

***OPERATOR'S MANUAL  
PERISTALTIC DISPENSER***

***PD12 I***

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**Declaration of conformity:**

We Flexicon A/S  
Frejasvej 2-6  
DK-4100 Ringsted

declare on our sole responsibility that the product:

PD12I - Peristaltic Filler

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

EN 292: Safety of Machinery: Basic Concepts,  
General Principles of design.

according to the provisions in the Directives:

98/37/EEC, 91/368/EEC and 93/44/EEC: Machine-directive.  
73/023: Low Voltage-directive.

EMC 89/336/EEC

<b>Flexicon</b> <sup>®</sup> denmark	
Model:	<input type="text"/>
S/N:	<input type="text"/>
Supply:	<input type="text"/>
Year:	<input type="text"/>
<b>CE</b>	Made in Denmark

Ringsted/Denmark April 2002

Mads Ulric Jensen  
Signature.

## 1.0: GENERAL INFORMATION

### 1.1 Unpacking and inspection

PD12I is a peristaltic filler in the Flexicon Multi Filling System (FMFS). The PD12I cannot do fillings by itself, but must be connected to Flexicons control unit, MC12, MC12P, or to a PC with RS485 multidrop communication.

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 supplier immediately.

When ordering spare parts or accessories for the PD12I, please state the serial number stamped. The serial number is stamped on the label on the rear of the PD12I.

ALWAYS REMEMBER that this machine must be grounded.

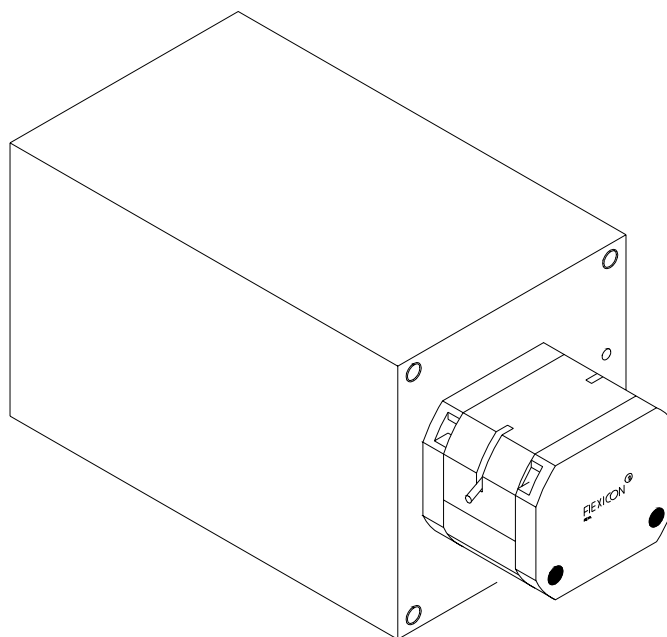


Fig. 1

## 1.2 The peristaltic principle

PD12I 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 sterilized tubes can be assembled in the head without disturbing the sterility. Flexicons tubes are produced of raw materials medically approved by the FDA. The tubes are delivered in tight packing 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 PD12I is specially suited for aseptic applications and for preventing cross-contamination among different products.

The dispenser head is self-priming, and the dispenser head itself can stand to 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.

### 1.3 Installation

PD12I must be placed on a stable bedplate, and all electrical connections are on its rear.

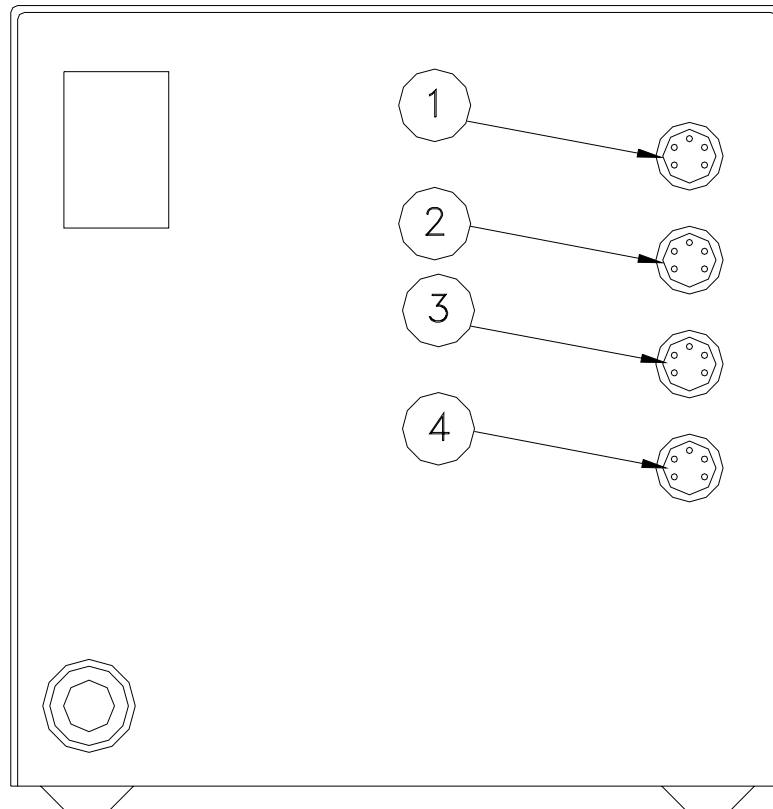


Fig.2

The main cable with plug (1) is connected to a grounded switch.

The communication cable from MC12 (type 3) comes fitted with two 4-pin DIN plugs. One is connected to the "net 1" socket (2) of PD12I, and the other plug is connected to the "net" socket of MC12 master controller from Flexicon.

The terminator supplied (4-pin blind DIN plug) is connected to the "net 2" (3) socket of PD12I.

Should the system be operating more than one PD12I, the "net 2" socket (3) is to be connected to the "net 1" socket (2) of the next PD12I by a communication cable (type 3). The terminator is connected to the last PD12I of the line.

#### 1.4 Addressing of filling station

Address	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SW1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
SW2	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
SW3	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0
SW4	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0

Fig. 3

Address "1" is the factory setting of PD12I.

If the PD12I is one of several filling stations in a system, none of the stations may have the same address and it must therefore be changed.

Change of address is performed via a dipswitch placed at the bottom of the PD12I. This change may only be carried out when the machine is turned off at the main isolator.

Addresses between 1 and 16 may be chosen, and Fig. 3 shows the various combinations.

## 2.0: CONTROL

### 2.1 Dispenser head

The dispenser head always works with two tubes which, after the dispenser head are connected to a Y-connector.

From the Y-connector a single tube is then connected to the filling needle.

The dispenser head is made of anodised aluminium and stainless steel.

### 2.2 Control panel

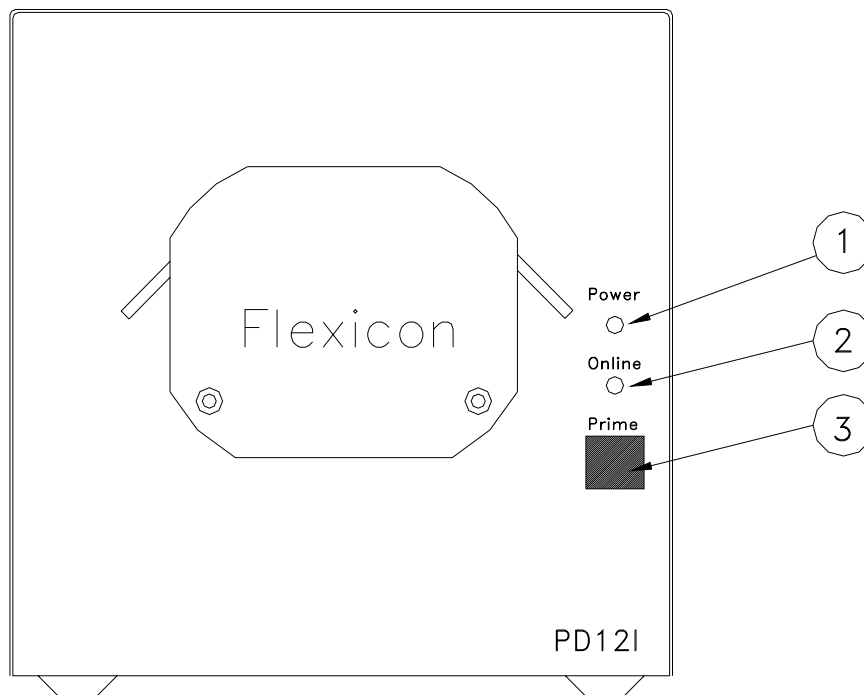


Fig.3

1. **Power** Lights when the machine is on.
2. **Online** Lights when communicating with MC12.
3. **Prime** Button for tube priming.

### 3.0: DISPENSING WITH PD12I

For optimal dispensing with the PD12I, the following should be observed:

- 3.1 Vessel placement
- 3.2 Tubes
- 3.3 Nature of fill media
- 3.4 Priming tubes
- 3.5 Drip
- 3.6 Hard feed

#### 3.1 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.

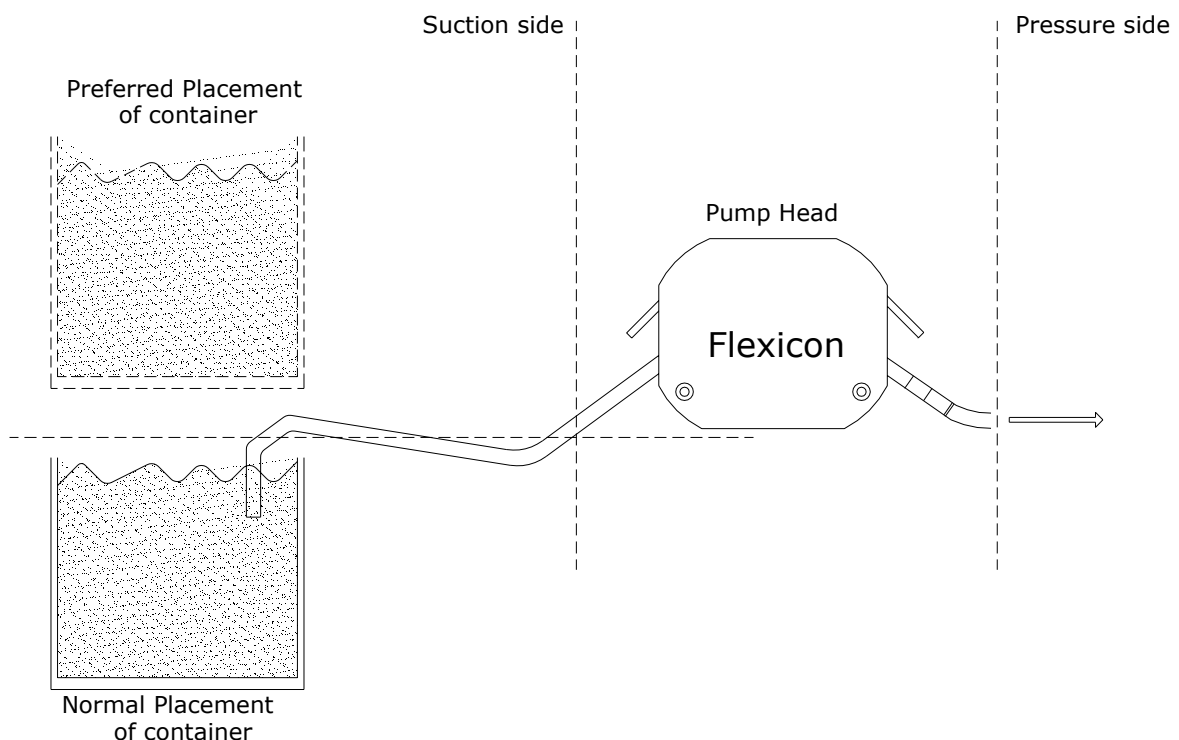


Fig. 4

### 3.2 Tubes

Tube size:

Tubes must be selected according to the application and volume to be filled. Use the table shown below for choice of tubes according to minimum volume to be filled.

PD12I 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 individual tube, and this is also the value to be entered in function 2 at the MC12P master controller.

PD12I can operate with the tubes in the table below:

In order to obtain stable and good results, the choice of tube may be made according to the following guidelines:

Flexicon part no.	Tube dimension	Min. volume recommended
84-101-005	0.5 mm i.d.	0.20 ml
84-101-008	0.8 mm i.d.	0.50 ml
84-101-012	1.2 mm i.d.	1.00 ml
84-101-016	1.6 mm i.d.	1.70 ml
84-101-032	3.2 mm i.d.	7.00 ml
84-101-048	4.8 mm i.d.	12.0 ml
84-101-060	6.0 mm i.d.	22.0 ml
84-101-080	8.0 mm i.d.	35.0 ml

The above should be considered as guidance only, and it will be possible to make adjustments for the individual applications.

Above-mentioned tubes are silicone tubes and supplied by Flexicon A/S. These can be sterilised by autoclaving.

Example of tube choice:

The filling time for a volume of 10.0 ml with a Ø3.2 id. tube in a PD12I dispensing head is 0.8 seconds with dispenser running at speed of 400 rpm and 100 in acceleration. The same volume can be obtained with Ø4.8 id. tube in 0.55 seconds for the same parameters. The contrast here is outweighed by the fact that Ø3.2 id. tube will in this case yields better accuracy than the option of using Ø4.8 ID. But as it is indicated the capacity will be higher with Ø4.8 tube since filling time is less.

The above should be considered as guidance only, and it is possible to make adjustments for the individual applications.

For the best accuracy and consistency results the suction tubes should be as short as possible. Therefore it is recommended to place the product vessel as close to the pumps as 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.

### 3.3 Nature of fill media

The peristaltic dispensers are **not** suitable for **viscous** products. For viscous product another type of dispenser from Flexicon can be used. In the case that the PD12P should be used and the product is of viscous nature, then heating the product before dispensing with PD12P is recommended.

Another consideration is the surface tension of liquid. Product with high surface tension tends to produce drip. 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.

### 3.4 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.

### 3.5 Drip

When dispensing very small volumes, the last drop of the filling constitutes a big part of the total filling. Therefore it is necessary to take measures for controlling the last drop. For small volumes a dumping nozzle system can be applied to eliminate uncontrolled after dripping.

When dispensing very large volumes, the shape of 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.

### 3.6 Hard Feed

When dispensing with small tubes, counter pressure on the pressure side of pump head might lead to 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 0.8 in the pump head, then Ø1.2 might be used as connection to filling point (feed side). Keep the feed line as short as possible.

## 4.0: ASSEMBLING THE PUMP HEAD

### 4.1 Assembly of Y-connectors

Since the dispenser head of PD12I 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 as close to the filling needle as practically possible.

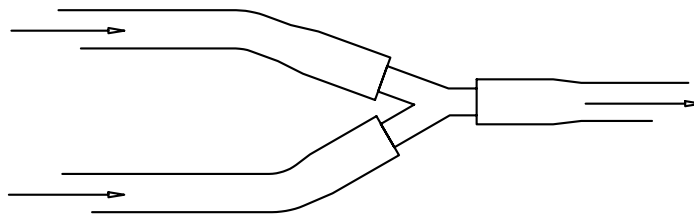


Fig. 4

The selected tube is connected to a Y-connector as shown in Fig. 4. Since the Y-connectors are made of polypropylene or glass. The total tube system can be sterilised in autoclave.

Standard Flexicon Y-connectors:

Size    Order No.

Ø 2 mm	84-010-002
Ø 4 mm	84-010-004
Ø 6 mm	84-010-006
Ø 8 mm	84-010-008
Ø 10 mm	84-010-010

## 4.2 Tube assembly

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

The tube bridge (tube head) must be assembled and placed as shown below.

The Y-connectors are always placed on the right side of tube bridge (Pressure side of head).

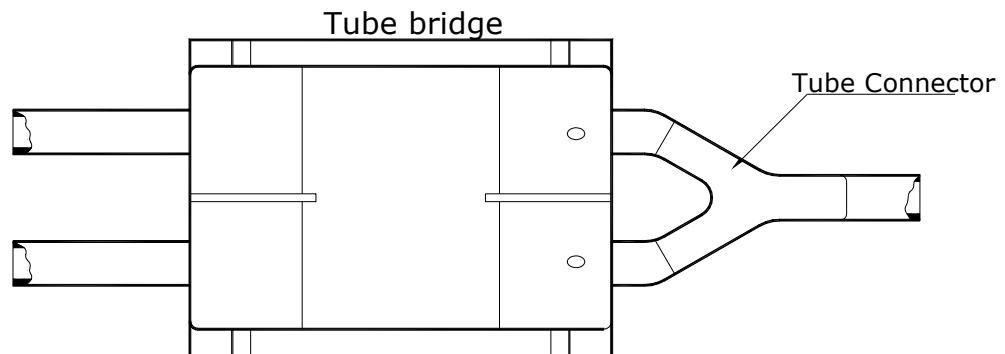


Fig. 5

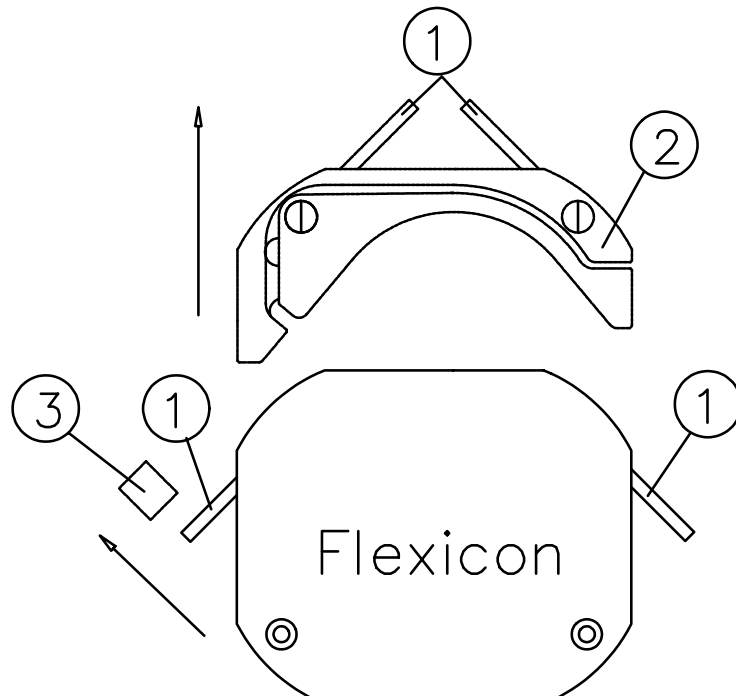


Fig. 6

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.

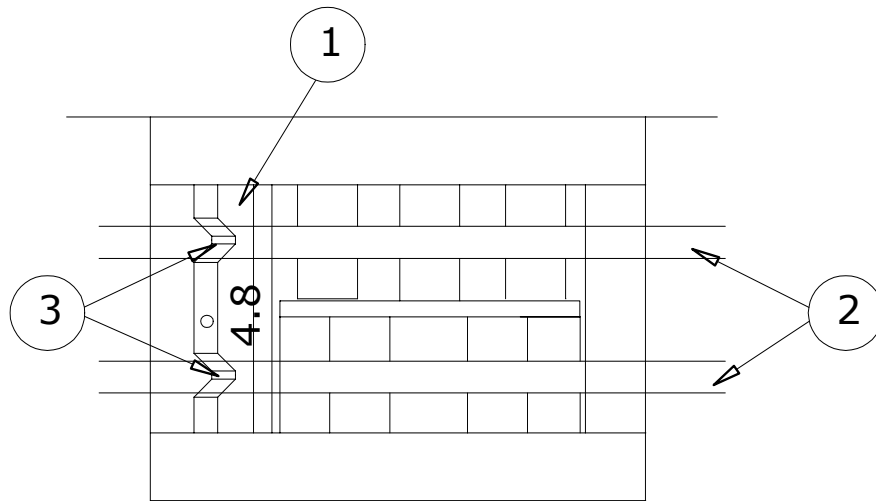


Fig. 7

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

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

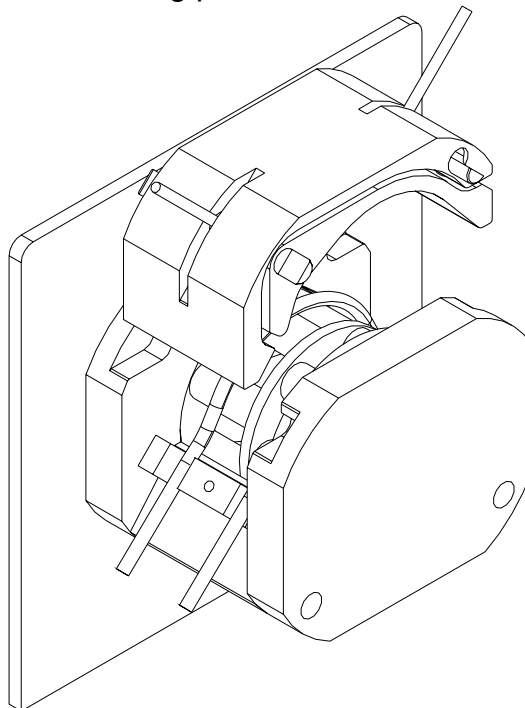


Fig. 8

**Note:** To ensure the safety of the operator, the pump is fitted with a switch, which prevents the pump from running if the tube bridge is not in place, and closed on the pump head.

## 5.0: PROGRAMMING

### 5.1 Programming principle

In the following, a parameter will be the value of a single function, for example volume, tube dimension or velocity.

A program is a complete set of parameters, which form an entire work program.

The programming is to be made by means of MC12P on the control panel, for which reason please consult the corresponding manual.

### 5.2 PD12I parameters

#### 1. Volume

Value: ml.

Range: 0.5 - 9999 ml.

PD12I can dispense from 0.5 to 9999 ml, but in case of volumes above 250 ml there will be a high reduction of the dispensing capacity.

If the volume is changed, a re-calibration should be made.

#### 2. Tubes

Value: Inside diameter (i.d.) in mm.

Range: 0.5 – 0.8 – 1.2 – 1.6 – 3.2 – 4.8 – 6.0 – 8.0.

The tubes can be measured by means of the tube template supplied with the filler.

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

#### 3. Velocity

Value: Revolutions per minute (rpm).

Velocity range depends on tube size applied.

Range: 30 - 400 rpm for tubes larger than Ø3.2 id.

30 - 500 rpm for tube Ø3.2 id.

30 - 600 rpm for tubes up to Ø1.6 id.

If the velocity is changed, a re-calibration should be made.

#### 4. Acceleration

Value: An integral number.

Acceleration range depends on what size tube is applied.

Range: 1 – 100 for tubes larger than Ø3.2 id.

1 – 150 for tubes = Ø3.2 id.

1 – 200 for tubes up to Ø1.6 id.

The acceleration and the deceleration will always be identical. The lowest value (1) will give the slowest acceleration, and the highest value (100/150/200) will give the fastest acceleration. If the acceleration is changed, a re-calibration should be made.

## 5. Reversing

Value: An integral number.

Range: 0 - 10.

If the rotor is moved a little backwards (reversing) after completion of the filling, a small back suction will be created. This can counteract dripping from the filling needle. The value "0" will give no reversing, but the value "10" will give maximum reversing.

ALWAYS make a re-calibration, if the reversing value is altered.

For other programming possibilities, please consult the MC12P reference manual.

## 6.0: Calibration

### 6.1 Initial volume calibration

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> on a MC12)

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.

### 6.2 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.

Draw off a filled sample and measure it. If the volume is not at the level desired, press <calib> + <Ent> (on MC12) and then insert the measured value. Subsequently, let the production continue and draw off a sample to check the volume again.

When the calibration/re-calibration has brought the dispensed volume to the desired level, then drawing off only one sample periodically can do the further calibration.

## **7.0: CLEANING AND MAINTENANCE**

### **7.1 Daily cleaning**

As PD12I is not in connection with the dispensed product, daily cleaning will not be necessary except for the normal routine cleaning of production equipment.

Liquids must NOT be splashed onto PD12I. It may only be cleaned with a damp piece of paper or cloth.

### **7.2 Maintenance**

As all movable parts in PD12I are maintenance-free, no other maintenance is required than normal cleaning of the equipment.

Should any further service be needed, please contact Flexicon A/S or your supplier.

## 8.0: INTERFACE AND CHANGE OF POWER

### 8.1 Interface

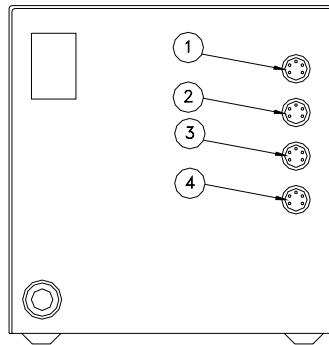


Fig. 9

- (1) External 1:
- pin 1. Start signal input  
+5 - 50 VDC, min. 100 msec.  
Positive edge triggered.
  - Pin 2. Output, +24 VDC, max. 500 mA.
  - Pin 3. Ground
  - Pin 4. Status output, max. +24 VDC, 100 mA.  
Grounded via an open collector during the busy period.
  - Pin 5. Status output, max. +24 VDC, 100 mA.  
Complementary to pin 4.
- (2) external 2:
- pin 1. Input for disabling.  
+5 - 50 VDC. Activating this pin  
disables the drive (no filling).
  - Pin 2. Output, +24 VDC, max. 500 mA.
  - Pin 3. Ground
  - Pin 4. Status output, max. +24 VDC, 100 mA.  
Grounded via a open collector during the busy period.
  - Pin 5. Status output, max. +24 VDC, 100 mA.  
Complementary to pin 4.
- (3) net 1      This socket is for the net (RS485) communication only.
- (4) net 2      This socket is for the net (RS485) Communication only.

**8.2 Change of voltage**

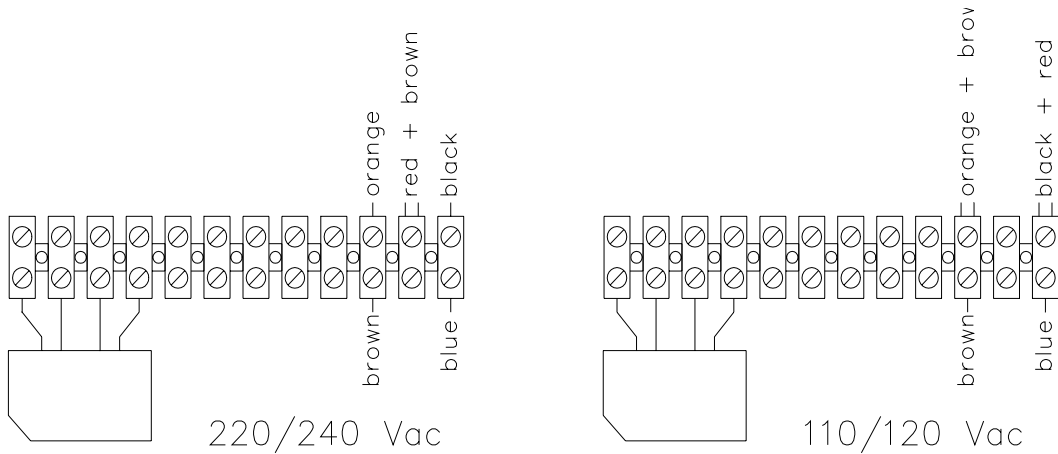
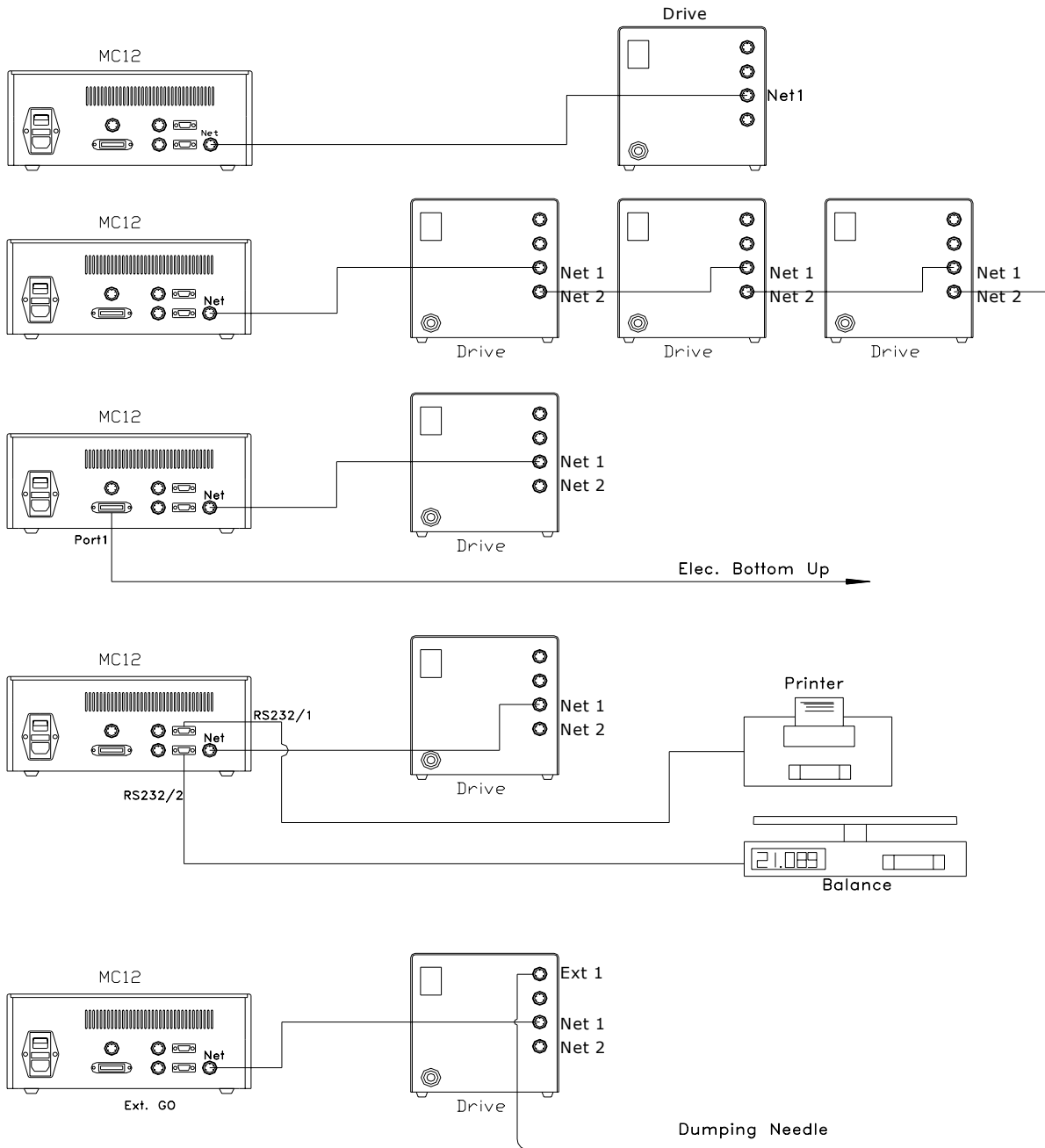


Fig.9

The PD12I can be converted to accept another supply voltage. The conversion can be made inside the machine by moving the cables of the transformer clamps.

### 9.0: CONNECTION CHOICES



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**Flexicon a.s**  
denmark

Frejasvej 2-6  
DK-4100 Ringsted

Tel. +45 57 67 11 55

Fax +45 57 67 05 41

flexicon@flexicon.dk · www.flexicon.dk