

OPERATING MANUAL:
MASTERFLEX® C/L®
PUMP SYSTEM

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 2.0 $\mu\text{L}/\text{min}$ to 50 mL/min.

Model No.

77122-04

77122-06

77122-14

77122-16

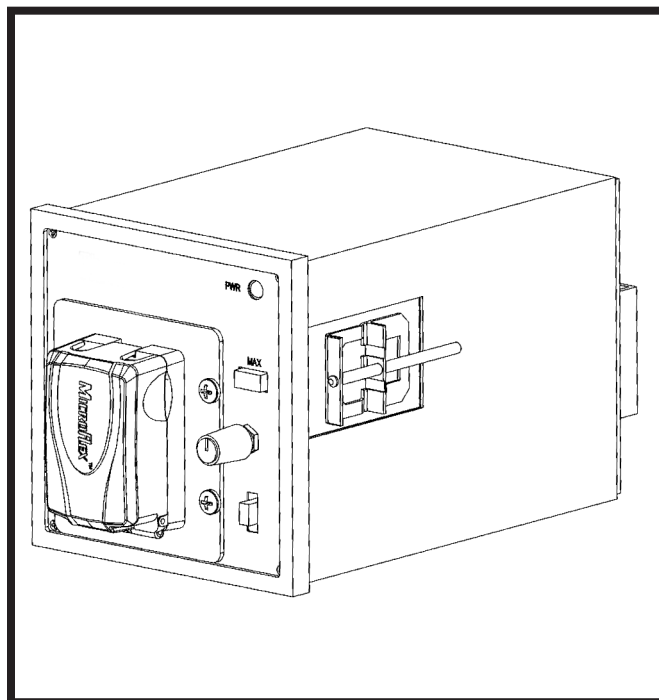
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77122-26

A-1299-1073
Edition 01

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PUMP FOR LIQUIDS ORIGINAL INSTRUCTIONS

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 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.



Do Not pull the tubing too tight. Do not pinch the tubing to cause it to be closed off.



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.

NORYL — Reg TM General Electric Company
 C-FLEX, PHARMED, TYGON — Reg TM Saint-Gobain Performance Plastics Corp.
 VITON — Reg TM E.I. duPont DeNemours & Co.

These products are covered by one or more of the following U.S. and corresponding foreign patents: D605,286S.

Trademarks bearing the ® symbol in this publication are registered in the U.S. and in other countries.

INTRODUCTION

The MASTERFLEX C/L Pump System is designed to pump fluid through Microbore Autoanalysis 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.

Rubber Feet, supplied with the unit, can be attached to the bottom of the Case for operating on a bench or other flat surface and for stability when stacking multiple units. The enclosure allows panel mounting using optional Mounting Brackets (see Accessory Section for Part No. and page 6 for mounting instructions).

The 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.

The self-closing 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.

The **single-turn, adjustable speed control knob**, *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.

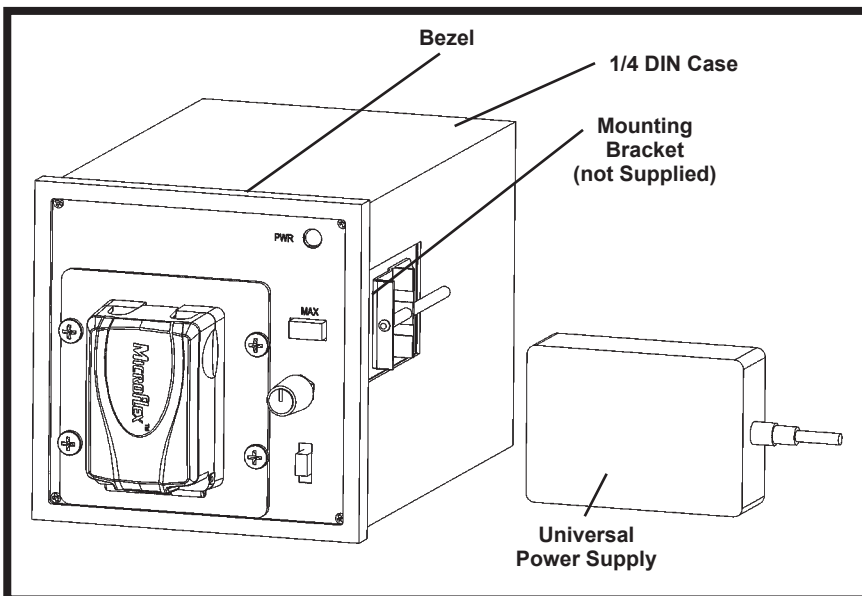


Figure 1. MASTERFLEX C/L Pump System

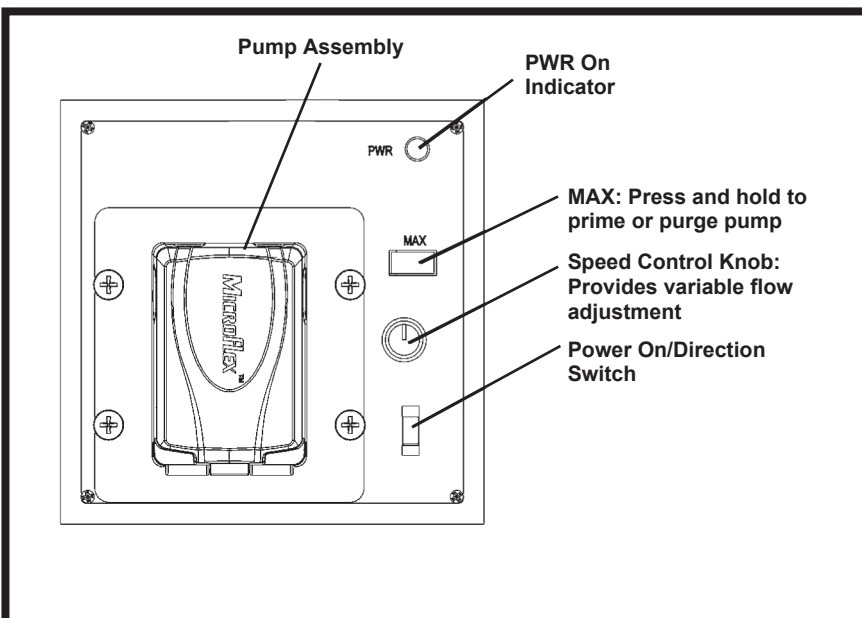


Figure 2. Pump — Front

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.

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 $\mu\text{L}/\text{min}$ and the maximum flow rates at 10 rpm, 80 rpm and 300 rpm. Tubing is listed by part number.

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. When the door is opened the Occlusion Bed moves back away from the pump rollers, Figure 4.
2. Holding both ends of the tubing in one hand, form a loop and wrap the tubing around the **Rollers**, Figure 4, making sure that the tubing is centered on the rollers and keeping the free ends of the tubing outside of the **Hi Vjb[F YU]b Yfg**, Figure 4
3. Once the tubing is in place, close the Door and the Occlusion Bed will automatically align itself within the pump, Figure 5.
4. Insert the tubing into one of the **Tubing Retainers**, Figure 4 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.

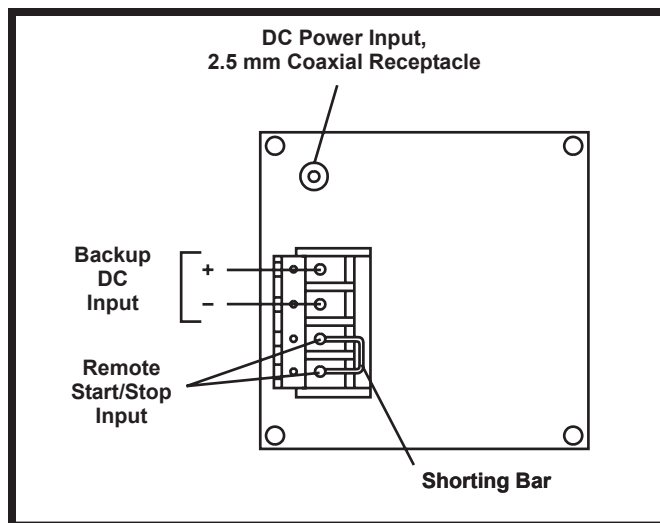


Figure 3. Pump — Rear Panel

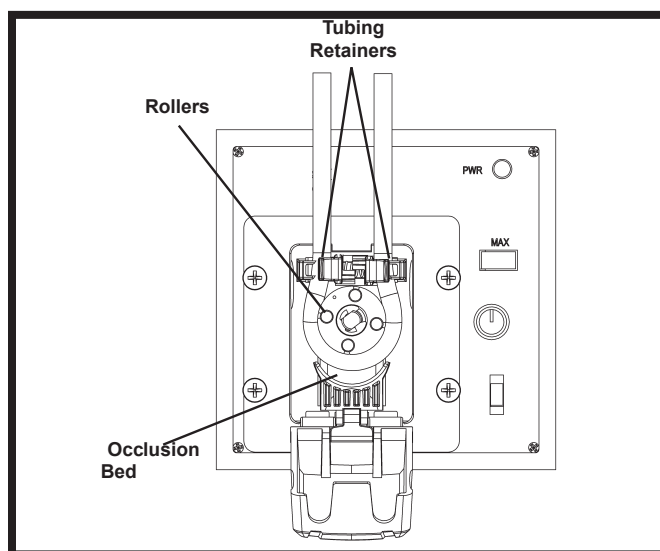


Figure 4. Occlusion Bed in Unlatched Tube Loading Position

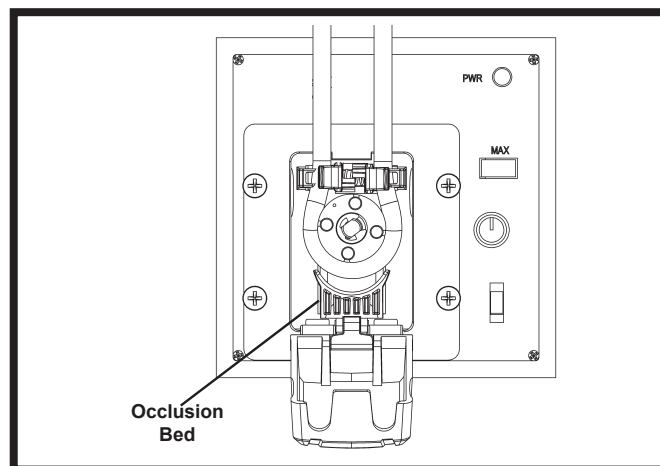


Figure 5. Closing Occlusion Bed

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 6*, 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.

Installing Rubber Feet

Four rubber feet are provided for operating the Pump System on a bench or other flat surface and for stability when stacking multiple units. 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 100-240V AC or 12V DC. The DC models can be connected to any DC* supply and are not supplied with a Universal 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 (+).

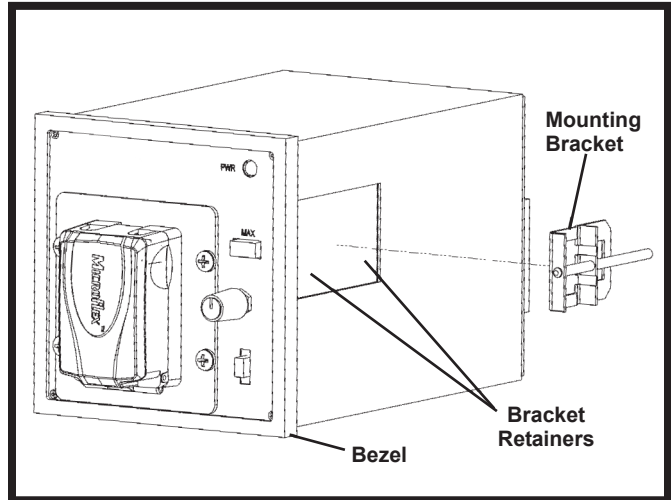


Figure 6. Mounting Bracket Installation

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: 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 knob. 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 10 rpm units.

MAINTENANCE

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



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-CR
Shorting Bar	A-4402
Pump Assembly 3 Roller	111185-CR
Pump Assembly 4 Roller	111186-CR

Accessory	Part No.
Mounting Brackets (2/set)	77120-03
Universal Power Supply 100-240V AC	77200-07

SPECIFICATIONS

Output:

Operating Speed:	
Models 77122-04 and 77122-06	1.7 to 10 rpm
Models 77122-14 and 77122-16	13 to 80 rpm
Models 77122-24 and 77122-26	50 to 300 rpm
Maximum No. of Tubes:	1
Direction of rotation:	Clockwise and Counterclockwise

Input:

Supply Voltage/Frequency:	
Model 77122-04, -14, -24	115V AC nominal, 50/60 Hz (90–130V AC) @ 400 mA AC 230V AC nominal, 50/60 Hz (190–260V AC) @ 250 mA max.
Model 77122-06, -16, -26	12.0V DC nominal, (11.0–15.0V DC) @ 2.4 A DC
Power Input:	11.0–15.0V DC to terminals 1 and 2 of terminal strip or External Power Supply
Installation Category:	
77122-04, -14, -24	Category II per IEC664 (Local level—appliances, portable equipment, etc.)
77122-06, -16, -26	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):	7.0 in x 3.5 in x 3.5 in (17.8 cm x 8.9 cm x 8.9 cm)
Weight:	1.5 pounds (0.68 kg)
Color:	Black
Material:	
Pump Head:	PPS, polyester and stainless steel
Case:	NORYL®
Enclosure Rating:	IP22 per IEC529

Environment:

Operating Temperature:	32°F to 105°F (0°C to 40°C)
Maximum Operating Pressure:	15 PSIG
Noise Level:	<70dBa @ 1 meter
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)
 EN809 (EU Machinery Directive)
 2011/65/EU (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.

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 one (1) year from date of purchase.

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.

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

Tubing Suffix	Tubing ID in (mm)	PHARMED® BPT	Silicone Peroxide	Silicone Platinum	TYGON® Lab	TYGON® Food	C-FLEX®	TYGON® E-LFL	Solvent/ Hydrocarbon	VITON®
		95809	07625	95590	06460	06457	95718	06449	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).

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