

# **FH10 *Microflex*<sup>®</sup> PUMP SYSTEM**

**Operating Manual**

**Model Number**

**72-310-010**

**72-310-080**

**72-310-300**

A-1299-7099 First Edition



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#### **A-1299-7099**

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<b>REV</b>	<b>ECR/ECN</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>By</b>

## SAFETY PRECAUTIONS



**DANGER:** Remove power from the Pump System before any cleaning operation is started.



**WARNINGS:** Tubing breakage may result in fluid being sprayed from pump. Use appropriate measures to protect operator and equipment.

*Before installing tubing into the Pump Head remove power or shut off the drive. Fingers or loose clothing could be caught in the rollers.*



**CAUTIONS:** Tubing for use with the MICROFLEX Pump Systems is Microbore Autoanalysis Tubing. See Appendix A for specifics. Use of tubing other than that specified will result in poor pumping performance and/or pump system damage and voiding of applicable warranty.

*Do not close the occlusion bed by pulling up on the locking tabs. Damage to the tabs may occur.*

## Explanation of Symbols



**CAUTION:** Risk of Danger. Consult Operator's manual for nature of hazard and corrective actions.



**CAUTION:** Risk of crushing. Keep fingers away from rotor while pump is in operation. Stop pump before loading or unloading tubing.



**CAUTION:** Hot Surface. Do not touch.



**CAUTION:** Risk of electric shock. Consult Operator's manual for nature of hazard and corrective actions.

## WARNING: Product Use Limitation



These products are not designed for, nor intended for use in patient connected applications; including, but not limited to, medical and dental use, and accordingly have not been submitted for FDA approval.



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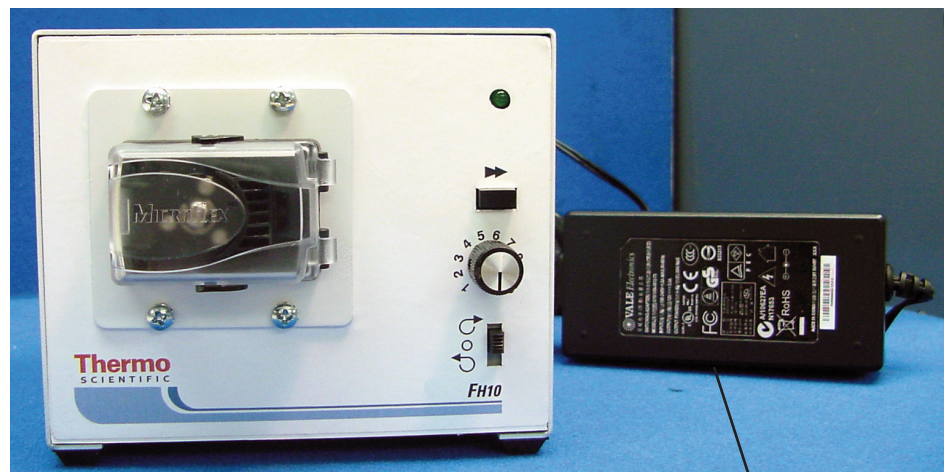


## Section 1 Introduction

The FH10 MICROFLEX Pump System is designed to pump fluid through Microbore tubing by means of peristaltic action at very low flow rates. It is ideal for sanitizers, reagent dispensing, analyzers, printing systems, controlled feeding and non-human infusion procedures.

### GENERAL DESCRIPTION

The FH10 MICROFLEX Pump System accommodates one tube at controlled speeds as low as 1.7 rpm. Tubing is held in place by spring-loaded Tubing Retainers. For a list of tubing sizes for use with the Pump System, refer to Appendix A.



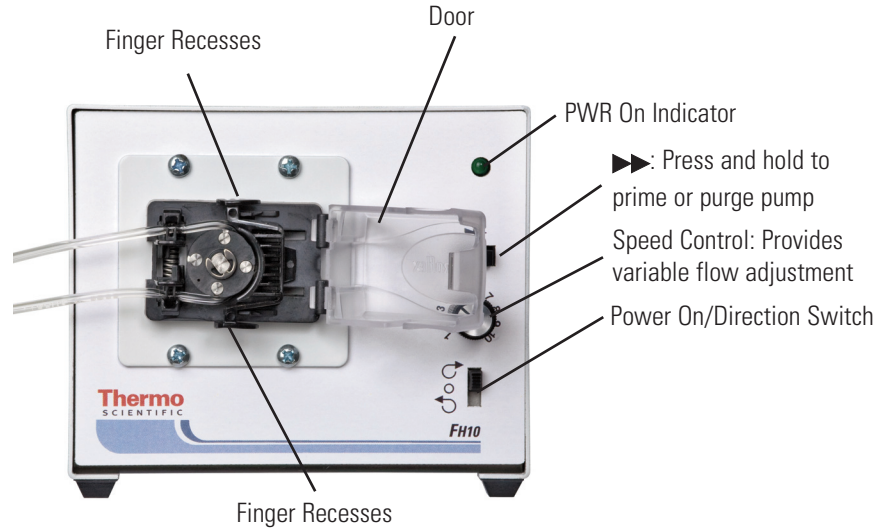
Universal Power Supply

**Figure 1-1.** FH10 MICROFLEX Pump System

The latching Occlusion Bed allows quick loading or changing of tubing. The Pump Head rotor contains four rollers for minimum pulsation. All units operate from an external DC power supply. The AC models are supplied with a Universal Power Supply, which provides a DC output for connection to the pump drive.

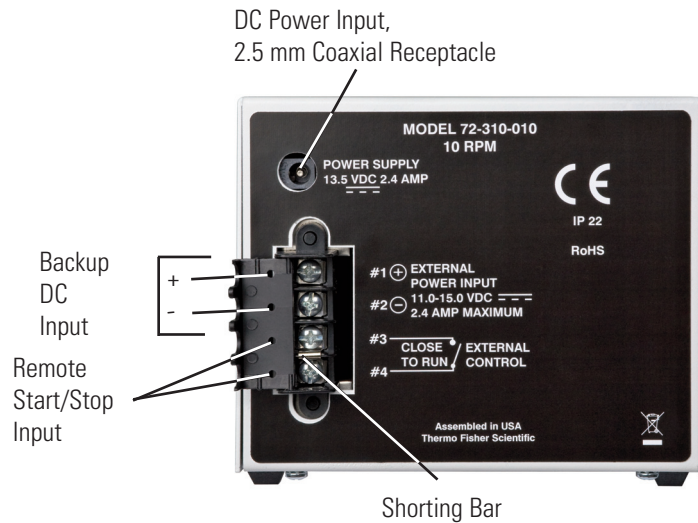
# GENERAL DESCRIPTION (continued)

The **single-turn, adjustable Speed Control**, Figure 1-2, provides variable flow-operation. The green PWR On indicator lights whenever the pump is operating. The Power On/Direction Switch turns power on when either clockwise or counterclockwise pump rotor direction is selected. The ►► Button is used for priming and purging and operates the pump at maximum speed while depressed.



**Figure 1-2.** Pump – Front Panel

The **Rear Panel**, Figure 1-3, contains a DC Power Input jack for connection of primary power and a 4-terminal barrier strip for connection of Remote Start/Stop and for a Backup DC supply.



**Figure 1-3.** Pump – Rear Panel

## Section 2 Installation and Setup

### Setup

***Use only Microbore Autoanalysis tubing with MICROFLEX pumps to ensure optimum performance. Use of other tubing may void applicable warranties.***

### Selecting Tubing Size

Appendix A provides a list of tubing sizes which will work efficiently with the FH10 MICROFLEX Pump System. This list includes tubing diameters, flow rates in  $\mu\text{L}/\text{min}$  and the maximum flow rates at 10 rpm, 80 rpm and 300 rpm. Tubing is listed by part number.

### Customer Selectable Orientation of Pump Head

The Pump Head as supplied from the factory is orientated such that the tubing exits the left hand side of the FH10 MICROFLEX Pump System. The orientation of the Pump Head can be changed as follows.

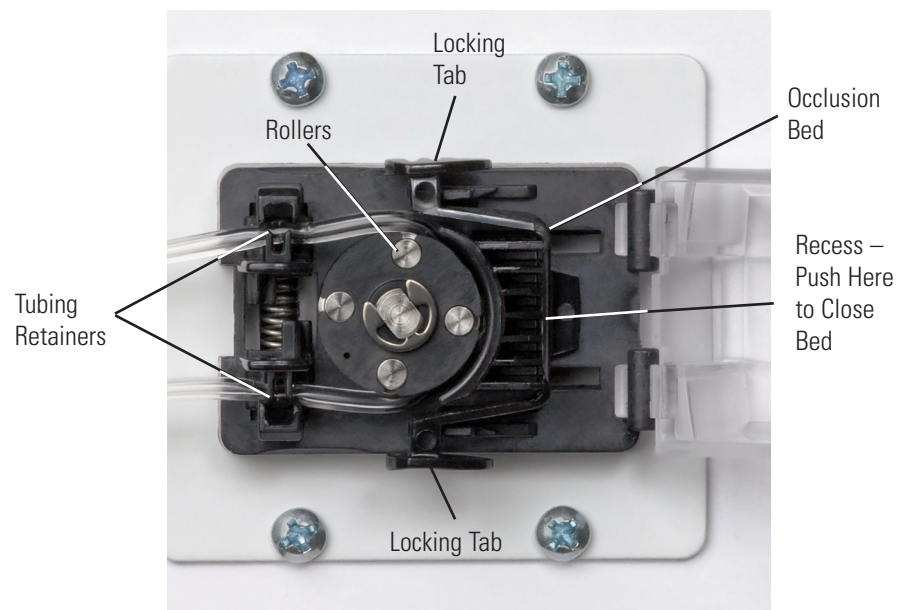
1. Remove the 4 screws (see Figure 2-1) on the face of the unit holding the pump mounting plate in place. Retain the 4 screws for reassembly.
2. Rotate the Pump Head by turning it in the orientation desired. **DO NOT PULL OUT THE PUMP**, only rotate it. Some resistance to rotation will be felt.
3. Reinstall the 4 screws into the pump mounting plate and tighten.

## Installing Tubing in Pump Head



**WARNING:** Before installing tubing into the Pump Head remove power or shut off the drive. Fingers or loose clothing could be caught in the rollers.

1. Place the **Power On/Direction** Switch, Figure 1-2, in the center (Off) position.
2. Open the **Door**, Figure 1-2, by grasping the finger recesses on either side and pulling away from the pump.
3. Release the **Occlusion Bed**, Figure 2-1, by squeezing the **Locking Tabs**, Figure 2-1, together and sliding the bed down towards the door hinge.

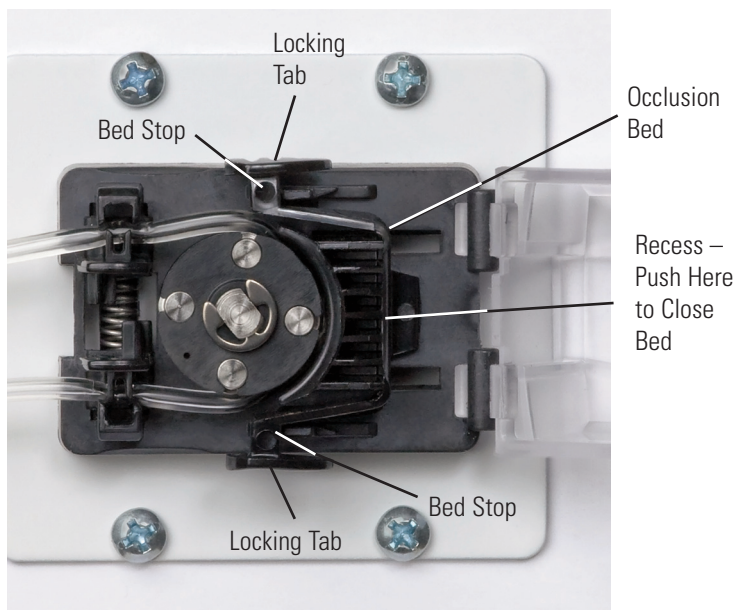


**Figure 2-1.** Occlusion Bed in Unlatched Tube Loading Position

4. Holding both ends of the tubing in one hand, form a loop and wrap the tubing around the **Rollers**, Figure 2-1, making sure that the tubing is centered on the Rollers and keeping the free ends of the tubing outside of the **Tubing Retainers**, Figure 2-1.

## Installing Tubing in Pump Head (continued)

5. Close the occlusion bed by pushing up on the recessed area at the bottom, Figure 2-2, until the **Locking Tabs** snap into place against the **Bed Stops**, Figure 2-2, on the housing.



**Figure 2-2.** Closing Occlusion Bed

6. Insert the tubing into one of the **Tubing Retainers**, Figure 2-1, by moving the retainer toward the center of the pump and placing the tubing in the v-notch of the retainer. Release the retainer so that the tubing is secured in place. Repeat for the other Tubing Retainer. The tubing should be stretched slightly around the rollers so that there is no excess tubing between the Rollers and the retainers—any excess can be removed by pulling slightly on the tubing outside of the pump.



**CAUTION:** Do not close the occlusion bed by pulling up on the locking tabs. Damage to the tabs may occur.

7. Close the door. The **Locking Tabs** must be on the outside of the door and the door fully closed for proper operation.

## Connecting Primary Power

Connect the external power supply to the applicable input voltage source and the output of the external power supply to the DC input connector on the pump unit.

**NOTE:** The Power Supply output connection is center positive (+).

## Remote DC Power Connection

Terminals 1 and 2 on the rear panel barrier terminal strip, Figure 1-3, provide a means for connecting a remote DC power source. The positive (+) terminal is terminal 1. The negative (-) terminal is terminal 2.

**NOTE:** Input voltage must not exceed 15V DC or equipment may be damaged. A minimum of 11V DC is required for proper operation.

## Remote Start/Stop Connection

Terminals 3 and 4 on the rear panel terminal strip, Figure 1-3, are used for remote start/stop operation. Pump direction and speed are not remotely controllable. In non-remote operation, these terminals are connected together by a Shorting Bar.

For remote control by switch closure, remove the Shorting Bar and connect the two terminals of the remote control switch to terminals 3 and 4. A closure of the remote control switch contacts will start the Pump System. Opening the contact will stop the Pump System.

## Section 3 Operation

This section describes the procedures for obtaining desired performance. Flow rate is determined by the drive speed and the tubing size.



**WARNING:** *Tubing breakage may result in fluid being sprayed from pump. Use appropriate measures to protect operator and equipment.*

### Turning Pump System On and Selecting Direction of Operation

The Pump System can be set to operate in either a clockwise or a counterclockwise direction. The same control used to select direction also turns power on or off. Select direction of pump operation desired. PWR indicator should light.

### Setting Pump Speed

Pump speed is controlled by the variable Speed Control. Turning the control clockwise increases the speed. Tube life is decreased with increased operating speed.

### Priming Pump System

The ►► push button is used for priming and purging the Pump System. When ►► is depressed, the pump operates at maximum speed in the selected direction until the button is released. Approximately two feet of tubing length can be filled or emptied per minute using the ►► push button on the 10 rpm units.





## Section 4 Maintenance

### Cleaning



***DANGER: Remove power from the Pump System before any cleaning operation is started.***

Clean exterior surfaces of case, control panel and pump rollers using a dry or damp cloth. Never immerse nor use excessive fluid.



## Section 5 Replacement Parts and Accessories

### Replacement Parts

Description	Part No.
Knob	110199
Shorting Bar	A-4402
Door	108229

### Accessories

Description	Part No.
Universal Power Supply 100-240V AC	77200-07



## Section 6 Specifications

### Output:

Operating Speed:

Models

72-310-010	1.7 to 10 rpm
72-310-080	13 to 80 rpm
72-310-300	50 to 300 rpm

Maximum No. of Tubes: 1

Direction of rotation: Clockwise and Counterclockwise

### Input:

Supply Voltage/Frequency:

Model:

72-310-010, 72-310-080 and 72-310-300	115V AC nominal, 50/60 Hz (90–130V AC) @ 400 mA AC  230V AC nominal, 50/60 Hz (190-260V AC) @ 250 mA max.
------------------------------------------	-----------------------------------------------------------------------------------------------------------------------

Power Input: 11–15V DC to terminals  
1 and 2 of terminal strip or  
external power supply

Installation Category:

Model:

72-310-010, 72-310-080 and 72-310-300	Category II per IEC664 (Local level—appliances, portable equipment, etc.)
------------------------------------------	---------------------------------------------------------------------------------

Remote Start/Stop: Contact Closure connection at terminal  
strip contacts 3 and 4

**Construction:**

Dimensions (L × W × H):	6.75 in × 5.25 in × 4.5 in (17.2 cm × 13.4 cm × 11.4 cm)
Weight:	3.3 pounds (1.5kg)
Color:	Light Gray (5% black)
Material:	
Pump Head:	PPS, polyester, stainless steel
Case:	Painted Steel
Enclosure Rating:	IP22 per IEC60529

**Environment:**

Operating Temperature:	32°F to 104°F (0°C to 40°C)
Storage Temperature:	−49°F to 149°F (−45°C to 65°C)
Humidity (Non-cond.):	10% to 90%
Altitude:	Less than 6600 ft (2000 m)
Pollution Degree:	Pollution Degree 2 per IEC664 (Indoor usage—lab, office)

**Compliance (For CE Mark):**

EN61326-1/A2: 2001 (EMC Directive)  
2002/95/EC (RoHS Directive)  
Converter is UL, cUL listed and CE,  
CCC approved.  
Regulatory agency specifications not  
applicable to the balance of the unit due  
to low voltage.

## Section 7 Warranty, Product Return and Technical Assistance

### Warranty

*Use only Microbore Autoanalysis tubing with MICROFLEX pumps to ensure optimum performance. Use of other tubing may void applicable warranties.*

This product is warranted against defects in material or workmanship, and at the option of the manufacturer or distributor, any defective product will be repaired or replaced at no charge, or the purchase price will be refunded to the purchaser, provided that: (a) the warranty claim is made in writing within the period of time specified on the warranty card, (b) proof of purchase by bill of sale or receipted invoice is submitted concurrently with the claim and shows that the product is within the applicable warranty period, and (c) the purchaser complies with procedures for returns set forth in the general terms and conditions contained in the manufacturer's or distributor's most recent catalog.

This warranty shall not apply to: (a) defects or damage resulting from: (i) misuse of the product, (ii) use of the product in other than its normal and customary manner, (iii) accident or neglect, (iv) improper testing, operation, maintenance, service, repair, installation, or storage, (v) unauthorized alteration or modification, or (b) post-expiration dated materials.

THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER, AND THE MANUFACTURER AND DISTRIBUTOR DISCLAIM ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NO EMPLOYEE, AGENT, OR REPRESENTATIVE OF THE MANUFACTURER OR DISTRIBUTOR IS AUTHORIZED TO BIND THE MANUFACTURER OR DISTRIBUTOR TO ANY OTHER WARRANTY. IN NO EVENT SHALL THE MANUFACTURER OR DISTRIBUTOR BE LIABLE FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES.

*The warranty period for this product is one (1) year from date of purchase.*

## **Section 7**

Warranty, Product Return and  
Technical Assistance

### **Product Return**

To limit charges and delays, contact the seller or Manufacturer for authorization and shipping instructions before returning the product, either within or outside of the warranty period. When returning the product, please state the reason for the return. For your protection, pack the product carefully and insure it against possible damage or loss. Any damages resulting from improper packaging are your responsibility.

### **Technical Assistance**

If you have any questions about the use of this product, contact the Manufacturer or authorized seller.



## Section 8 Appendix A



**CAUTION:** *Tubing for use with the MICROFLEX Pump Systems is Microbore Autoanalysis Tubing. Use of tubing other than that specified will result in poor pumping performance and/or pump system damage and voiding of applicable warranty.*

### Available Microbore Autoanalysis Tubing

Tubing Suffix	Tubing ID in (mm)	PHARMED® BPT	Silicone Peroxide	Silicone Platinum	TYGON® Lab	C-FLEX®	TYGON® LFL	Solvent/ Hydrocarbon	VITON®
		95809	7625	95590	95609	95718	96429	95712	97632
-10	0.007 (0.19)								
-12	0.010 (0.25)								
-14	0.015 (0.38)								
-16	0.017 (0.44)								
-18	0.020 (0.51)								
-22	0.025 (0.64)								
-24	0.030 (0.76)								
-26	0.035 (0.89)								
-28	0.040 (1.02)								
-30	0.045 (1.14)								
-32	0.051 (1.30)								
-34	0.056 (1.42)								
-36	0.060 (1.52)								
-38	0.065 (1.65)								
-40	0.073 (1.85)								
-42	0.081 (2.06)								
-44	0.090 (2.29)								
-46	0.100 (2.54)								
-48	0.110 (2.79)								

**NOTE:**

**White** indicates Available

**Black** indicates Not Available

**Dark Gray** indicates Special Order – check with factory.

## Tubing Flow Rates

See the following table for Tubing size versus ID and flow rates. Flow rates are for water pumped at room temperature and 0 psi.

Flow rate is determined by drive, speed, tubing size and material.

Tubing Suffix.	Tubing ID in (mm)	Flow Rate		
		10 rpm ( $\mu\text{L}/\text{min}$ )	80 rpm ( $\mu\text{L}/\text{min}$ )	300 rpm ( $\mu\text{L}/\text{min}$ )
-10	0.007 (0.19)	13.0	100	425
-12	0.010 (0.25)	22.5	180	730
-14	0.015 (0.38)	50.5	400	1650
-16	0.017 (0.44)	67.0	535	2200
-18	0.020 (0.51)	87.0	700	2900
-22	0.025 (0.64)	135	1050	4500
-24	0.030 (0.76)	185	1450	6250
-26	0.035 (0.89)	245	1950	8300
-28	0.040 (1.02)	315	2500	10400
-30	0.045 (1.14)	385	3100	13000
-32	0.051 (1.30)	485	3850	16300
-34	0.056 (1.42)	565	4500	19100
-36	0.060 (1.52)	635	5100	21300
-38	0.065 (1.65)	730	5850	24700
-40	0.073 (1.85)	885	7100	29800
-42	0.081 (2.06)	1050	8500	35200
-44	0.090 (2.29)	1250	9350	41000
-46	0.100 (2.54)	1450	10200	46200
-48	0.110 (2.79)	1650	11000	50000

All flow rates based on pumping water @ 0 psig 70°F (21°C).



Thermo Fisher Scientific  
28W092 Commercial Ave.  
Barrington, Illinois U.S.A. 60010-2392  
1-800-637-3739 (U.S. and Canada only)  
11 (847) 381-7050 (Outside U.S.)  
(847) 381-7050 (Local)

[www.thermo.com](http://www.thermo.com)  
[fluidhandling@thermofisher.com](mailto:fluidhandling@thermofisher.com)

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**1** year  
warranty