump displays program name and status. The status is either "Lock out" or "program".

T P N	<p>TPN</p> <p>PROGRAM</p> <p>Press NO to change</p>
T P N	<p>TPN</p> <p>LOCK OUT</p>

In the event a TPN program was interrupted and was not completed, the pump will display the Resume/Repeat screen.

T P N	Resume Press OK
	Repeat Press NO

To **continue** the interrupted program, press the **START/OK** key.

To **repeat** the previous program or **start a new program**, press the **STOP/NO** key.

If you choose to complete an interrupted program, the pump will display interrupted program data. Scroll with the **ARROW** keys to check program data. Pressing the **START/OK** key will start the program operation.

T P N	Volume 1256 ml
	Max Rate: 234 ml/h
	Press OK to start

Program Setting

Note: Whenever you decide to set a new program, follow the instructions at the bottom of the screen.

Note: -If one of the values is changed during the programming mode, the pump will not store the new value, unless the change is confirmed by pressing the **START/OK** key.
-If the flush key is activated during data setting, the pump will return to the original (previous) screen, once flushing has been completed.

1. The first parameter to set is the volume of the TPN bag.

T P N	Volume 1256 ml
	Press OK key

2. Set the total time for the program to run:
Options are:
 - a. Setting 4 digits - 2 first digits will represent hours and the other 2 will represent minutes
 - b. Setting 2 digits for full hours
 - c. Setting 1 digit for hours and using the digital point to set minutes.
 - d. Using the digital point to set only minutes.

T P N	Total Time 12:30
	Press OK key

3. Set the time for the rate to taper up (up to 4:15 h).

T P N	Up Time: 0:30
	Press OK key

4. Set the time for the rate to taper down (up to 4:15 h).

T P N	Down Time: 0:30
	Press OK key

5. The pump will calculate all the set data and display the Maximal rate for the program (to be infused during Flat period). Press the **START/OK** key to start the program.

T P N	Volume 1256 ml
	Max Rate: 108 ml/h
	Press OK to start

☞ **Note:** During the stop or data setting mode, use the **STOP/NO** key to return one step backwards: First press will erase the last digit displayed, once all the digits are erased pressing the **STOP/NO** key will display the previous screen .

6. During the TPN program operation, the pump will display the actual rate and program direction (Up/Flat/ Down).
Program operation will start from 2 ml/h and will increase to the maximal rate.

U P	Rate
	2 ml/h

7. During the Flat session the rate will not change and the pump will show the following message:

F L A T	Rate
	108 ml/h

8. During the last part of the program (T3), the program will start to decrease the infusion rate according to the set taper down time.

D O W N	Rate
	25 ml/h

- ☞ **Note:** If the program must be interrupted early, and the planned taper down time must commence immediately press the **STOP/NO** key continually (2 sec) to stop the pump operation and display Taper Down screen.

T P N	Taper Down: 0:30
	Press OK key

Set a new time or confirm the default setting. Press the **START/OK** key to start the taper down process immediately.

Intermittent Program

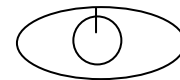
This is a special program, which enables the design of a Dose delivery protocol at set intervals. Each Dose will be given at a set time. Between Doses the pump will Keep the Vein Open. The infusion program continues until the total infusion bag is infused.

This “Launch and Forget” program enables the Home care company to program medication treatment for long treatments. For treatments like, IV Antibiotics, giving every 4 hours a dose of 100 ml, the intermittent program is saving 5 administration sets, during 24 hours, and essential time of the home care company.

Example: Programs setting

<i>Program</i>	<i>Rate</i>	<i>Volume</i>	<i>Time</i>
Period-1	100 ml/hr	100 ml.	1:00
Period-2 - KVO	5 ml/hr.	20 ml.	4:00
Period-3	100 ml/hr	100 ml.	1:00
Period-4 - KVO	5 ml/hr.	20 ml.	4:00
Period-5	100 ml/hr	100 ml.	1:00
Period-6 - KVO	5 ml/hr.	20 ml.	4:00

Switch the pump ON using the **ON/OFF** key.



Pump displays the program name and status. The status is either "Lock out" or "program".

I N T R	Intermittent PROGRAM Press NO to change
------------------	--

I N T R	Intermittent LOCK OUT
------------------	---------------------------------

Program Setting

☞ **Note:** Whenever you decide to set a new program, follow the instructions at the bottom of the screen.

Note: -If one of the values is changed during the programming mode, the pump will not store the new value, unless the change is confirmed by pressing the **START/OK** key.
 -If the flush key is activated during data setting, the pump will return to the original (previous) screen, once flushing has been completed.

1. The pump will display the last set rate. Change or press **START/OK** to confirm.

Rate	4 ml/h
Press OK for Volume	

2. The pump will display the last set Dose Volume. Change or press **START/OK** to confirm

Dose Vol: 100 ml
Press OK to continue

3. Adjust the time pause between Doses (up to 20:00 hours), or confirm the last setting by pressing the **START/OK** key.

Pause	04:00
Press OK to continue	

4. The pump will display the last set Volume (total volume to be infused). Use the numeric keys to change or press **START/OK** to confirm and start program operation.

Volume 1000 ml
Press OK to start

5. During the intermittent program the display will show continually the actual rate of infusion.

Rate	
	5 ml/h

6. During a pause between the doses, the display will show the KVO screen.

Delay 4:00	
KVO	5 ml/h

☞ **Note:** During operation the pump allows rate titration, by pressing a numeric or digital point key.

Rate: 500 ml/h
Adjust & press OK

The rate on the display will change during titration, however the operation rate will change only if the **START/OK** key is pressed within 10 seconds confirming the rate change. If the rate change is not confirmed within 10 seconds, the pump will continue operation on the original rate, and the display will return to the previous rate setting.

☞ **Note:** During stop or data setting mode, use the **STOP/NO** key to return one step backwards: First press will erase the last digit displayed, once all the digits are erased pressing the **STOP/NO** key will display the previous screen .

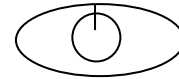
☞ **Note:** Delay Before start option is cancelled in the Intermittent program.

PCA Program – With protocols

Patient Control Analgesia is a program used in subcutaneous, IV or epidural pain relief. Pain management is undertaken by delivering a continuous basal rate, in combination with pre-programmed Boluses. The pump will deliver only the boluses corresponding to the preset time intervals. All attempts to obtain a bolus are stored in the pump memory. The Home Care Company can read these statistics and adjust the settings as required.

It is possible to set and store up to 5 different protocols for PCA, including names of drugs.

Switch the pump ON using the **ON/OFF** key.




The PCA program operates only in a lock mode.

Program mode will be displayed if no protocol has been locked.

PCA lock mode will be displayed if a protocol has been locked and Epidural mode is Off.

P C A	PCA PROGRAM
P C A	PCA LOCK OUT

Program Setting

 **Note:** Whenever you decide to set a new program, follow instructions at the bottom of the screen.

1. To enter PCA menu, pump will require a code. Use numeric keys to set code 007 and confirm with **START/OK** key.

P	Enter Code
C	007
A	Press OK key


2. Pump will display the PCA menu. Use the arrow keys to scroll through the different options, and select the required option, using the **START/OK** key. Selecting the “More..” option will display the Adjust Setting second selection menu.


P	=> Flush
C	MD Bolus
A	History

3. **Flushing is disabled during operation, therefore, always flush the set before starting a program.**

Selecting the **flush option** from the PCA menu, will display the flush previous screen. Pressing the **START/OK** key will activate the flush procedure. If no key will be pressed within 10 sec. the pump will return to the PCA menu screen.

When the flush is completed the pump will go back to the PCA menu screen.

 **Note:** The flushing rate can be adjusted, in adjust setting options, up to 1200 ml/h. The default is 600 ml/hr. During flushing the air in line alarm is disabled.

 **Warning** Always disconnect IV tubing from patient before starting flushing procedure.

4. Select the “Modify Program” option and press the **START/OK** key.

P	Select Program
C	=> Modify Program
A	More

5. Use the numeric key to set the code 008 and press the **START/OK** key.

P	Enter Code
C	008
A	Press OK key

6. Press the **START/OK** key to start new bag and clear previous program data. Pump will display bag volume screen - continue to step 7. Pressing the **STOP/NO** key will display program accumulation screen. Press **START/OK** key from accumulation screen to the VTBI left from previous program as total vtbi for the new program. continue to step 8.

P	Clear History & Start New Bag
C	
A	

7. Pump will display the Bag Volume screen (with total volume of previous program). Use the numeric keys to set a new value or approve the previous value, using the **START/OK** key.

P	Bag Vol: 500 ml Press OK key
C	
A	

8. Pump will display the list of 5 protocols with drug names. Use the arrow keys to scroll through the options. Pressing the **START/OK** key will display the rate screen of the chosen protocol. Pressing the **STOP/NO** key twice will enable the user to change the drug name.

A: MORPHINE
B: METHADONE
C: PETHIDINE

Use the **STOP/NO** key to erase the displayed drug name. Use the arrow keys and keys of 4 and 6 to move between letters. Select the letters using the **START/OK** key. Once the protocol name is completed, return the select key to the empty space, before the letter A and repeatedly press the **START/OK** key until the display returns to the Protocol List.

9. Pump will display the rate screen (the chosen protocol will be displayed on the left column of the screen). Use the numeric keys to set a new value (up to 100 ml/hr) or approve the previous value, using the **START/OK** key. Rate can be displayed in mg/ml, as well. Using this option – go to step 10, if not, continue to step 11.

P	Rate 50 ml/h Adjust & press OK
A	

10. From the rate screen press the **STOP/NO** key 3 times to display the concentration screen. Use numeric keys to set concentration and approve by pressing the **START/OK**. Pump will go back to the protocols list.

P	Concentration 0.5 mg/ml
C	
A	

To return from mg to ml, press **STOP/NO** key twice, from rate screen, enter a concentration of 0 mg/ml, and press the **START/OK** key for approval.

11. Pump will display the Bolus screen. Use the numeric keys to set a new value or approve the previous value, using the **START/OK** key.

P	BOLUS 5 ml
A	Adjust & press OK

12. Lock time is the minimal time between boluses. When a bolus is required during the lock time, a beep will be sounded but no bolus will be given. Use the numeric keys to set a new value or approve the previous value, using the **START/OK** key.

P	LockTime 60 Min
A	Adjust & press OK

13. 4 H Limit is the maximum volume to be given in 4 hours. Once this volume will be infused the pump will operate in the KVO mode, to complete the 4 hours. Use the numeric keys to set a new value or approve the previous value, using **START/OK** key.

P	4 H Limit 10 ml
A	Adjust & press OK

14. PCA program operates only in a lock mode. Press the **START/OK** to lock the program or **STOP/NO** to go back to protocols list and scroll again through the data.

P C A	Lock:Press OK Scroll:Press NO
-------------	--

15. The pump will display the protocol accumulation screen. Use the arrow keys to scroll through the data. Press the **START/OK** to start the program operation. Pressing the **STOP/NO** twice will go back to menu screen.


P	Bag Vol: 500 ml
	Volume Left 500
	Infused 0
A	Press OK to start

Note: -If one of the values is changed during the programing mode, the pump will not store the new value, unless the change is confirmed by pressing the **START/OK** key.

16. During the PCA program the display will show the selected protocol, the name of the drug, the rate of operating and the bolus volume.

P	MORPHINE
	Rate 50 ml/h
A	BOLUS 5 ml

17. Pressing the Syringe key and approving with **START/OK** key will activate the **Bolus Operation**. When the Bolus is given, the pump will display the progress of the procedure. **A bolus can also be given by pressing twice on the bolus cable.**

B O L U	Volume 5 ml
	
	0 2.1 5

18. After a program has been locked, whenever the pump will be turn on, resume-menu screen will be displayed. Pressing **START/OK** key will display accumulation screen, with Volume to be infused, as volume left from previous program. User can only continue previous program by pressing again **START/OK** key. Pressing **STOP/NO** key, will display code setting screen. Set code 007, to enter the PCA menu.

P	Resume:Press OK Menu:Press NO
C	
A	

Start new bag

1. Selecting “**Start new Bag**”, from the PCA menu, will display another screen for approval.

P	History
C	=> Start New Bag
A	Select Program

2. Pressing the **START/OK** key will start a new bag (Set total bag as Volume to be infused with no regards to previous Volume Infused). All other parameters are locked and can not be changed. Pressing the **STOP/NO** key will go back to the menu.

Start New Bag	
Resume – Press OK	

3. Data includes previous Volume Infused. Pressing the **START/OK** key, from accumulation screen, will start program operation. Pressing the **STOP/NO** key will go back to display resume-menu screen.

P	Bag Vol: 100ml
C	Volume Left 100
A	Infused 5
Press OK to Start	



Note:

After end program, user can start a new bag without a code. Pump will display the option to start a new bag or going back to menu. Pressing **START/OK** key will display program accumulation screen. Approving with **START/OK** will start the program.

Selecting a Program

1. Selecting “**Select Program**”, from the PCA menu, will display 2 options – to start new bag or to continue with previous bag.

P	Start New Bag
C	=> Select Program
A	Modify Program

2. Pressing the **START/OK** key will clear the volume infused history and start a new bag. Pressing the **STOP/NO** key will continue the program with previous Volume Infused. In both cases pump will continue to display accumulation screen.

P	Clear History & Start New Bag
C	
A	

3. Pressing the **START/OK** key will display the protocols list. Pressing the **STOP/NO** key will display again PCA main menu.

P	Bag Vol:	500ml
C	Volume Left	500
A	Infused	0
Resume - Press OK		

4. Use the arrow keys to scroll through different protocols and select with the **START/OK** key.

A: MORPHINE	
B: METHADONE	
C: PETHIDINE	

5. Pump will display the protocol accumulation screen. If Epidural mode was set to OFF, pressing **START/OK** key will start program operation.

P	Rate	50 ml/h
	BOLUS	5 ML
	LockTime	60 Min
A	4 H Limit	100 ml

MD Bolus

Selecting the **MD Bolus**, from PCA menu, will display the MD Bolus setting screen. If no key is pressed within 30 sec. the pump will go back to the code screen.

P	Flush
C	=> MD Bolus
A	History

Use the numeric keys to set the Bolus Volume, up to 25.5 ml.

When the Bolus is completed the pump will display the Resume/Menu screen. Press the **STOP/NO** key to go back to the menu code screen or the **START/OK** key to display the program accumulation screen.

P	MD Bolus
C	Volume 2 ml
A	Press OK to start

History

Selecting “**History**“ will display the PCA operation history for the last 24 hours or last program, if started within the last 24 hours. Pump will display: Volume Infused, Bolus Given and Bolus attempted. Use the **ARROW** keys to scroll through data.

P C A	MD Bolus => History Select Program
-------------	---

H	From 12.01.02	11:10
	To 13.01.02	11:10
2	Given:	200 ml
4	Bol. Given:	4

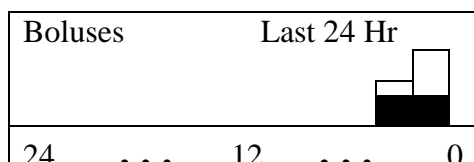
Use the down **ARROW** key to scroll to the information regarding the last 8 hours. Use the **ARROW** keys to scroll through the data.

H	From 13.01.02	03:10
	To 13.01.02	11:10
	Given:	80 ml
8	Bol. Given:	2

Press the **info** key for details per hour. Use the **ARROW** keys to scroll through the data.

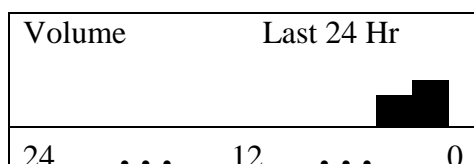
Press the **info** key once more to display the Boluses given and attempted for the last 24 hours or last program, in a graphic way.

Every column in the graph represents 1 hour. The black areas in each column are the boluses given and the white areas are the patient attempts for boluses.



Press the **info** key once more to display the Volume infused for the last 24 hours or last program, in a graphic way.

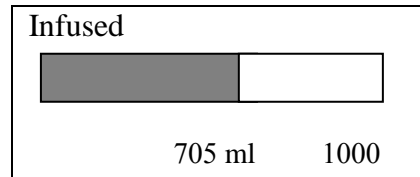
Every column in the graph represents 1 hour.



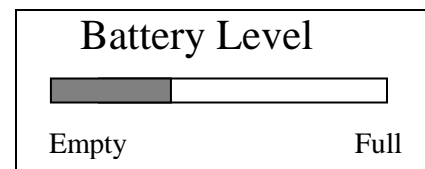
Note: History can also be displayed during operation, by pressing the **STOP/NO** key and then the info key.

Info Mode

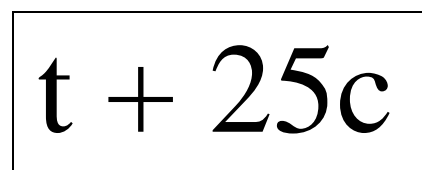
Pressing on the **info** key during operation will display the total Volume To Be Infused and the Infused Volume. The screen will be displayed for 7 seconds.



Pressing **twice** on the **info** key during operation will display the battery status. The screen will be displayed for 7 seconds.



Pressing **3 times** on the **info** key during operation will display the administration set temperature. The screen will be displayed for 7 seconds.

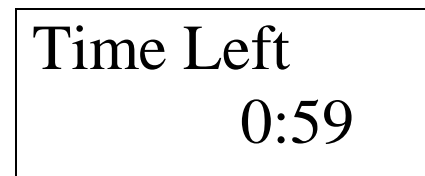


This option is not available in the 25 steps program.

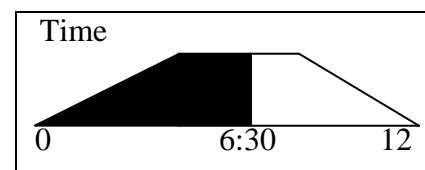
Pressing **3 times** on the **info** key, during **PCA** program, will display Boluses History, from beginning of the program operation.

P	Boluses
C	Attempted: 3
A	Given: 1
	Delay 60Min

Pressing **4 times** on the **info** key during operation will display the time left until the end of the program. This Option is not available in the 25 steps program and in the PCA program.



Pressing **4 times** on the **info** key during **TPN** operation will display the program status using a graph. The performed part of the trapeze will be painted black. The screen will be displayed for 7 seconds.



Pressing **4 times** on the **info** key during **PCA** operation will display the data of the present protocol operating.

P	Rate: 50 ml/h
	BOLUS 1 ml
	Lock Time 60Min
A	4 H Limit 200 ml

Pressing **5 times** on the **info** key during **PCA** operation will display the time and date.

Time 8:30
Date 24.03.02

To clear the volume infused (VI): press the **info** key to display the volume infused (from stop or setting mode) and then the **STOP/NO** key. The screen will change to show volume infused zero.

Infused

0 ml 1000

Pressing the **STOP/NO** key after the program is completed , will erased the VI. The option to erase the volume infused through info, is used in case the last program was not completed.

☞ **Note:** Exit from the **info** mode is automatic after 10 sec, or can be achieved by pressing the **info** key.

Program Delay

Delay of the program before the start is enabled in the Continuous program (both in rate over volume and in volume over time), TPN and the 25 steps program.

To enable delay before start option, set delay before start to on, as described on page 66 (Adjust Setting). After setting the program data the pump will enable the delay setting.

C	Volume	250ml
O		
N		
T		Press OK for Delay

C	Rate	25 ml/h
O	Volume	250ml
N	Time	10:00
T		Press OK for Delay

Use the numeric keys to set the time delay (up to 20 hours).

At this stage, if no value was set, pressing the **START/OK** key will start the program operation with no delay.

Time Delay	15:00
	Press OK to start

During the time delay, the KVO session will run. Time left will count down, until 00:00. At this stage the set program will automatically start operation.

Delay	12:20
KVO	5 ml/h

Program Completed

When the program is completed, the following message will appear on the display: press the **STOP/NO** key to mute the alarm.

End PROGRAM
Press STOP to mute

The pump will automatically turn to a **KVO** mode when the program is completed. Press the **STOP/NO** key to reset the pump and set a new program.

KVO 5 ml/h
Press STOP to renew

If the main program rate is higher than the KVO rate, set in the technician mode, the rate will remain as set in the technician mode. If the main program rate is lower than the KVO set rate in the technician mode, the pump will operate at the program rate. KVO volume is limited to 5 ml.

☞ **Note:** Before operating the pump, make sure the IV bag contains 5 mls more than the VTBI— for the KVO (and delay time, if applicable)

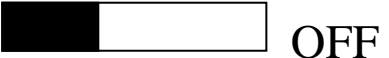
When the program is completed a special sound algorithm will be performed: 4 single beeps followed by a 4 minute pause, then again 4 beeps, another 4 minute pause and a continuous alarm is activated. When the audible alarm is activated, the display shows the “end program” screen. Between the beeps and alarm pause the display shows the KVO screen.

Press the **STOP/NO** key to stop the pump. This ceases the pump operation and the display shows STOP.

STOP
 2 min
Press OK to start

Stop mode is limited to 2 min. After 2 min. an audible alarm is sounded. Press the **STOP/NO** key again, to mute the alarm.

From STOP mode, switch the pump off by pressing the **ON/OFF** key (continuously until a beep is sounded).

 OFF
WAIT FOR BEEP

☞ **Note:** The pump cannot be switched off during operation.

Changing The Fluid Container

1. Ensure that the pump is not infusing by placing the pump in STOP mode or turning the pump OFF.
2. Remove the bag spike on the IV set from the empty / used container. Discard the empty/used container/bag.
3. Prepare a new container/bag and insert the spike into the new container.
4. Squeeze the drip chamber (if applicable) to fill approximately halfway with fluid.
5. Restart infusion.

Locking

The *VET-PRO* enables the user to lock the programs, on three different levels.

Level 1 (keys locking)

Level 2 (lock out program)

Level 3 (presetting maximal rates)

Level 1 – key locking

The *VET-PRO* keys locking function disables all but the **info** key, **START/OK** (during setting mode) and **STOP/NO** (during operation mode) keys.

Level 2 – program locking

The *VET-PRO* has a unique option, which enables the user to lock out the numeric keys, so that entered parameters, or set programs cannot be changed once they are set.

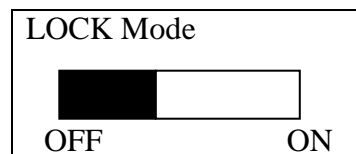
Level 3 – maximal rate locking

The *VET-PRO* provides the option of setting a maximal rate in the technician mode. The program rate can be adjusted up to a preset limit. For home patient (mainly for TPN or PCA treatments), who must repeat the same program daily, the option of adjusting the delivery regiment is very important.

How to Lock

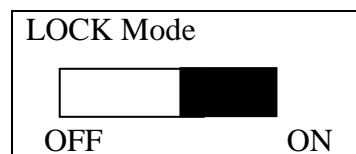
Level 1 – key locking

Pressing continuously on the **info** key, until the graph is all black and a beep is sounded will lock the program.



“1” will be shown on the right side of the display, indicating that the program is first level locked.

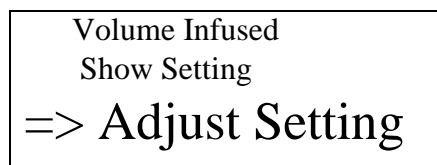
Pressing continuously on the **info** key, until the graph is all empty and a beep is sounded will **unlock** the program.



Level 2 – program locking

Press info key twice, from stop or setting mode.

Use **ARROW** keys to scroll to "Adjust Setting" option.



Choose "Adjust Setting" with **START/OK** key.

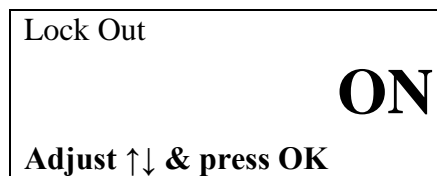
Use **ARROW** keys to scroll to "More" and confirm with **START/OK** key.



Set technician Code (Code 902), and confirm with **START/OK** key.



Use one of **ARROW** keys to change from OFF to ON. Confirm with **START/OK** key.



The default setting is "Lock Out - **NO**".
Unlock in the same procedure.

“2” will be shown on the right side of the display, indicating that the program is second level locked.

Level 3 – maximal rate locking

The home-care company can adjust the Maximal rate acceptable according to patient needs:

Press info key twice.

Use **ARROW** keys to scroll to "Adjust Setting" option.

Volume Infused
Show Setting
=> Adjust Setting

Enter "Adjust Setting" pressing **START/OK** key.

Use **ARROW** keys to scroll to "More".

Buzzer level
=> More ...
Adjust Setting

Confirm selection with **START/OK** key.

Set technician Code (Code 901), using the numeric keys, and confirm with **START/OK** key.

Technician
Code 901

Scroll through the setting parameters, using the **ARROW** keys, until the "Maximal Rate " option. Confirm with **START/OK** key.

Bolus Rate
=> Maximal Rate
KVO Rate

Set the maximal rate, using the **ARROW** keys and confirm with **START/OK** key.

Maximal Rate
500 ml/h
Adjust & press OK


☞ **Note:** The default setting for a maximal rate is 500 ml/h. "3" will be shown on the right side of the display, indicating that the program is in the third lock level only when the max. rate will be set to a rate different than 500 ml/h.


☞ **Note:**


- The selected Locking Option will remain in the pump's memory until changed by the user.
- Whenever the pump is in more than one locking level, the higher level will be displayed on the right side of the screen.

Battery Operation

The *VET-PRO* can operate on battery power, enabling operation when the patient is being moved or during electrical power failure. When the pump runs on the battery power, the AC icon is off. **At full charge, the battery provides 15 hours of operation at an infusion rate of 125ml/hr.**

 **Warning** Don't operate the pump on AC power if the battery is not loaded in the pump for back up.

 **Note:** When the pump is not in use, click the pump into the Charger and plug the system into an AC wall outlet (if possible) to charge battery.

 **Note:** After the "end battery" signal has been activated or following long periods of storage, wait 2 minutes after the pump has been connected to an AC power supply before operating.

There are two battery alarm conditions:

1. The pump will warn that the battery is low a minimum of 30 minutes before the "end battery" alarm activates (when the battery power reaches less than 7.1v).

Low Battery


Connect to charger


2. After the "battery low" warnings, when the battery power reaches less than 6.05v, the pump will cease operation and the "end battery" alarm will be activated.


End Battery

Connect to charger

- If the battery runs out, **End Battery** appears on the display. The pump stops the infusion.
- From the "end battery" state the user cannot restart the pump, until it has been connected to mains.

 **Caution:** Leaving the battery in a discharged state for a long period of time may damage the battery.

 **Note:** Whenever possible, use the pump connected to an AC power supply via the charging unit. This preserves the battery power supply for emergency use or for situations where the AC power is not available.

 **Note:** **Replace the battery once every two years.**

Cleaning and Storage

Before the transfer of a pump to a new patient and periodically during use, clean the pump by wiping over with a lint-free cloth lightly dampened with warm water and a standard disinfectant / detergent solution.

⚠ Warning: Before cleaning always switch off and disconnect from the AC power supply.

⚠ CAUTION Do not clean pump with chemicals such as Xylene, Acetone or similar solvents. These chemicals cause damage to plastic components and paint.

If the pump is to be stored for an extended period it should be first cleaned and the battery fully charged. Store in a clean, dry atmosphere at room temperature and, if available, employ the original packaging for protection.

Once every 3 months during storage, carry out functional tests and ensure that the battery is fully charged.

Alarms Conditions

At any time, when the pump detects a problem, an alarm is activated and the following will occur:

- An alarm message appears on the display, stating the cause of the alarm and indicates instructions for continued use.
- An audible alarm sounds.
- The infusion stops.

Alarms

- Air in Line
- Door Open
- Down Occlusion
- Pump Unattended
- Low Battery
- End Battery
- Internal Malfunction
- End Program
- Missing Key

The “Troubleshooting Table” (on the next pages) describes the pump’s alarm conditions and remedies.

Troubleshooting

<i>Description</i>	<i>Result</i>	<i>Possible Cause</i>	<i>Remedy</i>
Air in Line <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> Air in Line Clean air </div>	Infusion ceases	Air is present in administration set	Disconnect patient, press the STOP/NO key and remove the air from Administration set, as described on page 23. After flushing, press the START/OK key to resume the program.
The roller clamp above the Pump is closed.		Open Roler clamp	
Door Open <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> Door Open Close door </div>	Infusion ceases	The door of the pump was not closed prior to operation	Close Door
The door has accidentally opened during operation.			
Down stream occlusion <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> Down Occlusion Press STOP to mute </div>	Infusion ceases	Roller clamp closed	Open the Roller clamp
		Set kinked	Straight out the set
		Administration set loaded incorrectly	Reload administration set, as described on page 21
		Cannula blocked	Change Cannula
		**User may change pressure setting	Adjust pressure setting, as described on page 31
No key has been pressed for 2 minutes, during setting <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> Pump Unattended Press start key </div>	Pump operation has been stopped	No key was pressed for 2 minutes.	Press the START/OK key

Troubleshooting

<i>Description</i>	<i>Result</i>	<i>Possible Cause</i>	<i>Remedy</i>
<p>Message displayed showing \pm 30 minutes left of battery operation</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> <p style="text-align: center;">Low Battery</p> <p style="text-align: center;">Connect to charger</p> </div>	<p>If pump won't be connected to mains, battery will be depleted</p>	<p>Message will be displayed as long as the internal battery voltage is less than 7.1v.</p>	<p>Connect to Mains</p>
<p>End Battery</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> <p style="text-align: center;">End Battery</p> <p style="text-align: center;">Connect to charger</p> </div>	<p>Infusion ceases</p>	<p>Battery is depleted. The pump cannot be used before being connected to mains.</p>	<p>Connect to Mains and wait 2 minutes before operating.</p>
<p>Message displayed in the TPN programs, that the parameters entered are incorrect and cannot be calculated by the pump</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> <p style="text-align: center;">Wrong TPN Date</p> <p style="text-align: center;">Check Data</p> </div>	<p>Program will not start operating</p>	<p>The set parameters are impossible to perform. Volume or time parameters are incorrect</p>	<p>Check data and change accordingly.</p>
<p>Pump is in lock-mode</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> <p style="text-align: center;">Lock out</p> </div>	<p>Program parameters can not be changed</p>	<p>The program is set in second-level locking, which enables daily operation of the set program, without the ability to change parameters.</p>	<p>No action required.</p>
<p>A fatal error is detected</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> <p style="text-align: center;">Error XXX</p> <p style="text-align: center;">Send for Service</p> </div>	<p>Infusion ceases</p>	<p>The pump will advise the user to send the pump for service.</p>	<p>Restart the pump. If the alarm does not stop pack the pump properly, in its original packaging, and send it for service.</p>

Troubleshooting

<i>Description</i>	<i>Result</i>	<i>Possible Cause</i>	<i>Remedy</i>
Program completed <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> End PROGRAM Press STOP to mute </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> KVO 5 ml/h Press STOP to renew </div>	Pump will turn to KVO mode	The program was completed	Press the STOP/NO key to restart
		KVO (Keep Vein Open) program starts.	

Show Setting

The program was designed to disable unauthorised user access to technician settings. **Access to show setting mode, enable the user to inspect all settings, but not change them.**

Press info key twice.

Choose "Show Setting" to display all software adjustable parameters.

Scroll down the following parameters on the Show Setting mode:

Volume Infused
 => **Show Setting**
 Adjust setting

Show Setting:
 => **Battery Level**
 Lock Out

Show Setting Options

<i>Screen no.</i>	<i>Setting</i>	<i>Screen</i>
1	Battery Level (Empty ↔ Full)	Battery Level
2	Lock Out Option (ON/OFF)	Lock Out
3	Time & Date display	Time, Date
4	Tube Temperature	Tube Temperature
5	Buzzer Level	Buzzer Level
6	Pressure level (High/Normal/Low)	Pressure level
7	Pressure Default	Pressure Default
8	Select Program	Select Program
9	Display Flushing Volume (4 ml. Is the default- up to 20 ml)	Flushing Volume
10	Showing Flushing Rate (up to 1200 ml/hr)	Flushing Rate
11	Display BOLUS rate	Bolus Rate
12	Maximal Rate setting	Maximal Rate
13	Display KVO rate	KVO Rate
14	Air bubbles size	Air Size
15	Store last program	Store last Program
16	Operation led option (on/off)	Operation Led
17	Time option (on/off)	Time Option
18	Delay before start option (on/off)	Delay Before Start
19	Language	Language
20	Pump Serial Number	Serial Number
21	Production Date	Production Date
22	Operation time from service (hours)	Operation Time
23	Software Version	Software Version
24	Volume Calibration	Volume Calibration
25	Pressure calibration - delta	Pressure Delta
26	Pressure calibration CAP	Pressure CAP
27	EXIT	EXIT

Adjust Setting

Press info key twice.

Choose "Adjust Setting" to display all software adjustable parameters.

Volume Infused Show Setting => Adjust Setting
--

Confirm with **START/OK** key.

See list of parameters that can be set on "Adjust Setting" selection on the next page.

Adjust Setting: => Pressure Level Buzzer Level

The first 2 parameters, Pressure level and Buzzer level, can be adjusted using the arrow keys- no secret code required.

Access to "More..." will required a code.
Use **ARROW** keys to scroll to "More".

Buzzer level => More ... Show Setting
--

Confirm with **START/OK** key.

Set technician Code (Code 901), using the numeric keys and confirm with **START/OK** key.

Technician Code 901

**** For program locking (lock level 2) – set code 902**

Scroll through the setting parameters, using the **ARROW** keys and change them if necessary.

Adjust Setting Options

<i>Screen no.</i>	<i>Adjust</i>	<i>Screen</i>
A	Lock Out Option (<i>Code 902</i>)	Lock Out
B	Buzzer Level (no code required)	Buzzer Level (1 to 7)
C	Pressure level (no code required)	Pressure level (high, normal, low)
	<i>Use code 901 to enter</i>	
1	Restart Pump	Restart Pump
2	Pressure Default	Pressure Default
3	Select Program	Select Program
4	Setting Flushing volume (up to 20 ml)	Flushing Volume
5	Setting Flushing Rate (up to 1200 ml/hr)	Flushing Rate
6	Setting BOLUS rate (different from default)	Bolus Rate
7	Maximal Rate setting	Maximal Rate
8	Setting KVO rate	KVO Rate
9	Air bubbles size	Air Size
11	Store last program	Store Last Program
12	Setting Operation led (on/off)	Operation Led
13	Time Option On/ Off	Time Option
14	Time Delay Option On/Off	Delay Before Start
15	Language	Language
16	SetTime & Date	Set Time & Date
17	View History Events	History