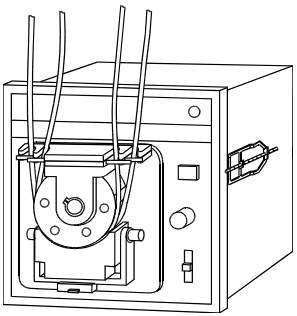
OPERATING MANUAL

PUMP SYSTEM

MODEL NOS.

77120-20	**77120-30**	**77120-40**
77120-25	**77120-35**	**77120-45**
77120-52	**77120-62**	**77120-70**



The MASTERFLEX® C/L® Pump Systems are small peristaltic pumps with integral drive motors and are intended for use with a series of tubing sizes that provide flow rates in the range of 2.2 µL/min to 37 mL/min.

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- Pump System Tubing Flow Rates A-1

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VITON — Reg TM DuPont Dow Elastomers, L.L.C.
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SAFETY PRECAUTIONS

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

CAUTION: ***Tubing for use with the MASTERFLEX® C/L® 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.***

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.

These products are covered by one or more of the following U.S. and corresponding foreign patents: 5,380,173.

INTRODUCTION

The MASTERFLEX® C/L® 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 MASTERFLEX® C/L® Pump System, Figure 1, is enclosed in a plastic 1/4 DIN Case. The enclosure allows panel mounting using optional Mounting Brackets (see Accessory Section). Rubber Feet, supplied with the unit, can be attached to the bottom of the Case for operating on a bench or other flat surface. The Pump System can accommodate two tubes simultaneously for the 6 and 60 rpm systems at controlled speeds as low as 1 rpm. The 200 rpm system accommodates one tube at controlled speeds as low as 35 rpm. Tubing is held in place by spring-clip Tubing Retainers. For a list of tubing sizes for use with the Pump System, refer to Appendix A. The latching Occlusion Bed allows quick loading or changing of tubing. The Pump Head Rotor contains six rollers for minimum pulsation. All units operate from an External DC Power Supply. The 115V AC and 230V AC models are supplied with an External Power Supply, which provides a DC output for connection to the Pump Drive.

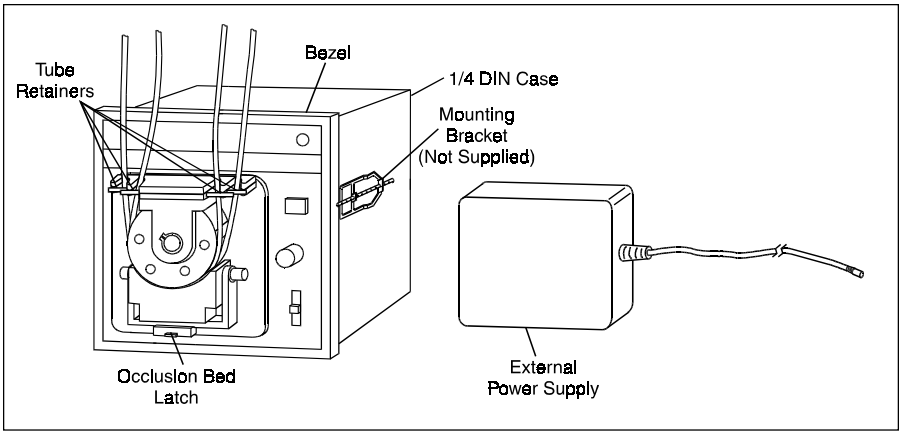


Figure 1. MASTERFLEX® C/L® Pump System

The single-turn, adjustable Speed Control, Figure 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 MAX Button is used for priming and purging and operates the pump at maximum speed while depressed.

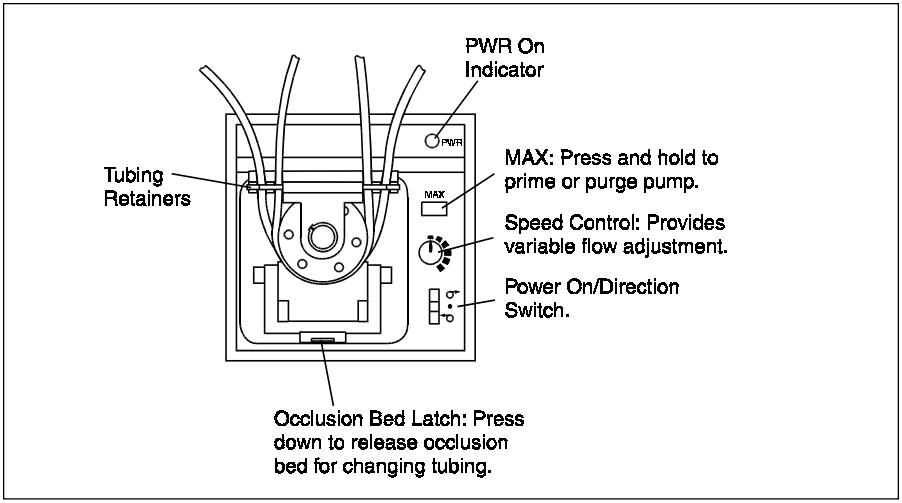


Figure 2. Pump — Front Panel

The rear panel, Figure 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 DC backup supply.

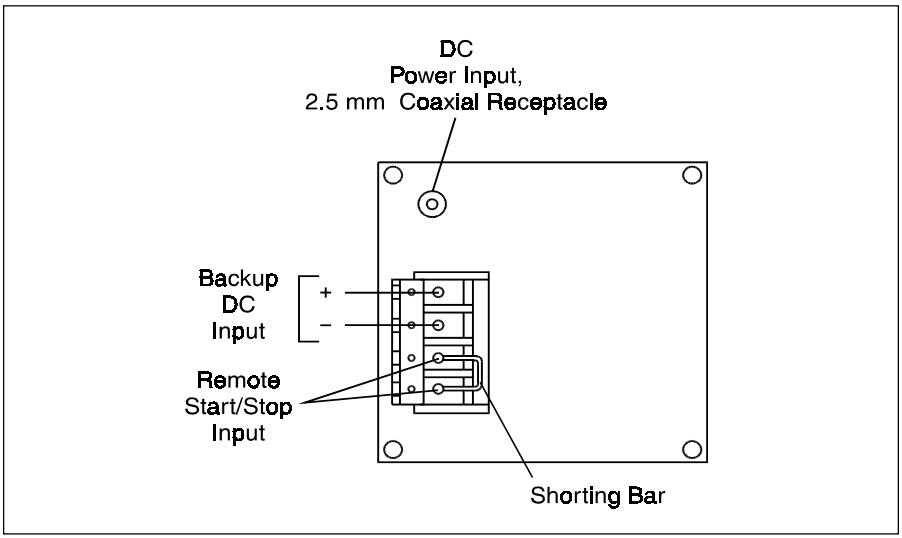


Figure 3. Pump — Rear Panel

SETUP

Use only Microbore Autoanalysis tubing with MASTERFLEX® C/L® 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 MASTERFLEX® C/L® Pump System. This list includes tubing diameters, flow rates in µL/min and the maximum flow rates at 6 rpm, 60 rpm and 200 rpm. Tubing is listed by part number. For best results, when using two tubes, select tubes that provide flow rates within a 10:1 range. (Tube diameter ratios should be within approximately 3.5:1.) Silicone tubing should not be used with TYGON® or NORPRENE®.

Installing Tubing in Pump Head

WARNING: Be sure the Pump Drive is turned off before proceeding. Loose clothing could be caught in the rollers.

1. Place the Power On/Direction Switch, Figure 2, in the center (Off) position.
2. Press down on the Occlusion Bed Latch, Figure 4, to release the Occlusion Bed from the rotor.
3. Gently stretch the tubing and insert the tubing into the spring-loaded left rear Retainer.
4. While maintaining the slight amount of stretching, wrap the selected tubing around the lower Rollers and secure the tubing in the right rear spring-loaded Retainer. If a second tubing is to be installed, secure the tubing in the same manner using the front spring-loaded Retainers.
5. Lift up on the outer edge of the Occlusion Bed until it locks in position holding the tubing against the bottom Rollers.

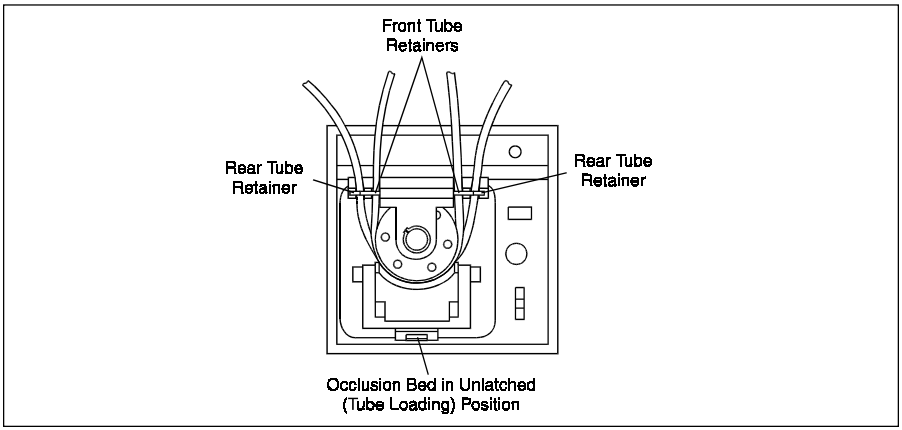


Figure 4. Occlusion Bed in Unlatched Tube Loading Position

Installing Panel Mount Mounting Brackets

The optional Mounting Brackets are used to attach the 1/4 DIN Case to a Mounting Rack. Use Mounting Brackets Part No. 77120-03, (2/set).

1. Be sure the panel bezel is on the pump, then slide the pump system through the front of the mounting rack.
2. Place a Mounting Bracket, Figure 5, between the grooved bracket retainers on one side of the Case and slide the Mounting Bracket back to lock into the retainer grooves.
3. Tighten the bracket screw against the back of the rack to hold the Pump System in place.
4. Repeat steps 2 and 3 for the second Mounting Bracket on the opposite side.

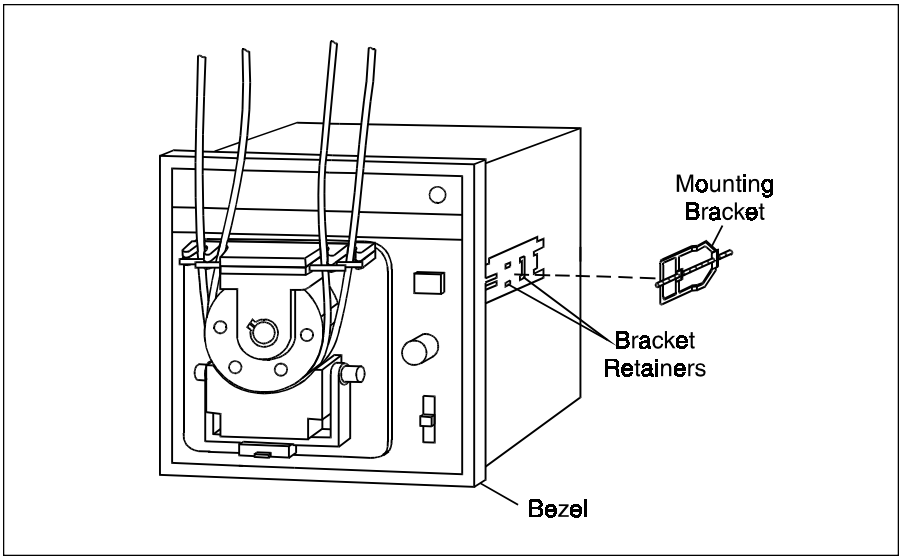


Figure 5. Mounting Bracket Installation

Installing Rubber Feet

Four rubber feet are provided for operating the Pump System on a bench or other flat surface. The feet should be installed at the four corners on the bottom of the unit. Remove the protective paper from the adhesive surface of each foot and press the foot firmly on the bottom surface about one-eighth inch in from and parallel to the outer edges.

Connecting Primary Power

Depending on the Pump System model, primary power may be 115V AC, 230V AC, 12V DC or 13.5V DC. The DC models can be connected to any DC* supply and are not supplied with an External Power Supply unit. 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.

*Refer to Specifications for current supply voltage.

NOTE

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

Backup Battery Connection

Terminals 1 and 2 on the rear panel Barrier Terminal Strip, Figure 3, provide a means for connecting a backup DC power source. The positive (+) terminal is terminal 1. The negative (–) terminal is terminal 2. Connection to these terminals would usually be made only for emergency type operation in conjunction with an External Power Supply, or a stand-alone operation for the DC models.

NOTE

For Models 77120-30, -35, -40, -45, -52 and -62, input voltage must not exceed 16V DC or equipment may be damaged. A minimum of 11.5V DC is required for proper operation.

For Models 77120-20, -25 and -70, input voltage must not exceed 15V DC or equipment may be damaged. A minimum of 11.0V DC is required for proper operation.

Remote Start/Stop Connection

Terminals 3 and 4 on the rear panel Terminal Strip, Figure 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.

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 MAX Push Button is used for priming and purging the Pump System. When MAX 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 MAX Push Button on the 6 rpm units.

MAINTENANCE

Cleaning

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

Replacement Parts and Accessories

Item	Part No.
Rubber Feet (4 ea.)	A-1390-0001
Shorting Bar	A-4402

Accessory	Part No.
Mounting Brackets (2/set)	77120-03
6 and 60 rpm External Power Supply, 115V AC	77120-01
6 and 60 rpm External Power Supply, 230V AC	77120-06
200 rpm External Power Supply 115V AC	77120-21
200 rpm External Power Supply, 230V AC	77120-26

SPECIFICATIONS

Output:

Operating Speed:	
Models 77120-30, 77120-35 and 77120-52	1 to 6 rpm
Models 77120-40, 77120-45 and 77120-62	10 to 60 rpm
Models 77120-20, 77120-25 and 77120-70	35 to 200 rpm
Maximum No. of Tubes:	2 for 6 and 60 rpm models 1 for 200 rpm models
Direction of rotation:	Clockwise and Counterclockwise

Input:

Supply Voltage/Frequency:	
Models 77120-30 and 77120-40	115V AC nominal, 50/60 Hz (90–130V AC) @104 mA AC
Models 77120-35 and 77120-45	230V AC nominal, 50/60 Hz (190–260V AC) @52 mA AC
Models 77120-52 and 77120-62	12V DC nominal (11.5–16.0V DC) @ 1.0 A DC
Model 77120-20	115V AC nominal, 50/60 Hz (90–130V AC) @ 120 mA AC
Model 77120-25	230V AC nominal, 50/60 Hz (190–260V AC) @ 60 mA AC
Model 77120-70	13.5V DC nominal, (11.0–15.0V DC) @ 2.4 A DC
Power Input:	For 6 and 60 rpm models 11.5–16.0V DC to terminals 1 and 2 of terminal strip or External Power Supply For 200 rpm model 11.0–15.0V DC to terminals 1 and 2 of terminal strip or External Power Supply
Installation Category:	
77120-20, -25, -30, -35, -40, -45	Category II per IEC664 (Local level—appliances, portable equipment, etc.)
77120-52, -62, -70	Category I per IEC664 (Signal Level)
Remote Start/Stop:	Contact Closure connection at terminal strip contacts 3 and 4

Construction:

Dimensions (L x W x H):	5.3 in x 3.5 in x 3.5 in (13.5 cm x 8.9 cm x 8.9 cm)
Weight:	2 pounds (0.91 kg)
Color:	Black
Material:	
Pump Head:	PPS, polypropylene and stainless steel

Case:	NORYL®
Enclosure Rating:	IP22 per IEC529
Environment:	
Operating Temperature:	32°F to 105°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/A1: 1998 (EMC Directive) 115V AC Power Supply AC/DC Converter is UL listed and CSA approved. Regulatory agency specifications not applicable to the balance of the unit due to low voltage.

WARRANTY

Use only Microbore Autoanalysis tubing with MASTERFLEX® C/L® pumps to ensure optimum performance. Use of other tubing may void applicable warranties.

The Manufacturer warrants this product to be free from significant deviations from published specifications. If repair or adjustment is necessary within the warranty period, the problem will be corrected at no charge if it is not due to misuse or abuse on your part, as determined by the Manufacturer. Repair costs outside the warranty period, or those resulting from product misuse or abuse, may be invoiced to you.

The warranty period for this product is noted on the Warranty Card.

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.

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APPENDIX A

CAUTION: ***Tubing for use with the MASTERFLEX® C/L® 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

TYGON — Catalog prefix number 95609-XX available in sizes 10 through 48.
TYGON LFL — Catalog prefix number 96429-XX available in sizes -18, -26, -30, -34, -42 and -48.
Silicone (peroxide-cured) — Catalog prefix number 07625-XX available in sizes 22 through 48.
Silicone (platinum-cured) — Catalog prefix number 95612-XX available in sizes 22 through 48.
PHARMED® — Catalog prefix number 95709-XX available in sizes -12, -18, -26, -32, -36, -40, -44 and -48.
VITON® fluoroelastomer — Catalog prefix number 07632-XX available in sizes -26, -30, -34, -38, -42, -46 and -48.
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 rates for silicone tubing are approximately 25%–50% less than listed.
Flow rate is determined by drive, speed, tubing size and material.

Tubing Suffix.	Tubing ID in (mm)	Flow Rate		
		200 rpm (µL/min)	60 rpm (µL/min)	6 rpm (µL/min)
-10	0.008 (0.19)	400	128	13
-12	0.010 (0.25)	610	178	17
-14	0.015 (0.38)	1290	378	45
-16	0.017 (0.44)	1673	490	55
-18	0.020 (0.51)	2280	698	70
-22	0.025 (0.64)	3630	1110	105
-24	0.030 (0.76)	5180	1580	150
-26	0.035 (0.89)	7160	2110	205
-28	0.040 (1.02)	8980	2680	270
-30	0.045 (1.14)	10950	3290	335
-32	0.051 (1.30)	14120	4130	420
-34	0.056 (1.42)	16800	4900	495
-36	0.060 (1.52)	18700	5510	555
-38	0.065 (1.65)	21200	6330	630
-40	0.073 (1.85)	24890	7650	750
-42	0.081 (2.06)	28090	8910	875
-44	0.090 (2.29)	31210	10160	1015
-46	0.100 (2.54)	34160	11340	1170
-48	0.110 (2.79)	36720	12340	1330

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

EU DECLARATION OF CONFORMITY

Name of Apparatus: MASTERFLEX® C/L® Pump System

Model Numbers: 77120-20, -25, -30, -35, -40, -45, -52, -62, -70

Description of Apparatus: Variable Speed Peristaltic Pump Motor Drive. Used with pump head and tubing to pump fluids.

77120-20 (200 rpm @115V AC), -25 (200 rpm @ 230V AC), -30 (6 rpm @115V AC), -35 (6 rpm @ 230V AC), -40 (60 rpm @ 115V AC), -45 (60 rpm @ 230V AC), -52 (6 rpm @12V DC), -62 (60 rpm @ 12V DC), -70 (200 rpm @13.5V DC)

Barnant Company declares that the above models are in conformity to the following harmonized standards and directives:

Applicable Directives	Applicable Specifications	Manufacturer's Report Number
89/336/EEC 92/31/EEC 93/68/EEC	EN61326-1/A1: 1998	TR9420

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Manufacturer's Signature:

James W. Doll
Vice President, Engineering

23 August, 2000
Date