

# VIT~FIT OPERATING INSTRUCTIONS

## 1. INSTALLATION OF THE PUMP

- Plug the power supply connector into the corresponding socket at the rear of the pump and secure it in place by rotation of the ring.
- Plug the universal switching power supply into an AC mains outlet (90–250V/50–60 Hz). After a short beep signal the display will be illuminated. The last used settings will appear on the display.
- Place the syringe into the bed (figure 1).
- Select the direction by pressing the direction button ◀ ▶ and press the ON/OFF button to bring the pusher block into such a position that the extremity of the syringe plunger can be placed into the pusher between the V-piece and the fixing disc (figure 2). You can use any convenient speed setting to displace the pusher. The maximal speed of the movement can be obtained by constantly pressing one of the direction buttons.
- By rotating the knob (figure 1A) tighten the upper part of the syringe body in the fixation.
- Press the ON/OFF button and select the rotation of the pump (button ◀ ▶) so that the V form part of the pusher just touches the syringe plunger.
- Turn the fixing disc to restrict the movement of the plunger extremity (figure 2A).
- Secure the body of the syringe using the elastic band (figure 3A).
- Select the direction (button ◀ ▶) and press the ON/OFF button to bring the syringe plunger into the start position and displace any bubbles in the line. The pump is now ready for use.

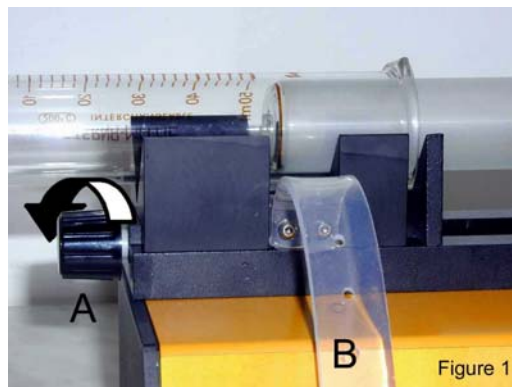


Figure 1

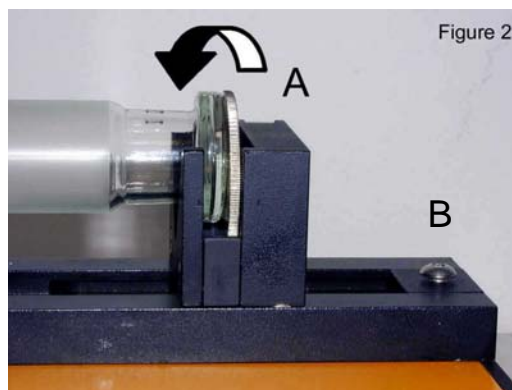


Figure 2

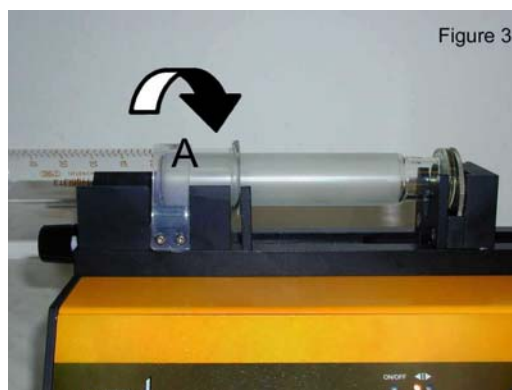


Figure 3

### 1.1 ON/OFF button

By pressing the ON/OFF button the pump is switched on or off. The internal memory will show the last used speed and flow direction setting.

#### 1.1.1 Setting the flow rate

The rate of flow of any liquid through the pumps depends upon the internal diameter of the syringe and the pump speed.

The VIT~FIT pump has been constructed for syringes up to 150 ml. Almost any available type of syringe can be used in the VIT~FIT pump.

With the speed control buttons below the LED display the speed of the motor can be selected. The numbers from 0 to 999 correspond to the velocity of the movement of the motor and plunger. The best

way to correlate the flow rate obtained with your syringe is to make a preliminary test in which the pump is allowed to pump the liquid over a certain time with a selected speed setting (for ex. 1 minute with setting 500). Then the weight or volume of the sample is measured. Using this value the speed numbers for desired flow rates can be easily calculated.

## 1.2 Setting of flow direction

The direction of the pusher movement can be selected by the ◀ ▶ button. The corresponding LED diode will be on.

### 1.2.1 Fast pusher movement

Keep the desired direction button pressed constantly for about 2 seconds. The pusher will move in the selected direction with maximal speed. This functions even when the ON/OFF button has not been activated. *The maximal filling position of the pusher can be blocked mechanically by a screw in the fixing dice (figure 2 B).*

## 1.3 Remote control

### 1.3.1 ON/OFF control

By interlinking contacts no. 4 and 5 of the socket at the rear of the pump (see figure 4), the pump will be blocked (both direction indicating LEDs will be switched off). The same effect can be obtained by applying a voltage of 3 to 12 V DC to contact no. 5 (0 line must be connected to contact no. 3). (In some cases a reversed logic for the remote control is required. Please contact us in this case).

### 1.3.2 Remote control of the pump speed

This pump can be controlled over the whole range by an external signal (0–10 V, option 0–20 or 4–20 mA). The plus pole of the signal is connected to contact no.1, 0 line to contact no.3. Press the REMOTE button on the front panel. The corresponding LED diode will come on and the display will indicate the approximate voltage of the external signal. This indication may become unstable when an external connection is not made indicating the high sensitivity of the electronics.

Warning: For safety reasons the voltage of the external signal must not exceed 48 V to earth!

## 1.4 How to program the pump

Up to 99 pairs of time and flow rate may be programmed in a simple way. Access to the program is opened by simultaneously pressing buttons REMOTE and RUN until an indication **PGM** appears on display and **both** directions diodes (◀ ▶ button) are illuminated.

(If you repeat this simultaneous pressing, the memory will be cleared and the indication **cLE** will appear on the display. For programming press both buttons again until **PGM** appears again).

- Press the ON/OFF button. The indication F01 will shortly appear on the display indicating that you can select the first flow rate value.
- Select the direction of the pusher movement (delivery or filling) using the direction button ◀ ▶
- Set the desired flow rate value (0 to 999 representing 0 to 100% speed of rotation) by pressing the buttons below the display. Press the ON/OFF button again. The indication t01 will appear for a few seconds on the display indicating that you can program the time period of the first step in minutes. Select the desired time period for the first programme step.
- Press the ON/OFF button again. The indication F02 will briefly appear on the display. You can now enter the desired flow rate. After this press the ON/OFF button again. The symbol t02 will briefly appear on the display. You can now set the time of the second step.
- In a similar way up to 99 steps can be programmed.
- After having entered the time of the last step press again ON/OFF button. The flow rate\* 000 of the next step **which will not be programmed** will appear on the display. In this situation press both REMOTE and RUN buttons simultaneously until an indication **End** appears on the display (both direction diodes will be off).

- Press the ON/OFF button again. You will see a message “c01” on the display. This indicates that the programme will be repeated once and then the pump will stop. If you wish to repeat the same program 3 times adjust the cycle number to “c03”. The program can be repeated up to 99 times “c99”.
- Press the ON/OFF button again to confirm the number of cycles selected.

*\*(It is not possible to end the programme after programming the time data).*

*Both direction LEDs indicate if you are programming the speed or the time:*

*One direction LED on: Programming of the flow rate*

*Both directions LED off: Programming of the time*

### **To start the program press the RUN button.**

To end the running program definitively press the RUN button.

It is possible to stop the pump (button ON/OFF), to change the direction and the speed of movement during any running programme step. This facilitates urgent replacement of the tubing or allows reaction in other emergency situations. *(Do not forget to restore the right direction of flow rate and to switch the pump on after you have finished your intervention).* The time basis in the microprocessor is **not stopped** meanwhile so that the total time of the step and of the program will not be affected by this modification. When the step time is elapsed, the pump will automatically go on to the next step. The program is not therefore modified by this emergency intervention.

#### 1.5 Reduction of the force.

The mechanism of the VIT~FIT develops a force of up to 30 kg. This will be appreciated by users who need to operate with high pressure, however it may be excessive when small syringes are used. Therefore the force can be limited to 8 kg by switch at the rear of the pump.

#### 1.6 Use of valve.

The VIT~FIT pump is equipped with two outputs for valves. It supplies a DC signal 12 V/1 A to command of valves. One output is on another off. This allows a cyclical operation of the pump. For connection scheme see section 5.

## **2. RECOMMENDATIONS**

- If as a consequence of tube breakage, syringe leakage or some other accident liquid spills into the top of the pump disconnect the pump from the mains and clean it by removing the liquid and rinsing it with water. The pump is so constructed that within certain limits the liquid should not penetrate into the interior of the pump. Clean the liquid with a damp cloth. Mild solvents like ethanol, isopropanol, alkanes are tolerated if the exposure is short. Teflon (or Elox coating) covers Black surfaces (except the display area) and even acetone can be used on these areas.
- Should you have any difficulties or questions concerning your VIT~FIT pump please contact our service office.

## **3. VIT~FIT PUMP – FOR YOUR SAFETY**

- Thanks to the use of a plug in power supply giving only a low voltage of 12 V DC the danger of electrical shock during the use of a VIT~FIT pump has been virtually eliminated, even in cases where an electro-conducting solution penetrates the pump.
- If the pump is not used for an extended period of time, disconnect it from the mains. A modern miniaturised switching power supply is used, which has a negligible consumption of el. current when the pump is not in use.

## 4. ACCESSORIES AND SPARE PARTS

### 4.1 Pump-Flow Integrator (Cat. no. 4803)

The VIT~FIT and other Lambda pumps are the only pumps on the market, which allow simple but precise integration of the amount of liquid, which has been transported, by the pump. The electrical impulses, which move the motor are registered and transformed into a direct voltage. The voltage can be measured or recorded by common recorders or voltmeters.

In chemical or biological processes where the pump is controlled e.g. by a pH-stat during a fermentation to keep the pH of the medium constant, it is frequently important to know when and how much acid or base was added. This data yields important information about the process, its kinetics, time of completion, etc. Another use of the INTEGRATOR is for measurement of enzyme activities (esterases, amidases, lactamases and other enzymes). The PUMP-FLOW INTEGRATOR can be placed under the VIT~FIT pump, to which it is connected by a cable to the 8-pole socket on the rear of the pump (figure 4).

### 4.2 Remote control cable (5 conductors) (Cat. no. 4810)

### 4.3 Remote control cable (8 conductors) (Cat. no. 4815)

## 5. SPECIFICATIONS

Type:	Microprocessor programmable syringe pump infusion/withdrawal
Program:	up to 99 steps of speed and time
Time resolution:	0 to 999 min. in 1 min. steps
Maximum program length:	1650 hr
Accuracy:	+/- 1%
Reproducibility:	+/- 0.2 % (electronics)
Syringes:	glass, plastic, metal from 5 ul to 150 ml
Flow rate range:	
Minimum	0.01 ul/min. with 5 µl syringe
Maximum	150 ml/min. with 150 ml syringe
Non-volatile memory:	storage of all settings
Maximum force:	30 kg
Maximum pressure:	2 MPa with syringe 10 ml
Motor:	microprocessor controlled brushless long life BLDC motor with neodymium magnets
Transmission:	linear bead bearings
Pusher travel:	120 mm
Pusher travel rate:	
Minimum	0.1 mm/min.
Maximum	100 mm/min.
Speed range:	1 to 1000
Interface:	RS 485 (option)
Voltage:	95–240 V/60–50 Hz AC plug integrated switching power supply DC 12V/12 W or similar (field operation on 12 V accumulator)
Dimensions:	
H x W x D	12,5 x 26,5 x 13 cm
Weight:	3.2 kg

## INPUTS/OUTPUTS (REMOTE):

### Contact number and cable colour code

1	+ input remote speed control 0-10V (yellow)*
2	step signal from stepping motor (0 and 12V) (grey)
3	earth, 0 V (green)
4	12 V + (brown)
5	+ input remote ON/OFF (white) 0 V = ON, 3–12 V = OFF (this logic can be inverted on demand)
6	earth (rose)
7	RS 485 B - (red)
8	RS 485 A + (blue)

\*(zero line connected to the contact no. 3)

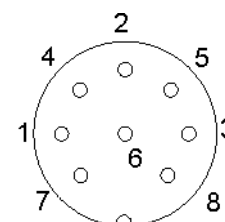
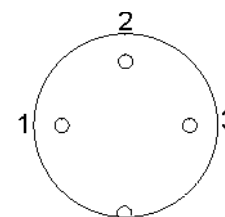


Figure 4

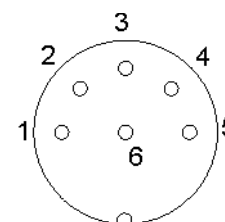
### INPUTS (12 V/DC):

1	+ 12 V DC
2	0 V
3	not connected



### OUTPUTS (VALVES):

1	filling valve 12 V/1 A DC
2	not connected
3	common earth 0 V
4	not connected
5	delivery valve 12 V/1 A DC
6	not connected



## 6. GUARANTEE

Lambda gives a two-year guarantee for all labour and components when the instrument has been used according to our operating instructions and the advice given above.

### Conditions of guarantee:

- The instrument must be returned with a complete description of the defect or problem.
- The customer will send the instrument to our service office.
- Damage or loss of items during transport will not be compensated for by Lambda.
- Failure to fulfil these requirements will disqualify the customer from compensation.

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## APPENDIX

### Communication protocol RS 485 for VIT~FIT, PRECIFLOW, MULTIFLOW AND HIFLOW PUMP

#### Format of data sent by PC to the pump and back:

#ss mm a ddd qs c  
<mm ss a dddd qs c

where:

# is the first sign of a command sent by PC  
< is the first sign of a message sent by pump  
ss is the address of the pump  
mm is the address of the PC  
a is a command for the sense of rotation:  
    r- cw rotation (to the right)  
    l- ccw rotation  
ddd is a speed of rotation 3 ASCII numbers 0.....9 (are sent from the highest order digit to the lowest)  
qs is the control sum in hex format (2 ASCII signs 0....9 ABCDEF)  
c is the end sign cr  
The pump will fulfil the task and block the manual command on the pump panel.

#### Commands not containing the data:

# ss mm **g** qs c activates the local command of the pump  
# ss mm **s** qs c the pump will stop  
# ss mm **G** qs c to send pumps data to PC

#### Addition control:

PC sends: #0201r123EEcr

The control addition is made in the following way:

# 0 2 0 1 r 1 2 3 EE cr  
23h + 30h + 32h + 30h + 31h + 72h + 31h + 32h + 33h = 1eeh 0dh

#### Format of the transmission:

Speed: 2 400 Bd

8 data bits, impair parity (o), 1 stop bit

#### Examples:

address of the pump: 02  
address of the PC: 01

PC sends: #0201r123EEcr  
The pump will rotate cw at the speed of 123

PC sends: #0201G2Dcr  
The answer of the pump: <0102r12307cr

PC sends: #0201l123E8cr  
The pump will rotate ccw at the speed of 123

PC sends: #0201s59cr  
pump stops

PC sends: #0201g4Dcr

The pump will go to the local command (pump panel can be used)

***How to set the pump address?***

Disconnect the pump from the means tension. While keeping the direction button < > pressed connect the pump to the means again. The message A and two numbers will appear on the display. This number from 00 to 99 is the current address of the pump. To change the address press the buttons under the display until the desired number is obtained. To confirm the address and memorize it press the button ON/OFF.

***Connector connections:***

The eight pin DIN connector "REMOTE" is used for the remote control and RS 485 connection. When the function RS 485 is activated the pins are used as follows:

pin8	-	RS A (+) blue conductor
pin7	-	RS B (-) red conductor
pin6	-	GND rosa conductor