Cole-Parmer®
Delivering Solutions You Trust

MasterFlex®
Application Solutions

Masterflex® Tubing Pumps—From Lab to Production

Masterflex peristaltic pumps serve a variety of markets—from laboratory applications to process engineering to heavy-duty production and manufacturing. In all, you'll discover pumps that are accurate, durable, and easy to use. Each component is designed to strict standards and rigorously tested to ensure precise flow delivery.

The peristaltic design confines the fluid to the tubing, so the pump cannot contaminate the fluid and the fluid cannot contaminate your pump. When you want to pump a different fluid, simply change the tubing.

Compact/Low Flow

C/L® Compact/Low Flow Tubing Pumps

FLOW RANGE: 0.002 to 43 mL/min

C/L® tubing pumps combine low flow and a compact size into a single pump that sits on your benchtop or mounts to your equipment rack—ideal for analyzer applications and any contamination-free pumping.

Technical info

- C/L®—use for equipment racks and low-flow benchtop applications.
- L/S®—ideal for transferring fluid in the laboratory, in process areas, or in the field.
- I/P®—use in production scale-up or for quick fluid transfer in the lab.
- B/T®—select to quickly transfer large batches of fluid.

Laboratory/Standard

L/S® Laboratory/Standard Tubing Pumps

FLOW RANGE: 0.0006 to 3400 mL/min

This group includes fixed- and variable-speed contamination-free tubing pumps. It features high accuracy drives for precise flow control and dispensing. Durable and versatile L/S® pumps are designed for laboratory, process, or field use.

Masterflex® pumps are easy to use and most can be installed within minutes. With few moving parts, they are easy to operate and maintain. And, select drives offer maintenance-free brushless motors. Feature-for-feature, you will not find a better, more valued tubing pump on the market. Contact our Application Specialists at 847-549-7600 to order or for expert product and technical assistance. Or visit our Web site at **Masterflex.com** for the latest technical and ordering information.

Industrial/Process

I/P® Industrial/Process Tubing Pumps

FLOW RANGE: 0.012 to 26 LPM

I/P® pumps are characterized by more powerful motors and better protection from hazards like dust and water. These reliable, easy-to-use pumps are perfect in your manufacturing process or for quick fluid transfer in your lab.

Batch/Transfer

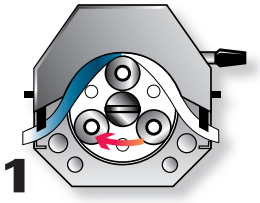
B/T® Batch/Transfer Tubing Pumps

FLOW RANGE: 0.67 to 37 LPM

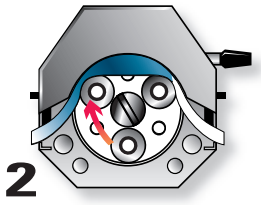
With an all-new pump head design, new tubing sizes, and easy-to-use controls similar to our lower-flow models, rugged B/T® pumps have the highest flow rates of any pumps in the Masterflex line. They are ideal for quickly transferring large batches of fluids or slurries. B/T tubing pumps have reliable heavy-duty motors and excellent hazard protection.

How Do Masterflex® Pump Heads Work?

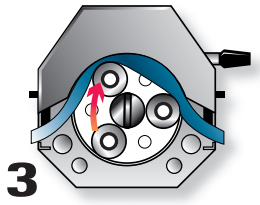
Precision, versatility, and ease of use make Masterflex peristaltic pump technology the preferred solution to increasing numbers of applications in the processing industry and in the lab.



A pump head consists of only two parts: the rotor and the housing. The tubing is placed in the tubing bed—between the rotor and housing—where it is occluded (squeezed).



The rollers on the rotor move across the tubing, pushing the fluid. The tubing behind the rollers recovers its shape, creates a vacuum, and draws fluid in behind it.



A "pillow" of fluid is formed between the rollers. This is specific to the ID of the tubing and the geometry of the rotor. Flow rate is determined by multiplying speed by the size of the pillow. This pillow stays fairly constant except with extremely viscous fluids.

Frequently Asked Questions about Masterflex® Pumps

Flow Rates

What flow rates are attainable?
Depending on which series you select, our systems deliver flow rates from 0.0005 mL/min to 37 LPM.

What flow precision can I expect?
You can obtain a flow precision of up to ±0.5% with calibrated flow systems. For other systems, ±3% precision is possible for general transfer applications.

Are measured volumes repeatable?
Yes. Volumes are repeatable with accuracies of ±0.25% or better using calibrated systems.

What is the effect of viscosity on flow?
All flow rates are based on water. Increasing the fluid viscosity will decrease the flow rate.

Pump Heads

What is the maximum pressure?†
The maximum pressure using L/S® High-pressure tubing is 100 psi (6.8 bar); nominal pressure is 25 psi (1.7 bar).

What is the maximum inlet pressure?†
Typically 40 psi (2.7 bar), depending on tubing ID, wall thickness, and formulation.

What is the maximum suction lift?
The maximum suction lift is 8.8 m H_2O (29 ft H_2O).

Are check valves required?
No. Our unique designs eliminate this need.

Can Masterflex pumps run dry?‡
Yes. They can pump gases, liquids, or mixed phases.

Are Masterflex pumps self-priming?
Yes. They can develop a vacuum in excess of 660 mm Hg (26" Hg).

Are Masterflex pumps positive-displacement type pumps?
Yes. The flow rate with water is directly proportional to the rotor speed up to the maximum capabilities of the drive.

Are Masterflex pumps nonsiphoning?
Yes. One roller is always squeezing the tubing closed, so you don't get any backflow up to the rated pressure of the tubing/pump head.

Can slurries and abrasive solutions be pumped?
Yes. The limitations are viscosity and particle size relative to selected tubing ID.

Why are so many pump heads and tubing sizes offered?
To provide maximum flexibility in achieving desired flow at the optimal drive speed.

Is flow reversible?
Yes. All specifications apply in either clockwise or counterclockwise rotation.

Tubing

Is the tubing important?
Yes. The tubing is the pump chamber. The elasticity of the tubing provides suction lift; its strength provides pressure handling ability; its flexibility determines pumping life; its bore determines the flow rate; and its wall thickness determines pumping efficiency.

What is the chemical resistance?
It depends on the tubing formulation you select. For detailed information, see pages 44–45.

How long will the tubing last?
Tubing life depends on pump speed and pressure, tubing material and chemical compatibility, and abrasiveness of the liquid (media) being pumped.

How does pump speed affect tubing life?
To put it simply, the lower the speed, the longer the life of the tubing.

What tubing formulation gives longest life?
In order, Norprene®, PharMed® BPT, PharmaPure®, Tygon® LFL, silicone, BioPharm Plus, C-FLEX®, Tygon®, and Viton® last the longest.

Is tubing available that is compatible for food and sterile applications?
Yes. Some tubing formulations meet NSF specifications, 3A, FDA, and USDA requirements for food handling. Many can be sterilized. See pages 38–39 for details on tubing formulations for specialty applications.

Drives

Why are drives also offered separately from pump heads in the L/S® and I/P® series?
The modular concept lets you customize your system for flexibility and economy.

Can a single drive run more than one pump head?
In many cases, two to four pump heads can be stacked in any combination up to the max torque capability of the drive.

†PTFE-pump head can operate at pressures up to 100 psi.
‡Except the PTFE-pump head which can overheat when run dry.

Selecting Your Masterflex® Tubing Pump System

1 Define your Application Requirements.

- What flow rate do I need?
- What chemical am I pumping?
- Do conditions such as fluid viscosity or back pressure play an important role in my application?

2 Select a Pump Series Based on your Flow Rate.

- C/L® .....0.002 to 43 mL/min Pages 4–5
- L/S® .....0.0006 to 3400 mL/min Pages 6–21
- I/P®.....0.012 to 26 LPM Pages 22–31
- B/T®..... 0.67 to 37 LPM Pages 32–35

3 Select a Pump Head, Tubing, and Drive.

The L/S and I/P pump series are divided into three component categories—pump head, tubing, and drive. Select one of the complete pump systems in this catalog, or choose from individual pump heads, tubing, and drives within the same series.

Help in selecting your Masterflex® pump system is available online!

Masterflex® Pump Configurator for selecting your perfect pump click here

Enter your specific application parameters into our interactive Pump Configurator and in seconds it will select a pump system that will meet your needs.

Technical info

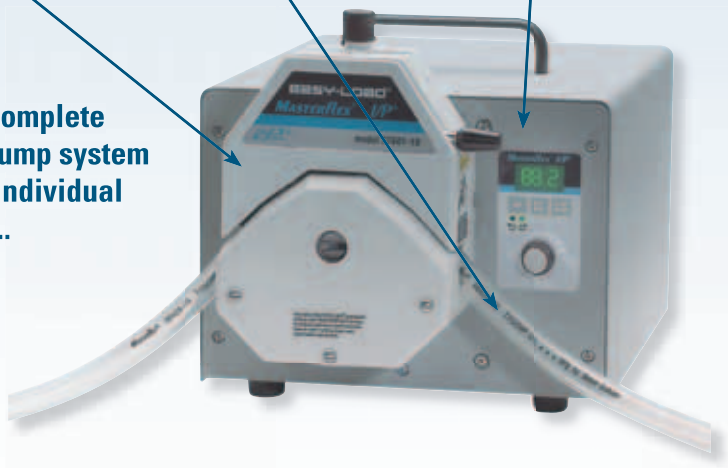
For detailed technical information and the most complete listings of Masterflex® parts and accessories, please see our Masterflex® Encyclopedia, Vol. 3.

Request your free copy at Masterflex.com

Your Complete Masterflex® Pump System

Pump Head + Tubing + Drive

Purchase a complete Masterflex pump system or purchase individual components...



Pump Head

WHAT TO CONSIDER:

Flow rate—Different pump heads have different flow rate capabilities.

Tubing change frequency—Some pump heads enable rapid tubing changes.

Desired number of channels—Pump heads are stackable in most cases.

Chemical compatibility—If chemicals spill, pump head materials become important.

Tubing

WHAT TO CONSIDER:

Flow rate—Tubing size directly affects flow rate.

Chemical compatibility—See pages 44–45

Tubing life—Go to Masterflex.com/techinfo

Fluid viscosity, presence of solids, back pressure, or suction lift—High-performance precision pump tubing is best for these conditions.

Fluid temperature—Information concerning the temperature range for each tubing formulation can be found at Masterflex.com/techinfo

Drive

WHAT TO CONSIDER:

Flow rate—The rpm of the drive directly correlates to flow rate.

Fixed- or variable-speed—Variable-speed drives enable flow rate adjustment.

Accuracy of flow rate or dispense volume—Many drives have digital speed control circuitry for highly accurate and repeatable flow rates.

Remote control or computer interface—Some drives can connect to your process controller or can be operated by a foot switch.

Environmental protection against hazards—Many drives are sealed against dust and water exposure.

C/L® Dual-Channel Pumps

Applications

- Chromatography ■ Spectroscopy ■ Flow injection analysis
- Dispensing ■ Sample preparation ■ Perfusion

Benefits

- ¼-DIN housing is stackable and compact enough to fit anywhere on your lab bench
- Accept continuous lengths of tubing—cut to exact size for an uninterrupted flow path with no fittings
- Two synchronous flow channels from a single compact pump
- Simple tubing changes ■ Economical ■ Low pulsation flow
- Self-priming

Features

- Flow range: 0.002 to 12.3 mL/min per channel (depending on drive rpm and tubing size)
- Compact ¼-DIN housing
- Two-channel, reversible pumping
- Stop/start remote control (contact closure)
- Polyphenylene sulfide and stainless steel pump head with acetal co-polymer rollers
- Includes 5 ft (1.5 m) of 0.89-mm ID Tygon® LFL tubing; order additional sizes and formulations on page 5

77120-32

The ideal pump system for flow-through analyzer applications

Power supply:

Flow Rates in mL/min

rpm	Microbore pump tubing size (ID)							
	0.19 mm	0.25 mm	0.51 mm	0.89 mm	1.14 mm	1.42 mm	2.06 mm	2.79 mm
1 to 6	0.002 to 0.013	0.0028 to 0.017	0.012 to 0.07	0.036 to 0.20	0.057 to 0.34	0.08 to 0.49	0.15 to 0.88	0.22 to 1.3
10 to 60	0.02 to 0.13	0.03 to 0.18	0.12 to 0.7	0.36 to 2.1	0.55 to 3.3	0.8 to 4.9	1.5 to 8.9	2.1 to 12.3

Specifications & Ordering Information

Catalog number	rpm	Speed control (repeatability)	Number of channels	Reversible motor	IP rating	Dimensions—¼ DIN (L x W x H)	Power	
							VAC, Hz	Amps
GJ-77120-32	1 to 6	±5%	1	Yes	IP22	5½" x 3¾" x 3½" (14.0 x 9.5 x 8.9 cm)	90 to 260, 50/60	150 mA at 115 VAC
GJ-77120-52							12 VDC†	—
GJ-77120-42	10 to 60						90 to 260, 50/60	150 mA at 115 VAC
GJ-77120-62							12 VDC†	—

†Power supply not included with 12 VDC models.

GJ-77120-03 Brackets for panel mounting. Set of 2

GJ-77120-11 Replacement power supply, 115/230 VAC, for pumps 77120-32 and -42

77120-03

Application Solution

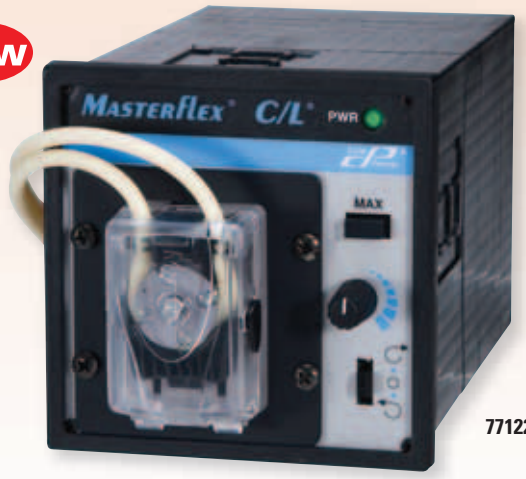
Challenge: A specialty foods processor needed to transfer a semi-viscous flavor concentrate at a flow rate of 8.0 mL/min. Space available for the pump was extremely limited and the operator wanted the option of starting and stopping the pump remotely.

Solution: The best solution for the application was the Masterflex C/L single-channel pump with a speed range of 13 to 80 rpm (77122-10). Using the 1.42-mm ID microbore tubing offered the flexibility of varying the flow rate while staying near the middle of the pump speed range.

PharMed® BPT tubing (95809-34) meets FDA and NSF criteria, and offers long life and excellent performance with the semi-viscous concentrate. Also, with the speed set on the pump, it could then be controlled remotely via contact closure on the back of the pump housing.

C/L® Single-Channel Pumps

New



77122-00

Power supply:

Applications

- Chromatography ■ Spectroscopy ■ Flow injection analysis
- Dispensing ■ Sample preparation ■ Perfusion

Benefits

- ¼-DIN housing is stackable and compact enough to fit anywhere on your lab bench
- Accept continuous lengths of tubing—cut to exact size for an uninterrupted flow path with no fittings
- Easier to load with self-adjusting tubing retainers ■ Simple tubing changes
- Economical ■ Low pulsation flow ■ Self-priming

Features

- Flow range: 0.001 to 39.4 mL/min (depending on drive rpm and tubing size)
- Compact ¼-DIN housing ■ Reversible, one-channel pumping
- Stop/start remote control (contact closure)
- Polyphenylene sulfide and copolyester pump head with stainless steel rollers
- Includes 5 ft (1.5 m) of 0.89-mm ID Tygon® LFL tubing; order additional sizes below

Flow Rates in mL/min

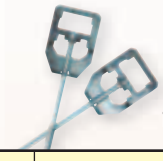
rpm	Microbore pump tubing size (ID)							
	0.19 mm	0.25 mm	0.51 mm	0.89 mm	1.14 mm	1.42 mm	2.06 mm	2.79 mm
1.7 to 10	0.002 to 0.013	0.004 to 0.022	0.015 to 0.087	0.041 to 0.25	0.064 to 0.39	0.09 to 0.57	0.18 to 1.05	0.28 to 1.65
13 to 80	0.017 to 0.10	0.03 to 0.18	0.12 to 0.70	0.33 to 2.0	0.52 to 3.1	0.75 to 4.5	1.4 to 8.5	1.8 to 11.0
50 to 300	0.06 to 0.38	0.11 to 0.67	0.43 to 2.6	1.2 to 7.4	1.9 to 11.5	2.8 to 17.0	5.3 to 32	7.2 to 43

Specifications & Ordering Information

Catalog number	rpm	Speed control (repeatability)	Number of channels	Reversible motor	IP rating	Dimensions—¼ DIN (L x W x H)	Power	
							VAC, Hz	Amps
GJ-77122-00	1.7 to 10	±5%	1	Yes	IP22	7" x 3½" x 3½" (17.8 x 8.9 x 8.9 cm)	110 to 260, 50/60	110 mA at 115 VAC
GJ-77122-02							12 VDC†	—
GJ-77122-10	13 to 80						175 to 260, 50/60	175 mA at 115 VAC
GJ-77122-12							12 VDC†	—
GJ-77122-20	50 to 300						400 to 260, 50/60	400 mA at 115 VAC
GJ-77122-22							12 VDC†	—

†Power supply not included with 12 VDC models.

GJ-77120-03 Brackets for panel mounting. Set of 2
GJ-77120-11 Replacement power supply, 115/230 VAC, for pumps 77122-00 and -10
GJ-77200-07 Replacement power supply, 115/230 VAC, for pump 77122-20



77120-03

Microbore Pump Tubing Ordering Information

Tube ID (mm)	Tygon® Lab	Silicone, platinum-cured	Silicone, peroxide-cured	PharMed® BPT	Tygon® LFL (long flex life)	Viton®	C-FLEX®	Solvent/ hydrocarbon
0.19	GJ-95609-10	—	—	—	—	—	GJ-95718-10	GJ-95712-10
0.25	GJ-95609-12	—	—	GJ-95809-12	—	—	GJ-95718-12	GJ-95712-12
0.51	GJ-95609-18	GJ-95590-18	—	GJ-95809-18	GJ-96429-18	—	GJ-95718-18	GJ-95712-18
0.89	GJ-95609-26	GJ-95590-26	GJ-07625-26	GJ-95809-26	GJ-96429-26	GJ-07632-26	GJ-95718-26	GJ-95712-26
1.14	GJ-95609-30	GJ-95590-30	GJ-07625-30	GJ-95809-30	GJ-96429-30	GJ-07632-30	GJ-95718-30	GJ-95712-30
1.42	GJ-95609-34	GJ-95590-34	GJ-07625-34	GJ-95809-34	GJ-96429-34	GJ-07632-34	GJ-95718-34	GJ-95712-34
2.06	GJ-95609-42	GJ-95590-42	GJ-07625-42	GJ-95809-42	GJ-96429-42	GJ-07632-42	GJ-95718-42	GJ-95712-42
2.79	GJ-95609-48	GJ-95590-48	GJ-07625-48	GJ-95809-48	GJ-96429-48	GJ-07632-48	GJ-95718-48	GJ-95712-48
Qty/pk	100 ft (30.4 m)	50 ft (15.2 m)	50 ft (15.2 m)	100 ft (30.4 m)	100 ft (30.4 m)	50 ft (15.2 m)	50 ft (15.2 m)	50 ft (15.2 m)

Masterflex® Advantage

Masterflex vs Gear Pumps

Application

A quality control technician needs to pump beverage samples through a spectrophotometer flow cell. Flow rate is in the range of 0.8 to 1.2 mL/min. The technician would like to circulate a blank solution simultaneously at the same flow rate.

Masterflex Advantages

- Sample changes are quick—just by changing tubing
- Dual-channel pump enables simultaneous pumping of sample and blank
- Vary flow rate by changing tubing size or adjusting rpm

Gear Pump Disadvantages

- Sample changes require careful flushing of the pump
- Without dual-channel capability, the technician would need to operate and adjust two separate pumps

Masterflex Products Applied

- 77120-42 C/L Dual-channel pump
- 96429-26 Tygon® LFL 0.89-mm ID tubing

GO to 16–21

For select individual system components:
L/S pump heads.....16
L/S drives.....17–19
L/S pump tubing 20–21

L/S® Economy Pumps

Applications

- General fluid transfer ■ Filtration
- Low-pressure chromatography ■ Fermentation

Benefits

- Versatile system with a wide flow range ■ Easy tubing changes
- Most economical L/S pump system ■ Self-priming

Features

- Soft-start, 1/20-hp continuous-duty drive
- ±5% drive speed accuracy
- Stackable painted-steel console housing

77910-30

77910-20

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77910-30	16 to 480	L/S Easy-Load® 3 77800-60	Tygon® LFL L/S 16 06429-16; 10 ft (3 m)	L/S 13, L/S 14, L/S 16, L/S 25, L/S 17, L/S 18	07554-90	20 to 600	IP23	90 to 130 VAC, 1.5 A
GJ-77910-35					07554-95			180 to 260 VAC, 0.8 A
GJ-77910-20	56 to 1700	L/S Easy-Load II 77200-62	Tygon LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	07554-90			90 to 130 VAC, 1.5 A
GJ-77910-25					07554-95			180 to 260 VAC, 0.8 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

L/S® Modular Pumps

Applications

- Sterile fluid transfer ■ Carboy or small tank pumping
- Chemical recirculation ■ Printing ■ Laboratory research
- Filtration ■ Polishing/lapping

Benefits

- Modular format lets you place drive and controller up to six feet apart
- Easy tubing changes
- On/off/reverse with inertia center prevents jumping when direction changes
- Reversible motor lets you purge tubing before or after pumping

Features

- Splash-resistant controller and chemical-resistant motor connected by 6-ft (1.8-m) cable
- Soft-start, 1/10-hp continuous-duty drive
- ±2% speed control

77913-40

77913-20

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77913-40	4.8 to 480	L/S Easy-Load 3 77800-60	Tygon LFL L/S 16 06429-16; 10 ft (3 m)	L/S 13, L/S 14, L/S 16, L/S 25, L/S 17, L/S 18	07553-70	6 to 600	Controller: IP23 Motor: IP21	90 to 130 VAC, 1.5 A
GJ-77913-45					07553-77			180 to 260 VAC, 0.8 A
GJ-77913-20	17 to 1700	L/S Easy-Load II 77200-62	Tygon LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	07553-70			90 to 130 VAC, 1.5 A
GJ-77913-25					07553-77			180 to 260 VAC, 0.8 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

Application Solution

Challenge: A soft drink bottler needed to pump degassed soda at approximately 50 mL/min into an Anton Parr density meter. This is a critical step in the quality assurance program at the bottling facility.

Solution: The L/S® precision pump with remote capability (77911-20, -27) allows the bottler to maintain precise control of flow rate without the expense of a digital model. The clarity of the Tygon® tubing allows the user to verify flow and the Easy-Load® II pump head speeds tubing changes between batches. The bottler can lock in the required speed setting and start/stop the pump remotely.

L/S® Precision Pump

Applications

- General transfer and filling applications
- Circulating bath pump
- Coolant circulation
- Low-volume tank transfer and filling

Benefits

- Powerful, low-cost metering and transfer pump with accurate speed control
- Reversible motor for purge before/after pumping; pump in either direction
- Stackable, splash-resistant ABS plastic housing wipes down for easy cleaning

Features

- 1/10-hp, continuous-duty drive
- ±2% speed control accuracy
- Simple analog controls

77916-00

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77916-00	17 to 1700	L/S Easy-Load® II 77200-62	Tygon® LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	07520-40	6 to 600	IP23	90 to 130 VAC, 2.3 A
GJ-77916-07					07520-47			190 to 260 VAC, 1.2 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

L/S® Precision Pump with Remote Capability

Applications

- Ink transfer
- Acid/base feed pump
- Gel destaining
- Photographic chemical delivery
- Remote-controlled metering pump

Benefits

- 10-turn speed control for repeatability
- Reversible pumping
- Lock in speed setting to prevent accidental changes
- Control motor operation and speed remotely. Start/stop foot switch (order below); 4–20 mA speed control (wire via DB9 male connector)
- Stackable splash-resistant ABS plastic housing

Features

- 1/10-hp, continuous-duty drive
- ±1% drive speed accuracy
- DB9 female connection on pump for remote wiring

77911-20

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77911-20	17 to 1700	L/S Easy-Load II 77200-62	Tygon LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	07521-40	6 to 600	IP23	90 to 130 VAC, 2.3 A
GJ-77911-27					07521-47			190 to 260 VAC, 1.2 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

GJ-77595-35 Foot switch, DB9 male. Use for start/stop operation
GJ-07595-45 Connector, DB9 male. Use for 4–20 mA remote control

Masterflex® Advantage

Masterflex vs Gear Pumps

Application

A veterinarian needs to pump physiological saline for wound irrigation and cleaning during large animal surgery. Flow rate for this application varies from 100 mL/min up to 600 mL/min.

Masterflex Advantages

- Continuous flow path with single length of tubing
- Easy to change out tubing and clean pump
- Maintains sterility of fluid (fluid only contacts the tubing)

Gear Pump Disadvantages

- Multiple connections in flow path
- Difficult to clean
- Limited flow range
- Does not provide sterile conditions (fluid contacts internal pump part)

Masterflex Products Applied

- 77800-60 L/S Easy-Load® 3 pump head
- 96410-18 platinum-cured silicone tubing
- 07520-40 L/S Precision console drive

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For select individual system components:

L/S pump heads.....16

L/S drives.....17–19

L/S pump tubing 20–21

L/S® Economy Digital Pump

Applications

- Vitamin addition ■ Aqueous buffer delivery ■ Fraction collecting
- Low-pressure chromatography

Benefits

- Low cost ■ Easy tubing changes
- Programmable flow rate for repeatable performance
- Displays flow rate and rpm ■ Can be calibrated for greater accuracy
- Splash-resistant housing protects internal components

Features

- 1/10-hp, continuous-duty drive ■ Membrane keypad
- Stackable ABS plastic housing ■ ±0.25% drive speed control with tach feedback

77920-30

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77920-30	28 to 1700	L/S Easy-Load® II 77200-62	Tygon® LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	07524-40	10 to 600	IP23	90 to 130 VAC, 2.3 A
GJ-77920-37					07524-47			180 to 260 VAC, 1.2 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

L/S® Standard Digital Pumps

Applications

- Acid/base pH control ■ Nutrient media dispensing
- Precision fragrance delivery ■ Automated fermentation
- Surfactant delivery

Benefits

- Brushless, maintenance-free motor reduces operating costs
- Reversible pumping ■ Displays flow rate, rpm, dispense volume, copy number
- Remote control: Start/stop foot switch (order below); 0–20 mA, 4–20 mA, or 0–10 VDC speed control; Start/stop/reverse/prime (with DB15 male connector)
- Programmable flow rate and dispense interval for automated dispensing
- Can be calibrated for greater accuracy

Features

- 1/10-hp, continuous-duty drive ■ ±0.25% drive speed control with tach feedback
- Splash-resistant stackable housing ■ Membrane keypad with lockout

77921-50

77921-40

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77921-50	8 to 480	L/S Easy-Load 3 77800-60	Tygon LFL L/S 16 06429-16; 10 ft (3 m)	L/S 13, L/S 14, L/S 16, L/S 25, L/S 17, L/S 18	07523-60	10 to 600	IP23	90 to 130 VAC, 2.2 A; and 190 to 260 VAC, 1.1 A
GJ-77921-40	28 to 1700	L/S Easy-Load II 77200-62	Tygon LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36				

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

GJ-07595-42 Foot switch, momentary start/start, 6-ft (1.8-m) cable

GJ-07595-52 DB15 Connector. Use to create your own cable

GJ-07595-60 Handheld dispensing wand

Application Solution

Challenge: An adhesives manufacturer needed to dose different types and different volumes of viscous rapid-drying glue. Pumps with valves and moving parts were prone to getting stuck or would have to be cleaned very thoroughly at the end of a session. In some cases, pumps were damaged beyond recovery.

Solution: We recommended L/S high-performance precision (thicker-walled) platinum-cured silicone tubing. Silicone is the only tubing that can be used more than once. The rapid-drying glue can actually be stored in the silicone tubing for several days if the outlet of the tubing is closed.

The manufacturer now uses an L/S standard digital drive and Easy-Load II pump head (system 77921-40) to dose 20 and 50 mL of rapid-drying glue with a viscosity of approximately 1200 cps. Oversizing the tubing allows the pump to run at speeds under 200 rpm; facilitating pumping of the viscous glue.

L/S® Computer-Compatible Pumps

Applications

- Programmable dispensing ■ Automated process ■ Dosing/metering additives
- Dispensing by weight/weight ratio ■ Repetitive filling
- Media dispensing in cell culture and fermentation ■ Gradient pump

Benefits

- Stand-alone digital dispenser or RS-232 control through PC
- Four-digit display shows rpm, flow rate, dispense volume, and copy number
- Programmable dispense interval for automated dispensing
- Analog remote control of speed, start/stop, and direction
- Programmed calibration ensures accuracy
- Stackable, splash-resistant housing wipes down for easy cleaning

Features

- 1/10-hp, continuous-duty brushless drive
- ±0.25% PWM speed control accuracy with tach output
- Remote control capability via DB15 connector on back of drive
- Membrane keypad with lockout

77924-40

77924-30

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77924-40	8 to 480	L/S Easy-Load® 3 77800-60	Tygon® LFL L/S 16 06429-16; 10 ft (3 m)	L/S 13, L/S 14, L/S 16, L/S 25, L/S 17, L/S 18	07550-30	10 to 600	IP23	90 to 130 VAC, 2.2 A; and 190 to 260 VAC, 1.1 A
GJ-77924-30	28 to 1700	L/S Easy-Load II 77200-62	Tygon LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36				

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

GJ-07595-42 Foot switch, momentary start/stop; 6-ft (1.8-m) cable

GJ-07595-52 DB15 male connector

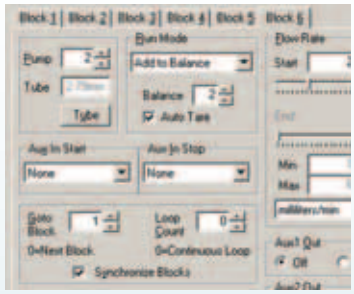
GJ-07595-60 Dispensing handle for momentary start/stop

Masterflex® Linkable Instrument Control Software

Enhanced balance interface capability and 21 CFR Part 11 compliance

- Control all functions of up to 25 Masterflex L/S computer-compatible pumps with your personal computer
- Windows®-based software has familiar pull-down menus and mouse-selectable icons
- Customize to meet your application: dispensing, mixing/diluting, flow proportioning, and single/multiple slope gradients; program each pump to automate up to 50 steps
- Improved balance interface allows you to dispense off of a balance and features weight-ratio dispensing; use of multiple balances is enabled with multiple COM ports on your PC
- Log at specific intervals, at the end of each block, or at the end of each run
- Complies with 21 CFR Part 11: password protection and authorized user list, audit trail documents all operations, file encryption permits authorized user access only

Design your own program using the simple-to-use software. Quick updates provide up-to-the-minute pump information.



Ordering Information

GJ-07550-74 Masterflex linkable instrument control software, Windows® 3.1 or later, CD-ROM

GJ-22050-54 RS-232 interface cable, DB9 (M) to DB9 (F), 8-ft (2.4-m) long. Connects pump drive to drive, and drive to PC

Masterflex® Advantage

Masterflex vs Gear Pumps

Application

A pharmaceutical engineer needs to draw a constant volume of 800 mL/min of water with particulates. The engineer needs variable speed and is drawing the fluid through a particle sensor.

Masterflex Advantages

- Handles particulates
- Easy to change out tubing and clean pump
- Runs dry
- Maintains sterility of fluid (fluid only contacts the tubing)

Gear Pump Disadvantages

- Does not handle particulates
- Difficult to clean
- Can't run dry
- Does not provide sterile conditions (fluid contacts internal pump parts)

Masterflex Products Applied

- 77800-62 L/S® Easy-Load® 3 pump head
- 06424-36 C-FLEX® L/S 36 High-performance precision tubing
- 07523-60 L/S Digital standard console drive
- 07596-20 Pulse dampener

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L/S® Multichannel Pumps

Applications

- Precision dispensing into multiple containers
- Transfer or meter fluids through multiple lines
- Rapid automated filling

Benefits

- Control of multiple channels with a single drive reduces operating cost per channel
- Powerful metering and transfer pump with accurate 10-turn speed control
- Synchronous flow from all four channels ensures accuracy when dispensing into multiple containers
- Reversible motor for purge before/after pumping; pump in either direction
- Simple analog controls; lock in speed setting for repeatability and security
- Remote control of speed and start/stop
- Accepts L/S two-stop tube sets for optimal tension with no adjustment
- Stackable ABS plastic housing wipes down for easy cleaning

Features

- Four-channel pump head
- 1/10-hp, continuous-duty drive with remote capability
- ±2% speed control accuracy

77926-00

77927-00

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77926-00	0.47 to 47	L/S four channel 07535-04	Tygon® Lab tube set, L/S 16 06416-16; pk of 8	L/S two-stop tube sets: L/S 13, L/S 14, L/S 16	77521-50	1 to 100	IP23	90 to 130 VAC, 2.3 A
GJ-77926-07					77521-57			180 to 260 VAC, 1.2 A
GJ-77927-00	2.8 to 280	L/S four channel 07536-04	Tygon Lab tube set, L/S 24 06416-24; pk of 4	L/S two-stop tube sets: L/S 15, L/S 24, L/S 35	77521-50	1 to 100	IP23	90 to 130 VAC, 2.3 A
GJ-77927-07					77521-57			180 to 260 VAC, 1.2 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order two-stop tube sets below and L/S extension tubing on pages 20–21.

GJ-77595-35 Foot switch, DB9 male. Use for start/stop operation
GJ-07595-45 Connector, DB9 male. Use for 4–20 mA remote control

L/S® Two-Stop Precision Pump Tube Sets Ordering Information

Pump tubing		L/S Precision pump tubing			L/S High-performance precision pump tubing		
		L/S 13	L/S 14	L/S 16	L/S 15	L/S 24	L/S 35
Flow rate per channel (mL/min)	1 to 100 rpm	0.045 to 4.5	0.16 to 16	0.47 to 47	1.6 to 160	2.8 to 280	3.8 to 380
	6 to 600 rpm	0.27 to 27	0.96 to 96	2.8 to 280	10 to 1000	17 to 1700	23 to 2300
Tygon® Lab		GJ-06416-13 Pk of 8	GJ-06416-14 Pk of 8	GJ-06416-16 Pk of 8	GJ-06416-15 Pk of 4	GJ-06416-24 Pk of 4	GJ-06416-35 Pk of 4
Silicone (platinum-cured)		GJ-06421-13 Pk of 8	GJ-06421-14 Pk of 8	GJ-06421-16 Pk of 8	GJ-06421-15 Pk of 4	GJ-06421-24 Pk of 4	GJ-06421-35 Pk of 4
PharMed® BPT		GJ-96114-13 Pk of 8	GJ-96114-14 Pk of 8	GJ-96114-16 Pk of 8	GJ-96114-15 Pk of 4	GJ-96114-24 Pk of 4	GJ-96114-35 Pk of 4
Viton®		GJ-06428-13 Pk of 8	GJ-06428-14 Pk of 8	GJ-06428-16 Pk of 8	GJ-06428-15 Pk of 4	GJ-06428-24 Pk of 4	GJ-06428-35 Pk of 4

Application Solution

Challenge: A pharmaceutical manufacturer needed to dispense volumes of 300 mL in 15 seconds or less repeating three times per minute; and 20 mL in 2 seconds or less repeating 20 times per minute. The desired accuracy target for both applications was ±1.5%. The efficiency of simultaneously pumping multiple channels was critical.

Solution: The manufacturer now uses a Masterflex® L/S digital drive with an L/S four-channel pump head 07536-04. Size L/S 15 two-stop silicone tubing (06421-15) met the smaller flow requirement; while size L/S 35 two-stop silicone tubing (06421-35) met the larger flow requirement. Careful calibration of the drive, and the synchronous multichannel flow capability of the pump head enabled the manufacturer to meet the accuracy target.

L/S® Cartridge Pump Systems

Applications

- Multiple-channel low-flow transfer and perfusion
- Synchronous multichannel dispensing
- Low-pressure chromatography
- Feeding automated dispensers

Benefits

- Cartridges accept multiple tubing sizes for wide flow range
- Cartridges snap in and out for tubing changes; change tubing in one channel without disturbing others
- Finely adjust occlusion to increase accuracy
- Use only one cartridge, or load to capacity
- Digital dispensing drive features maintenance-free brushless motor
- Program dispensing parameters, including delay interval, for automated dispensing
- Four-channel, eight-roller pump offers lowest pulsation for better accuracy

Features

- 1/10-hp continuous-duty brushless drive
- Tach feedback for ±0.25% drive speed control
- Remote control via DB15 female connector on drive
- IP23 rated, stackable ABS housing
- Membrane keypad with lockout

77919-00

77919-10

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
L/S eight-channel four-roller cartridge pump system								
GJ-77919-00	0.17 to 18	L/S Cartridge head 07519-06 with eight small cartridges 07519-80	PVC microbore tube set, 1.42-mm ID 06416-34; pk of 12	Microbore tube sets; L/S 13, L/S 14	07523-70	1 to 100	IP23	90 to 130 VAC, 2.2 A; 190 to 260 VAC, 1.1 A
L/S reduced-pulsation four-channel eight-roller cartridge pump system								
GJ-77919-10	0.12 to 12	L/S Cartridge head 07519-20 with four small cartridges 07519-85	PVC microbore tube set, 1.42-mm ID 06416-34; pk of 12	Microbore tube sets; L/S 13, L/S 14	07523-70	1 to 100	IP23	90 to 130 VAC, 2.2 A; 190 to 260 VAC, 1.1 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order microbore two-stop tube sets below and L/S tubing on pages 20–21.

Microbore Two-Stop Pump Tube Sets Ordering Information

Pump tubing		0.89 mm ID	1.42 mm ID	2.06 mm ID	2.79 mm ID
Flow rate per channel (mL/min)	Cartridge head 07519-06	0.074 to 7.4	0.17 to 18	0.37 to 37	0.63 to 63
	Cartridge head 07519-20	0.052 to 5.2	0.12 to 12	0.22 to 22	0.34 to 34
Platinum-cured silicone		**GJ-06421-26 Pk of 6**	**GJ-06421-34 Pk of 6**	**GJ-06421-42 Pk of 6**	**GJ-06421-48 Pk of 6**
Santoprene®		**GJ-06431-26 Pk of 12**	**GJ-06431-34 Pk of 12**	**GJ-06431-42 Pk of 12**	**GJ-06431-48 Pk of 12**
PVC		**GJ-06416-26 Pk of 12**	**GJ-06416-34 Pk of 12**	**GJ-06416-42 Pk of 12**	**GJ-06416-48 Pk of 12**
Viton®		**GJ-06428-26 Pk of 12**	**GJ-06428-34 Pk of 12**	**GJ-06428-42 Pk of 12**	**GJ-06428-48 Pk of 12**

Cartridge Ordering Information

GJ-07519-80 Additional small cartridge for pump system 77919-00

GJ-07519-85 Additional small cartridge for pump system 77919-10

07519-80

Masterflex® Advantage

Masterflex vs Syringe Pumps

Application

A university research lab needs to pump a fixative (formaldehyde and glutaraldehyde in a phosphate buffer) to preserve brain tissue. They are pumping at low flow rates (20 to 40 mL/min) with four channels pumped at one time.

Masterflex Advantages

- Handles high viscosities well
- Easy to change out tubing and clean/sterilize tubing
- Excellent self-priming capabilities
- Able to pump particulates
- Multichannel capabilities

Syringe Pump Disadvantages

- Does not handle viscous fluids
- Difficult to clean and sanitize
- Not self-priming
- Cannot pump particulates
- Automated options are expensive at the lower flow rates

Masterflex Products Applied

- 07519-06 L/S Multichannel cartridge pump head
- 07519-80 Small cartridges
- 06424-14 C-FLEX® L/S 14 Precision tubing
- 07523-70 L/S Brushless digital drive

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L/S pump tubing 20–21

L/S® Digital Modular Pump

77923-60

Applications

- Epoxy resin delivery ■ Culture media dispensing
- Coffee-additive dispensing ■ FDA tablet coating

Benefits

- Separate drive/controller for placement flexibility
- Brushless motor for continuous-duty maintenance-free operation
- Remote I/O for control flexibility; tach output lets you monitor pump operation
- Easy tubing changes saves operator time ■ Reverse pumping to prime or purge tubing
- Programmable time delay interval for repetitive filling

Features

- 1/10-hp, continuous-duty drive ■ ±0.3% drive speed accuracy
- Controller/drive connected by a 25-ft (7.6-m) cable

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77923-60	28 to 1700	L/S Easy-Load® II 77200-62	Tygon® LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	77301-20	10 to 600	Controller: IP22 Motor: IP56	90 to 130 VAC, 2.2 A; 190 to 260 VAC, 1.1 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

GJ-07595-42 Foot switch, momentary start/stop; 6-ft (1.8-m) cable
GJ-07595-52 DB15 male connector, use to create your own cable

L/S® Digital Modular Pump with Wall-Mount Controller

77923-70

Applications

- Adhesive resin delivery ■ Salad dressing dispensing
- Food-additive dispensing ■ Packaging process pump

Benefits

- Washdown IP56-rated components for easy cleanup in process applications
- Remote I/O for control flexibility; tach output lets you monitor pump operation
- Brushless motor for continuous-duty maintenance-free operation ■ Easy tubing changes
- Repetitive dispensing with programmable delay for efficient repeat filling operations

Features

- 1/10-hp, continuous-duty drive ■ ±0.3% drive speed accuracy
- IP56-rated controller/drive connected by a 25-ft (7.6-m) water-tight cable

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77923-70	28 to 1700	L/S Easy-Load II 77200-62	Tygon LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	77301-30	10 to 600	Controller: IP56 Motor: IP56	90 to 130 VAC, 2.2 A; 190 to 260 VAC, 1.1 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

GJ-07592-83 Handheld remote controller, with 25-ft (7.6-m) cable
GJ-77300-32 DB15 remote cable, 25 ft (7.6 m) for remote capabilities

Application Solution

Challenge: An engineer at a water treatment plant was setting up a pilot project requiring feeding and returning activated sludge. The viscous sludge had to be pumped in and out of two separate tanks at approximately equal rates. The pumps would run at maximum speed for one minute out of every five minutes.

Solution: The engineer now uses four L/S digital modular drives with wall-mount controller and Easy-Load II pump heads (system 77923-70) to circulate the sludge. Norprene® tubing (06404-series) handles the viscous fluid, and Easy-Load II pump heads facilitate the occasional tubing changes. The modular systems give the operator flexibility in placing the controllers; and the controller and motor can be washed down when needed. The digital drives accept remote signals in the event the operating conditions change.

L/S® Digital Process Pumps

Applications

- Pharma, food, and dairy processing
- Metering flavorings and colorants
- Pumping buffer solutions
- Filling/emptying media bags
- Sterile filtration; sterile fluid transfer
- Spray coating
- Pumping slurries and purees

Benefits

- Full-featured digital dispenser is ideal for filling applications requiring varying flow rates and volumes
- Four-digit display shows rpm, flow rate, dispense volume, copy number, and cumulative volume
- Select to display English or metric units
- Programmable dispense interval for automated dispensing
- Analog remote control of speed, start/stop, and direction; tach output for monitoring pump operation
- Programmed calibration ensures dispense accuracy
- Sealed, 316 stainless steel housing for easy washdown in sanitary process environments
- Keypad lockout feature prevents inadvertent changes to programmed settings

Features

- 1/10-hp, continuous-duty brushless drive
- ±0.25% PWM speed control accuracy with tach output
- Remote control capability via fluid-resistant I/O connector on back of drive

77975-00

77975-10

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77975-00	3.0 to 1700	L/S Easy-Load® II 77200-62	Tygon® LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	07575-00	1 to 600	IP66	90 to 130 VAC, 2.2 A; 190 to 260 VAC, 1.1 A
GJ-77975-10	3.0 to 1800	L/S High-Performance 77250-62	Tygon LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36				

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

GJ-07592-83 Handheld remote controller, with 25-ft (8.3-m) cable

GJ-07595-43 Washdown foot switch, momentary start/stop; 6-ft (1.8-m) cable

GJ-77300-32 DB15 Remote cable, 25 ft (8.3 m) for remote capabilities

07592-83

77300-32

Masterflex® Advantage

Masterflex vs Diaphragm Pumps

Application

A dairy processor needs to pump 30% hydrogen peroxide (H_2O_2) at relatively high back pressure (30 to 40 psi) in an aseptic bottling system.

Masterflex Advantages

- H_2O_2 is compatible with tubing with minimal decomposition
- Flow is steady at back pressure
- Tubing lasts up to three months, minimizing maintenance
- IP66-rated drive is ideal for the dairy processing environment

Diaphragm Pump Disadvantages

- H_2O_2 decomposes in contact with metal, releasing O_2 gas
- Diaphragm pumps have difficulty with the back pressure
- Maintenance time increases operating costs

Masterflex Products Applied

- 77200-62 L/S Easy-Load II pump head
- 06402-15 Norprene® Food L/S 15 pump tubing
- 07575-00 L/S digital process drive

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L/S® PTFE-Tubing Pump

Applications

- Transfer of aggressive chemicals ■ Filtration
- High-purity pumping ■ Chemical injection

Benefits

- Excellent chemical compatibility for metering aggressive chemicals
- Higher pressures up to 6.9 bar (100 psi), low pulsation
- Inert PTFE tubing maintains fluid purity
- Adjustable occlusion ■ Low maintenance

Features

- 1/10-hp, 6 to 300 rpm continuous-duty drive
- 32 to 212°F (0 to 100°C) temperature range
- 8-ft suction lift; 100 psi pressure capability

77912-00

Tubing Ordering Information

GJ-77390-60 PTFE tubing set, 6-mm OD, 4-mm ID. Set of two 15" (38-cm) lengths

GJ-06407-20 PTFE extension tubing, 6-mm OD. One 12-ft (3.7-m) length

GJ-31321-64 Straight connector; 6 mm, 135 psi (9.2 bar) max

Specifications & Ordering Information

Catalog number	Flow range (mL/min)	Pump head included	Tubing included†	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77912-00	0.25 to 65	L/S PTFE-tubing 77390-00	6-mm OD PTFE tubing set 77390-60	—	07520-60	1 to 300‡	IP23	90 to 130 VAC, 2.3 A
GJ-77912-07					07520-67			180 to 260 VAC, 1.2 A

†Also includes two ¼" pipe adapters. ‡Recommended drive speed operating range for included pump head.

L/S® PTFE-Diaphragm Pump

Applications

- Chemical feed and metering ■ Chemical injection ■ High-purity fluid transfer
- Pumping aggressive chemicals ■ High-pressure pumping

Benefits

- Continuous pressure up to 50 psi; 75 psi intermittent
- Excellent chemical compatibility ■ High metering accuracy
- Self-priming ■ PTFE fluid path maintains fluid purity

Features

- 1/10-hp, 6 to 600 rpm continuous-duty drive ■ ±2% speed control accuracy
- ABS plastic housing ■ DB9 female connection on back for remote control

77915-00

Specifications & Ordering Information

Catalog number	Flow range (mL/min)	Pump head included	Tubing included†	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77915-00	80 to 800	L/S PTFE diaphragm 07090-42	¼" ID x ⅜" OD PTFE tubing 06605-15; 12 ft (3.6 m)	—	77521-40	40 to 400‡	IP23	90 to 130 VAC, 2.3 A
GJ-77915-07					77521-47			180 to 260 VAC, 1.2 A

†Also includes pipe adapters and check valve. ‡Recommended drive speed operating range for included pump head.

Application Solution

Challenge: A manufacturer of insect repellents needed to inject a viscous pheromone suspension into 40 meters of fine-gauge pipe without contaminating the fluid. They were using a vacuum pump to draw the suspension into the pipe, but this method was very slow and had a problem with pressure buildup.

Solution: The L/S PTFE-tubing pump (77912-00, -07) solved the problem. The rigid PTFE tubing withstands pressures up to 100 psi and the all-PTFE wetted parts eliminate the risk of contamination in the flow line. This particular step in the manufacturing process was reduced from one hour to six minutes—a 1000% improvement!

L/S® High-Pressure Pump

Applications

- High-pressure chemical feed and metering
- High-pressure chemical injection ■ Chromatography
- Pressure filtration ■ Sterile filtration

Benefits

- Pump at continuous pressure up to 6.9 bar (100 psi)
- No gears, valves, seals, or diaphragms for minimal maintenance and downtime
- Fluid remains in tubing at all times; contamination-free
- Separate speed control and power switch maintain speed setting when pump is switched on/off
- Reversible motor; pump in either direction

Features

- 1/10-hp, continuous-duty drive
- ±1% speed control accuracy ■ ABS plastic housing

77914-00

Tubing Ordering Information

GJ-95664-16 L/S PharMed BPT 16HP high-pressure tubing; 0.9 to 90 mL/min, 6.9 bar (100 psi) max pressure. Pack of 25 ft (7.6 m)

GJ-95664-15 L/S PharMed BPT 15HP high-pressure tubing; 1.7 to 170 mL/min, 5.4 bar (80 psi) max pressure. Pack of 25 ft (7.6 m)

GJ-06504-16 L/S Norprene® 16HP high-pressure tubing; 0.9 to 90 mL/min, 6.9 bar (100 psi) max pressure. Pack of 25 ft (7.6 m)

GJ-06504-15 L/S Norprene 15HP high-pressure tubing; 1.7 to 170 mL/min, 5.4 bar (80 psi) max pressure. Pack of 25 ft (7.6 m)

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77914-00	0.9 to 90	L/S High-Performance 77250-62	PharMed® BPT L/S 16HP 95664-16; 8 ft (2.4 m)	L/S 16HP, L/S 15HP	07520-50	1 to 100	IP23	90 to 130 VAC, 2.3 A
GJ-77914-07					07520-57			180 to 260 VAC, 1.2 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order above right.

L/S® Air-Powered Pump

Applications

- Transfer of chemicals where hazardous vapors are present
- Transfer of printing inks and solvents ■ Transfer of heat-sensitive fluids
- Production fermentation

Benefits

- Ideal where electricity is unsafe ■ Operates from your compressor
- High power, compact size ■ Cooler operation
- Smooth-starting, low-maintenance 1/3-hp motor

Features

- 1/3-hp, continuous-duty drive ■ ±10% drive speed accuracy
- Complete with regulator with 5-µm air filter and 1/4" NPT(F) connection, automatic lubricator, 0 to 20 psi pressure gauge, and muffler

77931-10

Specifications & Ordering Information

Catalog number	Flow range† (mL/min)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power
GJ-77931-10	170 to 1700	L/S Easy-Load® II 77200-62	Tygon® LFL L/S 24 06429-24; 10 ft (3 m)	L/S 15, L/S 24, L/S 35, L/S 36	07569-00	60 to 600	IP44	3 to 25 cfm (0.08 to 0.7 m^3/min) at 1.4 to 6.9 bar (20 to 100 psi)

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on pages 20–21.

Masterflex® Advantage

Masterflex vs Piston Pumps

Application

A rubber manufacturer needs to dispense 1-mL doses of Methyl Ethyl Ketone (MEK) as a primer in the process of vulcanizing (curing) rubber. They need a pump that is easy to operate.

Masterflex Advantages

- PTFE tubing is chemically compatible with aggressive MEK
- Simple to operate controls
- Easy to change out tubing and clean pump—reduces labor
- Runs dry to prime

Piston Pump Disadvantages

- Chemical compatibility is challenging
- Difficult to regulate the 1-mL doses
- Difficult to clean (internal parts of pump head and valves)
- Can't run dry

Masterflex Products Applied

- 77390-00 L/S PTFE-tubing pump head
- 77390-60 L/S PTFE tubing, 6-mm OD
- 07520-60 L/S Variable-speed precision console drive

L/S® Pump Heads

L/S® Pump Heads

A
Easy-Load® 3 pump head

B
Easy-Load II pump head

C
High-performance pump head

A Easy-Load® 3 Pump Heads

- Mount and stack heads without tools or hardware—automatic tubing retention speeds setup and changeover
- Twist-lock mounting feature lets you mount and stack heads in seconds
- Same side tubing entry/exit permits easy integration into space-limited applications—mount and operate head in any of four positions (depending on drive)
- Polypropylene housing with cold-rolled steel (CRS) or stainless steel (SS) rotor—CRS is a more economical choice while SS offers greater durability and chemical resistance
- Pump head comes ready to mount to drive—stack heads to increase flow capacity and for multiple-channel applications
- Included mounting plate adapts pump head to L/S drives—locking tab secures head during operation in either direction

B Easy-Load II Pump Heads

- Four-roller rotor improves pressure performance and mechanical stability, and reduces flow pulsation
- Improved occlusion bed geometry reduces tubing wear and lengthens tubing life
- Models with adjustable occlusion available—tighten occlusion for higher pressure, loosen for longer tubing life
- Polyphenylene sulfide (PPS) housing with CRS or SS rotor—choose SS for greater durability and chemical resistance
- Pump head comes ready to mount—mount up to four heads on a single drive (see page 36 for hardware to mount two or more heads)

C High-Performance Pump Head

- The highest flow rate and highest pressure generation of any L/S pump head!
- Offers better suction lift, viscous fluid transfer, and long tubing life
- Use with L/S high-pressure (HP) pump tubing to handle pressures up to 125 psi
- SS rollers, bearings, rotor plates, rotor shaft; PPS occlusion bed—both materials offer excellent chemical resistance
- Compatible with all L/S drives that accept two or more pump heads (pump head is not stackable)

Specifications & Ordering Information

Pump tubing size	mL per rev	Flow rates (mL/min)		Max system pressure†, psi (bar)		Fixed occlusion		Adjustable occlusion	Pump head includes
		1 to 100 rpm	6 to 600 rpm	Continuous	Intermittent	CRS rotor	SS rotor	SS rotor	
A Easy-Load 3 pump heads for precision pump tubing									
L/S 13	0.06	0.06 to 6	0.36 to 36	25 (1.7)	40 (2.7)	GJ-77800-50	GJ-77800-60	—	Mounting plate/adapter kit for L/S pump drives and a 17" (43-cm) length of silicone pump tubing
L/S 14	0.22	0.22 to 22	1.3 to 130	25 (1.7)	40 (2.7)				
L/S 16	0.8	0.8 to 80	4.8 to 480	25 (1.7)	40 (2.7)				
L/S 25	1.7	1.7 to 170	10 to 1000	20 (1.4)	35 (2.4)				
L/S 17	2.8	2.8 to 280	17 to 1700	15 (1.0)	20 (1.4)				
L/S 18	3.8	3.8 to 380	23 to 2300	10 (0.7)	15 (1.0)				
A Easy-Load 3 pump heads for high-performance precision pump tubing									
L/S 15	1.7	1.7 to 170	10 to 1000	25 (1.7)	30 (2.0)	GJ-77800-52	GJ-77800-62	—	Mounting plate/adapter kit for L/S pump drives and a 17" (43-cm) length of silicone pump tubing
L/S 24	2.8	2.8 to 280	17 to 1700	25 (1.7)	30 (2.0)				
L/S 35	3.8	3.8 to 380	23 to 2300	20 (1.4)	25 (1.7)				
L/S 36	4.8	4.8 to 480	29 to 2900	15 (1.0)	20 (1.4)				
B Easy-Load II pump heads for precision pump tubing									
L/S 13	0.06	0.06 to 6	0.36 to 36	25 (1.7)	40 (2.7)	GJ-77200-50	GJ-77200-60	GJ-77201-60	Single-channel mounting hardware and a 15" (38-cm) length of silicone pump tubing
L/S 14	0.21	0.21 to 21	1.3 to 130	25 (1.7)	40 (2.7)				
L/S 16	0.8	0.8 to 80	4.8 to 480	25 (1.7)	40 (2.7)				
L/S 25	1.7	1.7 to 170	10 to 1000	20 (1.4)	35 (2.4)				
L/S 17	2.8	2.8 to 280	17 to 1700	15 (1.4)	20 (1.4)				
L/S 18	3.8	3.8 to 380	23 to 2300	10 (0.7)	15 (1.0)				
B Easy-Load II pump heads for high-performance precision pump tubing									
L/S 15	1.7	1.7 to 170	10 to 1000	25 (1.7)	40 (2.7)	GJ-77200-52	GJ-77200-62	GJ-77201-62	Single-channel mounting hardware and a 15" (38-cm) length of silicone pump tubing
L/S 24	2.8	2.8 to 280	17 to 1700	25 (1.7)	40 (2.7)				
L/S 35	3.8	3.8 to 380	23 to 2300	20 (1.4)	35 (2.4)				
L/S 36	4.8	4.8 to 480	29 to 2900	15 (1.0)	20 (1.4)				
C High-performance pump head									
L/S 16HP‡	0.9	0.9 to 90	Not recommended	100 (6.8)	125 (8.5)	—	GJ-77250-62	—	Mounting hardware and a 15" (38-cm) length of Tygon® LFL pump tubing
L/S 15HP‡	1.7	1.7 to 170	Not recommended	80 (5.5)	100 (6.8)				
L/S 15	1.8	1.8 to 180	11 to 1100	25 (1.7)	40 (2.7)				
L/S 24	3.0	3.0 to 300	18 to 1800	25 (1.7)	40 (2.7)				
L/S 35	4.3	4.3 to 430	26 to 2600	20 (1.4)	35 (2.4)				
L/S 36	5.8	5.8 to 580	34 to 3400	15 (1.0)	20 (1.4)				

†Actual performance varies depending on pump tubing formulation—values shown are for firm pump tubing.

‡L/S 15HP and L/S 16HP pump tubing is for use only with the L/S High-Performance pump head mounted on any L/S 1 to 100 rpm drive capable of running two or more pump heads. **Note:** High-Performance pump head is not stackable.

L/S® Variable-Speed Drives

A Variable-Speed Economy Console Drives

- Pump head flow rate: 0.42 to 2900 mL/min (depends on drive rpm and tubing size)
- Separate single-turn speed control and on/off switch with green power indicator. Maintain speed setting while turning on/off
- The 1/20-hp unidirectional motor has soft start and back EMF for ±5% speed control
- Smooth operation and long service life

What's included: 6-ft (1.8-m) line cord—
115 VAC: U.S. standard plug; 230 VAC: IEC 320/CEE22 socket.

A
07554-80

B Variable-Speed Modular Drives

- Pump head flow rate: 0.06 to 3400 mL/min (depends on drive rpm and tubing size)
- Separate single-turn potentiometer and forward/off/reverse switch. Maintain speed while turning drive on/off/reverse
- 6-ft (1.8-m) cable connects motor and controller; place components where convenient or for efficient use of space

What's included: 6-ft (1.8-m) line cord—
115 VAC: U.S. standard plug; 230 VAC:
IEC 320/CEE22 socket.

B
07553-70

C Variable-Speed Console Drives

- Flow range: 0.06 to 3400 mL/min (depends on drive rpm and tubing size)
- Locking, 10-turn potentiometer for precise speed control
- Separate speed control and forward/off/reverse switch. Maintain speed setting when turning drive on/off/reverse
- Reversible motor—purge tubing before or after pumping; pump fluid in either direction
- Feature a DB9 female connector on back of drive:
  – Speed control input: 4 to 20 mA or 2 to 10 VDC
  – Start/stop via open collector or contact closure

What's included: 6-ft (1.8-m) line cord—
115 VAC: U.S. standard plug;
230 VAC: IEC 320/CEE22 socket.

C
77521-40

Specifications & Ordering Information

Catalog number	rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz) VAC	Power (50/60 Hz) Amps
A Variable-speed economy console drives								
GJ-07554-90	20 to 600	±5%	1	1/20 hp (37 W)	IP22	9" x 7" x 5¼" (22.9 cm x 18.1 cm x 13.3 cm)	90 to 130	1.5
GJ-07554-95							180 to 260	0.8
GJ-07554-80	7 to 200		2				90 to 130	1.5
GJ-07554-85							180 to 260	0.8
B Variable-speed modular drives								
GJ-07553-70	6 to 600	±2%	2	1/10 hp (75 W)	Controller: IP23 Drive: IP21	Controller: 4 15/16" x 7 1/16" x 4 1/16" (12.5 x 17.9 x 10.3 cm) Drive: 7 7/8" x 3 13/16" x 4 5/8" (20 x 9.7 x 11.7 cm)	90 to 130	3.0
GJ-07553-77							190 to 260	1.2
GJ-07553-80	1 to 100		4				90 to 130	3.0
GJ-07553-87							190 to 260	1.2
C Variable-speed console drives with 10-turn speed control and remote control capabilities								
GJ-77521-40	6 to 600	±2% (10-turn speed control)	2	1/10 hp (75 W)	IP23	11½" x 7" x 7" (29.2 x 17.8 x 17.8 cm)	90 to 130	2.3
GJ-77521-47							190 to 260	1.2
GJ-77521-50	1 to 100		4				90 to 130	2.3
GJ-77521-57							190 to 260	1.2

GO to page(s) 16, 20–21
For select individual system components:
L/S pump heads.....16
L/S pump tubing 20–21

L/S® Variable-Speed Digital Drives

A Economy Digital Drives

- Flow rate: 0.1 to 3400 mL/min (depends on drive rpm and tubing size)
- Display shows motor speed (rpm) or flow rate
- Membrane keypad for easy programming. Select tubing size and enter desired flow rate—drive locks in required rpm.
- Drive stores one user-specified calibration value per tubing size even when power is turned off— calibrate system to improve display accuracy

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket.

A
Drive 07524-40 shown with High-Performance pump head 77250-62

B Standard Brushless Digital Drives

- Flow rate: 0.1 to 3400 mL/min (depends on drive rpm and tubing size)
- Dispense by: mL—vol in mL of each dispense, 0.001 to 9999 mL; copy—1 to 9,999 dispense cycles; or SEC—time between each dispense: 1 to 9,999 secs
- Remote control capabilities via DB15 female connector on drive; speed control input, pumping direction and start/stop/purge, tachometer output: 0 to 20 mA, 4 to 20 mA, 0 to 10 V, TTL pulse
- Membrane keypad for easy programming. Select tubing size and enter desired flow rate—drive locks in required rpm
- Drive stores one user-specified calibration value per tubing size even when power is turned off—calibrate system to improve display accuracy

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket.

B
07523-60

C Computer-Compatible Brushless Digital Drives

- Flow rate: 0.1 to 3400 mL/min (depends on drive rpm and tubing size)
- Operate as a stand-alone dispensing drive with all the features of our Standard Brushless Digital Drives ("B" above) or operate through a PC
- Full RS-232 input/output via DB9 connector

See page 9 for control software and cables.

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket.

C
Drive 07550-30 shown with Easy-Load 3 pump head 77800-60

Specifications & Ordering Information

Catalog number	rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)	
							VAC	Amps
A Economy digital drives								
GJ-07524-40	10 to 600	±0.25% (1 rpm at 600 rpm; 0.1 rpm at 100 rpm)	2	1/10 hp (75 W)	IP23	11½" x 7" x 7" (29.2 x 17.8 x 17.8 cm)	90 to 130	2.3
GJ-07524-45							190 to 260	1.2
GJ-07524-50	1.6 to 100		4				90 to 130	2.3
GJ-07524-55							190 to 260	1.2
B Standard brushless digital drives								
GJ-07523-60	10 to 600	±0.25% (1 rpm at 600 rpm; 0.1 rpm at 100 rpm)	2	1/10 hp (75 W)	IP23	11½" x 7" x 7" (29.2 x 17.8 x 17.8 cm)	Dual voltage: 90 to 130, and 190 to 260	2.2 at 115 VAC, 1.1 at 230 VAC
GJ-07523-70	1.6 to 100		4				Dual voltage: 90 to 130, and 190 to 260	2.2 at 115 VAC, 1.1 at 230 VAC
C Computer-compatible brushless drives								
GJ-07550-30	10 to 600	±0.25% (1 rpm at 600 rpm; 0.1 rpm at 100 rpm)	2	1/10 hp (75 W)	IP23	11½" x 7" x 7" (29.2 x 17.8 x 17.8 cm)	Dual voltage: 90 to 130, and 190 to 260	2.2 at 115 VAC, 1.1 at 230 VAC
GJ-07550-50	1.6 to 100		4					

L/S® Variable-Speed Modular Dispensing Drives

A Modular Brushless Digital Dispensing Drive

- Flow rate: 0.6 to 3400 mL/min (depends on drive rpm and tubing size)
- Four-digit LED display shows flow rate, dispense volume, copy, and motor rpm
- Remote control capabilities: speed control input, pumping direction, start/stop/purge, and tachometer output: 0 to 20 mA, 4 to 20 mA, 0 to 10 V, or TTL pulse
- 25-ft (7.6-m) cable connects motor and controller—place where convenient

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket.

B Modular Brushless Digital Dispensing Drive with Wall-Mount Controller

- Flow rate: 0.6 to 3400 mL/min (depends on drive rpm and tubing size)
- Four-digit LED display shows flow rate, dispense volume, copy, and motor rpm
- Remote control capabilities: speed control input, pumping direction, start/stop/purge, and tachometer output: 0 to 20 mA, 4 to 20 mA, 0 to 10 V, or TTL pulse
- IP56 controller and motor—protected against dust and strong jets of water
- 25-ft (7.6-m) weather-resistant cable connects motor and controller

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket.

A
77301-20

B
77301-30

Specifications & Ordering Information

Catalog number	rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)	
							VAC	Amps
A Modular brushless digital dispensing drive								
GJ-77301-20	10 to 600	±0.3%	2	1/10 hp (75 W)	Controller: IP22 Motor: IP56	Controller: 9¾" x 9³⁄₁₆" x 5³⁄₁₆" (24.8 x 23.3 x 12.9 cm) Motor: 10½" x 3¹³⁄₁₆" x 4⅝" (26.7 x 9.7 x 11.7 cm)	Dual voltage: 90 to 130, and 190 to 260	2.2 at 115 VAC, 1.1 at 230 VAC
B Modular brushless digital drive with wall-mount controller								
GJ-77301-30	10 to 600	±0.3%	2	1/10 hp (75 W)	Controller: IP56 Motor: IP56	Controller: 9¾" x 9³⁄₁₆" x 5³⁄₁₆" (24.8 x 23.3 x 12.9 cm) Motor: 10½" x 3¹³⁄₁₆" x 4⅝" (26.7 x 9.7 x 11.7 cm)	Dual voltage: 90 to 130; 190 to 260	2.2 at 115 VAC, 1.1 at 230 VAC

L/S® Digital Console Process Drive

- Sealed, IP66 and NEMA 4X, 316 stainless steel housing and sealed keypad—simply hose down to clean
- Flow rate: 0.1 to 3400 mL/min (depends on drive rpm and tubing size)
- Five-digit LED display shows motor rpm, flow rate, dispense volume, cumulative volume, dispense interval time, and copy number
- Select to display English (gal.) or metric (mL, L) units
- Dispense by: volume and copy. Set time interval (SEC) between dispense cycles
- Remote control capabilities via fluid-resistant input/output connector on back of drive (order control cables and accessories on page 13)

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE 22 connector coupler; watertight cord connection.

WASHDOWN

L/S digital console drive 07575-00 shown with L/S High-Performance pump head 77250-62 and L/S PharMed® BPT tubing.

Specifications & Ordering Information

Catalog number	rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)	
							VAC	Amps
GJ-07575-00	1 to 600	±0.25%	2	1/10 hp (75 W)	IP66	12" x 9" x 9¼" (30.5 x 22.9 x 23.5 cm)	Dual voltage: 90 to 130, and 190 to 260	2.2 at 115 VAC, 1.1 at 230 VAC

L/S® Pump Tubing

L/S® Precision and High-Performance Precision Pump Tubing

- Ensure optimal performance from your Masterflex® pump
- Custom extruded to fit Masterflex pumps
- Engineered for long life in peristaltic pump applications
- Lot-to-lot consistency provides superior accuracy and repeatability

Masterflex L/S pump tubing is manufactured to extremely close tolerances that match our L/S pump heads, ensuring accurate, repeatable flow and long tubing life. Our pump tubing is factory-tested and optically inspected to provide the best performance from your peristaltic pump. With 19 different materials available, there is an L/S pump tubing formulation suitable for nearly any fluid handling application.

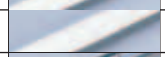
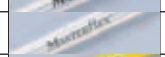
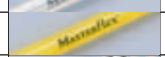
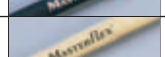
Our High-performance precision pump tubing features a thicker wall compared to our Precision pump tubing, making it the best choice for applications involving pressure, suction lift, viscous fluids, or long tubing life.

L/S Precision Pump Tubing Specifications

	Precision pump tubing					
Pump tubing cross sections						
	L/S 13	L/S 14	L/S 16	L/S 25	L/S 17	L/S 18
Inside diameter (nominal), in. (mm)	0.03 (0.8)	0.06 (1.6)	0.12 (3.1)	0.19 (4.8)	0.25 (6.4)	0.31 (7.9)
Hose barb size, in. (mm)	1/16 (1.6)	1/16 (1.6)	1/8 (3.2)	3/16 (4.8)	1/4 (6.4)	3/8 (9.5)
Flow range (approximate)† with 1 to 600 rpm drive, mL/min	0.06 to 36	0.21 to 130	0.8 to 480	1.7 to 1000	2.8 to 1700	3.8 to 2300
Maximum pressure, continuous‡ Maximum pressure, intermittent‡	25 psig (1.7 bar) 40 psig (2.7 bar)			20 psig (1.4 bar) 35 psig (2.4 bar)	15 psig (1.0 bar) 20 psig (1.4 bar)	10 psig (0.7 bar) 15 psig (1.0 bar)
Maximum vacuum‡ Suction lift‡	26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)				20" Hg (510 mm Hg) 22 ft H_2O (6.7 m H_2O)	

†Determined under the following conditions: 0 psi at inlet, 0.5 psi at outlet; water temperature at 72°F (22°C). ‡Actual performance varies depending on tubing formulation—values shown are for firm tubing. Values for STA-PURE®/CHEM-SURE® pump tubing are 60 psi (4.1 bar) continuous, 100 psi (6.9 bar) intermittent.

L/S Precision Pump Tubing Ordering Information

Pump tubing formulation / size			L/S 13	L/S 14	L/S 16	L/S 25	L/S 17	L/S 18
Silicone (platinum-cured)	25 ft (7.6 m) per pack		GJ-96410-13	GJ-96410-14	GJ-96410-16	GJ-96410-25	GJ-96410-17	GJ-96410-18
Silicone (peroxide-cured)	25 ft (7.6 m) per pack		GJ-96400-13	GJ-96400-14	GJ-96400-16	GJ-96400-25	GJ-96400-17	GJ-96400-18
BioPharm silicone (platinum-cured)	25 ft (7.6 m) per pack		GJ-96420-13	GJ-96420-14	GJ-96420-16	GJ-96420-25	GJ-96420-17	GJ-96420-18
BioPharm Plus silicone (platinum-cured)	25 ft (7.6 m) per pack		GJ-96440-13	GJ-96440-14	GJ-96440-16	GJ-96440-25	GJ-96440-17	GJ-96440-18
C-FLEX® (50 A)	25 ft (7.6 m) per pack		GJ-06424-13	GJ-06424-14	GJ-06424-16	GJ-06424-25	GJ-06424-17	GJ-06424-18
PharMed® BPT	25 ft (7.6 m) per pack		GJ-06508-13	GJ-06508-14	GJ-06508-16	GJ-06508-25	GJ-06508-17	GJ-06508-18
PharmaPure®†	25 ft (7.6 m) per pack		GJ-06435-13	GJ-06435-14	GJ-06435-16	GJ-06435-25	GJ-06435-17	GJ-06435-18
STA-PURE®	12" (30.5 cm) per pack		—	GJ-96200-14	GJ-96200-16	GJ-96200-25	GJ-96200-17	GJ-96200-18
CHEM-SURE®	12" (30.5 cm) per pack		—	GJ-96210-14	GJ-96210-16	GJ-96210-25	GJ-96210-17	GJ-96210-18
Tygon® LFL	25 ft (7.6 m) per pack		GJ-06429-13	GJ-06429-14	GJ-06429-16	GJ-06429-25	GJ-06429-17	GJ-06429-18
Tygon® Food (B-44-4X)	50 ft (15.2 m) per pack		GJ-06419-13	GJ-06419-14	GJ-06419-16	GJ-06419-25	GJ-06419-17	GJ-06419-18
Tygon® lab (R-3603)	50 ft (15.2 m) per pack		GJ-06409-13	GJ-06409-14	GJ-06409-16	GJ-06409-25	GJ-06409-17	GJ-06409-18
Tygon® fuel & lubricant (F-4040-A)	50 ft (15.2 m) per pack		GJ-06401-13	GJ-06401-14	GJ-06401-16	GJ-06401-25	GJ-06401-17	GJ-06401-18
Tygon® chemical (2001)†	50 ft (15.2 m) per pack		GJ-06475-13	GJ-06475-14	GJ-06475-16	GJ-06475-25	GJ-06475-17	GJ-06475-18
Norprene® (A 60 G)	50 ft (15.2 m) per pack		GJ-06404-13	GJ-06404-14	GJ-06404-16	GJ-06404-25	GJ-06404-17	GJ-06404-18
Norprene® Food (A 60 F)	50 ft (15.2 m) per pack		GJ-06402-13	GJ-06402-14	GJ-06402-16	GJ-06402-25	GJ-06402-17	GJ-06402-18
Chem-Durance®†	50 ft (15.2 m) per pack	 New	GJ-06432-13	GJ-06432-14	GJ-06432-16	GJ-06432-25	GJ-06432-17	GJ-06432-18
Viton®	25 ft (7.6 m) per pack		GJ-06412-13	GJ-06412-14	GJ-06412-16	GJ-06412-25	GJ-06412-17	GJ-06412-18
FDA Viton®	25 ft (7.6 m) per pack		GJ-96412-13	GJ-96412-14	GJ-96412-16	GJ-96412-25	GJ-96412-17	GJ-96412-18

†These formulations are recommended for use with Easy-Load® and Easy-Load® II pump heads only.

GO to ColeParmer.com

ColeParmer.com/MasterflexTubing

For help selecting the right Masterflex® pump tubing formulation for your application, visit our Web site at www.coleparmer.com/MasterflexTubing

Pulse Dampener

Virtually eliminate pulsation in your output flow. Pulse dampener features a polyethylene body. It includes five pairs of fittings and PTFE-pipe thread tape. Pulse dampener accepts all L/S® tubing sizes and I/P® 26 size tubing.

GJ-07596-20 Pulse dampener

L/S High-Performance Precision Pump Tubing Specifications

	High-performance precision pump tubing			
Pump tubing cross sections				
	L/S 15	L/S 24	L/S 35	L/S 36
Inside diameter (nominal), in. (mm)	0.19 (4.8)	0.25 (6.4)	0.31 (7.9)	0.38 (9.7)
Hose barb size, in. (mm)	3⁄16 (4.8)	1⁄4 (6.4)	3⁄8 (9.5)	3⁄8 (9.5)
Flow range (approximate)† with 1 to 600 rpm drive, mL/min Value in ( ) obtained with High-Performance pump head	1.7 to 1000 (1.8 to 1100)	2.8 to 1700 (3.0 to 1800)	3.8 to 2300 (4.3 to 2600)	4.8 to 2900 (5.8 to 3400)
Maximum pressure, continuous‡ Maximum pressure, intermitten‡	25 psig (1.7 bar) 40 psig (2.7 bar)		20 psig (1.4 bar) 35 psig (2.4 bar)	15 psig (1.0 bar) 20 psig (1.4 bar)
Maximum vacuum‡ Suction lift‡	26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)			24" Hg (610 mm Hg) 27 ft H_2O (8.3 m H_2O)

†Determined under the following conditions: 0 psi at inlet, 0.5 psi at outlet; water temperature at 72°F (22°C). ‡Actual performance varies depending on tubing formulation—values shown are for firm tubing. Values for STA-PURE®/CHEM-SURE® pump tubing are 60 psi (4.1 bar) continuous, 100 psi (6.9 bar) intermittent.

L/S High-Performance Precision Pump Tubing Ordering Information

Pump tubing formulation / size			L/S 15	L/S 24	L/S 35	L/S 36
Silicone (platinum-cured)	25 ft (7.6 m) per pack		GJ-96410-15	GJ-96410-24	GJ-96410-35	GJ-96410-36
Silicone (peroxide-cured)	25 ft (7.6 m) per pack		GJ-96400-15	GJ-96400-24	GJ-96400-35	GJ-96400-36
BioPharm silicone (platinum-cured)	25 ft (7.6 m) per pack		GJ-96420-15	GJ-96420-24	GJ-96420-35	GJ-96420-36
BioPharm Plus silicone (platinum-cured)	25 ft (7.6 m) per pack		GJ-96440-15	GJ-96440-24	GJ-96440-35	GJ-96440-36
C-FLEX® (50 A)	25 ft (7.6 m) per pack		GJ-06424-15	GJ-06424-24	GJ-06424-35	GJ-06424-36
PharMed® BPT	25 ft (7.6 m) per pack		GJ-06508-15	GJ-06508-24	GJ-06508-35	GJ-06508-36
PharmaPure®†	25 ft (7.6 m) per pack		GJ-06435-15	GJ-06435-24	—	—
STA-PURE®	14" (35.6 cm) per pack		GJ-96200-15	GJ-96200-24	GJ-96200-35	—
CHEM-SURE®	14" (35.6 cm) per pack		GJ-96210-15	GJ-96210-24	GJ-96210-35	—
Tygon® LFL	25 ft (7.6 m) per pack		GJ-06429-15	GJ-06429-24	GJ-06429-35	GJ-06429-36
Tygon® Food (B-44-4X)	50 ft (15.2 m) per pack		GJ-06419-15	GJ-06419-24	GJ-06419-35	GJ-06419-36
Tygon® lab (R-3603)	50 ft (15.2 m) per pack		GJ-06409-15	GJ-06409-24	GJ-06409-35	GJ-06409-36
Tygon® fuel & lubricant (F-4040-A)	50 ft (15.2 m) per pack		GJ-06401-15	GJ-06401-24	GJ-06401-35	GJ-06401-36
Tygon® chemical (2001)†	50 ft (15.2 m) per pack		GJ-06475-15	GJ-06475-24	—	—
Norprene® (A 60 G)	50 ft (15.2 m) per pack		GJ-06404-15	GJ-06404-24	GJ-06404-35	GJ-06404-36
Norprene® Food (A 60 F)	50 ft (15.2 m) per pack		GJ-06402-15	GJ-06402-24	GJ-06402-35	GJ-06402-36
Chem-Durance® ††	50 ft (15.2 m) per pack	New	GJ-06432-15	GJ-06432-24	GJ-06432-35‡	—
Viton®	25 ft (7.6 m) per pack		GJ-06412-15	GJ-06412-24	GJ-06412-35	GJ-06412-36
FDA Viton®	25 ft (7.6 m) per pack		GJ-96412-15	GJ-96412-24	GJ-96412-35	GJ-96412-36

†These formulations are recommended for use with Easy-Load® and Easy-Load® II pump heads only.
‡This size is recommended for use with Easy-Load®, Easy-Load® II, and High-Performance pump heads only.
††These sizes in this formulation are not recommended for use with Easy-Load 3 pump heads.

I/P® Pump Systems

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I/P® Modular Pump

Applications

- Printing ■ Laboratory research ■ Polishing/lapping ■ Chemical recirculation
- Sterile fluid transfer ■ Pumping from 55-gallon drums ■ Filtration

Benefits

- Place components where convenient—separate by up to 6 feet
- Easy tubing changes ■ Purge tubing before or after pumping
- Forward/off/reverse switch lets you reverse while maintaining speed setting

Features

- ⅓-hp continuous-duty drive ■ ±3% drive speed accuracy
- Separate single-turn potentiometer, forward/off/reverse switch, and green power indicator
- Motor/controller connected by a 6-ft (1.8-m) cable

77962-00

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77962-00	0.2 to 8.0	I/P Easy-Load® 77601-10	Tygon® LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	07591-00	20 to 650	Controller: IP22 Motor: IP34	90 to 130 VAC, 3.0 A
GJ-77962-07					07591-07			180 to 260 VAC, 1.5 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

I/P® Pump with Wall-Mount Controller

Applications

- pH control ■ Process control ■ Dispensing ■ Food applications
- Printing ■ pH control ■ Dispensing culture media ■ Dye dispensing
- Plating chemical pump ■ Corrosive fluid transfer ■ Slurry pump

Benefits

- Ideal for wet or hostile environments ■ Easy tubing changes
- Forward/off or reverse (reverse direction while maintaining speed setting)
- Control drive speed remotely (4–20 mA) ■ Purge tubing before or after pumping

Features

- ⅓-hp, continuous-duty drive
- ±3% drive speed accuracy
- Motor and controller are connected by a 24-ft (7.3-m) weather-resistant cable
- Separate single-turn potentiometer, forward/off/reverse switch, and green power indicator

77962-10

Controller

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77962-10	0.2 to 8.0	I/P Easy-Load 77601-10	Tygon LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	07591-10	20 to 650	Controller: IP55 Motor: IP34	90 to 130 VAC, 3.0 A
GJ-77962-15					07591-15			180 to 260 VAC, 1.5 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

Application Solution

Challenge: A public water utility plant needs four pumps. Two of the pumps are used to destroy chlorine; they must meter sodium thiosulfate at 200 mL/min. The other two pumps are for pumping water down a 10-foot well at a rate of 3.8 LPM. Once this water has been pumped for 24 hours through the well, it is then analyzed for a variety of components.

Solution: The 77962-10 metering pump system has the accuracy needed (±3%) to meter the sodium thiosulfate as well as the power to pump water down a 10-foot well at a rate of 3.8 LPM. The modular design makes it easy to place the controller up to 24 feet away from the pumping area, allowing the operator quick access.

I/P® Process Pumps


77963-10

Applications

- Media transfer ■ Filling/emptying large carboys and bags ■ Pumping dyes and pigments
- Pumping fermentation chemicals ■ Sewage and sludge sampling

Benefits

- Brushless, maintenance-free motor ■ Light enough to carry with one hand
- Displays percent speed from 5 to 100% for repeatable control
- Sealed, IP55-rated housing sprays or wipes down for easy cleaning
- Powerful enough to drive two Easy-Load® pump heads for twice the flow rate

Features

- ⅓-hp, continuous-duty brushless drive ■ ±0.25% PWM speed control accuracy
- Precise, three-turn speed control ■ Sealed membrane keypad

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77963-10	0.4 to 8.0	I/P Easy-Load® 77601-10	Tygon® LFL I/P 73, 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	77410-10	33 to 650	IP55	90 to 130 VAC, 4.5 A; 220 to 260 VAC, 2.6 A
GJ-77963-20	0.9 to 17.0	I/P High-Performance 77600-62	Tygon LFL I/P 88, 06429-88; 3 ft (1 m)	I/P 70, I/P 88, I/P 89				

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

I/P® Process Pumps with Remote Capability


77965-10

Applications

- Purification/filtration/media transfer ■ Automated process
- Food and pharma process pump ■ Pumping anti-foaming agents
- Chemical feed and metering ■ Wastewater process pump

Benefits

- Remote control capability via fluid-resistant I/O connector on back of drive (requires 77300-32 remote cable kit—order at right)
- Analog outputs include "pump ready" signal (order 77300-32 remote cable kit below)
- Displays percent speed from 5 to 100% for precise, repeatable control
- Sealed, IP55-rated housing sprays or wipes down for easy cleaning
- Brushless, maintenance-free motor

Features

- ⅓-hp, continuous-duty brushless drive ■ ±0.25% PWM speed control accuracy
- Sealed membrane keypad

Accessories

GJ-07595-43 Washdown foot switch
GJ-77300-32 Remote cable kit

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77965-00	0.4 to 8.0	I/P Easy-Load® 77601-10	Tygon® LFL I/P 73, 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	77411-00	33 to 650	IP55	90 to 130 VAC, 4.5 A; 220 to 260 VAC, 2.6 A
GJ-77965-10	0.9 to 17.0	I/P High-Performance 77600-62	Tygon LFL I/P 88, 06429-88; 3 ft (1 m)	I/P 70, I/P 88, I/P 89				

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

Masterflex® Advantage

Masterflex vs Diaphragm Pumps

Application

A manufacturer needs to pump ethylene glycol from a 55-gallon drum into six smaller containers. Once these six containers are filled with the ethylene glycol, they are used to lubricate needles for their process.

Masterflex Advantages

- Handles high viscosities well—improved customer's flow rate
- Fluid does not contact internal pump parts—only the tubing
- Easy tubing replacement; reduced maintenance time

Diaphragm Pump Disadvantages

- Cannot handle high viscosities—the flow would be reduced by 75% due to the 450-cp viscosity of ethylene glycol
- Difficult to clean
- Numerous replacement parts: diaphragms and internal valves

Masterflex Products Applied

- 77601-10 I/P Easy-Load pump head (stack up to two heads)
- 06429-26 Tygon LFL I/P 26 Precision tubing
- 77410-10 I/P Brushless process drive

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I/P® Digital Modular Pump

Applications

- Yogurt dispensing pump
- Flavor concentrate/food additive dispenser
- Photochemical dispenser
- Shampoo dispenser

Benefits

- Modular format lets you separate drive and controller up to 25 feet
- Remote control capabilities allow easy integration into a system (order connector 07595-52 below)
- Repeat dispensing
- Reverse pumping
- Start/stop foot switch (order 07595-42 below)
- Ideal for wet environments

Features

- ⅓-hp, continuous-duty drive
- ±0.3% drive speed accuracy
- Controller/drive connected by a 25-ft (7.6-m) cable

77970-20

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77970-20	0.2 to 8.0	I/P Easy-Load® 77601-10	Tygon® LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	07592-20	20 to 650	Controller: IP22 Motor: IP34	90 to 130 VAC, 4.4 A
GJ-77970-27					07592-27			190 to 260 VAC, 2.2 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

GJ-07595-42 Foot switch, momentary start/stop; 6-ft (1.8-m) cable
GJ-07595-52 DB15 male connector. Use to create your own cable

I/P® Digital Modular Pump with Wall-Mount Controller

Applications

- Transfer cell culture media
- Flavor concentrate/food additive dispenser
- Photochemical dispenser

Benefits

- Ideal for wet environments
- Repetitive dispensing
- Separate drive/controller allows convenient placement of components
- Handheld remote offers remote control operation (order 07592-83 below)
- Analog remote control of speed/start/stop and direction (requires 77300-32; order below)

Features

- ⅓-hp, continuous-duty drive
- ±0.3% drive speed accuracy
- Controller/drive connected by a 25-ft (7.6-m) cable

77970-30

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77970-30	0.2 to 8.0	I/P Easy-Load 77601-10	Tygon LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	07592-30	20 to 650	Controller: IP56 Motor: IP34	90 to 130 VAC, 4.4 A
GJ-77970-37					07592-35			190 to 260 VAC, 2.2 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

GJ-07592-83 Handheld remote
GJ-07595-43 Washdown foot switch
GJ-77300-32 Remote cable kit

Application Solution

Challenge: A customer is pouring hot wax into containers that hold from 50 grams to 3 pounds. They had been using another peristaltic pump to pump the wax, but it was slow. They need to put the containers on a conveyor belt and want to operate the pump with a remote control feature so that the operator does not get too close to the wax. Additionally, the customer needs intervals of 1 to 2 seconds in between filling sessions, so this needs to be controlled by the pump as well.

Solution: The larger I/P 77970-30 pump system fulfills the customer's need to accurately dispense wax into a range of container capacities in quick succession with time-controlled intervals. Plus, the handheld remote allows the operator to be a safe distance away.

I/P® Digital Process Pumps

Applications

- Pharma and cosmetics process pump
- Sanitary food/dairy process pump
- Automated process pump
- Dosing/metering additives
- Bulk media transfer and dispensing
- Large-volume buffer transfer
- Pilot scale fermentation

Benefits

- Brushless motor virtually eliminates maintenance—no motor brushes to replace
- Full-featured digital dispenser
- Four-digit display shows rpm, flow rate, dispense volume, and copy number
- Programmable dispense interval for automated dispensing
- Analog remote control of speed, start/stop, and direction (order remote accessories below)
- Programmed calibration ensures dispense accuracy
- Sealed, stainless steel housing for easy washdown in sanitary process environments
- Tach output for precise speed control and feedback

Features

- ⅜-hp continuous-duty brushless drive
- ±0.25% PWM speed control accuracy with tach output
- Remote control capability via fluid-resistant I/O connector on back of drive (order 77300-32 below)
- Sealed membrane keypad with lockout

77964-00

77964-10

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77964-00	0.01 to 8.0	I/P Easy-Load® 77601-10	Tygon® LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	77420-00	1 to 650	IP66	90 to 130 VAC, 4.5 A; 220 to 260 VAC, 2.5 A
GJ-77964-10	0.02 to 17.0	I/P High-Performance 77600-62	Tygon LFL I/P 88 06429-88; 3 ft (1 m)	I/P 70, I/P 88, I/P 89				

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

Accessories

GJ-07592-83 Handheld remote

GJ-07595-43 Washdown foot switch, momentary start/stop; 1.8-m (6-ft) cable

GJ-77420-01 Caster kit for easy movement of the drive

GJ-77300-32 Remote cable kit

Masterflex® Advantage

Masterflex vs Flexible Impeller Pumps

Application

A laboratory needs to pump dilute sulfuric acid and a copper sulfate solution 24 hours a day for five days in a row. They need to recirculate these two chemicals at 60°C for a cell lab. They need to vary the flow rate with a maximum flow of 15 LPM at 15 psi.

Masterflex Advantages

- Handles higher pressures at higher flow rates
- Chemically compatible with a variety of tubing formulations
- Runs dry
- Easy to change out tubing and clean pump

Flexible Impeller Pump Disadvantages

- Does not handle higher pressures at higher flow rates well
- Difficult to find chemically compatible internal pump parts
- Cannot run dry
- Difficult to clean

Masterflex Products Applied

- 77600-62 I/P® High-performance pump head
- 06429-88 Tygon® LFL I/P® 88 High-performance precision tubing
- 77420-00 I/P® Digital brushless process drive

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I/P® Multichannel Fixed-Speed Pumps

Applications

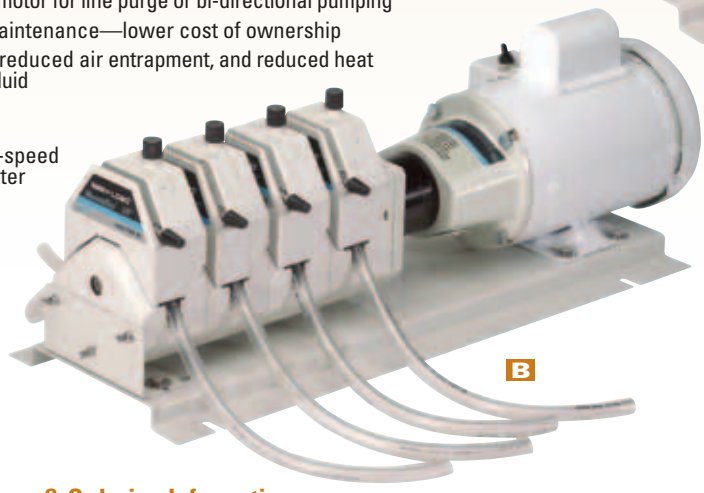
- Transferring printing inks
- Pumping dyes in textile manufacture
- Feeding solutions and additives to multiple process lines
- Pumping adhesives for envelope manufacture

Benefits

- IP55-rated drive for washdown
- Reduced noise
- Minimal downtime and cleanup for fluid or color changeover
- Reversible motor for line purge or bi-directional pumping
- Reduced maintenance—lower cost of ownership
- Low shear, reduced air entrapment, and reduced heat transfer to fluid

Features

- ½-hp, fixed-speed motor/adapter
- ±1% speed control accuracy



Specifications & Ordering Information

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Catalog number	Flow range† (LPM)	Pump heads included	Tubing included	Tubing sizes accepted	Drive included	Drive speed (rpm)‡	Drive IP rating	Power (50/60 Hz)
A I/P Three-channel fixed-speed pump								
GJ-07588-80	2.3 per channel	I/P Easy-Load® 77601-10	Tygon® LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	07588-60	180	IP55	90 to 130 VAC, 8.0 A
GJ-07588-87	1.9 per channel					150		190 to 260 VAC, 4.0 A
B I/P Four-channel fixed-speed pump								
GJ-07588-90	2.3 per channel	I/P Easy-Load 77601-10	Tygon LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	07588-60	180	IP55	90 to 130 VAC, 3.0 A
GJ-07588-97	1.9 per channel					150		190 to 260 VAC, 4.0 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.
‡Speed modified via NEMA adapter.

More info **FREE TUBING TEST KIT!**

Masterflex pump tubing formulations are available to handle many aggressive and hazardous fluids.

Check the chemical compatibility of your fluid using the Chemical Compatibility charts on pages 44–45; or use our interactive compatibility charts at Masterflex.com/mflexchem.

Our FREE Masterflex tubing kit includes samples of 17 different tubing formulations. Use these samples to verify the chemical compatibility of tubing with your fluid before introducing it into your application.

Call 847-549-7600 or go online to request your free tubing test kit today.

Application Solution

Challenge: A customer is looking for a peristaltic pump for his ink processing application. He needs to transport ink from a sump to an inking blade, which will then dispense the ink. The system is totally enclosed. The viscosity of the ink is similar to water. Flow rates are between 1.9 to 3.8 LPM (0.5 to 1 GPM). The ink is solvent-based so it is potentially explosive; hence the customer is looking for a hazardous-duty pump.

Solution: The 77981-10 system allows the customer to achieve the flow rates he needs even with a potentially hazardous solution. The hazardous-duty pump drive is ideal for this situation where a drive run by electricity would be unsafe. The variable-speed drive lets the customer find the desired flow range. Plus, the Easy-Load pump head allows for easy, quick, and frequent changes of the tubing when necessary.

I/P® Air-Powered Pump

Applications

- Transfer of hazardous materials
- Transfer of printing inks
- Production fermentation

Benefits

- Safe where electrical power not advisable
- Operates from your compressor ■ Easy tubing changes
- High horsepower in a compact size ■ Cooler operation
- Smooth-starting, low-maintenance motor

Features

- ¾-hp continuous-duty drive
- ±10% drive speed accuracy
- Complete with regulator with 5-µm air filter and ¼" NPT(F) connection, automatic lubricator, 0 to 30 psi pressure gauge, and muffler.

77980-00

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power
GJ-77980-00	1.2 to 8.0	I/P Easy-Load® 77601-10	Tygon® LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	07589-30	100 to 650	IP34	3 to 25 cfm (0.08 to 0.7 m³/min) at 20 to 100 psi (1.4 to 6.9 bar)

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

Note: For safe operation of Masterflex® air-powered pumps, ground pump carefully to protect from static electricity.

I/P® Hazardous-Duty Pump

Applications

- Transfer of chemicals where hazardous vapors are present
- Transfer of heat-sensitive fluids
- Production fermentation

Benefits

- Ideal where electricity is unsafe
- Easy tubing changes
- Variable-speed for wide flow ranges

Features

- ¼-hp continuous-duty drive
- ±10% drive speed accuracy

77981-10

Motor only

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive included	Drive speed range (rpm)	Drive IP rating	Power
GJ-77981-10	0.12 to 5.3	I/P Easy-Load® 77601-10	Tygon® LFL I/P 73 06429-73; 10 ft (3 m)	I/P 26, I/P 73, I/P 82	07583-50	10 to 430	IP 21	115 VAC, 60 Hz

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 31.

Masterflex® Advantage

Masterflex vs Air-Operated Double Diaphragm Pumps

Application

A manufacturer needs to pump oil from a drum into small containers. The oil is mixed with cheese blocks and spices to create different cheese flavors. The pump the company had been using was problematic.

Masterflex Advantages

- Easy to control flow reduces manual operation
- Reduced cavitation problems
- Easy to maintain sterility of tubing and fluid path
- Offer food-grade tubing
- No valves to clean or maintain

Air-Operated Double Diaphragm Pump Disadvantages

- Difficult to control the flow rate
- Cavitation of the pump caused air bubbles within the flow path
- Difficult to clean and maintain sterility of internal parts of pump

Masterflex Products Applied

- 77601-10 I/P Easy-Load pump head
- 06402-73 Norprene® Food I/P 73 Precision tubing
- 07589-30 I/P variable-speed air-powered drive

I/P® Easy-Load® Pump Heads

- Fast tubing changes minimize downtime
- Adjustable occlusion—optimize pressure capabilities and tubing life by adjusting the "squeeze" on the tubing
- Automatic tubing retention system—spring-loaded tubing retainers ensure tubing is secured automatically. Improves tubing life and performance of all tubing sizes.
- Tubing guide ensures correct positioning of tubing to maximize performance and pump tubing life
- Polysulfone (PSF) housing with cold-rolled steel (CRS) or stainless steel (SS) rotor, or polyphenylene sulfide (PPS) housing with SS rotor available. PPS has better chemical resistance than PSF. CRS rotors have Buna N shielded bearings; SS rotors have PTFE-sealed bearings.
- Tang boot provides quieter operation and less maintenance
- Five-screw mounting—ensures pump head is mounted securely to drive. Pump head comes ready to mount onto drive.
- Dual-channel hardware available (order separately on page 36). Mount two pump heads on a single drive; change tubing without removing heads.

Easy-Load pump head

Specifications & Ordering Information

Pump tubing size	mL per rev	Flow rates (LPM)			Max system pressure, psi (bar)		PSF housing		PPS housing	Pump head includes
		100 rpm	540 rpm	20 to 650 rpm	Continuous	Intermittent	CRS rotor	SS rotor	SS rotor	
I/P 26	6.15	0.6	3.2	0.12 to 4	25 (1.7)	40 (2.7)				
I/P 73	12.3	1.2	6.8	0.2 to 8	25 (1.7)	40 (2.7)	**GJ-77601-00**	**GJ-77601-10**	**GJ-77601-60**	Single-channel mounting hardware and a 15" (38-cm) length of silicone tubing
I/P 82	20.0	2.0	11.0	0.4 to 13	15 (1.0)	20 (1.4)				

I/P® High-Performance Pump Head

- Highest flow rates and pressure ratings of any I/P pump head
- "C-shaped" design allows tubing to enter and exit same side of pump head; facilitates connection to tubing inlet and outlet
- Versatile dual mounting options—pump head can be mounted on drive upwards or on its side
- Rollers, bearings, rotor plates, and rotor shaft are made from SS for excellent chemical resistance, high durability, and long service life; occlusion bed is made from thermoset polyester
- Compatible with I/P drives that accept two or more pump heads. Drives that accept two heads have enough torque to drive pump head even under difficult conditions such as high back pressure.
- Pump head comes ready to mount onto drive; High-Performance pump heads are not stackable

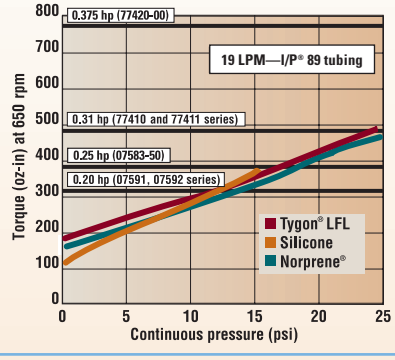
High-performance pump head

Specifications & Ordering Information

Pump tubing size	mL per rev	Flow rates (LPM)	Max system pressure, psi (bar)		SS housing	Pump head includes
		20 to 650 rpm	Continuous	Intermittent	SS rotor	
I/P 70	12.3	0.25 to 8	25 (1.7)	40 (2.7)		
I/P 88	26.2	0.52 to 17	20 (1.4)	35 (2.4)	**GJ-77600-62**	Single-channel mounting hardware and a 15" (38-cm) length of Tygon® LFL tubing
I/P 89	29.2	0.58 to 19	15 (1.0)	20 (1.4)		

Stack two Easy-Load® pump heads with dual-channel mounting hardware 77601-96. See page 36 to order.

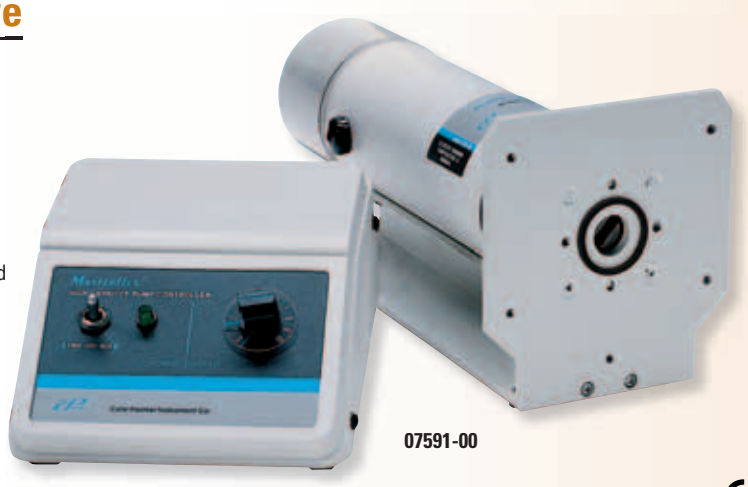
Drive torque requirements to obtain 19 LPM with High-Performance pump head



I/P® Variable-Speed Modular Drive

- Pump head flow rate: 0.2 to 19 LPM (depends on drive rpm and tubing size)
- Separate motor and controller up to six feet for convenient setup
- Reversible ⅕-hp motor allows flow in either direction—purge tubing before or after pumping
- Separate single-turn potentiometer and forward/off/reverse switch maintain speed setting while turning drive on/off/reverse
- Accepts one High-Performance pump head, or up to two Standard or Easy-Load® pump heads

What's included: 6-ft (1.8-m) line cord; 115 VAC model has U.S. standard plug; 230 VAC model has IEC 320/CEE22 socket. Must specify final destination country to receive the correct plug/cord set.



07591-00

Specifications & Ordering Information

Catalog number	rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)	
							VAC	Amps
GJ-07591-00	20 to 650	±3%	2†	⅕ hp (0.15 kW)	Controller: IP22 Motor: IP34	Controller: 7⅝" x 6½" x 3½" (19.4 x 16.5 x 8.9 cm) Motor: 14⅛" x 5⁹⁄₁₆" x 6" (35.9 x 14.1 x 15.2 cm)	90 to 130	3.0
GJ-07591-07							190 to 260	1.5

†Drive accepts two pump heads when loaded with silicone or C-FLEX® tubing.

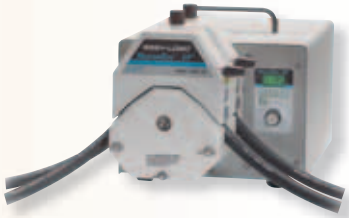
I/P® Brushless Process Drives

- Pump head flow rate: 0.41 to 19 LPM (depends on drive rpm and tubing size)
- Powerful, low-maintenance drives are versatile and cost effective
- Nonchip epoxy-coated, IP55-rated steel enclosure protects against moisture, chemicals, and dust
- Compact drives are light enough to carry with one hand, but powerful enough to drive two pump heads
- Drive model 77411-00 features remote inputs (4 to 20 mA, 0 to 10 V, start/stop, reverse) and remote outputs ("pump ready" signal and 4 to 20 mA outputs) (order remote cables on page 23)
- Accepts one High-Performance pump head or up to two Standard or Easy-Load® pump heads

What's included: 6-ft (1.8-m) line cord with IEC320/CEE 22 connector coupler. Must specify final destination country to receive the correct plug/cord set.

77410-10

Double the flow rate by stacking two I/P® Easy-Load® pump heads on the I/P brushless process drives.



Specifications & Ordering Information

Catalog number	rpm	Speed control (repeatability)	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)	
							VAC	Amps
Variable-speed brushless process drive								
GJ-77410-10	33 to 650	±0.25% (2% of max rpm)	2	⅓ hp (0.25 kW)	IP55	14" x 10" x 9" (35.6 x 25.4 x 22.9 cm)	90 to 260	4.5 at 115 VAC; 2.6 at 230 VAC
Variable-speed brushless process drive with remote input/output								
GJ-77411-00	33 to 650	±0.25% (2% of max rpm)	2	⅓ hp (0.25 kW)	IP55	14" x 10" x 9" (35.6 x 25.4 x 22.9 cm)	90 to 260	4.5 at 115 VAC; 2.6 at 230 VAC

GO to page(s) 28 and 31
For select individual system components:
I/P pump heads.....28
I/P pump tubing.....31

I/P® Variable-Speed Dispensing Drives

A Modular Digital Dispensing Drive

- Pump head flow rate: 0.2 to 19 LPM (depends on drive rpm and tubing size)
- Designed for accurate dispensing or general fluid transfer
- Modular—place the system components where most convenient
- Motor and controller are connected by a 25-ft (7.6-m) cable
- Large, easy-to-read digital display shows dispensing parameters as well as specified flow rate
- Remote control capabilities via DB15 female connection on controller—speed control input: 0 to 20 mA, 4 to 20 mA, or 0 to 10 V; pumping direction/start/stop: open collector or contact closure; tachometer output: 0 to 20 mA, 4 to 20 mA, 0 to 10 V, or TTL pulse (order cable on page 24)

What's included: 6-ft (1.8-m) line cord; 115 VAC model has U.S. standard plug; 230 VAC model has IEC 320/CEE22 socket. Must specify final destination country to receive the correct plug/cord set.

A
07592-20

B Modular Digital Dispensing Drive with Wall-Mount Controller

- Pump head flow rate: 0.2 to 19 LPM (depends on drive rpm and tubing size)
- Designed for accurate dispensing or general fluid transfer
- Modular design enables you to place the system components where they are most convenient
- Large, easy-to-read digital display shows dispensing parameters as well as specified flow rate
- Motor and controller are connected by a 25-ft (7.6-m) weatherproof cable
- Washdown; IP56 rating protects controller against dust and strong jets of water
- Remote control capabilities via weather-resistant connection on controller (must purchase remote control cable 77300-32, sold separately on page 24)—speed control input: 0 to 20 mA, 4 to 20 mA, or 0 to 10 V; pumping direction/start/stop: open collector or contact closure; tachometer output: 0 to 20 mA, 4 to 20 mA, 0 to 10 V, 2 to 10 V, or TTL pulse

What's included: 6-ft (1.8-m) line cord; 115 VAC model has U.S. standard plug; 230 VAC model has IEC 320/CEE22 socket. Must specify final destination country to receive the correct plug/cord set.

B
07592-30

c UL us CE for 07592-27 and -35 only

Catalog number	rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power VAC	Power Hz	Power Amps
A Modular digital dispensing drive									
GJ-07592-20	20 to 650	±0.3%	2†	⅛ hp (0.15 kW)	Controller: IP22 Motor: IP34	Controller: 9⅞" x 9³⁄₁₆" x 5¹⁄₁₆" (25.8 x 23.3 x 12.9 cm) Motor: 14⅛" x 5⁹⁄₁₆" x 6" (35.9 x 14.1 x 15.2 cm)	90 to 130	60	4.4
GJ-07592-27							190 to 260	50	2.2
B Modular digital dispensing drive with wall-mount controller									
GJ-07592-30	20 to 650	±0.3%	2†	⅛ hp (0.15 kW)	Controller: IP56 Motor: IP34	Controller: 10¼" x 11" x 4½" (26.0 x 27.9 x 11.4 cm) Motor: 14⅛" x 5⁹⁄₁₆" x 6" (35.9 x 14.1 x 15.2 cm)	90 to 130	60	4.4
GJ-07592-35							190 to 260	50	2.2

†Accepts two pump heads when used with silicone or C-FLEX® tubing.

I/P® Digital Console Process Drive

- Pump head flow rate: 0.01 to 19 LPM (depends on drive rpm and tubing size)
- Accurate dispensing plus excellent cleanability
- Dispense by volume or time, or pump continuously
- Completely sealed 316 stainless steel enclosure is IP66 and NEMA 4X rated for protection from tough process environments
- Brushless motor virtually eliminates maintenance
- Remote control capabilities allow easy integration into your process (order remote control cable on page 25)

What's included: 6-ft (1.8-m) line cord; 115 VAC model has U.S. standard plug; 230 VAC model has IEC 320/CEE22 socket. Must specify final destination country to receive the correct plug/cord set.

I/P digital console drive 77420-00 shown with I/P High-Performance pump head 77600-62 and I/P 88 silicone pump tubing 06429-88

WASHDOWN

c UL us CE IP66

Catalog number	rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz) VAC	Power (50/60 Hz) Amps
GJ-77420-00	1 to 650	±0.25% (±1 rpm)	2	⅜ hp (0.28 kW)	IP66	18⅜" x 11" x 17" (48 x 28 x 43 cm)	115/230	4.5/2.5

I/P® Precision and High-Performance Precision Pump Tubing

- Ensure optimal Masterflex® pump performance
- Custom extruded for precise fit and long life in Masterflex pumps
- Lot-to-lot consistency provides superior accuracy and repeatability

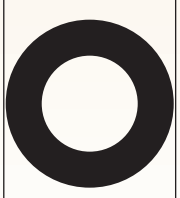
Masterflex I/P pump tubing is manufactured to extremely close tolerances that match our I/P pump heads, ensuring accurate, repeatable flow and long tubing life. Our tubing is factory-tested and optically inspected to provide the best performance from your peristaltic pump.

GO to ColeParmer.com

ColeParmer.com/MasterflexTubing

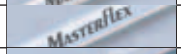
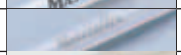
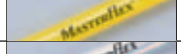
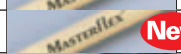
For help selecting the right Masterflex® pump tubing formulation for your application, visit our Web site at www.coleparmer.com/MasterflexTubing

I/P Precision and High-Peformance Precision Pump Tubing Specifications

	I/P Precision pump tubing			I/P High-performance precision pump tubing		
Pump tubing cross sections						
	I/P® 26	**I/P® 73**	**I/P® 82**	**I/P® 70**	**I/P® 88**	**I/P® 89**
Inside diameter (nominal) Hose barb size (nominal)	0.25" (6.4 mm) ¼" (6.4 mm)	0.37" (9.5 mm) ⅜" (9.5 mm)	0.5" (12.7 mm) ½" (12.7 mm)	0.37" (9.5 mm) ⅜" (9.5 mm)	0.5" (12.7 mm) ½" (12.7 mm)	0.62" (15.88 mm) ⅝" (15.88 mm)
Flow range (approximate)† with 1 to 650 rpm drive	0.01 to 4 LPM (0.002 to 1.1 GPM)	0.01 to 8 LPM (0.002 to 2.1 GPM)	0.02 to 13 LPM (0.005 to 3.5 GPM)	0.01 to 8 LPM (0.002 to 2.1 GPM)	0.02 to 17 LPM (0.005 to 4.5 GPM)	0.03 to 19 LPM (0.007 to 5.0 GPM)
Maximum pressure‡, continuous Maximum pressure‡, intermittent	25 psi (1.7 bar) 40 psi (2.7 bar)	25 psi (1.7 bar) 40 psi (2.7 bar)	15 psi (1.0 bar) 20 psi (1.4 bar)	25 psi (1.7 bar) 40 psi (2.7 bar)	25 psi (1.7 bar) 35 psi (2.4 bar)	15 psi (1.0 bar) 20 psi (1.4 bar)
Maximum vacuum‡ Suction lift‡	26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)	26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)	20" Hg (510 mm Hg) 23 ft H_2O (7.0 m H_2O)	26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)	26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)	24" Hg (610 mm Hg) 27 ft H_2O (8.2 m H_2O)

†Determined under the following conditions: 0 psi at inlet, 0.5 psi at outlet; water temperature at 72°F (22°C). ‡Actual performance varies depending on tubing formulation—values shown are for firm tubing. Values for STA-PURE®/CHEM-SURE® pump tubing are 60 psi (4.1 bar) continuous, 100 psi (6.9 bar) intermittent.

I/P Precision and High-Peformance Precision Pump Tubing Ordering Information

Pump tubing formulation			Precision pump tubing			High-performance precision pump tubing		
			I/P 26	**I/P 73**	**I/P 82**	**I/P 70**	**I/P 88**	**I/P 89**
Silicone (platinum cured)	25 ft (7.6 m) per pack		GJ-96410-26	GJ-96410-73	GJ-96410-82	GJ-96510-70 10-ft/pk	GJ-96510-88 10-ft/pk	GJ-96510-89 10-ft/pk
Silicone (peroxide cured)	25 ft (7.6 m) per pack		GJ-96400-26	GJ-96400-73	GJ-96400-82	GJ-96400-70 10-ft/pk	GJ-96400-88 10-ft/pk	GJ-96400-89 10-ft/pk
BioPharm silicone (platinum)	25 ft (7.6 m) per pack		GJ-96420-26	GJ-96420-73	GJ-96420-82	GJ-96421-70 10-ft/pk	GJ-96421-88 10-ft/pk	GJ-96421-89 10-ft/pk
BioPharm Plus silicone (platinum)	25 ft (7.6 m) per pack		GJ-96440-26	GJ-96440-73	GJ-96440-82	GJ-96441-70 10-ft/pk	GJ-96441-88 10-ft/pk	GJ-96441-89 10-ft/pk
C-FLEX® (50 A)	25 ft (7.6 m) per pack		GJ-06424-26	GJ-06424-73	GJ-06424-82	GJ-06424-70 10-ft/pk	GJ-06424-88 10-ft/pk	GJ-06424-89 10-ft/pk
PharMed® BPT	25 ft (7.6 m) per pack		GJ-06508-26	GJ-06508-73	GJ-06508-82	GJ-06508-70	GJ-06508-88	GJ-06508-89
PharmaPure®††	25 ft (7.6 m) per pack		GJ-06435-26	GJ-06435-73	GJ-06435-82	—	—	—
STA-PURE®	24" (61 cm) per pack		GJ-96200-26	GJ-96200-73	GJ-96200-82	—	—	—
CHEM-SURE®	24" (61 cm) per pack		GJ-96210-26	GJ-96210-73	GJ-96210-82	—	—	—
Tygon® LFL	25 ft (7.6 m) per pack		GJ-06429-26	GJ-06429-73	GJ-06429-82	GJ-06429-70	GJ-06429-88	GJ-06429-89
Tygon® Food (B-44-4X)	50 ft (15.2 m) per pack		GJ-06419-26	GJ-06419-73	GJ-06419-82	—	—	—
Tygon® lab (R-3603)	50 ft (15.2 m) per pack		GJ-06409-26	GJ-06408-73	GJ-06408-82	GJ-06409-70	GJ-06409-88	GJ-06409-89
Tygon® fuel & lubricant (F-4040-A)	50 ft (15.2 m) per pack		GJ-06401-26	GJ-06401-73	GJ-06401-82	—	—	—
Tygon® chemical (2001)††	50 ft (15.2 m) per pack		GJ-06475-26	GJ-06475-73	GJ-06475-82	—	—	—
Norprene® (A 60 G)	50 ft (15.2 m) per pack		GJ-06404-26	GJ-06404-73	GJ-06404-82	GJ-06404-70 25-ft/pk	GJ-06404-88 25-ft/pk	GJ-06404-89 25-ft/pk
Norprene® Food (A 60 F)	50 ft (15.2 m) per pack		GJ-06402-26	GJ-06402-73	GJ-06402-82	GJ-06402-70 25-ft/pk	GJ-06402-88 25-ft/pk	GJ-06402-89 25-ft/pk
Chem-Durance®	50 ft (15.2 m) per pack	 New	—	GJ-06432-73††	GJ-06432-82††	GJ-06432-70	GJ-06432-88 25-ft/pk	GJ-06432-89 25-ft/pk
Viton®	25 ft (7.6 m) per pack		GJ-06412-26	GJ-06412-73				
FDA Viton®	25 ft (7.6 m) per pack		GJ-96412-26	GJ-96412-73				

††Recommended for use with Easy-Load® pump head only.

GO to page(s) 35
For a selection of B/T pump tubing.

B/T® Fixed-Speed Pump

New

77110-00

Applications

- Bulk fluid pumping ■ High-volume tank transfer and filling
- Transfer shear-sensitive and viscous fluids ■ Process vat pumping

Benefits

- Integrated pump interlock—shuts pump down when head is opened
- IP55 rated for spraydown in wet or challenging environments
- Gentle enough for pumping shear-sensitive and viscous fluids
- Load tubing with ease ■ Aluminum frame for durability
- Simple to set up and operate

Features

- Reversible motor; pump in either direction
- IP55-rated, ½-hp direct-drive motor

Specifications & Ordering Information

77110-07 only

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77110-00	37	Rapid-Load®	Tygon® LFL B/T 91 06429-91; 3 ft (1 m)	B/T 87, B/T 91	321	IP55	115 VAC, 8.0 A
GJ-77110-07	30.7				266		220 VAC, 4.0 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 35.

B/T® Hazardous-Duty Fixed-Speed Pump

New

77110-20

Applications

- Applying coatings to finished paper ■ Pumping bulk volatile chemicals
- Media transfer

Benefits

- Nonsparking motor for hazardous environments ■ Easy tube loading
- Integrated pump interlock—shuts pump down when head is opened
- IP55 rated for protection against dust and low-pressure jets of water
- Gentle enough for pumping shear-sensitive and viscous fluids
- Aluminum frame for durability

Features

- IP55-rated, ½-hp direct-drive motor

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77110-20	37	Rapid-Load	Tygon LFL B/T 91 06429-91; 3 ft (1 m)	B/T 87, B/T 91	321	IP55	115 VAC, 8.0 A

†Flow rate with included tubing; extend the flow rate of these systems with additional sizes of tubing; order on page 35.

Application Solution

Challenge: A paper company needs to apply a water-based coating to their finished paper. The coating has a viscosity of 1500 cp and is not chemically aggressive. Due to solvent fumes present in the area, they need an air drive that is safer than an electrical drive. The coating must be delivered at a consistent rate of 2.5 LPM.

Solution: The B/T® air-powered variable-speed pump (77110-80) includes an air drive which will not spark around any of the solvent fumes within the area. In order to achieve 2.5 LPM at 1500 cp, it is recommended the customer use a size B/T 87 tubing. With a thicker wall, the size 87 tubing will perform better with the higher viscosity.

B/T® Variable-Speed Pump

Applications

- Drain tanks and drums quickly ■ High-viscosity fluid transfer
- Large-volume chemical addition ■ Shear-sensitive fluid transfer

Benefits

- Easy to clean with epoxy-powder coating
- Housing prevents chemical corrosion ■ Easy tubing changes
- Rugged housing for durability ■ Washdown IP56-rated housing
- Detachable controller mounts up to 16 ft (4.9 m) away for convenient placement

Features

- Reversible pumping direction
- ½-hp continuous-duty drive
- ±5% drive speed accuracy
- IP56-rated pump and controller

New

77110-60

77110-67 only

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77110-60	0.67 to 37	Rapid-Load®	Tygon® LFL B/T 91 06429-91; 3 ft (1 m)	B/T 87, B/T 91	12 to 321	IP56	115 VAC, 5.0 A
GJ-77110-67							230 VAC, 2.5 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 35.

B/T® Air-Powered Variable-Speed Pump

Applications

- Transfer of volatile solvents ■ Media transfer
- Production fermentation ■ Transfer of printing inks

Benefits

- Safe where electrical power should not be used
- Operates from your compressor ■ Easy tubing changes
- Cooler operation ■ Smooth-starting, low-maintenance motor

Features

- High horsepower ■ ¾-hp continuous-duty drive
- ±5% drive speed accuracy ■ IP56-rated; painted steel housing
- Complete with regulator with 5-µm air filter and ¼" NPT(F) connection, automatic lubricator, 0 to 30 psi pressure gauge, and muffler.

New

77110-80

ATEX Zone 2

Specifications & Ordering Information

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive speed range (rpm)	Drive IP rating	Power
GJ-77110-80	1.9 to 37	Rapid-Load®	Tygon LFL B/T 91 06429-91; 3 ft (1 m)	B/T 87, B/T 91	35 to 321	IP56	12 cfm (0.34 m^3) at 40 psi (2.7 bar) minimum

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 35.

Masterflex® Advantage

Masterflex vs Centrifugal Pumps

Application

A food manufacturer needs to pump a high-viscosity food-grade glue (6000 to 9000 cp) into a labeler machine. The glue is placed on a roller and then onto a palette, which places a thin layer of glue onto a bottle.

Masterflex Advantages

- Handles high viscosities well
- Easy to change out tubing and clean pump—less maintenance
- Washdown models allow for quick and easy cleaning
- Tubing is food-grade compatible

Centrifugal Pump Disadvantages

- Does not handle high viscosities
- Difficult to clean
- Internal pump parts are not food-grade compatible
- Limited automated capabilities

Masterflex Products Applied

- 77110-60 B/T variable-speed washdown pump system
- 06402-91 Norprene® Food B/T 91 High-performance precision tubing

GO to page(s) 35
For a selection of B/T pump tubing.

B/T® Digital Pump with Wall-Mount Controller

New

77110-40

Applications

- Caustic detergents ■ Car wash chemicals ■ Polishing slurry pump
- Lubricator for ball bearings ■ Pumping glue

Benefits

- One-handed opening and closing for easy tubing changes
- Swing-away cover for CIP or SIP protocols ■ Quiet yet rugged operation
- Separate controller/drive connected by a 16-ft (4.9-m) cable
- Displays flow rate, dispense volume, copy, rpm
- IP56-rated controller and drive protect against dust and water

Features

- Remote control with optional controller and cable
- ½-hp, continuous-duty drive ■ ±0.3% drive speed accuracy

Specifications & Ordering Information

77110-47 only

Catalog number	Flow range† (LPM)	Pump head included	Tubing included	Tubing sizes accepted	Drive speed range (rpm)	Drive IP rating	Power (50/60 Hz)
GJ-77110-40	0.67 to 37	B/T Rapid-Load®	Tygon® LFL B/T 91 06429-91; 3 ft (1 m)	B/T 87, B/T 91	12 to 321	Controller: IP56 Motor: IP56	90 to 130 VAC, 5.0 A
GJ-77110-47							190 to 260 VAC, 2.5 A

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order on page 35.

GJ-07592-83 Handheld remote controller, with 25-ft (7.6-m) cable
GJ-77300-32 Remote cable, 25 ft (7.6 m) for remote capabilities

B/T® Rapid-Load® Pump Heads

New

- Convert your existing motor into a high-capacity Masterflex® B/T pump
- Accept new B/T PerfectPosition™ pump tubing sizes B/T 87 and B/T 91
- Compatible with standard 56C frame or IEC 72/ISO 71 motors with B5 motor flange
- Complete with mounting hardware and 3 ft. (1 m) of Tygon LFL B/T 91 tubing 06429-91—order additional tubing separately on page 35.

Motor not included

77110-50

Specifications & Ordering Information

77110-55 only

Catalog number	Motor mount	Motor size	rpm	IP rating	Mounting type	Dimensions (L x W x H)	Power
GJ-77110-50	NEMA Type 56C	Motor size, rpm, and IP rating (up to IP56) depend on specifications of motor selected			Direct-coupled	20" x 15½" x 12½" (51 x 40 x 31.8 cm)	Power specifications depend on the type of motor selected (min ½ hp, max 1800 rpm required)
GJ-77110-55	IEC 72/ISO 71 with B5 flange				Direct-coupled	20" x 15½" x 12½" (51 x 40 x 31.8 cm)	

Application Solution

Challenge: A pharmaceutical company needs to pump diluents, which they use to adjust the final concentration of their injectable drugs, from a large 1000-L tank where it is mixed and stored, into 10-L totes they can easily transport to their production lines. They want to dispense exactly 10 L into each tote, and they want to do so quickly.

Solution: We recommend using the B/T digital pump (77110-40, -47) because it dispenses large volumes precisely and quickly. The controller and drive are both washdown IP56-rated; an important feature for the extremely clean pharmaceutical production environment. Plus, the easy-opening cover swings away to allow for CIP or SIP protocols. Using size B/T 91 pump tubing will provide the company with a ±0.5% accuracy at a dispense volume of 10 L, ensuring that very little diluent is lost during the dispensing process.

B/T® PerfectPosition™ Pump Tubing

for New and Improved Rapid-Load® Pump Heads

Ensure optimal performance from your Masterflex® pump

New

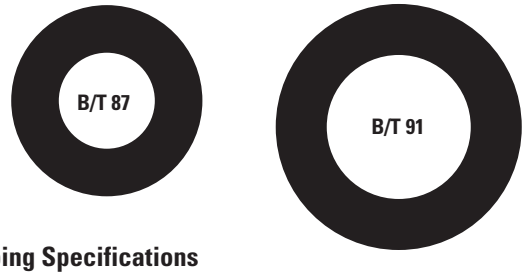
- PerfectPosition tubing retention marks indicate the exact placement of tubing in the pump head to provide the best performance and life of the tubing
- Custom extruded to fit 77110-series Masterflex B/T pumps and pump heads
- Engineered for long life in peristaltic pump applications

These **new** Masterflex® B/T® tubing sizes 87 and 91 are optimized to provide better performance in higher-pressure applications. Each tubing size is manufactured to extremely close tolerances that match our B/T pump heads. These tight tolerances ensure accurate, repeatable flow, and long tubing life. Plus, the PerfectPosition tubing retention marks indicate the best placement of the tubing within the pump head.

Choose from a variety of tubing formulations below to allow for optimal performance in the most challenging applications.

B/T PerfectPosition tubing shown on pump head 77110-20

Cross Sections



Tubing Specifications

Pump tubing size	PerfectPosition™ pump tubing	
	B/T 87	B/T 91
Inside diameter (nominal) Hose barb size	0.5" (12.7 mm) ½" (12.7 mm)	0.75" (19.0 mm) ¾" (19.0 mm)
Flow range (approximate)† with 12 to 321 rpm drive	0.67 to 17.7 LPM (0.17 to 4.7 GPM)	1.4 to 37 LPM (0.4 to 9.8 GPM)
Maximum pressure‡, continuous Maximum pressure‡, intermittent	25 psi (1.7 bar) 40 psi (2.7 bar)	20 psi (1.4 bar) 35 psi (2.4 bar)
Maximum vacuum‡ Suction lift‡	26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)	

†Determined under the following conditions: 0 psi at inlet, 0.5 psi at outlet; water temperature at 72°F (22°C). ‡Actual performance varies depending on tubing formulation—values shown are for firm tubing.

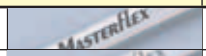
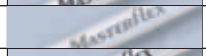
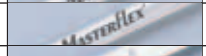
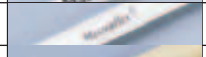
More info FREE TUBING TEST KIT!

Find out which tubing formulations work best with chemicals you are using

Includes 17 FREE pump tubing samples, formulation descriptions, testing and ordering instructions.

Call 847-549-7600 to request a tubing test kit today!

B/T PerfectPosition Pump Tubing Ordering Information

Pump tubing formulation			PerfectPosition™ pump tubing	
			B/T 87	B/T 91
Silicone (platinum-cured)	10 ft (3.0 m) per pack		GJ-96510-87	GJ-96510-91
Silicone (peroxide-cured)	10 ft (3.0 m) per pack		GJ-96400-87	GJ-96400-91
BioPharm silicone (platinum-cured)	25 ft (7.6 m) per pack		GJ-96422-87	GJ-96422-91
BioPharm Plus silicone (platinum-cured)	25 ft (7.6 m) per pack		GJ-96442-87	GJ-96442-91
C-FLEX® (50 A)	10 ft (3.0 m) per pack		GJ-06424-87	GJ-06424-91
PharMed® BPT	25 ft (7.6 m) per pack		GJ-06508-87	GJ-06508-91
	3 ft (0.9 m) per pack		GJ-95668-87	GJ-95668-91
PharmaPure®	25 ft (7.6 m) per pack		GJ-06435-87	GJ-06435-91
Norprene® food (A 60 F)	25 ft (7.6 m) per pack		GJ-06402-87	GJ-06402-91
	3 ft (0.9 m) per pack		GJ-06403-87	GJ-06403-91
Tygon® LFL	25 ft (7.6 m) per pack		GJ-06429-87	GJ-06429-91
	3 ft (0.9 m) per pack		GJ-06430-87	GJ-06430-91

Technical info

For detailed tech info and complete listings of Masterflex parts and accessories, request our Masterflex Encyclopedia, Vol. 3. at Masterflex.com

MASTERFLEX® Pump Accessories

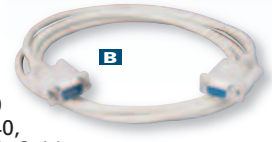
A Pulse Dampener

Virtually eliminates pulsation in output flow. Five pairs of fittings and PTFE-pipe thread tape are included. Accepted tubing: all L/S® sizes, I/P® 26, nominal from 1/16" to 3/8" ID (1.6 to 9.5 mm ID). Fittings included (tubing ID x NPT(M) thread): 1/16" x 1/8", 1/8" x 1/8", 3/16" x 1/8", 1/4" x 1/8", and 3/8" x 1/8".
Dampener connections: 1/8" NPT(F).
Dead volume: 190 mL.
Max pressure: 60 psi (4.3 bar).
Polyethylene body.

Cat. no.	Description
GJ-07596-20	Pulse dampener

B DB9 Cable Assembly

Use these 9-pin interface cable assemblies with Masterflex L/S drives (07550-30 and -50, 77521-40, -47, -50, and -57). Cable measures 6 ft (1.8 m) long.



Cat. no.	Description
GJ-22050-54	DB9 cable assembly

C USB to DB9 (M) RS-232 Serial Adapter Cable

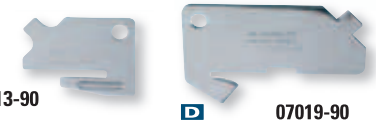
New

Use this cable to connect the Masterflex computer-compatible drives 07550-30 and -50 to a PC with USB port. Will also connect other peripheral devices equipped with RS-232 serial interface including balances, printers, scanners, and PDAs. Includes 2-ft cable and driver software. Supports data transfer speeds up to 500 Kbps; compatible with Windows® 98SE, ME, 2000, and XP.

Catalog number	Description
GJ-22050-58	USB to DB9 (M) RS-232 serial adapter cable

D Tubing Loading Keys (replacement)

L/S and I/P Standard pump heads include tubing loading keys. A key is required to ensure proper tubing alignment and tension. Order a free key to replace a lost key based on your pump head series: L/S or I/P.



Catalog number	Description
GJ-07013-90	L/S tubing loading key
GJ-07019-90	I/P tubing loading key

E Remote Control Connectors

Combine these connectors with 20–22 gauge shielded wire to create your own interface cable. Maximum cable length is 1000 ft (300 m).

Cat. no.	Description
GJ-07595-45	DB9 male connector. Wire only the pins needed for remote control of your Masterflex drive
GJ-07595-52	DB15 male connector. Wire only the pins needed for remote control of your Masterflex drive

F Tubing Weights

Flow-through weights of PTFE keep tubing in place in receiving vessel during dispense cycles. Fit Masterflex L/S tubing sizes noted.

Cat. no.	Description
GJ-78226-81	Weight for L/S 16, L/S 15, and L/S 25
GJ-78226-82	Weight for L/S 17, L/S 18, L/S 24, L/S 35, L/S 36
GJ-77310-03	Set of two; one each of 78226-81 and 78226-82

Mounting Hardware for L/S® and I/P® Pump Heads

L/S Easy-Load® 3 Pump Heads

Replacement mounting kit, for mounting L/S Easy-Load 3 pump head to Masterflex L/S pump drives. Includes mounting plate and four stainless steel screws.

Catalog number	Description
GJ-77800-00	Replacement mounting kit

L/S Easy-Load II Pump Heads

Mount up to four L/S Easy-Load II pump heads on a single drive; see individual drive specifications for maximum number of heads to be mounted. Mounting hardware is stainless steel.

Catalog number	Description	Heads to be mounted
GJ-77200-01	Mounting hardware	One
GJ-77200-02		Two
GJ-77200-03		Three
GJ-77200-04		Four

L/S High-Performance Pump Head

Replacement mounting screws, stainless steel, for mounting L/S High-Performance pump head to Masterflex L/S pump drives.

Catalog number	Description
GJ-77250-01	Replacement mounting screws

I/P Easy-Load Pump Heads

Mount up to two I/P Easy-Load pump heads on a single drive; see individual drive specifications for maximum number of heads to be mounted. Mounting hardware is stainless steel.

Catalog number	Description	Heads to be mounted
GJ-77601-95	Mounting hardware	One
GJ-77601-96		Two

GJ-77600-03 Replacement tang boots for I/P Easy-Load pump heads. Pack of 10

I/P High-Performance Pump Head

Replacement mounting screws, stainless steel, for mounting I/P High-Performance pump head to Masterflex I/P pump drives.

Catalog number	Description
GJ-77600-01	Replacement mounting screws

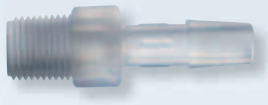
GJ-77600-03 Replacement tang boots for I/P High-Performance pump heads. Pack of 10

Masterflex® Barbed Fittings

A Straight barb

B Tee connector

C "Y" connector



D Barb x NPT(M) adapter

E Reducer barb

Size	Use with Masterflex tubing sizes			HDPE	Nylon	Polypropylene	Kynar® PVDF
	L/S®	I/P®	B/T®	Catalog number (pk of 10)	Catalog number (pk of 10)	Catalog number (pk of 10)	Catalog number (pk of 10)
A Straight barbs							
1/16"	13, 14	—	—	GJ-30612-01	GJ-30612-02	GJ-30612-03	GJ-30612-04
1/8"	16	—	—	GJ-30612-05	GJ-30612-06	GJ-30612-07	GJ-30612-08
3/16"	15, 25	—	—	GJ-30612-09	GJ-30612-10	GJ-30612-11	GJ-30612-12
1/4"	17, 24	26	—	GJ-30612-13	GJ-30612-14	GJ-30612-15	GJ-30612-16
3/8"	18, 35, 36	70, 73	86	GJ-30612-17	GJ-30612-18	GJ-30612-19	GJ-30612-20
1/2"	—	82, 88	87, 88	GJ-30612-21	GJ-30612-22	GJ-30612-23	GJ-30612-24
5/8"	—	89	—	GJ-30612-25	GJ-30612-26	GJ-30612-27	GJ-30612-28
3/4"	—	—	90, 91	GJ-30612-29	GJ-30612-30	GJ-30612-31	GJ-30612-32
1"	—	—	92	GJ-30612-33	GJ-30612-34	GJ-30612-35	GJ-30612-36
B Tee connectors (equal leg)							
1/16"	13, 14	—	—	GJ-30613-01	GJ-30613-02	GJ-30613-03	GJ-30613-04
1/8"	16	—	—	GJ-30613-05	GJ-30613-06	GJ-30613-07	GJ-30613-08
3/16"	15, 25	—	—	GJ-30613-09	GJ-30613-10	GJ-30613-11	GJ-30613-12
1/4"	17, 24	26	—	GJ-30613-13	GJ-30613-14	GJ-30613-15	GJ-30613-16
3/8"	18, 35, 36	70, 73	86	GJ-30613-17	GJ-30613-18	GJ-30613-19	GJ-30613-20
1/2"	—	82, 88	87, 88	GJ-30613-21	GJ-30613-22	GJ-30613-23	GJ-30613-24
5/8"	—	89	—	GJ-30613-25	GJ-30613-26	GJ-30613-27	GJ-30613-28
3/4"	—	—	90, 91	GJ-30613-29	GJ-30613-30	GJ-30613-31	GJ-30613-32
1"	—	—	92	GJ-30613-33	GJ-30613-34	GJ-30613-35	GJ-30613-36
C Y-connectors (equal leg)							
1/16"	13, 14	—	—	GJ-30614-01	GJ-30614-02	GJ-30614-03	GJ-30614-04
1/8"	16	—	—	GJ-30614-05	GJ-30614-06	GJ-30614-07	GJ-30614-08
3/16"	15, 25	—	—	GJ-30614-09	GJ-30614-10	GJ-30614-11	GJ-30614-12
1/4"	17, 24	26	—	GJ-30614-13	GJ-30614-14	GJ-30614-15	GJ-30614-16
3/8"	18, 35, 36	70, 73	86	GJ-30614-17	GJ-30614-18	GJ-30614-19	GJ-30614-20
1/2"	—	82, 88	87, 88	GJ-30614-21	GJ-30614-22	GJ-30614-23	GJ-30614-24
D Barb x NPT(M) adapters							
1/8" x 1/8"	16	—	—	GJ-30615-05	GJ-30615-06	GJ-30615-07	GJ-30615-08
3/16" x 1/8"	15, 25	—	—	GJ-30615-09	GJ-30615-10	GJ-30615-11	GJ-30615-12
1/4" x 1/4"	17, 24	26	—	GJ-30615-13	GJ-30615-14	GJ-30615-15	GJ-30615-16
3/8" x 1/4"	18, 35, 36	70, 73	86	GJ-30615-17	GJ-30615-18	GJ-30615-19	GJ-30615-20
1/2" x 1/2"	—	82, 88	87, 88	GJ-30615-21	GJ-30615-22	GJ-30615-23	GJ-30615-24
5/8" x 1/2"	—	89	—	GJ-30615-25	GJ-30615-26	GJ-30615-27	GJ-30615-28
3/4" x 1/2"	—	—	90, 91	GJ-30615-29	GJ-30615-30	GJ-30615-31	GJ-30615-32
E Reducer barbs†							
1/16" x 1/8"	13, 14	—	—	GJ-30616-01	GJ-30616-02	GJ-30616-03	GJ-30616-04
1/8" x 3/32"	16	—	—	GJ-30616-05	GJ-30616-06	GJ-30616-07	GJ-30616-08
3/16" x 1/8"	15, 25	—	—	GJ-30616-09	GJ-30616-10	GJ-30616-11	GJ-30616-12
1/4" x 1/8"	17, 24	26	—	GJ-30616-13	GJ-30616-14	GJ-30616-15	GJ-30616-16
3/8" x 1/4"	18, 35, 36	70, 73	86	GJ-30616-17	GJ-30616-18	GJ-30616-19	GJ-30616-20
1/2" x 3/8"	—	82, 88	87, 88	GJ-30616-21	GJ-30616-22	GJ-30616-23	GJ-30616-24
5/8" x 1/2"	—	89	—	GJ-30616-25	GJ-30616-26	GJ-30616-27	GJ-30616-28
3/4" x 1/2"	—	—	90, 91	GJ-30616-29	GJ-30616-30	GJ-30616-31	GJ-30616-32
1" x 1/2"	—	—	92	GJ-30616-33	GJ-30616-34	GJ-30616-35	GJ-30616-36

†Tubing sizes listed match first dimension given in "size" column.

Handheld Tubing Cutter

Steel blade coated with PTFE resin produces clean, straight cuts through tubing up to 1¼" OD (cuts polyethylene tubing up to 1½" OD).

06438-90

Catalog number	Description
GJ-06438-90	Handheld tubing cutter

GJ-06438-81 Optional tubing cutter pouch
GJ-06438-92 Replacement blade for 06438-90

Benchtop Tubing Cutter

Steel blade makes right-angle cuts in plastic tubing 1/16" to 5/8" OD.

06438-10

Catalog number	Description
GJ-06438-10	Benchtop cutter

GJ-06438-11 Replacement blade for 06438-10

Specialty Tubing Formulations

Accept no substitutes—use only Masterflex® tubing in your tubing pumps!
Our exclusive pump tubing is always your best choice because, unlike commodity tubing, it is specifically designed and manufactured to help you achieve top performance from the demanding peristaltic pumping process. Featured here are some of our most unique tubing formulations to meet your specialty needs.

MASTERFLEX® PTFE Tubing

The only peristaltic-compatible PTFE tubing available!

- Chemically inert; offering the best chemical resistance of any pump tubing
- Excellent fluid purity, chemical resistance, and very low gas permeability
- Rigid tubing structure provides tolerance for high-pressure applications up to 100 psi (6.8 bar)
- Inert fluoropolymer will not leach into or absorb out of fluid being pumped
- Meets FDA and USP Class VI standards
- *For complete information, go to page 14*

Applications
- Vulcanization
- Feeding and metering of aggressive chemicals
- Dispensing of fruit extracts and flavoring
- Electronics and semiconductor industries
- Industrial

MASTERFLEX® C-FLEX® Tubing

Combines the biocompatibility of silicone with chemical resistance of Tygon®, but with a much longer pumping life

- Chemically resistant to acids and bases for longer tubing life
- Excellent biocompatibility
- Nonpyrogenic, noncytotoxic, and nonhemolytic properties maintain purity and sterility of fluids
- Low protein binding ensures minimal degradation or loss of sample
- Meets FDA and USP Class VI standards
- *For complete information, go to pages 20–21, 31, and 35*

Applications
- Biopharmaceutical processing and storage
- Botanical production
- Nutraceuticals

MASTERFLEX® Viton® Tubing

The highest fluorine content of any Viton tubing for enhanced chemical compatibility

- Tolerates some of the harshest chemicals used in the semiconductor industry
- Resistant to corrosive solvents and aliphatic and aromatic hydrocarbons—even at elevated temperatures
- Ultra-low gas permeability maintains integrity of fluid
- Max temperature of 400°F (205°C)
- *For complete information, go to pages 20–21 and 31*

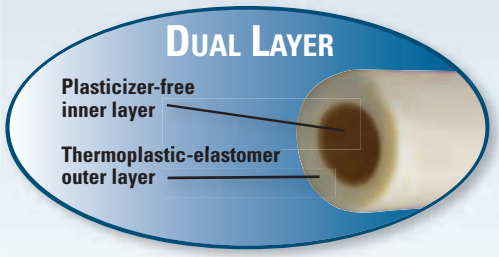
Applications
- Transfer harsh chemicals through process lines
- Manufacturing
- Semiconductor industries

MASTERFLEX® Chem-Durance® Pump Tubing

Excellent chemical resistance and long pumping life!

New

- Flexible outer jacket acts as an insulating layer to absorb and dissipate heat from the rollers—extending the life of the tubing
- Plasticizer-free, smooth bore liner is hydrophobic and resists the absorption/adsorption of aqueous fluids
- Performs in a wide range of chemical applications limiting the number of tubing formulations you need to keep on hand
- Low spallation maintains purity of fluid
- Meets FDA 21 CFR 177.2600 regulations
- Ideal for use in all Masterflex L/S® and I/P® Easy-Load®, Easy-Load II, and High-Performance pump heads
- *For complete information, go to pages 20–21 and 31*



Applications
- Transfer of sensitive fluids
- Ink and solvent production
- Diagnostic testing
- Battery acid filling
- Specialty chemical production/processing

Better Chemical Compatibility than other tubing formulations

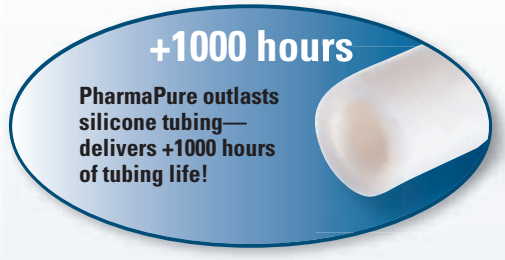
Chemical	Chem-Durance tubing	CHEM-SURE® tubing	Silicone tubing
Aqua regia	**Excellent compatibility**	Good compatibility	No compatibility*
Butanol	**Excellent compatibility**	No compatibility*	Good compatibility
Potassium hydroxide (conc)	**Excellent compatibility**	Good compatibility	Poor compatibility
Sulfuric acid (conc)	**Excellent compatibility**	Poor compatibility	No compatibility*

*Not recommended; tubing is severely affected by chemical.

MASTERFLEX® PharmaPure® Low-Spallation Pump Tubing

Especially for pharmaceutical, biotechnology, and laboratory use

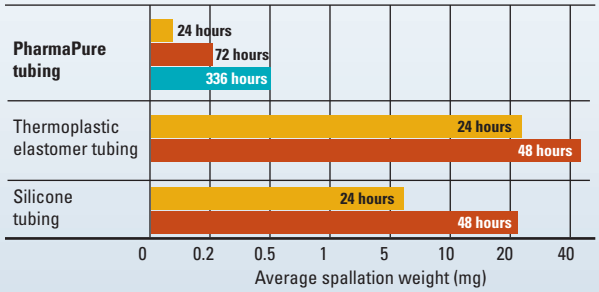
- Outlasts silicone tubing in peristaltic pumps up to 30 times!
- Ultra-low particulate spallation
- Provides superior flex life and excellent wear properties
- Withstands repeated autoclaving and sterilization
- Meets all USP Class VI and FDA criteria
- Ideal for use in all Masterflex L/S®, I/P®, and B/T® pump heads, except for L/S and I/P High-Performance pump heads
- *For complete information, go to pages 20–21, 31, and 35*



Applications
- Cell harvest and media process systems
- Vaccine manufacturing
- Bioreactor process lines
- Sterile filling
- Diagnostic test products
- Production filtration and fermentation

Much Lower Spallation Rate than other tubing formulations

The comparison table at right summarizes the spallation test data results of select tubing used in a peristaltic pump. In each case, ¼" ID tubing was used in a three-roller pump head operating at 600 rpm under room temperature 23°C (73°F). Results from a minimum of five samples were averaged to obtain values.



Continuous pressures up to 6.9 bar (100 psi)!
See page 15 for details and to order our High-pressure tubing.

Masterflex® Pump Tubing Formulations Descriptions

Silicone Tubing

While our silicone tubing formulations share many characteristics, there are some basic differences.

Platinum-Cured Silicone Tubing

- Slightly greater clarity
- Smooth surface; lower protein binding levels
- Fewer potential leachables
- Ideal for pharmaceutical and biotechnology use

Peroxide-Cured Silicone Tubing

- Greater physical compression capability
- Economical, longer tubing life
- Potential outgassing of peroxide products

BioPharm Silicone Tubing (platinum-cured)

- Ultra-smooth inner surface minimizes particle entrapment
- Very low extractables, with documented biocompatibility for sensitive applications
- Ideal for lab, biotech, and pharmaceutical applications

BioPharm Plus Silicone Tubing (platinum-cured)

- All of the benefits of BioPharm silicone tubing (at left), plus:
- Longest tubing life of any silicone pump tubing
- Lower spallation than regular silicone
- Enhanced pressure capability

C-FLEX® Tubing

- Combines biocompatibility of silicone with chemical resistance similar to Tygon®
- Very low protein binding
- Heat sealable, weldable, economical

To sterilize all silicone tubing:

High-speed instrument (flash) autoclave: Place tubing on nonlinting cloth or sterilizing paper in a clean, open tray for 10 minutes at 270°F (132°C) at 2 kg/cm² (30 psi).

Standard gravity autoclave: Wrap tubing in nonlinting cloth or sterilizing paper and place in a clean, open tray for 30 minutes at 250°F (121°C) at 1 kg/cm² (15 psi).

Pre-vacuum high-temperature autoclave: Wrap tubing in nonlinting cloth or sterilizing paper and place in a clean, open tray for normal cycle of 30 to 35 minutes at 250°F (121°C).

Gamma radiation: 2.5 Mrad.

Pump tubing formulation	Silicone (platinum-cured)	Silicone (peroxide-cured)	BioPharm Silicone (platinum-cured)	BioPharm® Plus Silicone (platinum-cured)	C-FLEX® (50 A)
Series number	**96410**	**96400**	**96420**	**96440**	**06424**
					
Advantages	Excellent biocompatibility. No leachable additives, DOP, or plasticizers; phthalate and latex-free; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Extremely good over a wide temperature range. Weather, ozone, corona, and radiation resistant. Minimal tendency to take a set.	Excellent biocompatibility. No additives, plasticizers or DOP; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Extremely good at low temperatures. Weather, ozone, corona, and radiation resistant. Minimal tendency to take a set.	Ultra-smooth inner surface minimizes particle entrapment. Lower absorption; excellent biocompatibility; no leachable additive, DOP, or plasticizers. Very low extractables. Odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Weather, ozone, corona, and radiation resistant.	Similar to BioPharm Silicone, plus: Longest life of any silicone pump tubing. Lower spallation than regular silicone. Enhanced pressure capability. Fungus-resistant. Nontoxic, no leachable plasticizers. Lower gas permeability than other silicones. Use with many acids and alkalies.	Physical properties similar to silicone with chemical compatibility of Tygon®. Very low protein binding. Inexpensive. Biocompatible. Heat sealable and weldable.
Limitations	Do not use with concentrated acids and bases, organic solvents, or oils. Relatively high gas permeability.	Do not use with concentrated solvents, oils, acids. Relatively high gas permeability.	Do not use with concentrated solvents, oils, or acids. Relatively high gas permeability.	Do not use with concentrated solvents, oils, or acids. Relatively high gas permeability.	Not recommended for use with oils. Moderate pumping life.
Application suitability:					
Acids	Not recommended	Not recommended	Not recommended	Not recommended	Good
Alkalies	Not recommended	Not recommended	Not recommended	Not recommended	Good
Organic solvents	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended
Pressure	Fair	Fair	Fair	Fair	Fair
Vacuum	Good	Good	Good	Good	Good
Viscous fluids	Fair	Fair	Fair	Fair	Fair
Sterile fluids	Excellent	Excellent	Excellent	Excellent	Excellent
Physical characteristics and composition	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material; flexible. Translucent, clear to light amber.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material. Translucent, clear to light amber.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material. Translucent, clear to light amber.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material. Translucent, clear to light amber.	Thermoplastic elastomer. Styrene-ethylene-butylene modified block copolymer with silicone oil. Excellent tensile and tear strength Soft material. Opaque, white.
Temperature range	–58 to 446°F (–50 to 230°C)	–58 to 446°F (–50 to 230°C)	–75 to 450°F (–60 to 232°C)	–75 to 450°F (–60 to 232°C)	–100 to 275°F (–73 to 135°C)
Meets classifications	USP Class V Extractables; exceeds Class VI Implant; FDA 21 CFR 177.2600; Exceeds 3A Sanitary cGMPs (FDA 21 CFR 210 and 211). European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.2600 criteria European Pharmacopoeia (EP) Exceeds 3A sanitary standards	USP Class VI FDA 21 CFR 177.2600 Exceeds 3A sanitary standards European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.2600 Exceeds 3A sanitary standards European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.1810 European Pharmacopoeia (EP)
Gas permeability $\frac{cc \times mm}{(cm^2 \times sec \times cm\ Hg) \times 10^{-10}}$	CO_2: 20,132 H_2: 6579 O_2: 7961 N_2: 2763	CO_2 20,132 H_2: 6579 O_2: 7961 N_2: 2763	CO_2: 25,147 H_2: — O_2: 4715 N_2: 2284	CO_2: 25,147 H_2: — O_2: 4715 N_2: 2284	CO_2: — H_2: — O_2: 150 N_2: —
Cleaning/sterilization	Clean with hot water/soap solution; use a non-oily soap such as Ivory®, not synthetic detergent or oil-based soap as they may be absorbed by the tubing and into the fluid. Rinse well with distilled water. Ethylene oxide (ETO) sterilization is not recommended—sufficient data is not available about complete outgassing of residual ETO and other ETO products.	Clean with isopropyl alcohol or hot water/soap solution; use a non-oily soap such as Ivory®, not synthetic detergent or oil-based soap as they may be absorbed by the tubing and into the fluid. Rinse thoroughly with distilled water. May use ETO. Autoclavable.	Sterilize by ETO, autoclave, or gamma radiation up to 2.5 Mrad. To autoclave: coil loosely in nonlinting cloth or paper; autoclave at 250°F (121°C), 1 bar (15 psi) for 30 minutes.	Sterilize by ETO, autoclave, or gamma irradiation up to 2.5 Mrad. To autoclave: coil loosely in nonlinting cloth or paper; autoclave at 250°F (121°C), 1 bar (15 psi) for 30 minutes.	Sterilize by ETO, autoclave, or gamma radiation.

Other Biopharmaceutical Tubing

In addition to silicone, we also carry other pump tubing formulations that are biocompatible and well-suited to biotech and pharmaceutical laboratory or production applications.

PharMed® BPT Tubing

- Over 10,000 hours of tubing life
- Resists ozone and UV radiation
- Noncytotoxic and nonhemolytic
- Ideal for tissue and cell culture work
- Heat sealable and bondable

PharmaPure® Tubing

- Biocompatibility similar to PharMed® BPT
- Long life under continuous pressure up to 40 psi (2.7 bar)
- Very low spallation
- Low extractables

STA-PURE® Tubing

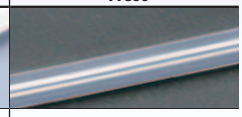
- Long life at continuous pressure up to 60 psi (4 bar)
- Excellent flow stability
- Spallation-free
- Low gas permeability

CHEM-SURE® Tubing

- Very similar to STA-PURE (left), plus:
- Excellent chemical resistance
- Compatible with many inorganic and organic chemicals

PTFE Tubing

- Chemically inert; best chemical resistance of any pump tubing
- Sold in molded pump tubing elements
- Use with PTFE tubing pump head

Pump tubing formulation	PharMed® BPT	PharmaPure®	Gore™ STA-PURE®	Gore™ CHEM-SURE®	PTFE
Series number	06508	06435	96200	96210	77390
					
Advantages	Great for tissue and cell work—nontoxic and nonhemolytic. Long service life minimizes risk of fluid exposure; reduces tubing costs and pump downtime. Opaque to UV and visible light to protect light-sensitive fluids. Low gas permeability. High-pressure (100 psi) version available.	Nontoxic and nonhemolytic (similar to PharMed® BPT); biocompatible. Long life even under pressure; up to 1000 hours at 40 psi (2.7 bar). Very low spallation—protects fluid purity. Low extractables. Low gas permeability.	Long life, even under pressures up to 60 psi (4 bar). Excellent flow stability; <1% change in flow rate as tubing wears, no break-in period required. Spallation-free. Excellent biocompatibility. Very low extractables.	Similar to STA-PURE® tubing but with enhanced chemical resistance. Resistant to many organic and inorganic fluids. Long life at pressure up to 60 psi (4 bar). Spallation-free. Excellent biocompatibility. Low gas permeability.	Chemically inert. Excellent chemical resistance. Will not leach into or absorb out of fluid being pumped. Extremely low gas permeability. Nontoxic. Virtually nonporous. Low coefficient of friction.
Limitations	Potential leaching of USP mineral oil or blend material.	Potential leaching of USP mineral oil or blend material.	Sold as tube elements only; no continuous lengths available.	Sold as tube elements only; no continuous lengths available.	Limited pumping life.
Application suitability:					
Acids	Good	Good	Not recommended	Excellent	Excellent
Alkalies	Good	Good	Not recommended	Good	Excellent
Organic solvents	Not recommended	Not recommended	Not recommended	Excellent	Excellent
Pressure	Good	Good	Excellent	Good	Good
Vacuum	Good	Good	Good	Good	Good
Viscous fluids	Excellent	Excellent	Good	Good	Excellent
Sterile fluids	Excellent	Good	Excellent	Excellent	Good
Physical characteristics and composition	Thermoplastic elastomer. Polypropylene-based material with USP mineral oil. Excellent tensile strength. Firm (stiff) material. Opaque, beige.	Thermoplastic elastomer. Polypropylene-based material with USP mineral oil. Excellent tensile strength. Firm (stiff) material. Opaque, off-white.	ePTFE (expanded PTFE) and platinum-cured silicone. Excellent tensile strength. Firm (stiff) material. Opaque, white.	ePTFE (expanded PTFE) and fluoroelastomer. Excellent tensile strength. Firm (stiff) material. Opaque, white.	Polytetrafluoroethylene. Rigid material. Translucent, white.
Temperature range	–60 to 270°F (–51 to 132°C)	–89 to 275°F (–67 to 135°C)	–40 to 302°F (–40 to 150°C)	–112 to 392°F (–80 to 200°C)	–400 to 500°F (–240 to 260°C)
Meets classifications	USP Class VI FDA 21 CFR 177.2600 NSF-listed (Standard 51). European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.2600 European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.2600 European Pharmacopoeia (EP)	USP Class VI FDA 21 CFR 177.1550	USP Class VI FDA 21 CFR 177.1500
Gas permeability $\frac{cc \times mm}{(cm^2 \times sec \times cm\ Hg) \times 10^{-10}}$	CO_2: 1200 H_2: — O_2: 200 N_2: 80	CO_2: 1200 H_2: — O_2: 200 N_2: 80	CO_2: 20,132 H_2: 6579 O_2: 7961 N_2: 2763	CO_2: 76 to 79 H_2: — O_2: — N_2: 4.3	CO_2: 6.8 H_2: — O_2: — N_2: 1.0
Cleaning/sterilization	Sterilize by ETO, autoclave, or gamma radiation up to 2.5 Mrad. Repeated autoclaving will not affect overall life.	Sterilize by ETO, autoclave or gamma radiation up to 2.5 Mrad. Repeated autoclaving will not affect overall life.	Sterilize by ETO, autoclave or SIP (steam in place). Repeated autoclaving will not affect overall life.	Sterilize by ETO, autoclave or SIP (steam in place). Repeated autoclaving will not affect overall life.	Sterilize by ETO, autoclave or dry heat.

Masterflex® Pump Tubing Formulations Descriptions

Tygon® Tubing

Our Tygon tubing comes in five separate formulations that share common characteristics but differ in tubing life and other specifications. See descriptions below for details about each formulation.

Tygon® Lab Tubing

- Ideal for general transfer applications
- Economical
- Nontoxic, nonaging, and nonoxidizing

Tygon® LFL Tubing

- Longest tubing life of all Tygon tubing formulations
- Broad chemical compatibility
- Low gas permeability

Tygon® Food Tubing

- Meets various food and sanitary regulations
- Unaffected by all commercial sanitizers
- Nonwetting properties allow flush-cleaning and complete drainage
- Smooth inner surface

Tygon® Fuel & Lubricant Tubing

- Ideal for transferring hydrocarbons, gasoline, kerosene, heating oils, cutting compounds, and glycol-based coolants
- Not for use with concentrated strong acids or alkalies

Tygon® Chemical Tubing

- Best chemical resistance of Tygon® formulations
- Compatible with some organics
- Plasticizer-free

Sterilization

Ethylene oxide (ETO): Coil tubing loosely in nonlinting cloth or sterilization paper. Follow the sterilization equipment manufacturer's directions as to gas type, concentration, times, and temperatures; maintain humidity within the prescribed limits, generally between 30 to 65%.

Standard gravity autoclave: Coil tubing loosely in nonlinting cloth or sterilizing paper, and place in a clean, open tray for 30 minutes at 250°F (121°C) at 1 kg/cm² (15 psi); air dry at max 150°F (66°C) for 2 to 2½ hours until clear.

Gamma radiation: Cap ends of tubing if required. Radiation should be product specific and according to GMP guidelines.

Pump tubing formulation	Tygon® Lab (R-3603)	Tygon® LFL	Tygon® Food (B-44-4X)	Tygon® Fuel & Lubricant (F-4040-A)	Tygon® Chemical (2001)
Series number	06409	06429	06419	06401	06475
					
Advantages	Inexpensive tubing for general laboratory applications. Clear for easy flow monitoring. Handles virtually all inorganic chemicals. Nonaging, nonoxidizing. Low gas permeability. Good for viscous fluids. High dielectric constant.	Longest life of all Tygon® peristaltic tubing (up to 1000 hrs). Clear for easy flow monitoring. Broad chemical resistance. Nonaging, nonoxidizing. Low gas permeability. Smooth bore. Good for viscous fluids. High dielectric constant.	Designed especially for handling food products. Bore is extremely smooth (better than most stainless steels) Nontoxic, will not affect taste or odor, and clear for CIP and flow verification. Excellent nonwetting properties permit flush cleaning and complete drainage. High dielectric constant.	Specially formulated to transport hydrocarbons, petroleum products, and distillates. Suitable for gasoline, kerosene, heating oils, cutting fluids, and glycol-based coolants. Minimum extractability. Low gas permeability. High dielectric constant.	Best chemical resistance of any Tygon® formulation. Compatible with many polar solvents. Plasticizer-free. Clear for easy flow monitoring. Low extractability. Low gas permeability. High dielectric constant.
Limitations	Limited pumping life. Potential leaching of plasticizer.	Potential leaching of plasticizer.	Limited pumping life.	Don't use with strong acids and alkalies.	Limited pumping life. Some external spallation during use (does not affect tubing ID). Recommended for use with Easy-Load®, Easy-Load® II, and Easy-Load®3 pump heads only.
Application suitability:					
Acids	Good	Good	Good	Good	Excellent
Alkalies	Good	Good	Good	Good	Excellent
Organic solvents	Not recommended	Not recommended	Not recommended	Not recommended	Good
Pressure	Good	Good	Good	Good	Good
Vacuum	Good	Good	Good	Good	Good
Viscous fluids	Excellent	Excellent	Excellent	Excellent	Excellent
Sterile fluids	Poor	Good	Good	Poor	Good
Physical characteristics and composition	Thermoplastic. PVC-based material with plasticizer. Firm (stiff) material. Transparent, clear.	Thermoplastic. PVC-based material with plasticizer. Firm (stiff) material. Transparent, clear.	Thermoplastic. PVC-based material with plasticizer. Firm (stiff) material. Transparent, clear.	Thermoplastic. PVC-based material with plasticizer. Firm (stiff) material. Transparent, yellow.	Thermoplastic elastomer. PVC- and plasticizer-free material. Firm (stiff) material. Transparent, clear.
Temperature range	–58 to 165°F (–50 to 74°C)	–75 to 165°F (–59 to 74°C)	–47 to 165°F (–44 to 74°C)	–35 to 165°F (–37 to 74°C)	–108 to 135°F (–77 to 57°C)
Meets classifications	FDA 21 CFR 175.300	USP Class VI FDA 21 CFR 175.300	FDA 21 CFR 175.300 NSF-listed (Standard 51)	None	FDA 21 CFR 177.2600
Gas permeability $\frac{cc \times mm}{(cm^2 \times sec \times cm\ Hg) \times 10^{-10}}$	CO_2: 360 H_2: 97 O_2: 80 N_2: 40	CO_2: 563 H_2: — O_2: 124 N_2: 67	CO_2: 270 H_2: 97 O_2: 60 N_2: 30	CO_2: 100 H_2: 97 O_2: 22 N_2: 12	CO_2: 114 H_2: — O_2: 19 N_2: 9
Cleaning/sterilization	Sterilize with ETO or autoclave. To autoclave: Coil tubing loosely in nonlinting cloth or paper, autoclave at 250°F (121°C), 1 kg/cm² (15 psi) for 30 minutes (tubing will appear milky); air dry at max 150°F (66°C) for 2 to 2½ hours until clear.	Sterilize with ETO or autoclave. To autoclave: Coil tubing loosely in nonlinting cloth or paper, autoclave at 250°F (121°C), 1 kg/cm² (15 psi) for 30 minutes (tubing will appear milky); air dry at max 150°F (66°C) for 2 to 2½ hours until clear.	Unaffected by commercial sanitizers (with recommended procedures). Sterilize by ETO or autoclave. To autoclave: Coil tubing loosely in nonlinting cloth or paper; autoclave at 250°F (121°C), 1 kg/cm² (15 psi) for 30 minutes (tubing will appear milky); air dry at max 150°F (66°C) \for 2 to 2½ hours until clear.	Sterilization is not recommended.	Sterilize by ETO, autoclave, or gamma radiation. To autoclave: Coil tubing loosely in nonlinting cloth or paper; autoclave at 250°F (121°C), 1 kg/cm² (15 psi) for 30 minutes (tubing will appear milky); air dry at max 150°F (66°C) for 2 to 2½ hours until clear.

Other Industrial and Food-Grade Tubing

Norprene® Tubing

- Up to 10,000 hours of tubing life
- Best choice for pressure/vacuum applications
- Resists heat, ozone, acids, and alkalies
- Heat sealable and bondable
- Nonaging, nonoxidizing

Norprene® Food Tubing

- Ideal for high-temperature food and beverage applications
- Similar characteristics as Norprene® tubing
- Meets FDA and NSF standards

Chem-Durance® Tubing

- Excellent chemical resistance
- Excellent pumping life
- Low spallation

Viton® Tubing

- Excellent chemical resistance
- Resists corrosives, solvents, and oils at elevated temperatures

FDA Viton® Tubing

- Similar to Viton® (above), but with FDA approval
- Excellent chemical resistance

Where to Order Tubing

Continuous pressures up to 6.9 bar (100 psi)!

L/S® High-Pressure Pump System

See page 15 for details and to order our High-pressure Norprene® and PharMed® BPT tubing.

Pump tubing formulation	Norprene® (A 60 G)	Norprene® Food (A 60 F)	Chem-Durance®	Viton®	FDA Viton®
Series number	06404	06402	06432	06412	96412
					
Advantages	Best choice for vacuum/pressure applications. Offers longest pump tubing life. Heat, ambient ozone resistant. Good resistance to acids/alkalies. Black color hides dirt and dust. Heat sealable, nonaging, and nonoxidizing. High dielectric constant. High-pressure version available.	Similar to Norprene® (06404) but with FDA approval. Excellent for food/dairy applications. Longest life, good flow consistency. Heat and ozone resistant. Good resistance to acids/alkalies. Heat sealable, nonaging, and nonoxidizing. High dielectric constant.	Excellent chemical resistance. Excellent life and durability under pressure. Low spallation. Plasticizer-free inner liner. High dielectric constant.	Excellent chemical resistance. Resistant to corrosives, solvents, and oils at elevated temperatures. Low gas permeability.	Similar to Viton® (06412) but with FDA approval. Perfect for food and lab applications where FDA compliance is required. Excellent chemical resistance. Resistant to corrosives, solvents, and oils at elevated temperatures. Low gas permeability.
Limitations	Potential leaching of USP mineral oil or blend material.	Potential leaching of USP mineral oil or blend material.	Requires high starting torque.	Limited pumping life.	Limited pumping life.
Application suitability:					
Acids	Good	Good	Excellent	Excellent	Excellent
Alkalies	Good	Good	Excellent	Excellent	Excellent
Organic solvents	Not recommended	Not recommended	Good	Variable—test before using	Variable—test before using
Pressure	Excellent	Excellent	Excellent	Good	Good
Vacuum	Excellent	Excellent	Excellent	Good	Good
Viscous fluids	Excellent	Excellent	Excellent	Good	Good
Sterile fluids	Not recommended	Good	Excellent	Fair	Fair
Physical characteristics and composition	Thermoplastic elastomer Polypropylene-based material with USP mineral oil. Excellent tensile strength. Firm (stiff) material. Opaque, black.	Thermoplastic elastomer Polypropylene-based material with USP mineral oil. Excellent tensile strength. Firm (stiff) material. Opaque, beige.	Thermoplastic elastomer (for outer jacket). Plasticizer-free inner liner. Firm (stiff) material. Opaque, beige.	Thermal set rubber. Viton B (67% fluorine). Firm (stiff) material. Opaque, black.	Thermal set rubber. Viton B (67% fluorine). Firm (stiff) material. Opaque, black.
Temperature range	–60 to 270°F (–59 to 135°C)	–60 to 270°F (–59 to 135°C)	–71 to 130°F (–60 to 54°C)	–25 to 400°F (–32 to 205°C)	–25 to 400°F (–32 to 205°C)
Meets classifications	None	FDA 21 CFR 177.2600 NSF-listed (Standard 51)	FDA 21 CFR 177.2600	None	FDA 21 CFR 177.2600
Gas permeability $\frac{cc \times mm}{(cm^2 \times sec \times cm\ Hg) \times 10^{-10}}$	CO_2: 1200 H_2: — O_2: 200 N_2: 80	CO_2: 1200 H_2: — O_2: 200 N_2: 80	CO_2: 745 H_2: — O_2: 135 N_2: 45	CO_2: 76 to 79 H_2: — O_2: 13 to 15 N_2: 4.3	CO_2: 76 to 79 H_2: — O_2: 13 to 15 N_2: 4.3
Cleaning/sterilization	Sterilize by autoclave. Repeated sterilization will not affect overall life.	Sterilize by autoclave. Repeated autoclaving will not affect overall life.	Sterilize with ethylene oxide (ETO) radiation or autoclave. To autoclave: Coil loosely in nonlinting cloth or paper, autoclave at 250°F (121°C) 1 kg/cm² (15 psi) for 30 minutes; air dry at 150°F (66°C) for 2 to 2½ hours. Radiation: 25 kGy (2.5 Mrads).	Sterilization is not recommended.	Sterilize by using a circulating hot air oven at 480°F (249°C) for 16 hours.

Pump Tubing Compatibility Charts

GO to ColeParmer.com
ColeParmer.com/Mflexchem
for our interactive, searchable compatibility data—always up to date with the latest formulations.

Determine the right tubing formulation for your application using the chemical compatibility tables at right. These tables are for use with all Masterflex® tubing sizes. All ratings in the tables indicate tubing condition after exposure to the chemical at 70°F (21°C).

Ratings & Materials Legend

Ratings

- **A:** No effect; little noticeable change
- **B:** Minor effect; slight corrosion or discoloration
- **C:** Moderate effect; not recommended for continuous use; softening, loss of strength, swelling and/or shrinkage
- **D:** Severe effect; not recommended for use; severe softening, swelling and/or shrinkage
- **—:** No data available

Tubing formulations

- **PN:** PharMed® BPT, High-Pressure PharMed® BPT, PharmaPure®, Norprene®, Norprene® Food
- **CF:** C-FLEX®
- **S:** Silicone (peroxide/platinum-cured), BioPharm, BioPharm Plus, STA-PURE®
- **T:** Tygon® Lab, Tygon® LFL, Tygon® Food
- **TU:** Tygon® Fuel & Lubricant
- **TC:** Tygon® Chemical
- **CD:** Chem-Durance®
- **CS:** CHEM-SURE®
- **V:** Viton®, FDA Viton®
- **PT:** Polytetrafluoroethylene (PTFE)

Pump head materials

- **PSF:** Polysulfone
- **PC:** Polycarbonate
- **PPS:** Polyphenylene sulfide
- **SS:** Stainless steel
- **PP:** Polypropylene

Where to Order Tubing

⚠ DANGER

Even if tubing passes the immersion test, variations in temperature, pressure, or concentration may cause tubing failure. SERIOUS INJURY MAY RESULT. Use suitable guards and/or personal protection when pumping chemicals.

⚠ WARNING

The information in these tables has been supplied to Cole-Parmer by the tubing manufacturers and is to be used ONLY as a guide to select your tubing. Test fluids and tubing using the tubing test procedure on page 45. Cole-Parmer does not warrant (neither express or implied) that the information in these tables is accurate or complete or that any material is suitable for any purpose.

Fluid	Tubing formulation										Pump head material				
	PN	CF	S	T	TU	TC	CD	CS	V	PT	PSF	PC	PPS	SS	PP
Acetaldehyde	D	A	B	D	D	D	C	A	D	A	D	—	A	A	A
Acetate LMW	A	A	—	D	D	C	D	—	—	A	D	—	A	A	D
Acetic acid <5%	A	A	A	A	A	B	A	A	—	A	A	A	A	B	B
Acetic acid >5%	A	A	A	B	A	B	A	A	B	A	A	C	A	B	A
Acetic anhydride	A	B	C	D	D	A	A	A	D	A	D	D	A	B	C
Acetone	D	C	C	D	D	C	B	A	D	A	D	D	A	A	A
Acetonitrile	B	A	—	D	D	B	B	—	D	A	D	D	A	A	—
Acetyl bromide	C	A	—	D	D	C	D	—	—	A	—	—	—	—	—
Acetyl chloride	C	A	C	D	D	C	D	A	A	A	D	D	A	A	D
Air	A	A	A	A	A	A	A	A	A	A†	A	A	A	A	A
Aliphatic hydrocarbons	D	D	—	D	B	D	D	—	—	—	—	—	—	B	—
Aluminum chloride	A	A	B	A	A	A	A	—	A	A	A	A	A	D	A
Aluminum sulfate	A	A	A	A	A	A	A	—	A	A	A	A	A	B	A
Alums	A	A	A	A	A	A	A	—	A	A	—	—	—	—	A
Ammonia, gas / liquid	A	A	C	B	B	B	B	—	D	A	A	D	A	B	A
Ammonium acetate	A	A	—	A	A	A	A	A	D	A	—	A	—	B	A
Ammonium carbonate	A	A	C	A	A	A	A	A	A	A	A	—	A	B	A
Ammonium chloride	A	A	C	A	A	A	A	A	A	A	A	—	A	C	A
Ammonium hydroxide	A	A	A	B	C	A	A	A	B	A	A	D	A	A	A
Ammonium nitrate	A	A	C	A	A	A	A	A	A	A	A	—	A	A	A
Ammonium phosphate	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Ammonium sulfate	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Amyl acetate	B	D	D	D	D	D	D	B	D	A	D	D	A	A	D
Amyl alcohol	D	D	D	D	A	A	A	A	A	A	A	—	A	A	A
Amyl chloride	C	D	D	D	D	D	D	—	A	A	D	D	D	A	D
Aniline	C	B	D	D	D	D	D	A	B	A	D	D	A	A	A
Aniline hydrochloride	C	B	D	D	D	D	D	A	B	A	—	D	—	D	D
Aqua regia (80% HCl, 20% H)	D	—	D	D	D	A	A	—	B	A	D	D	D	D	B
Aromatic hydrocarbons	D	D	—	D	D	D	D	—	A	—	—	—	—	B	—
Arsenic salts	A	—	—	A	A	A	A	—	D	—	—	—	—	—	—
Barium salts	A	A	A	A	A	A	A	A	A	A	A	—	A	B	B
Benzaldehyde	D	D	B	D	D	C	C	A	D	A	C	C	A	B	C
Benzenesulfonic acid	D	A	D	D	D	D	D	A	A	A	D	D	A	B	D
Bleaching liquors	A	B	B	A	A	A	A	—	A	A	—	—	—	—	B
Boric acid	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Bromine	D	A	D	D	D	D	D	—	A	A	—	D	D	D	C
Butane	A	D	D	A	A	B	B	B	A	A	—	—	A	A	B
Butanol (butyl alcohol)	D	B	B	D	A	A	A	A	A	A	A	C	A	A	B
Butyl acetate	B	D	D	D	D	D	D	B	D	A	D	D	A	B	D
Butyric acid	B	A	D	D	C	D	D	A	B	A	—	—	A	B	C
Calcium oxide	A	—	A	A	A	A	A	—	A	A	—	—	—	A	A
Calcium salts	A	A	B	A	A	A	A	A	A	A	A	—	A	B	A
Carbon bisulfide	D	D	D	D	D	D	D	—	—	A	—	—	—	A	C
Carbon dioxide	A	A	B	A	A	A	A	A	A	A†	—	A	A	A	A
Carbon tetrachloride	D	B	D	D	D	D	D	B	A	A	A	D	A	B	D
Chlorine, dry	C	A	D	A	A	C	C	—	A	A†	D	—	D	A	D
Chlorine, wet	D	A	D	B	A	C	C	—	B	A	D	—	D	C	D
Chloroacetic acid	B	A	—	A	D	A	A	B	D	A	D	D	A	B	D
Chlorobenzene	D	D	D	D	D	D	D	A	A	B	D	D	A	A	D
Chlorobromomethane	B	D	D	D	D	—	D	—	A	A	D	—	—	—	A
Chloroform	C	D	D	D	D	D	D	B	A	A	D	D	A	A	D
Chlorosulfonic acid	D	A	D	D	D	D	D	A	D	A	D	—	—	D	D
Chromic acid, 30%	A	A	C	B	C	B	B	—	A	A	D	D	A	B	A
Chromium salts	A	A	—	A	A	A	A	—	—	—	—	—	—	—	—
Copper salts	A	A	A	A	A	A	A	—	A	A	—	—	A	B	A
Cresol	D	D	D	D	C	A	A	A	A	A	D	D	A	A	C
Cyclohexane	D	D	D	D	C	D	D	B	A	A	A	B	A	A	D
Cyclohexanone	D	D	D	D	D	C	C	—	D	A	D	D	A	A	D
Diacetone alcohol	A	A	B	D	D	A	A	A	D	A	—	D	—	B	C
Dimethyl formamide	B	B	B	D	D	A	A	A	D	A	D	D	A	A	A
Essential oils	D	B	C	D	C	D	D	—	—	—	—	—	—	—	—
Ethanol (ethyl alcohol)	C	B	A	D	B	A	A	A	A	A	B	B	A	A	A
Ether	C	D	D	D	C	D	D	B	D	A	D	D	A	A	B
Ethyl acetate	B	D	B	D	D	D	D	A	D	A	A	D	A	B	A
Ethyl bromide	D	A	D	D	D	C	D	—	A	A	—	—	—	—	D
Ethyl chloride	C	A	D	D	D	D	D	—	A	A	D	D	—	A	D
Ethylamine	D	A	C	D	D	B	B	B	D	—	—	—	—	—	—
Ethylene chlorohydrin	A	A	C	D	B	A	A	—	A	A	D	D	A	B	D
Ethylene dichloride	C	A	D	D	D	D	D	B	A	A	D	D	A	B	A
Ethylene glycol	A	B	A	A	A	A	A	A	A	A	A	C	A	B	A
Ethylene oxide	A	A	D	A	A	A	A	B	D	A	A	D	D	B	D
Fatty acids	C	B	C	B	B	C	C	A	A	A	—	C	—	B	A
Ferric chloride	A	A	B	A	A	A	A	—	A	A	A	—	A	D	A
Ferric sulfate	A	A	B	A	A	A	A	A	A	A	A	—	A	B	A
Ferrous chloride	A	A	C	A	A	A	A	—	A	A	A	D	A	D	A
Ferrous sulfate	A	A	C	A	A	A	A	A	A	A	A	A	A	B	A
Fluoboric acid	D	A	A	A	D	A	A	—	—	A	A	—	A	B	A
Fluoroborate salts	A	A	—	A	A	A	A	—	—	—	—	—	—	—	—
Fluosilicic acid	C	A	D	A	A	A	A	—	A	A	A	—	A	C	A
Formaldehyde	D	A	B	D	D	C	C	A	D	A	A	A	A	C	A
Formic acid, 25%	A	A	B	A	C	A	A	A	D	A	C	D	A	B	A
Freon® TMS	D	C	—	D	D	A	A	D	—	A	—	D	A	—	—
Gasoline, high-aromatic	D	D	D	D	B	D	D	B	A	B	A	C	A	A	D
Gasoline, nonaromatic	D	D	D	D	B	D	D	B	A	A	A	A	A	—	C
Glucose	A	A	A	A	A	A	A	A	A	A	—	A	—	A	A
Glue, P.V.A.	A	A	A	A	A	—	A	—	A	A	—	—	—	A	C
Glycerin	A	B	A	A	A	A	A	—	A	A	A	A	A	A	A
Hydriodic acid	D	A	—	A	A	A	A	—	A	—	—	—	—	—	—
Hydrobromic acid, 30%	D	A	D	A	A	A	A	—	A	A	B	D	A	D	A
Hydrochloric acid (dil)	A	A	D	A	A	A	A	A	A	A	A	A	D	D	A
Hydrochloric acid (med)	B	A	D	A	D	A	A	A	A	A	A	D	D	D	A
Hydrochloric acid (conc)	—	B	D	A	D	A	A	A	A	A	A	B	D	D	A
Hydrocyanic acid	A	A	C	A	A	A	A	A	A	A	—	—	—	B	A
Hydrocyanic acid, gas, 10%	A	A	C	A	A	A	A	—	A	A	—	—	—	—	A
Hydrofluoric acid, 50%	D	A	D	C	D	A	A	D	D	A	—	D	A	D	C
Hydrofluoric acid, 75%	—	A	D	D	D	—	C	D	D	A	—	D	A	D	C

†Do not use the L/S® PTFE-tubing pump head with gases due to excessive heat buildup.

Pump Tubing Compatibility Charts

Fluid	Tubing formulation										Pump head material				
	PN	CF	S	T	TU	TC	CD	CS	V	PT	PSF	PC	PPS	SS	PP
Hydrogen peroxide (dil)	A	A	A	A	A	A	A	A	A	A	A	A	—	B	A
Hydrogen peroxide, 90%	B	D	B	D	D	B	B	A	A	A	A	A	—	B	A
Hypochlorous acid	A	A	D	A	A	A	A	A	A	A	—	—	—	—	—
Iodine solutions	A	C	C	A	A	A	A	—	A	A	—	D	D	D	A
Iodoform	—	—	—	—	—	—	D	—	C	—	—	—	—	A	—
Kerosene	D	D	D	D	B	D	D	A	A	A	A	A	A	A	A
Ketones	D	B	—	D	D	C	C	—	—	A	D	D	A	A	A
Lacquer solvents	B	D	D	D	D	D	D	A	D	A	—	D	—	A	D
Lactic acid, 3–10%	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Lead acetate	A	A	D	A	A	A	A	—	D	A	A	—	A	B	A
Linseed oil	C	D	A	D	A	B	B	A	A	A	A	A	A	A	A
Lithium hydroxide	B	A	D	A	A	—	B	—	C	A	—	D	A	B	—
Magnesium chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Magnesium sulfate	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Malic acid	A	A	B	A	A	A	A	A	A	A	—	—	—	A	B
Manganese salts	A	A	B	A	A	A	A	—	A	A	—	—	—	D	—
Mercury salts	A	A	—	A	A	A	A	—	A	A	—	—	—	B	A
Methane	A	D	D	A	A	A	A	B	A	A†	—	—	—	A	B
Methanol (methyl alcohol)	A	—	A	C	C	A	A	A	B	A	D	B	A	A	A
Methyl chloride	C	A	D	D	D	D	D	B	B	A	D	—	A	A	D
Methyl ethyl ketone (MEK)	D	—	D	D	D	C	C	B	D	A	D	D	A	A	A
Mixed acid (40% H_2SO_4, 15% HNO_3)	B	—	—	B	D	—	A	—	—	A	D	—	—	B	A
Molybdenum disulfide	—	A	—	—	—	—	A	—	A	—	—	—	—	—	—
Monoethanolamine	C	B	B	D	D	D	D	—	D	A	A	—	A	A	B
Naphtha	D	D	D	D	B	D	D	B	A	B	B	—	A	A	A
Natural gas	A	D	A	A	A	A	A	B	A	A†	—	—	—	A	B
Nickel salts	A	A	A	A	A	A	A	A	A	A	A	—	A	B	A
Nitric acid (dil)	A	A	B	A	D	A	A	A	B	A	A	B	A	A	A
Nitric acid (med)	A	—	C	A	D	A	A	A	A	A	C	C	—	A	B
Nitric acid (conc)	D	—	D	D	D	A	A	A	A	A	C	D	D	A	C
Nitrobenzene	D	D	D	D	D	D	D	A	B	A	D	D	A	B	B
Nitrogen oxides	A	A	D	A	A	A	A	—	D	A	—	—	—	—	—
Nitrous acid	A	A	—	A	C	A	A	—	—	A	—	—	—	B	A
Oils, animal	C	B	B	D	B	B	B	—	A	A	—	—	—	A	—
Oils, mineral	D	B	B	C	A	D	D	—	A	A	B	A	A	A	A
Oils, vegetable	C	B	B	D	A	B	B	A	A	A	A	—	A	A	A
Oleic acid	C	A	D	D	B	D	C	A	B	A	A	A	A	B	A
Oxalic acid, cold	B	A	B	B	D	A	A	A	A	A	—	B	A	B	A
Oxygen, gas	A	A	B	A	A	A	A	A	B	A†	A	A	—	A	—
Palmitic acid, 100% in ether	C	—	D	D	B	C	C	A	A	A	—	—	—	B	C
Perchloric acid	A	A	D	C	D	A	A	A	A	A	D	D	A	C	C
Perchloroethylene	C	B	D	D	D	D	D	B	A	A	D	D	A	B	D
Phenol (carbolic acid)	A	D	D	B	C	A	A	A	A	A	—	D	—	B	A
Phosphoric acid, 50%	A	A	C	A	A	A	A	A	A	A	A	B	—	A	A
Phthalic acid	A	D	B	D	A	A	A	—	B	A	—	—	—	B	A
Plating solutions	A	A	D	A	D	A	A	—	A	A	—	—	—	—	A
Polyglycol	B	B	A	A	A	—	B	—	A	—	—	—	—	—	—
Potassium carbonate	A	A	—	A	A	A	A	A	A	—	A	—	A	B	A
Potassium chlorate	B	A	B	A	A	—	A	A	A	A	A	—	A	B	A
Potassium hydroxide (med)	A	A	B	A	D	—	A	B	D	A	A	D	A	B	A
Potassium hydroxide (conc)	A	A	C	D	D	—	A	B	D	A	A	D	—	B	B
Potassium iodide	A	A	—	A	A	A	A	—	A	A	—	—	—	A	B
Propanol (propyl alcohol)	C	—	A	D	A	A	A	A	A	A	B	A	A	A	A
Pyridine	C	A	D	D	D	C	C	A	D	A	D	D	A	A	B
Silicone fluids	A	B	C	B	A	B	A	—	A	A	—	—	A	A	A
Silicone oils	C	B	C	B	A	B	A	—	A	A	—	A	A	A	A
Silver nitrate	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Soap solutions	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium bicarbonate	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Sodium bisulfate	A	A	—	A	A	A	A	A	A	A	A	A	A	D	A
Sodium bisulfite	A	A	A	A	A	—	A	A	A	A	—	A	—	B	A
Sodium borate	A	A	A	A	A	—	A	—	A	A	A	A	A	B	B
Sodium carbonate	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium chlorate	A	A	C	A	A	A	A	—	A	A	A	A	A	B	A
Sodium chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A
Sodium ferrocyanide	A	A	—	B	B	—	A	—	A	A	—	—	—	B	A
Sodium hydrosulfite	B	A	—	A	A	—	A	—	—	A	—	—	—	—	—
Sodium hydroxide (dil)	A	A	A	A	D	A	A	A	A	A	A	D	A	A	A
Sodium hydroxide, 25%	A	B	B	C	D	A	A	—	A	A	A	D	A	B	A
Sodium hydroxide (conc)	—	C	—	C	D	A	A	—	A	A	—	D	A	C	B
Sodium hypochlorite, <5%	A	A	B	A	A	A	A	A	A	A	A	B	A	A	A
Sodium hypochlorite, >5%	A	A	B	A	A	A	A	A	A	A	A	—	A	C	B
Sodium nitrate	A	A	D	A	A	A	A	A	A	A	—	—	A	B	A
Sodium silicate	A	A	A	A	A	—	A	A	A	A	A	—	A	B	A
Sodium sulfide	A	A	A	A	A	A	A	A	A	A	A	—	A	C	A
Sodium sulfite	A	A	A	A	A	A	A	A	A	A	—	D	—	A	B
Steam, up to 40 psi	C	—	A	D	D	—	D	A	B	A†	A	A	A	A	—
Stearic acid	C	A	B	A	B	C	C	A	A	A	C	A	—	B	C
Styrene	D	D	D	D	D	D	D	A	A	A	—	D	—	A	—
Sulfuric acid (dil)	A	A	D	A	A	A	A	A	A	A	A	A	A	D	A
Sulfuric acid (med)	A	A	D	A	B	A	A	—	A	A	B	C	A	D	A
Sulfuric acid (conc)	D	A	D	D	D	D	A	C	A	A	D	D	A	C	B
Sulfurous acid	A	A	D	A	A	A	A	—	B	A	A	—	A	B	A
Tannic acid	B	A	B	B	D	A	A	—	A	A	A	—	A	B	A
Tanning liquors	A	B	—	A	A	A	A	—	—	A	—	—	—	A	B
Tartaric acid	A	A	A	A	A	A	A	A	A	A	A	B	A	C	A
Tin salts	A	A	B	A	A	A	A	—	—	A	—	—	—	—	A
Toluene (toluol)	D	D	D	D	D	D	D	A	A	A	D	D	A	A	B
Trichloroacetic acid	B	A	D	A	D	A	A	—	C	A	—	D	A	D	A
Trichloroethylene	D	D	D	D	D	D	D	B	A	A	C	D	A	B	D
Trisodium phosphate	A	A	—	A	A	A	A	—	A	A	—	—	A	B	A
Turpentine	D	D	D	D	B	D	D	A	A	A	—	—	A	A	B
Urea	A	A	B	A	A	A	A	A	—	A	C	D	A	A	A
Uric acid	A	A	—	A	C	A	A	—	—	A	—	—	—	B	—
Water, fresh	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
Water, salt	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
Xylene	D	D	D	D	D	D	D	A	A	A	D	D	A	A	C
Zinc chloride	A	A	A	A	A	A	A	A	A	A	A	A	A	D	A

†Do not use the L/S® PTFE-tubing pump head with gases due to excessive heat buildup.

FREE
Tubing Test Kit!

Can't find your chemical in the tables?

Request your **FREE** tubing kit to test compatibility of your chemicals against up to 17 different tubing formulations.

Call or go online to request your FREE test kit today!

Tubing Test Procedure

1. Measure and weigh a sample of tubing.
2. Immerse the sample in the fluid for 72 hours in a closed vessel.
3. Dry sample, then measure and weigh it. Inspect carefully for signs of deterioration such as swelling, embrittlement, cracking, softness, or change of size or weight.
4. If there is no sign of deterioration, test a sample in pump under the conditions of your application.

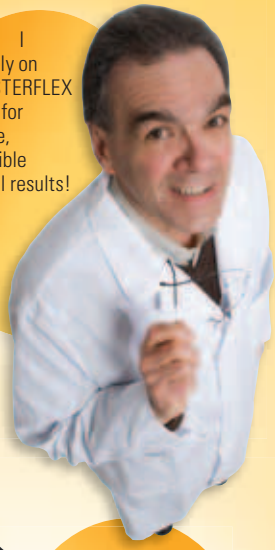
Tubing for Food Products

Liquified food products	Norprene® food	Silicone	Tygon® food
Alcohol	B	—	—
Beer	B	A	—
Brandy	B	—	—
Butter	A	B	A
Carrot	A	—	A
Chocolate syrup	A	—	A
Citric acid	A	A	A
Coffee	A	A	—
Corn oil	—	A	—
Corn syrup	—	—	A
Fish	—	A	A
Fruit juices	A	—	A
Liqueurs	B	B	—
Mayonnaise	A	—	A
Milk	A	A	A
Milk of magnesia	A	—	B
Molasses	A	—	B
Orange syrup	A	B	—
Sauerkraut	A	—	B
Shortening (liquid)	C	B	—
Soft drink concentrate	B	C	—
Sugar	A	A	A
Tomatoes	A	—	A
Vegetable oil	B	B	B
Vinegar	A	A	A
Whiskey	B	A	B
Wines	B	A	B

99999-05

I purchased MASTERFLEX tubing in bulk and saved a lot of time, trouble; and expense!

I rely on MASTERFLEX pumps for accurate, reproducible analytical results!



Cleanup is easy and quick with MASTERFLEX pumps. I just change the tubing with no downtime in the process.

With MASTERFLEX systems, scale-up from research to production has been a breeze!

MASTERFLEX systems provide complete validation documentation and tubing certifications so validation is not a problem!

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