1 Declaration of conformity

We **Watson-Marlow Flexicon**
Frejasvej 2-6
DK-4100 Ringsted

Declare on our sole responsibility that the peristaltic dispensers

Peristaltic dispenser type	Model
PF6	61-050-022
PF22	61-220-000; 61-220-010
PD12I	61-150-022; 61-150-021
PD12IHS; PD12IDH	61-154-014
PD12P	61-151-022;
PD12PS	61-152-014; 61-152-020
PD22I	61-250-022
PD22P	61-251-022
PD22PS	61-252-022

To which this declaration relates is in conformity with the following standard(s):

EN55022   Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

EN61000-6-2   Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN61000-6-3   Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

According to the provisions in the Directives:

2006/42/EC   On the approximation of the laws of the Member States relating to machinery
2004/108/EC   On the approximation of the laws of the Member States relating to electromagnetic compatibility

May 2012   Signature:

Ringsted, Denmark

Jørn Jeppesen, Development Manager

2 Caution

This manual should be read before using the PF22.

Explanations to the pictograms:
Warning against touching/Warning against opening:

Warning against high voltage:

When operating the PF22, make sure that the QC-dispenser head is properly assembled and the locking pins are in closed position.

The main switch is used for emergency stopping.

The PF22 should only be used for dosing and filling of liquid fluids.

The PF22 must be placed on a stable bed plate and should not be not exposed to great humidity, high temperatures or other abnormal operating-environments. It is not to be used in explosion hazardous environments.

It is prohibited to maintain or clean the PF22, when it is connected to the power supply.

It is prohibited for unauthorised personnel to open the cover of the PF22's electrical parts.

Always remember that the PF22 must be earthed by way of the switch.

Sound pressure level: L_{Aeq} < 70 dB(a)

3 General information

3.1 Use

PF22 is a fully programmable, peristaltic filler (dispenser) which as a single unit can dispense liquids of volumes from 1 ml up to 9999.9 ml.

PF22 has been specially developed for laboratory applications where extreme flexibility, frequent product changes and absolute accuracy are key parameters.

PF22 is programmable for a number of different applications, and full production documentation can be printed, if a printer is connected.

This manual contains all information necessary for the daily operation of the unit and so the PF22 manual should be read before using the filler.

3.2 Unpacking and inspection

Please check that all ordered items have been received and that no items were damaged during transport. In case of any defects or omissions, please contact Flexicon A/S or your local supplier immediately.
When ordering spare parts, or accessories, for the PF22, please state the serial number. The serial number is stamped on the label on the rear of the PF22.

ALWAYS REMEMBER that this machine must be earthed.

3.3 The peristaltic principle

PF22 operates with a peristaltic dispenser head (tube pump), where the liquid only comes into contact with the flexible tube, the tube connections and the filling needle. The tubes are usually made of silicone, but other materials can also be used.

The dispenser head is designed in such a way that sterilised tubes can be assembled in the head without affecting the sterility. Flexicon tubes are made of raw materials medically approved by the FDA. The tubes are delivered in sealed packages and are provided with a batch number which makes it possible to trace the tubes all the way back to the raw material source.

For this reason PF22 is specially suited for aseptic applications and for preventing cross-contamination. The dispenser head is self-priming, and the dispenser head itself can stand to be run dry. It is recommended not to let the dispenser head be run dry for a long period WITH CONNECTED TUBES, since this will lead to particle release.

A peristaltic dispenser head is not suitable for viscous products.

3.4 Installation

PF22 must be placed on a stable bedplate. All electrical connections are on its rear.
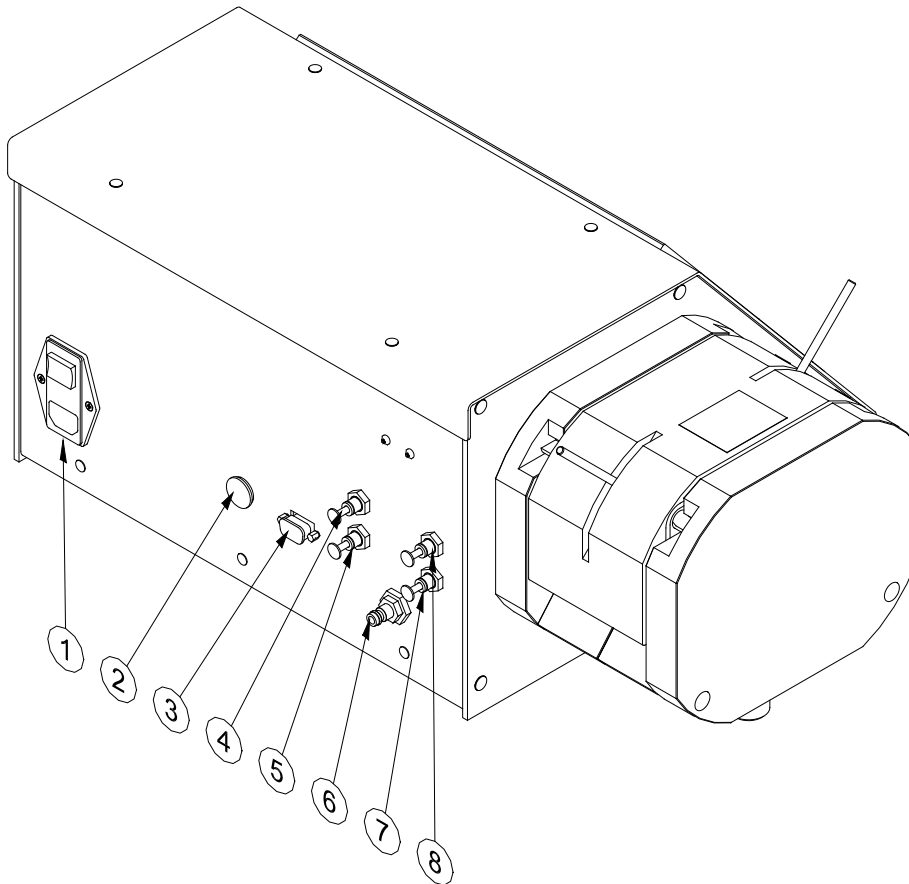
Fig. 3.1

1	Main Switch	230 Volts ac
2	External GO	5 way DIN
3	Printer Connection	RS 232
4	(O) Air for nozzle with outside valve	Pressure when Pump is running
5	(I) Air for nozzle with inside valve	Constant pressure when machine is ON
6	Main air supply	
7	(B) Diving Nozzle Bottom.	Constant pressure when machine is ON
8	(T) Diving Nozzle Top	Pressure when Pump is running

The main cable supplied is connected to the integrated main socket (1) in the main isolator, which also contains master fuses. The plug is connected to an earthed switch.

External GO (2) is for the connection of a foot switch or for an external starting signal.

3.5 Fitting of filling stand

Fig. 3.2

The filling stand is fitted as shown above.

First remove the screws (1)

Now you are able to fit the filling stand (4) by using the supplied distance tubes (2) and the screws (3).

The bottle guide (5) can be turned upside / down for adjusting to low or high bottles or containers.

PF22 is now ready to be switched on and to be programmed.

4 Control

4.1 Filler lay-out
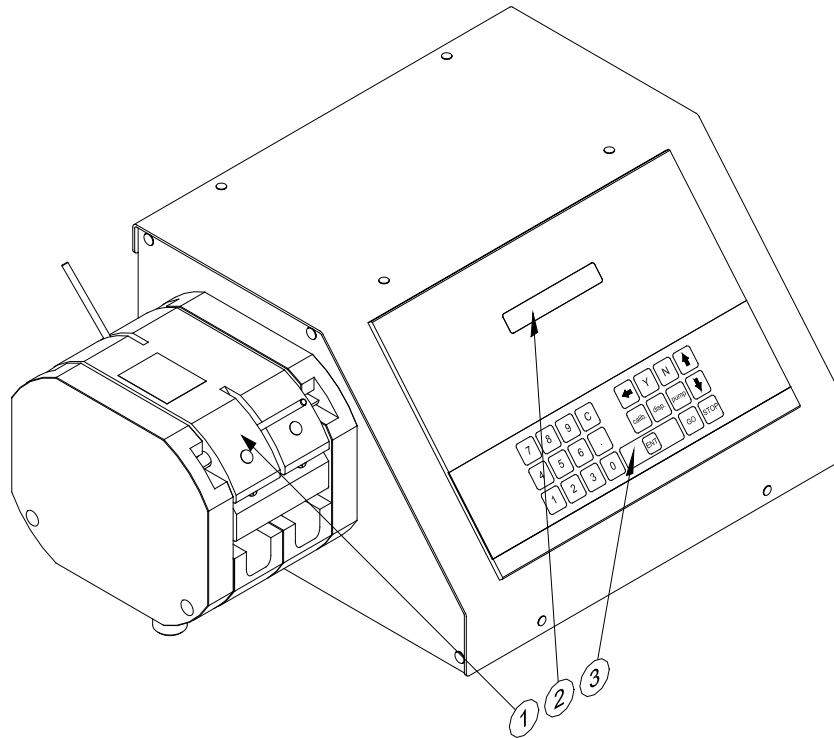
Fig. 4.1

(1)   Dispenser head

(2)   Display

(3)   Membrane-type keyboard

4.2 Dispenser head

The dispenser head can work with six different tube dimensions, and the head is equipped with a "quick change" tube bridge for rapid changeover between the different sizes.

The dispenser head works with two parallel tubes that are squeezed by six rollers mounted on ball bearings. The rollers in the two sections are offset in order to eliminate pulsing.

4.3 Display

```
FUNCTION NO.:

F 1: VOLUME (ml): 100.00
```
Fig. 4.2

The display of PF22 consists of 2 lines of 24 characters each and has constant background lighting.

There will always be a blinking cursor on the display showing where a character will appear, if a key is activated.

The top line is the prompt line where PF22 communicates with the operator.

The bottom line is the status line that always shows the current operating parameters. This status line can be scrolled by pressing the UP or DOWN ARROW of the keyboard.

When operating PF22, it is VERY important to watch the top line constantly, as any current question or instruction will be displayed here.

4.4 Keyboard

It is a foil-type keyboard with built-in click. The keyboard is quite tight and plane and can be cleaned with alcohol and other detergents.

7 8 9 C 4 5 6 . 1 2 3 0	Numerical keys 0 to 9 as well as decimal point.
C	"C" : Cancel
←	Delete Character to the left of the cursor
↑	Scroll the status line one line up
↓	Scroll the status line one line down
Y	YES key for YES/NO qustions on display
N	NO key for YES/NO qustions on display
disp.	Activates filling
pump	Activates continous pumping
calib.	Activates calibration
GO	Start Button
STOP	Stop Button
ENT	Enter / return to enter values typed on the keyboard.

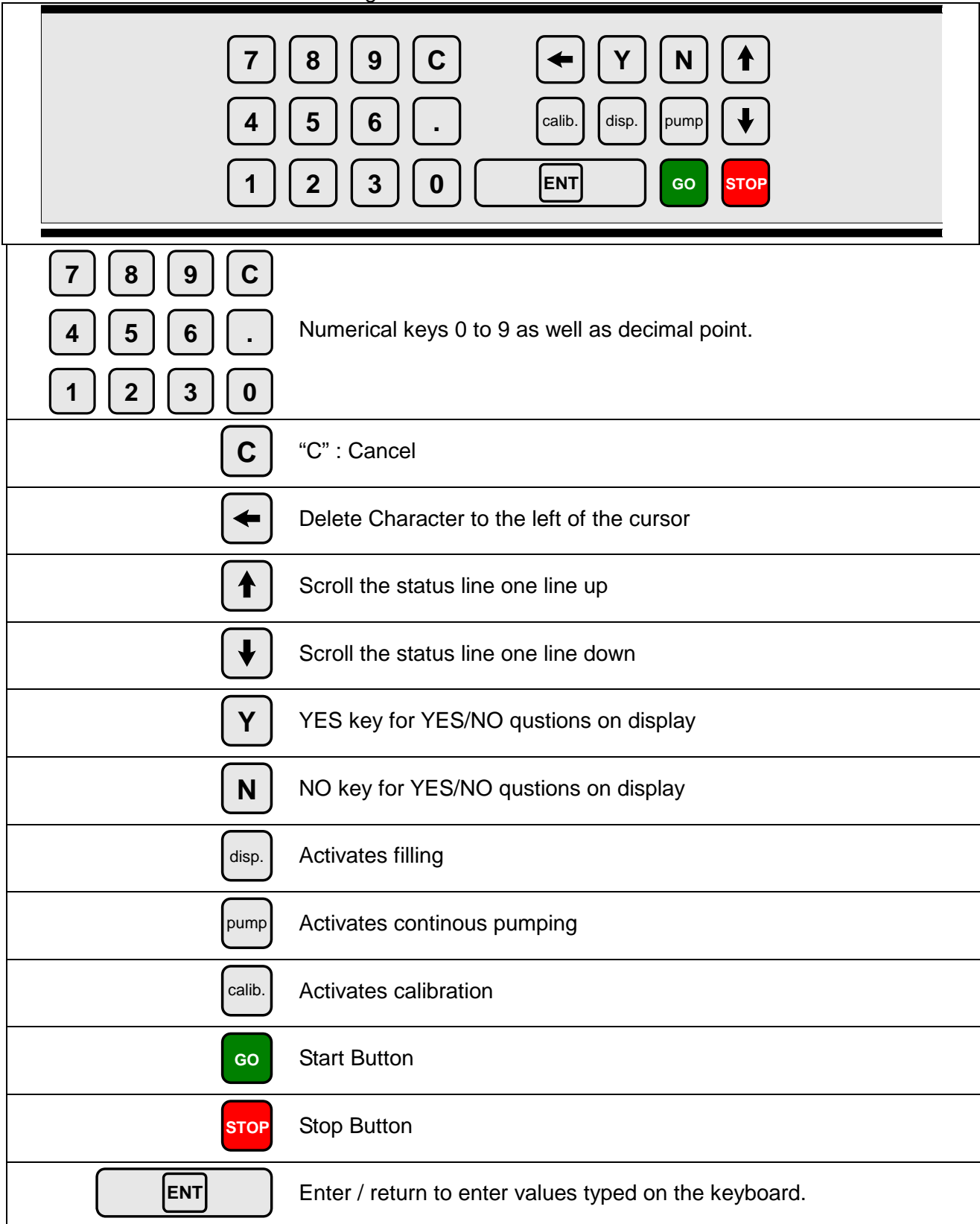Fig. 4.3

5 Programming

5.1 Starting PF22

When turning on the main switch, the display will show the following:

```
PF22 V1.1 (C) Flexicon' 03

PRESS GO TO CONTINUE
```

Press the <GO> key, and the display will show the following:

```
FUNCTION NO.:

F 1: VOLUME (ml): 100.00
```

The value shown in the status line will be the above or the latest value used.

PF22 is now ready to be programmed.

5.2 Parameters

In the following, a parameter will be the value of a single function, for instance: volume, velocity or number of fills.

5.3 Programs

In the following descriptions, a program will be a complete set of parameters which together will constitute the PF22 work instructions.

5.4 General information on the programming of PF22

PF22 is equipped with a battery in the memory and will therefore always remember the programmed parameters, even if the main isolator is turned off.

The programming is done using functions, i.e. every operating parameter has its own function number.

The programming is carried out by entering the function number followed by "ENT".
This will make the required function appear in the prompt line of the display and show the current value or information of the function.
This value will automatically be overwritten when entering a new value.
After being entered, the new value will be shown in the prompt line. The new value is entered into the computer by pressing "ENT".
The new value will be shown in the status line at once.

Example:
If a volume of **8.5 ml** is required, the following must be entered:
<1>+<ENT>+<8>+<.>+<5>+<ENT>

5.5 List of functions

1. Volume

2. Tube dimension

3. Velocity

4. Acceleration/deceleration

5. Reversing (back suction)

6. Batch size

7. Delay

8. Completed fills

9. Specific gravity

10. Output rate

15. Input mode

18. Timer 2

19. Timer 3

20. Operator number

21. Batch number

24. Print status

29. Print parameters

31. Save program

32. Load program

33. Delete program

34. Print programs

46. Set language

47. Printer set-up

72. Volume format

80. Reset memory

5.6 Description of functions

The individual functions will be described in the following:

1. Volume
Value: Choice of ml and grams.
Range: Required volume from 1 to 9999.9 ml.

2. Tubes
Value: Inside diameter (i.d.) in mm
Range: 3.0 - 5.0 - 6.5 - 8.5 - 10.0 - 12.5
The tubes can be measured with the supplied tube gauge.

If the tube is changed, a new calibration must always be made.

3. Velocity
Value: Pump revolutions per minute (rpm)
Range: 30 - 250 rpm

If the velocity is changed, a recalibration should be made.

4. Acceleration/deceleration
Value: An integral number
Range: 1 - 100
The acceleration and the deceleration will always be the same. The lowest value (1) will give the lowest acceleration, and the highest value (100) will give the fastest acceleration.

If the acceleration is changed, a recalibration should be made.

5. Reversing (back suction)
Value: An integral number
Range: 0 - 10

If the reversion is changed, a recalibration should be made.

6. Batch size
Value: Number.
Enter the number of fills you want the filler to perform when started by <GO>, foot switch or via electrical signal. Any number of fills between 1 and 65,000 can be selected.
When the filler is operating in automatic system, where the system itself starts the filler each time a bottle is in position, THE VALUE IN THIS FUNCTION MUST ALWAYS BE 1.

7. Delay (Timer 1)
Value: Seconds.
If more than one fill is chosen in function 6, enter the required delay between the fills.
The value of the delay can range between 0.1 - 25.0 seconds, with a graduation of 0.1 second.

8. Completed fills
Value: Number.
Nothing can be entered in this function since it only displays the number of fills completed since the latest reset of the function.
To reset this function, press the <C> key.

9. Specific gravity
Value: Decimal number.
Enter the specific gravity of the liquid in g/ml if the required volume was entered in Function 1 and if this volume is controlled by balance. A re-calibration is necessary after entering the specific gravity.

10. Output rate
Value: Number of fills per time unit.
Nothing can be entered in this function as it only displays the current output.

The function displays how many fills the system carries out per time unit. The time unit can be HOUR or MINUT.
The function operates as follows:
The PF22 records the precise time between two fills via the built-in clock, and calculates the number of fillings per time unit.
The display is updated at the completion of each fill.
The function can be called up for viewing, but it cannot be reset and values cannot be entered in this function.

15. Input mode
Value: 1 or 2.
1 =   The foot switch will only function as a starter.
2 =   First press on the foot switch starts the filler.
         Second press on the foot switch stops the filler.
         Third press on the foot switch starts the filler.

18. Timer 2: Delay BEFORE filling with diving needle

Value: seconds
Range: 0.1 – 25 in increments of 0.1 seconds.
The timer is used to control the delay needed, when the PF22 is used in combination with a diving needle.
The timer starts AFTER the GO signal is sent to the pump, to allow the diving needle to reach bottom position before filling starts.

19. Timer 3: Delay AFTER filling with diving needle

Value: seconds
Range: 0.1 – 25 in increments of 0.1 seconds.
The timer is used to control the delay needed, when the PF22 is used in combination with a diving needle.
The timer starts after the pump has finished allowing the diving needle to return to top.

20. Operator number

An operator number can be entered in Function 20.
The maximum number of digits in an operator number is 10.
This means that an operator number is an integral number between 0 and 9999999999.

With this function it is possible to inform the system which operator is in charge of the current production. The operator number entered will always appear on print-outs of the log (F24) and the operating parameters (F29).

21. Batch number

A batch number can be entered in this function.

The maximum number of digits in a batch number is 10.
This means that a batch number is an integral number between 0 and 9999999999.

With this function the operator can inform the system of the batch or production number under which the current production is recorded. The batch number entered will always be shown on print-outs of the log (F24) and print-outs of the operating parameters (F29).

24. Print status

If a printer is connected, this function will start the printing of the current production status.

29. Print parameters

This function prints the current parameters via the connected printer. The print-out is for the current drive or all the current drives.

When the function is called, the system will ask the following questions:

```
F29 PRN PARAM  (Y/N):

F29: PRINT PARAM
```

For print-out of the current drive only, press <Y>.
For print-out of all connected drives, press <N>.

31. Save program
Saves a complete set of parameters as a program.
It is possible to save up to 6 sets of parameters in the memory.

If a particular set of parameters is used frequently, it is a good idea to store the settings in order to allow their easy retrieval as a complete filling program. This also ensures that exactly the same parameters are used each time thereby reducing the risk of programming error.

It is important that all parameters are entered and that these parameters are checked before saving the program saved via Function 31.

The system will always suggest the first available number in a range between 1 and 6.

If this number is to be accepted as the program number, press <ENT>, and all parameters will be saved under this program number.

If another number is required, enter the number chosen, and if this number is free, the program is saved by pressing <ENT>.
If the number is occupied by a program already saved, the user is asked whether to overwrite the program already saved.

32. Load program
Loads a program already saved and overwrites the current parameters with the values of the loaded program.
By pressing the required program number followed by <ENT>, the operating parameters saved under the specified program number will be entered as the current parameters under the respective functions.
If program number 0 is selected, the function is left without loading a program and the system will keep the current values.

33. Delete program
If a complete program is to be deleted, this can be done by overwriting it via Function 31, or the program can be deleted via Function 33.

When pressing the required program number followed by <ENT> the specified program will be deleted.

If a number is entered under which no program is saved, the system will not accept it and the number must be corrected, or the function can be left by pressing <0>+<ENT>.

34. Print programs
This function prints the individual parameters in all the programs stored in the memory.

46. Select language
Value: An integral number.
This version offers a choice of 2 languages.

1 - English
2 - German

The languages will be active on the display and on the print-outs.

47. Printer set-up
Function 47 tells the system which protocol to use when transmitting to connected printer.
When this function is activated, it will first require the operator to enter the transmission velocity.
One of the following values must be chosen:

75   110   134   150   300   600   1200   1800   2000   2400   4800   9600

Subsequently PF22 will ask the operator to enter a protocol number. There is a choice between the following protocols:

1 :	7 data bits	1 stop bit	no parity
2 :	7 data bits	1 stop bit	even parity
3 :	7 data bits	1 stop bit	uneven parity
4 :	7 data bits	2 stop bits	no parity
5 :	7 data bits	2 stop bits	even parity
6 :	7 data bits	2 stop bits	uneven parity
7 :	8 data bits	1 stop bit	no parity
8 :	8 data bits	1 stop bit	even parity
9 :	8 data bits	1 stop bit	uneven parity
10 :	8 data bits	2 stop bits	no parity
11 :	8 data bits	2 stop bits	even parity
12 :	8 data bits	2 stop bits	uneven parity

72. Volume format

This function sets the unit for volume. If the value 1 is chosen then the volume unit is set to ml and if value 2 is chosen then the volume unit is set to gram. The unit ml or gram is shown in F1 and log print outs.

80. Reset memory
This function will reset the memory with the exception of the part used for saving programs.
PF22 will pass into stand-by, and when switched on again the built-in parameters will be valid.

**IF PF22 DOES NOT WORK OR DOES NOT OPERATE AS EXPECTED,
ACTIVATE FUNCTION 80.**

6 Daily Use

For optimal dispensing with the PF22, the following should be observed:

Vessel placement
Nature of fill media
Priming tubes
Drip
Hard feed
Tubes

6.1 Vessel Placement

In order to build up adequate pressure and reduce friction, it is recommendable to place the vessel containing fill media at the same level as pump head or preferably above the pump head level. Placing the vessel higher than pump head level provides positive product support and may reduce the calibration interval. It is also recommended to place the vessel as close as possible to the pump on suction side.
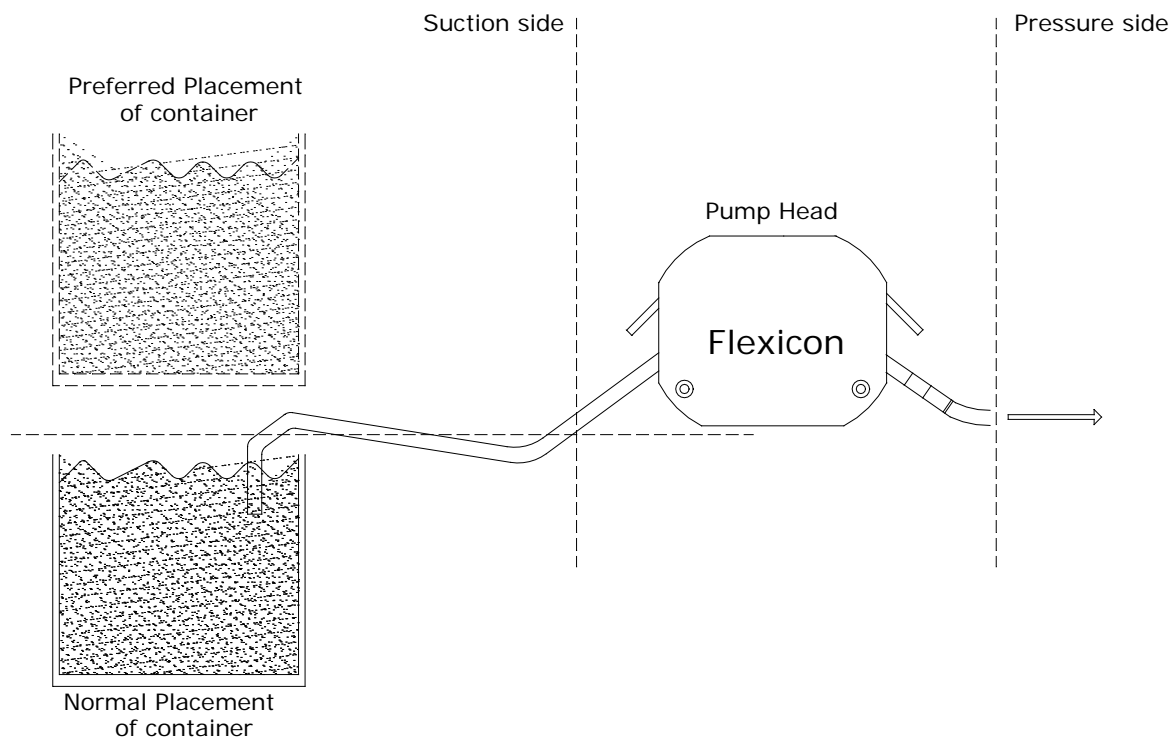

Fig. 6.1

Nature of fill media

The peristaltic dispensers are **not** suitable for **viscous** products. For viscous products another type of dispenser from Flexicon can be used. In the case that the PF22 should be used and the product is of viscous nature, then heating the product before dispensing with PF22 is recommended.

Another consideration is the surface tension of the liquid. Products with high surface tension tend to produce dripping. Due to this fact it is difficult to have sufficient cut off after every individual dispensing. When filling with small volumes and high surface tension present drips are often produced and constitute inaccuracy.

Filling with large volume and high surface tension might have tendency to suck air back in the filling line.

Drip

When dispensing very small volumes, the last drop of the filling constitutes a big part of the total filling. Therefor it is necessary to take necessary measures for controlling the last drop. For small volumes reverse suction or a dumping nozzle system can be applied to control the last drop of filling.

When dispensing very large volumes, the shape of the nozzle and the filling speed required may not always be compatible. For this reason consideration should be done if using non-return valve or forced back-suction is necessary.

Flexicon dispensers offer back-suction (reversing) after every individual dispensing.

Hard Feed

When dispensing with small tubes, counter pressure on the pressure side of pump head might constitute inaccuracy and instability in filling (hard feed). In some cases the problem can be resolved by using a larger tube on the pressure side (after Y-connector). For example if using 3.0 in the pump head, then Ø5.0 might be used as connection to filling point (feed side). Keep the feed line as short as possible.

6.2 Choice of tube

PF22 can operate with six different tube dimensions chosen according to the volume to be dispensed.
The tubes are designated by their internal diameters (i.d.) in millimetres. This value is always used as designation for the tube, and this is also the value to be entered in Function 2 of PF22.

PF22 can operate with the following tubes:

Tube dimension	Min. volume recommended
3.0 mm i.d.	10 ml
5.0 mm i.d.	20 ml
6.5 mm i.d.	50 ml
8.0 mm i.d.	85 ml
10.0 mm i.d.	150 ml
12.5 mm i.d.	250 ml

In order to obtain consistent and good results, the choice of tube should be made according to the above recommendations.

Example of tube choice:
The filling time for a volume of 10.0 ml with a Ø3.0 id. tube in a PF22 dispensing head is 1.1 seconds with dispenser running at speed of 250 rpm and 100 in acceleration.
The same volume can be obtained with Ø5.0 id. tube in 0.65 seconds with the same parameters.
The choice depends on the actual need. The Ø3.0 id. tube yields the better accuracy. The Ø5.0 i.d. yields the better capacity, since filling time is less.

Tubes must be cut in the right length in order to achieve optimised dispensing. It is recommendable to keep the tubes as short as practically possible.
The tube ends must always be kept below the liquid level of the suction vessel in order to keep the tubes from sucking air.
Avoid having tubes close to the bottom of product vessel.

The above is a guide only, and it will sometimes be necessary to make adjustments for the individual applications.

Priming tubes

In order to evacuate air from the tubes and prepare the tubes for filling, it is necessary to prime the tubes. Priming must be done adequately and continued until the tube material hysteresis disappears as well as any air bubbles.
Priming is performed by pressing "PUMP" on the keypad.
Hold down "PUMP" for 1 second and the pump will start priming with 125 rpm.
Priming will continue as long as "PUMP" is held down.

6.3 Assembly of Y-connectors

Since the dispenser head of PF22 is fitted with a double rotor, two suction tubes are used all the way through the dispenser head. These two suction tubes are joined by a Y-connector. The Y-connector should be placed as close to the filling nozzle as practically possible, for the best precision and consistency in fillings.
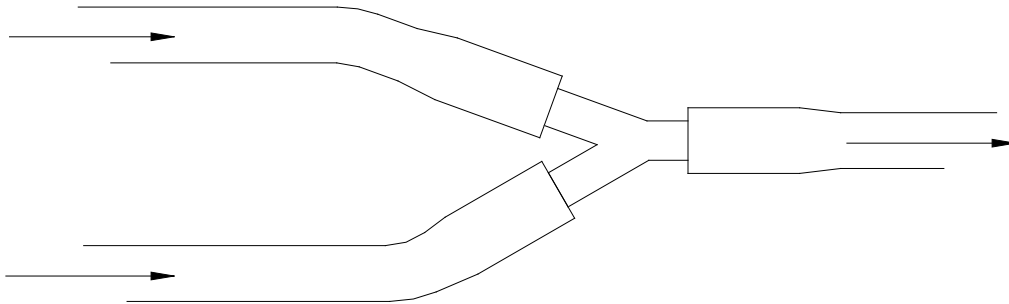

Fig. 6.2

The selected tube is connected to a Y-connector as shown in Fig. 6.2. Since the Y-connectors are made of polypropylene, the total tube system can be sterilised in an autoclave.

Standard Y-connectors:

Size
Ø 4 mm
Ø 6 mm
Ø 8 mm
Ø 10 mm
Ø 12 mm
Ø 14 mm

6.4 Tube assembly

After selecting a suitable tube dimension and after fitting the tubes with Y- connector and filling needle, assemble the tubes in the dispenser head.
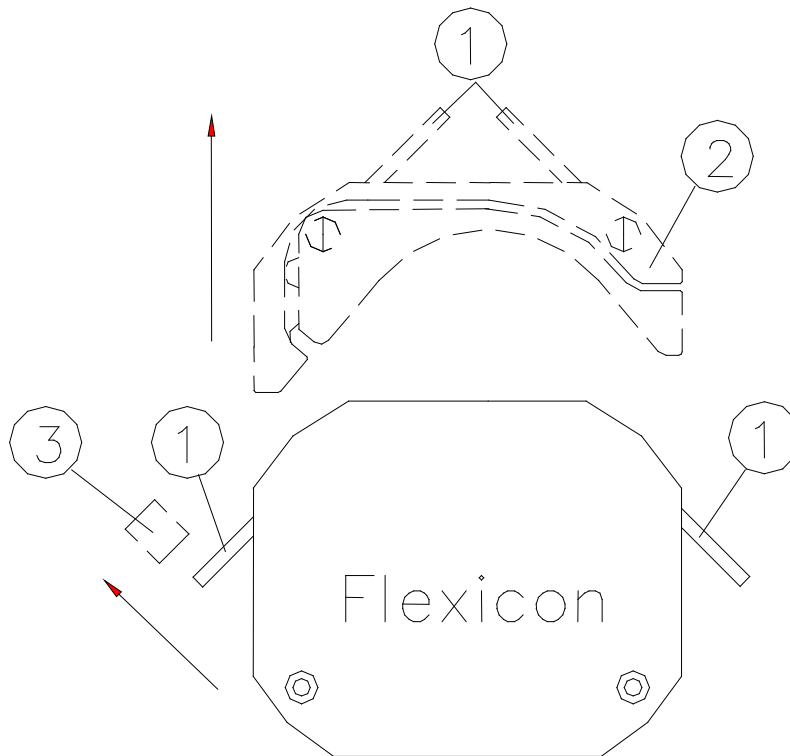

Fig. 6.3

Open the dispenser head by turning the two locking pins (1) over the tube bridge (2), after which the tube bridge can be lifted up.

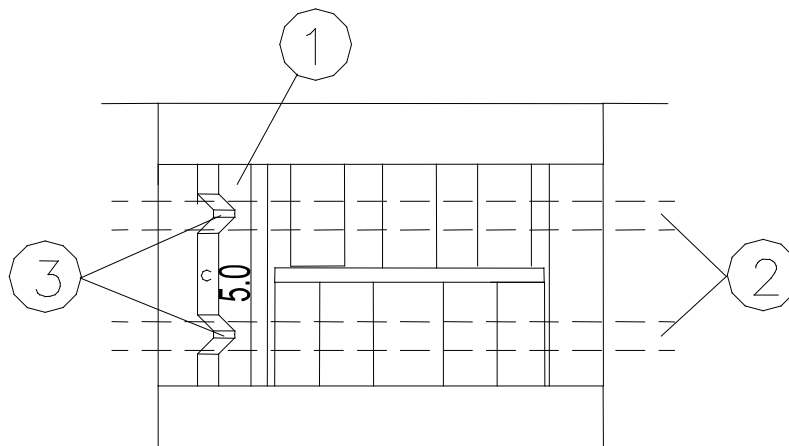It will now be possible to remove the tube lock (3) from its dowel pin.

Fig. 6.4

Mount the correct tube lock (1) on its dowel pin and place the tubes (2) in the dispenser head. The Y-connector must be located to the right of the dispenser head.

It is important that the tubes are located in the two notches (3). Now place the tube bridge in its tracks and engage the two locking pins.

Fig. 6.5

The dispenser head is now ready, fitted with the selected set of tubes, and the suction ends of the tubes may be put into the product feed vessel, and the tubes can be primed by pressing "PUMP" on the keypad and holding it down for 1 second.

The tube ends must always be kept below the liquid level of the feed vessel in order to prevent the tubes from sucking air.

6.5 Used as a filler

Switch on PF22 and press <GO>.

Example of filling job:

Volume: 15.5 ml.
Tube: 3.0.
Velocity: 200 rpm.
Acceleration: 100.
Small/low back suction.
100 fills to be completed.
A delay of 1.1 seconds between the fills.
Product with specific gravity of 1.0
The above job is to be programmed as follows:

Volume:	<1>+<ENT>+<1>+<5>+<.>+<5>+<ENT>
Tube:	<2>+<ENT>+<3>+<.>+<0>+<ENT>
Velocity:	<3>+<ENT>+<2>+<0>+<0>+<ENT>
Acceleration:	<4>+<ENT>+<1>+<0>+<0>+<ENT>
Back suction:	<5>+<ENT>+<1>+<ENT>
Number of fills:	<6>+<ENT>+<1>+<0>+<0>+<ENT>
Delay:	<7>+<ENT>+<1>+<.>+<1>+<ENT>
Specific Gravity	<9>+<ENT>+<1>+<.>+<0>+<ENT>

You have now programmed the PF22 for the job, but want to reset the built- in counters.
In function 8 the counters indicate "number of completed fills".

Number of fills: <8>+<ENT>+<C>+<ENT>

Now inform PF22 that you want to enter filling mode by pressing <disp.>.
Every time <GO> or the foot switch is pressed, or every time an electric signal is given, PF22 will run 100 fills of 8.5 ml with a delay of 1.1 seconds between the fills.

Press <GO>, verify that PF22 starts and let it run.
Press ARROW DOWN until you see function 8 on the status line and that F8: is counting each fill.

F10: gives a current indication of the number of fills completed per minute.

The fills have not been calibrated. For this function, please see chapter 5 of this manual.

6.6 Stop filling

When PF22 has completed the number of fills asked for in F6: it will stop automatically. If <GO> is pressed again, PF22 will complete the programmed number of fills once more.

If you want to stop the filling before the programmed number has been completed, press <STOP>, and PF22 will stop after completing the filling in progress.
The filling series can be completed by pressing <GO>.

If you want to stop IMMEDIATELY, such as in the middle of a fill, press <STOP> twice, and PF22 will stop immediately.
The filling series can be completed by pressing <disp.>+<GO>, and the interrupted filling will be included.

6.7 Used as a pump

PF22 can also be used as a pump.

In this case only velocity should be entered.

Start the pumping by pressing <pump>+<GO>.

PF22 will start and run the required number of revolutions per minute.
PF22 will pump at this velocity until stopped by pressing <STOP>.

6.8 Used with a bottle handling system

PF22 can also be used together with a bottle handling system like FlexFeed 20 from Flexicon.
When PF22 is integrated in an automatic bottle handling system, it is important to observe the following:

The batch size in case of running with a bottle handling system must be set to 1.
The PF22 should be in "dispense mode" before starting the fill sequence.
The Go signal which activates filling should be generated by the bottle handling system.
The Go signal should be inserted into PF22 via External Go port.

For information on External Go port, please refer to section 7.1.

7 Calibration

As the surroundings of the PF22 may vary from time to time and as tubes and products have small tolerances, it is necessary to calibrate the filler when it is started.

If the quantity has been entered as volume in ml, a measuring cylinder or a balance may be used as a control and measuring unit. The balance will always be the more accurate, especially for small quantities.

The calibration in PF22 is made as following.
This re-calibration can be carried out simultaneously with the fills.

7.1 Volume calibration with measuring cylinder

IF A VOLUME HAS BEEN ENTERED IN FUNCTION 1, AND A COMPLETED
FILL IS MEASURED IN A MEASURING CYLINDER, THE SPECIFIC GRAVITY
IN FUNCTION 9 MUST ALWAYS BE SET AT THE VALUE 1.0.

(The parameters already entered may be used for a trial).

Prepare the measuring cylinder and make sure that the tubes are completely filled, up to and including the filling needle.
(It is recommended to let the filler complete a few fills before the calibration is carried out).

Keep the measuring cylinder below the filling needle and press <calib>+<GO> to complete a single fill and PF22 will now ask the dispensed volume showing the following display:

```
CALIB. WEIGHT: 0.0000_

F 1: VOLUME (ml): 8.50
```

In the prompt line, PF22 asks the weight. THE WEIGHT MUST BE ENTERED, for example 8.05:
<8>+<.>+<0>+<5>+<ENT>.

PF22 has now automatically adjusted from 8.05 ml to 8.5 ml.

Function 8 should now be reset, and the filling may be started by pressing <disp.>+<GO>.

7.2 Initial volume calibration

If a volume has been entered in function 1, and a completed fill is measured with a balance, the specific gravity of the liquid in question is to be entered in function 9.

(The parameters already entered may be used for a trial).

Prepare the balance by tarring the container and make sure that the tubes are completely filled, up to and including the filling needle.
(It is recommended to let the filler complete a few fills before the calibration is carried out).

Keep the tarred container below the filling needle and complete a single fill by pressing <calib>+<GO> and PF22 will now ask for the completed volume showing the following display:

```
CALIB. WEIGHT: 0.0000_

F 1: VOLUME (ml): 8.50
```

In the prompt line, PF22 asks the weight, and the WEIGHT of the trial fill in question must be entered, for example. 8.12: <8>+<.>+<1>+<2>+<ENT>
After calibration, complete a few fills and draw off a sample and check the volume.
If the volume is not at the level desired, carry out a re-calibration as described below.

Function 8 should now be reset, and the filling may be started by pressing <disp.>+<GO>.

7.3 Re-calibration

During production it may be necessary to recalibrate the volume dispensed by the filler to compensate for changes in the environment e.g. the liquid level of the feed vessel will sink. This re-calibration may be carried out without stopping the filling.

IT IS IMPORTANT TO USE THE SAME MEASURING METHOD FOR THE RECALIBRATION AS USED FOR THE INITIAL CALIBRATION.

Draw off a filled sample and measure it. If the volume is not at the level desired, press <calib> + <Ent> and then insert the measured value. Subsequently, let the production continue and draw off a sample to check the volume again.

PF22 will now automatically adjust the subsequent fills.

8 Print-outs

PF22 can be connected to a printer (via RS-232) which can produce three different types of print-outs.

8.1 Print current parameters

Function 29 prints the current parameters, and print-outs should be made after programming and calibrating PF22 and resetting function 8.

The print-out is started in the following way:

<2>+<9>+<ENT>, and the following display will be shown:

```
F29 PRN PARAM (Y/N):_

F 1: VOLUME (ml): 50.50
```

Press the <Y> key to confirm start of printing, and the printer will start.

Example of print-out:

* Flexicon PF22 V1.1 *

OPERATOR	2641
BATCH NO.	9604084438
VOLUME (ml)	50.50
TUBE (mm)	6.5
VELOCITY (rpm)	200
ACCELERATION	100
REVERSE	1
BATCH SIZE	100
DELAY (sec)	1.1
SPECIFIC GRAVITY (g/ml)	1.0000
NUMBER OF FILLS	0

8.2 Print current status

Function 24 prints the current parameters, and print-outs should be made after completion of the filling series.

The printing is to be started in the following way:

<2>+<4>+<ENT>, and the following display will be shown:

> F24 PRN STATUS (Y/N):_
>
> F 1: VOLUME (ml): 50.50

Press the <Y> key to confirm start of printing, and the printer will start.

Example of print-out:

```
    * Flexicon PF22 V1.1 *

    OPERATOR          2641
    BATCH NO.         9604084438

    VOLUME (ml)       50.50
    FILLS PER MIN     30
    NUMBER OF FILLS   100

    AT FILL NO:       51
    RECALIB VOL (ml): 50.53
    AT FILL NO:       74
    RECALIB VOL (ml): 50.52
```

In addition to registering the filling series, PF22 also registers when and from which value re-calibrations were carried out.

If the print-out of the current parameters is left in the printer till the status print-out has been made, this will give a full production documentation which might look like the one shown on next page.

```
       * Flexicon PF22 V1.1 *

    OPERATOR                 2641
    BATCH NO.                9604084438

    VOLUME (ml)              50.50
    TUBE (mm)                6.5
    VELOCITY (rpm)           400
    ACCELERATION             100
    REVERSE                  1
    BATCH SIZE               100
    DELAY (sec)              1.1
    SPECIFIC GRAVITY (g/ml)  1.0000
    NUMBER OF FILLS          0


          * Flexicon PF22 V1.1 *

    OPERATOR                 2641
    BATCH NO.                9604084438

    VOLUME (ml)              50.50
    FILLS PER MIN            30
    NUMBER OF FILLS          100

    AT FILL NO:              51
    RECALIB VOL (ml):        50.43
    AT FILL NO:              74
    RECALIB VOL (ml):        50.52
```

After the status print-out the printer memory is deleted automatically.

8.3 Print programs

Up to five programs can be stored in PF22, and a list of saved programs can be printed by means of function 34.

The printing is to be started in the following way:

<3>+<4>+<ENT>, and the following display will be shown:

F34 PRINT PROGS (Y/N):_

F 1: VOLUME (ml): 50.50

press the <Y> key to confirm start of printing, and the printer will start.

Example of print-out:

* Flexicon PF22 V1.1 *

PROGRAM NO.	1
VOLUME (ml)	50.50
TUBE (mm)	6.5
VELOCITY (rpm)	200
ACCELERATION	35
REVERSE	1
BATCH SIZE	100
DELAY (sec)	1.1
SPECIFIC GRAVITY (g/ml)	1.0000

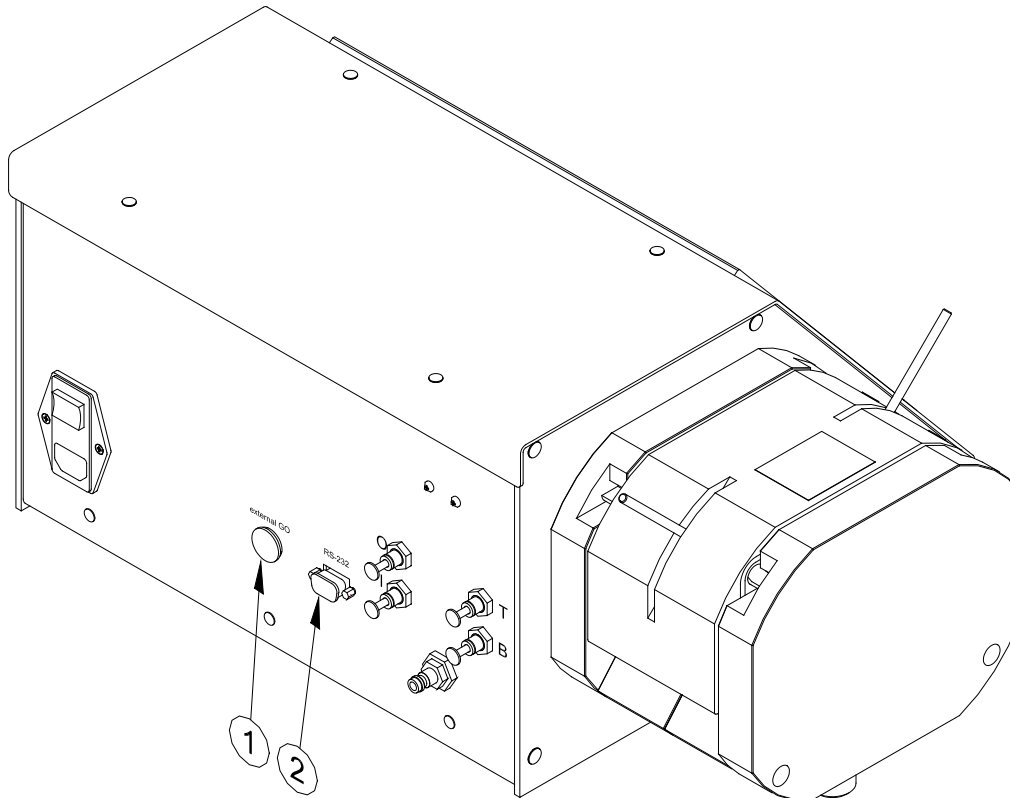| PROGRAM NO.	2
VOLUME (ml)	25.0
TUBE (mm)	5.0
Velocity (rpm)	250
ACCELERATION	28
REVERSE	0
BATCH SIZE	500
DELAY (sec)	1.0
SPECIFIC GRAVITY (g/ml)	1.0100

9   Interface

Fig. 9.1

PF22 has two electrical interface connectors.
(1)   "External GO"

(2)   RS-232

9.1 External GO

"External GO" is designed as a 5-pin DIN plug with the following PIN configuration:

PIN 1: Input for **start** signal. +5 - 50 VDC, min. 100 msec. positive edge-trigged.

PIN 2: Output, +24 VDC, max. 250 mA.

PIN 3: Ground.

PIN 4: **Status** output, max. +24 VDC, 100 mA.
Pin4 is grounded via an open collector during filling.

PIN 5: **Status** output, max. + 24 VDC, 100 mA.
Pin 5 is complementary to Pin 4.

9.2 RS-232

RS-232 has a 9-pin SUB-D plug.

PIN 1: No connection

PIN 2: Receive data

PIN 3: Transmit data

PIN 4: +12 VDC (at 1 kOhm)

PIN 5: Ground

PIN 6: No connection

PIN 7: Request to send

PIN 8: Clear to send

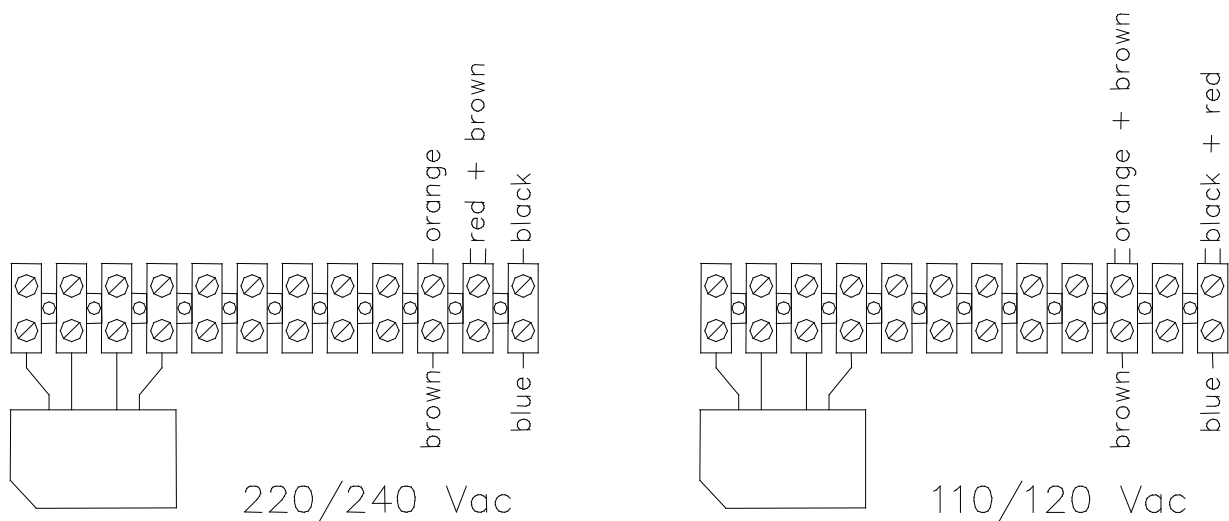PIN 9: No connection

9.3 Change of main power

Fig. 9.2

PF22 can be changed over to different main powers.
The change over is carried out inside the machine by moving the wires to the positions indicated in Fig. 9.2.

10 Cleaning and maintenance

10.1 Daily cleaning

As PF22 is not in direct contact with the dispensed product, daily cleaning will not be necessary except for the normal routine cleaning of production equipment.

When cleaning, please note that the cabinet of PF22 is provided with open slots for the cooling of the built-in parts. Therefore, liquids must NOT be splashed onto PF22. It may only be cleaned with a damp piece of paper or cloth.

The cabinet is made of anodized aluminium, and normal cleaning agents such as tepid/medium hot water, ethyl alcohol (ethanol) 70% and may be used all over the machine.

10.2 Sterilisation

If PF22 is placed in an aseptic environment, the sterilisation may be made as described in section 8.1, or you may sterilise PF22 by gases observing the following precautions.

If you use gasses that might injure and corrode contacts and other metals, air slots and sockets MUST be covered with tape.

10.3 Maintenance

As all movable parts in PF22 are maintenance-free, no maintenance is required apart from normal cleaning of the equipment.

If service should be needed, please contact your supplier or Flexicon A/S.

Disposal:
The PF22 contains lithium batteries. The machine can be disposed in the same way as Personal Computers.