

MASTERFLEX® Application Solutions

Research



Food & Beverage



Industrial



Masterflex® I/P®
Digital Pump System
page 29

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Why Use *MASTERflex*® Tubing?

Accept no substitutes!

For accurate flow rates and long tubing life, use only Masterflex tubing—your best choice. Unlike general-purpose commodity tubing, Masterflex is specifically designed and manufactured for use in demanding peristaltic pump applications. Masterflex tubing is:

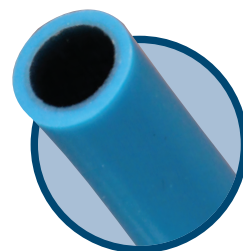
- *Precision extruded to meet tight tolerances*
- *Factory tested and optically inspected*
- *Engineered to comply with numerous standards and classifications*

Achieve top performance from your fluid transfer system with Masterflex tubing.

Challenging conditions? Bring it on—we have tubing to meet your needs! Choose from 22 different tubing formulations in a variety of sizes for every application. Select Precision tubing or High-Performance Precision tubing to improve pressure generation, suction lift, ability to pump viscous fluids, and tubing life. Find these exclusive, unique formulations you can't find anywhere else:

Solve-Flex®

- One formulation for all your needs
- Nontoxic, chemically inert fluoropolymer lining
- Ideal for use with harsh solvents
- Meets USP Class VI requirements



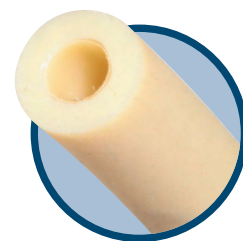
BioPharm Plus Silicone

- Longest pumping life of any silicone tubing
- Maintains pumping volumes over life of tubing
- Extremely low spallation
- Excellent biocompatibility



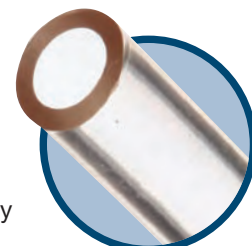
Chem-Durance® Bio

- Excellent performance and durability, even under pressure
- Plasticizer-free inner liner
- Well suited for protecting light-sensitive fluids
- Excellent biocompatibility



Tygon® E-LFL

- Longest pump life of any Tygon formulation
- Clear wall for easy flow monitoring
- Good choice for pumping viscous fluids
- Smooth bore and low gas permeability protect purity of your fluid



Go to www.coleparmer.com/terms for a full list of terms and conditions. For full information on returns, go to www.coleparmer.com/returns.

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*See pages 41–43 for a comparison
of tubing formulations*

Why **MASTERflex**® Peristaltic Pumps?

1

Easy

- Quick installation
- Low maintenance
- Easy tubing changeover

2

Durable

- Trusted for over 45 years
- Broad chemical compatibility

3

Versatile

- From research to process
- Handles just about any fluid
- Multichannel capabilities

4

Customizable

- Configurable systems
- Many tubing options
- Easy scale-up

5

Accurate

- Flow ranges from 0.0006 mL/min to 42 L/min
- Rigorous design and testing standards
- Tubing is custom manufactured to precise tolerances



Selecting a **Masterflex**® Pump: As Easy As

Application Requirements

- What is my required flow rate?
- What chemical am I pumping?
- Do conditions such as viscosity or back pressure play an important role in my decision?

Base a Pump Series on Your Flow Rate

- Use the table below to find the pump series that best fits your flow rate needs

Complete Your System

- L/S and I/P pump series are divided into three components—pump head, tubing, and drive
- Select the three components from the same series or choose a complete preconfigured system

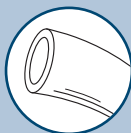
Masterflex pump series	Features	Flow range	Speed		Remote control capability	Multichannel capabilities	Page(s)
			Fixed	Variable			
C/L ®	Compact, low-flow pump that easily fits on benchtop or mounts within a panel	0.002 to 43 mL/min		✓	Yes	Yes	10–11
L/S ®	High-accuracy drives for precise flow control and dispensing	0.0006 to 3400 mL/min	✓	✓	Yes	Yes	12–26
I/P ®	Powerful systems that provide better protection from possible hazards such as dust and water	0.012 to 19 LPM	✓	✓	Yes	Yes	27–36
B/T ®	Highest flow rates—ideal for large batch fluid transfer with excellent hazard protection	0.3 to 42 LPM	✓	✓	Yes	Yes	37–40

More Online: ColeParmer.com/Masterflex



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.
- Accuracy—Standard pump heads offer the most accurate, repeatable flow rates.



WHAT TO CONSIDER:

- Flow rate—Tubing size directly affects flow rate.
- Chemical compatibility
- Tubing life
- Fluid viscosity, presence of solids, back pressure, or suction lift—High-performance tubing is best for these conditions.
- Fluid temperature



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.

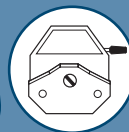
10,000+ Combinations

Masterflex pumps allow you to choose each component for your unique demands—change out components as your needs change



Or choose a Complete System
Convenient preconfigured systems include everything you need to get started

PUMP HEAD



TUBING



DRIVE



Custom **OEM** Pump Systems

When an off-the-shelf pump just won't cut it, you need a solution custom-built for your requirements

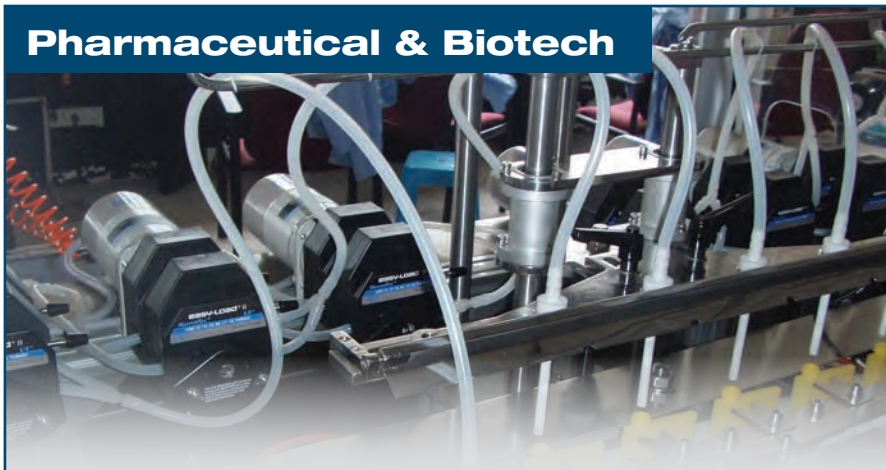
With more than 100 years of combined experience, our design engineers will partner with you to create the exact pump you need.



Still not sure what to choose?

Contact your local Cole-Parmer representative: ColeParmer.com/Dealers

Pharmaceutical & Biotech



Application Examples

- Harvesting cell media
- Manufacturing IV bag dispensing
- Spiral ultrafiltration
- Fermentation control
- Dissolution testers
- Cosmetic dispensing

Features	Benefits
Wide range of tubing materials	Compatible with many laboratory chemicals.
Noncontaminating	Fluid media only contacts inside of tubing.
Easy cleanup	Just change the tubing to clean the pump
Multichannel capability	Use up to 32 channels simultaneously on one drive.
Sanitary connections on tubing	Quick tubing connections within sanitary systems.
Handles viscous materials	Dispense agars and suspensions.
Runs dry	Use as a low-flow aspirator or air/vacuum pump.
Modular design	Mix and match pump heads, tubing, and drives.
OEM packages	Design into your lab dispensers or analytical equipment.



Bioprocess Pump

- Accurately pump nutrient media from a bulk source into bio-bag sterile containers
- Silicone tubing for easy flow monitoring and biocompatibility; can be sterilized by gamma irradiation
- Flow rates: 0.28 to 1700 mL/min with L/S® 24 tubing
- Monitor flow rate, volume, batch count, cumulative volume, copy number, and rpm
- Easy calibration—store one value per tubing size
- Easy-Load® II pump head for fast tubing changes
- Drive is IP66 and NEMA 4X rated—easily cleaned or washed down

Pump products shown

[UH-77200-62](#) L/S® Easy-Load® II Pump Head (page 21)

[UH-96410-24](#) L/S 24 Platinum-Cured Silicone Tubing (page 26)

[UH-07575-30](#) L/S Digital Process Drive (page 23)



Fermentation Pump

- Pump media into or out of fermenters
- Meter additives, antifoam agents, and acid/base for pH control
- Noncontaminating; easy sterilization and cleanup
- Remote control of speed, direction, and start/stop
- Quick, easy tubing changes between samples
- Platinum-cured silicone tubing ensures excellent biocompatibility

Pump products shown

[UH-77200-52](#) L/S Easy-Load II Pump Head (page 21)

[UH-96410-16](#) L/S 16 Platinum-Cured Silicone Tubing (page 25)

[UH-07522-20](#) L/S Digital Standard Drive (page 23)



Process Filtration Pump

- Pump media and other fluids through sanitary process filters
- Noncontaminating; facilitates application of single-use tubing and assemblies
- Speed, direction, and start/stop remote control
- Quick, easy tubing changes between process applications
- I/P 88 pump tubing offers flow up to 17 LPM; pressure up to 2.5 bar (35 psi)
- Sanitary tube set with premolded ends simplifies connections
- Drive is IP66 and NEMA 4X rated—easily cleaned or washed down after use

Pump products shown

[UH-77600-62](#) I/P® High-Performance Pump Head (page 33)

[UH-96113-88](#) I/P 88 PharMed® BPT Sanitary Tubing Assembly (online)

[UH-77420-10](#) I/P Digital Process Drive (page 35)



Bulk Media Transfer Pump

- Modular format for convenient component placement; controller can be wall mounted
- IP56 rated controller and drive are protected from water spray in washdown environments
- Program dispense volume for repetitive filling protocols
- Flow rates up to 17.7 LPM with B/T® 87 PerfectPosition® PumpTubing
- Rapid-Load® pump head makes tubing changes quick and easy
- PharmaPure® tubing offers excellent pump life and meets EP, FDA, and USP classifications

Pump products shown

[UH-06437-91](#) B/T® 87 PharmaPure® Pump Tubing (page 40)

[UH-77111-40](#) B/T Digital Modular Pump (page 39)

Research & Development

Application Examples

- Acid/base dispensing
- Aspiration of tissue culture media
- Circulation of cell suspension in fermentation
- Chromatography
- Coolant circulation in low temperature baths
- Desiccator air circulation
- Distilled water transfer
- Dispensing agar into petri dishes
- Electrophoresis
- Elutriation
- Filtration pumps
- Flow injection analysis
- Gas sampling system
- Gel column pump
- Injection metering pump
- Liquid-phase chemiluminescence
- Magnetic particle separation
- Nutrient supply for cultures
- pH acid/base metering
- Spectrophotometer pump
- Sterilized media dispensing
- Transfer pump-circulating baths
- Toxicology assays (salt solutions)

Features	Benefits
Modular design	Mix/match pump heads, tubing, and drives for many applications.
Noncontaminating	Fluid media only contacts inside of tubing.
Adjustable occlusion	Over-occlude for priming and pressure; reduce for longer tubing life.
Reversible	Operate in both directions without disconnecting tubing.
Wide range of tubing materials	Compatible with numerous laboratory chemicals.
Multichannel capability	Use up to 32 channels simultaneously on one drive.
Easy cleanup	Simply change the tubing to clean the pump.
Runs dry	Use as a low-flow aspirator or air/vacuum pump.
Easily sterilized	Sterilize tubing via ethylene oxide, gamma radiation, or autoclave.
High-accuracy dispenser	Calibrate digital drives for accuracies up to $\pm 0.5\%$.
Low cell disruption	Circulate cell tissue with minimal damage (low shear).
Remote control	Interface with PC or other analytical instruments.
Self-priming	Generates vacuum up to 660 mm Hg (26" Hg).
Handles viscous materials	Dispense agars and suspensions.
OEM packages	Design into your lab dispensers or analytical equipment.



Analyzer Feed Pump

- Perfect for low-flow analytical applications
- Connects easily to flow cells in spectrophotometers, refractometers, and other instruments
- Highly accurate—multiple rollers, continuous circulation, and reduced pulsation
- Compact size permits flexible placement on benchtop
- Silicone tubing offers clarity for visually monitoring fluid flow and excellent biocompatibility

Pump products shown

[UH-95590-42](#) Platinum-Cured Silicone Microbore Pump Tubing, 2.06 mm ID ([page 11](#))

[UH-77122-14](#) C/L® Single-Channel Pump ([pages 10–11](#))



Electrophoresis Circulation/Cooling Pump

- Modular format permits convenient placement of components; drive can be placed in a hood or safety cabinet with controller outside
- Simple drive controls with separate speed control and on/off/reverse switch; turn pump on or off while maintaining speed settings
- Reversible motor for pumping in either direction
- Dual-channel head lets you pump two channels simultaneously
- Silicone tubing lets you make low-pressure connections in seconds
- Drive and L/S 16 tubing deliver a flow range of 4.8 to 480 mL/min

Pump products shown

[UH-77202-50](#) L/S® Easy-Load® II Dual-Channel Pump Head ([online](#))

[UH-96400-16](#) L/S 16 Peroxide-Cured Silicone Pump Tubing ([page 25](#))

[UH-07557-00](#) L/S Precision Modular Drive ([page 24](#))



Gradient Pump

- Remote programming and control via PC work station
- Control functions include dispensing onto or off of a balance for gravimetric measurements
- Highly accurate; easy to program and calibrate
- Independently program up to 25 pump/mixers to develop gradients
- Program each pump or mixer for up to 50 steps
- Tygon® E-LFL tubing is clear for visually monitoring fluid flow

Pump products shown

[UH-07015-21](#) L/S Standard Pump Head ([online](#))

[UH-06440-15](#) L/S 15 Tygon® E-LFL Pump Tubing ([page 26](#))

[UH-07551-20](#) L/S Computer-Compatible Digital Drive ([page 23](#))

Industrial & Manufacturing



Application Examples

- Adhesives for cement
- Carpet sanitizers/cleaners
- Caustic detergents
- Chemicals for car washers
- Dyes in fabric manufacturing
- Etching chemicals for plate processors
- Chlorine analyzers
- Dispensing glue emulsions
- Laundry chemicals
- pH control of effluent
- Smoke-generating machines
- Plating chemicals
- Pulp quality monitoring
- Microfilm developing
- Oil skimmer
- Silicone wafer rinse
- Crankcase oil analyzer
- Inks for lithographs
- Lubricator for ball bearings
- Coating for coils
- Tank transfer pumps
- Polishing slurry pump
- Web printing inks

Features	Benefits
Wide range of tubing materials	Compatible with many industrial chemicals.
Noncontaminating	Fluid media only contacts inside of tubing.
Self-priming	Suction lifts up to 8.8 m (29 ft).
Runs dry	Handles liquids and gas easily without damaging the pump.
Easy cleanup	Simply change the tubing to clean the pump.
Reversible	Operate in both directions without disconnecting tubing.
Handles viscous materials	Transfer and dispense oils or fluids in suspension.
Modular design	Mix and match pump heads, tubing, and drives for many applications.
OEM packages	Design into your own industrial metering and transfer equipment.



Rapid-Dry Adhesive Transfer

- Dosing various volumes of viscous (1200 cps), rapid-drying adhesive
- Eliminates problem of sticking valves, regular pump maintenance, and periodic pump failure
- High-performance precision tubing has a thicker wall and higher suction for handling viscous fluids
- Compatibility of silicone tubing allows it to be used more than once; oversizing the tubing allows pumping at speeds below 200 rpm
- Drive control features deliver desired accuracy and flexibility

Pump products shown

[UH-77250-62](#) L/S® High-Performance Pump Head (page 21)

[UH-96410-24](#) L/S 24 Platinum-Cured Silicone Tubing (page 26)

[UH-07522-20](#) L/S Standard Digital Drive (page 23)



Batch Caustic Pump

- For batch/bulk transfer and corrosive fluid dispensing
- Flow rates up to 42 LPM with B/T® PerfectPosition® pump tubing
- Ideal for viscous and shear-sensitive fluids
- Detachable controller for convenient component placement
- Rapid-Load® pump head makes changing tubing quick and easy
- IP56-rated, washdown controller and drive are protected from water spray
- C-Flex tubing offers excellent compatibility with common acids and bases

Pump products shown

[UH-06424-91](#) B/T® 91 C-Flex® PerfectPosition® Pump Tubing (page 40)

[UH-77111-60](#) B/T Variable-Speed Pump (page 39)

Chemical Sampling Pump

- Program fluid volume for repeat sampling operations
- Controller is wall mountable for convenient location at sampling station
- Controller display shows operating parameters and run status
- Easy-Load® pump head allows for quick tubing changes between batches or drums
- Pump head with PPS housing and stainless steel rollers resists corrosion and chemical attack
- Pump is self-priming and reversible; easily prime or purge tubing
- Substitute tubing based on compatibility with various chemicals

Pump products shown

[UH-77601-60](#) I/P® Easy-Load® Pump Head (page 33)

[UH-06404-73](#) I/P 73 Norprene® Pump Tubing (page 36)

[UH-07594-10](#) I/P Modular Digital Dispensing Drive (page 35)



Food & Beverage



Application Examples

- Pizza sauce dispensing
- Automatic drain cleaners
- Salad dressing pump
- Popcorn butter dispensing
- Glass washing system
- Vitamin A & D injection
- Ice cream pump

Features	Benefits
High-purity	Fluid media only contacts tubing—USP, FDA, EP, 3A, NSF compliance.
Easy cleanup	Simply change the tubing to clean the pump.
Wide range of tubing materials	Compatible with many foods and chemicals.
Handles viscous materials	Transfer and dispense yogurts, ice cream, and food particles.
Easily sterilized	Sterilize by ethylene oxide, gamma radiation, or autoclave.
Adjustable occlusion	Over-occlude for priming; reduce for longer tubing life and particulates.
Reversible	Operate in both directions without disconnecting tubing.
Self-priming	Lift fluids up to 8.8 m (29 ft).
Modular design	Mix and match pump heads, tubing, and drives for many applications.
OEM packages	Design into your lab dispensers or analytical equipment.



Additive/Concentrate Pump

- Compact—fits easily into OEM applications
- Pump operates “on demand” to dispense flavor concentrate
- Flow rate: 0.002 to 37 mL/min
- Easy to service and clean
- Tygon® E-LFL food-grade tubing offers USP and FDA compliance and long life

Pump products shown

[UH-06449-48](#) 2.79 mm ID Tygon® E-LFL Microbore Pump Tubing (page 11)

[UH-77120-42](#) C/L® Dual-Channel Pump (pages 10–11)



Multichannel Dispensing Pump

- Advanced digital drive offers programmable repeat dispensing functionality
- Cumulative volume totalizer and batch count
- Heads are stackable for expanded channel capacity
- Heads accept multiple tubing sizes for application flexibility
- Excellent between-channel accuracy ($\pm 1.5\%$ or better)
- BioPharm Plus silicone tubing offers superior dispensing precision and flow stability with no break-in

Pump products shown

[UH-07535-04](#) L/S® Multichannel Pump Head

[UH-96116-16](#) L/S 16 BioPharm Plus Silicone Two-Stop Tubing Sets

[UH-07522-20](#) L/S Digital Standard Drive

This pump is available as a complete system; see page 22 for details.



Dairy Process Pump

- Handles viscous materials
- Noncontaminating
- Self-priming (no valves)
- Easy cleanup, IP55 rated for washdown
- Delivers up to 8 LPM (2.1 GPM) with I/P® 73 Noreprene® food pump tubing
- Easy-Load® pump head facilitates quick tubing changes between samples
- Vary occlusion to handle purees, syrups, and other viscous fluids in the mixture
- Variable-speed drive features handles for convenient portability

Pump products shown

[UH-77601-60](#) I/P® Easy-Load® Pump Head (page 33)

[UH-06402-73](#) I/P 73 Norprene® Food Pump Tubing (page 36)

[UH-77411-00](#) I/P Brushless Process Drive (page 34)



Sanitary Sampling Pump

- Draw sanitary samples from process lines
- Stack pump heads to draw samples from multiple lines simultaneously
- Drive is easily programmed for repetitive sampling; program time delay (pause) between runs
- Control drive remotely via 0 to 20 mA, 4 to 20 mA, or 0 to 10 V signal; signal is scaleable and invertible
- Easy-Load II pump head permits fast tubing changes; pumping is contamination free
- Drive is IP66 and NEMA 4X rated—easily cleaned or washed down after use

Pump products shown

[UH-77200-52](#) L/S Easy-Load II Pump Heads (page 21)

[UH-96410-16](#) L/S 16 Platinum-Cured Silicone Pump Tubing (page 25)

[UH-07575-30](#) L/S Digital Process Drive (page 23)

Environmental & Special



Application Examples

- Contaminated ground water
- Chemical drum sampling
- Enzyme isolation
- Flow injection analysis
- Greenhouse watering
- Fertilizer applications
- Pesticide delivery systems
- Sewage/sludge analysis
- Tree spraying
- Water salinity analyzers
- Wastewater sampling

Features	Benefits
Noncontaminating	Samples collected only contact inside diameter (ID) of tubing.
Self-priming	Suction lifts up 8.8 m (29 ft)
Runs dry	Pump is not damaged when left unattended.
Wide range of tubing materials	Compatible with water or waste samples.
Easy cleanup	Simply change the tubing to clean the pump.
Reversible	Purge and collect sample with one pump.
Modular design	Mix and match pump heads, tubing, and DC, AC, or hand-operated drives.
OEM packages	Design into your water sampling or analytical equipment.



High-Purity Metering Pump

- Suitable for aggressive organic solvents
- Flow rates up to 65 mL/min with PTFE tubing
- Rigid tubing withstands pressure up to 6.9 bar (100 psi)
- PTFE-wetted parts allow contamination-free pumping
- Maintains high fluid purity
- Limited chemical exposure—fluid contacts only the tubing

Pump product shown

[UH-77390-00](#) L/S® PTFE Tubing Pump Head

[UH-77390-60](#) L/S PTFE Tubing Set

[UH-07528-20](#) L/S Precision Variable-Speed Drive

This pump is available as a complete system; see [page 18](#) for details.



Composite Sampler

- Program operation to meet EPA sampling requirements
- Dual-line, 24-character, adjustable LCD with glow-in-the-dark keypad
- Locking latches prevent tampering; sampler floats up to 30 minutes
- Complete composite sampler system includes Easy-Load® pump head and L/S® tubing
- Passes through 18" diameter manhole
- Up to a 90-day standby for a remote signal
- Operates on internal rechargeable battery, 12 VDC, or 115/230 VAC

Pump product shown

[UH-07516-12](#) L/S Easy-Load® pump head (included with sampler) ([online](#))

[UH-96400-24](#) L/S 24 Peroxide-Cured Silicone tubing (included with sampler) ([page 26](#))

[UH-07580-00](#) E/S® Composite Sampler ([online](#))



Hazardous-Duty Pump

- For transferring hydrocarbons, petroleum products, and distillates
- Suitable for gasoline, kerosene, heating oils, cutting fluids, and glycol-based coolants
- No electric power necessary; connect to existing air supply or compressor
- Ideal for hazardous-duty locations
- Intrinsically safe when properly grounded for static electricity
- Low-maintenance motor

Pump products shown

[UH-77601-60](#) I/P® Easy-Load Pump Head ([page 33](#))

[UH-06401-73](#) I/P 73 Tygon® Fuel & Lube Pump Tubing ([page 36](#))

[UH-07589-30](#) I/P Air-Powered Drive ([online](#))

C/L® Variable-Speed Compact Pumps

Pump in even the tightest spaces!

- Pump fluids in either direction—easily switchable reversing motor
- Stop/start remotely via contact closure
- MAX button quickly primes or purges tubing
- ¼-DIN housing is perfect for panel mounting
- Both pumps include 5 ft (1.5 m) of 0.89-mm ID Tygon® E-LFL tubing

A. C/L Single-Channel Pumps

- Quick and easy tubing changes—open cover and release occlusion bed in one motion
- Pump from 0.002 to 43 mL/min
- Pump head made from polyphenylene sulfide, acetal, and copolyester; stainless steel rollers

B. C/L Dual-Channel Pumps

- Pump from 0.002 to 12.3 mL/min per channel, depending on drive and tubing
- Pump head made of polyphenylene sulfide and stainless steel; rollers made of acetal co-polymer



B

Tubing retainers firmly grip tubing—no need to adjust occlusion



A

APPLICATIONS

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



Low-flow pumps for chromatography, filtration, dispensing and...



...the ideal pump system for flow-through analyzer applications

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
A. C/L single-channel compact pumps								
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
B. C/L dual-channel compact pumps								
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 0.70	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

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 50 to 300 rpm (77122-24). 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.

Ordering Information for C/L® Pumps

ISO9001:2008
CERTIFIED SUPPLIER

Power supplies are:



rpm	Speed control (repeatability)	Number of channels	Number of rollers	Reversible motor	IP rating	Dimensions— $\frac{1}{4}$ DIN (L x W x H)	Power		Catalog number	Price
							VAC, Hz	Amps		
A. C/L single-channel compact pumps										
1.7 to 10	±5%	1	4	Yes	IP22	7" x 3 $\frac{3}{4}$ " x 3 $\frac{1}{2}$ " (17.8 x 9.5 x 8.9 cm)	90 to 260, 50/60 12 VDC†	110 mA at 115 VAC	UH-77122-04	
13 to 80							90 to 260, 50/60 12 VDC†	175 mA at 115 VAC	UH-77122-06	UH-77122-14
50 to 300							90 to 260, 50/60 12 VDC†	400 mA at 115 VAC	UH-77122-16	UH-77122-24
							90 to 260, 50/60 12 VDC†	—	UH-77122-26	
B. C/L dual-channel compact pumps										
1 to 6	±5%	2	6	Yes	IP22	7 $\frac{1}{2}$ " x 3 $\frac{3}{4}$ " x 3 $\frac{1}{2}$ " (19 x 9.5 x 8.9 cm)	90 to 260, 50/60 12 VDC†	110 mA at 115 VAC	UH-77120-32	
10 to 60							90 to 260, 50/60 12 VDC†	175 mA at 115 VAC	UH-77120-52	UH-77120-42
							90 to 260, 50/60 12 VDC†	—	UH-77120-62	

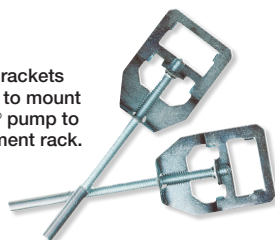
†Power supply not included with 12 VDC models.

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

UH-77200-07 Replacement power supply, 100 to 240 VAC, for pump 77122-24

UH-77120-11 Replacement power supply, 100 to 240 VAC, for pumps 77122-04, -14; 77120-32 and -42

Order brackets 77120-03 to mount your C/L® pump to an equipment rack.



Stack pumps for efficient use of bench space



Microbore Pump Tubing Ordering Information

Tube ID (mm)	Tygon® E-Lab	Silicone (platinum-cured)	Silicone (peroxide-cured)	PharMed® BPT	Tygon E-LFL (long flex life)	Viton®	Puri-Flex™	C-Flex®	Solvent/hydrocarbon
0.19	UH-06460-10	—	—	—	—	—	UH-96418-10	UH-95718-10	UH-95712-10
0.25	UH-06460-12	—	—	UH-95809-12	—	—	UH-96418-12	UH-95718-12	UH-95712-12
0.51	UH-06460-18	UH-95590-18	—	UH-95809-18	UH-06449-18	—	UH-96418-18	UH-95718-18	UH-95712-18
0.89	UH-06460-26	UH-95590-26	UH-07625-26	UH-95809-26	UH-06449-26	UH-97632-26	UH-96418-26	UH-95718-26	UH-95712-26
1.14	UH-06460-30	UH-95590-30	UH-07625-30	UH-95809-30	UH-06449-30	UH-97632-30	UH-96418-30	UH-95718-30	UH-95712-30
1.42	UH-06460-34	UH-95590-34	UH-07625-34	UH-95809-34	UH-06449-34	UH-97632-34	UH-96418-34	UH-95718-34	UH-95712-34
2.06	UH-06460-42	UH-95590-42	UH-07625-42	UH-95809-42	UH-06449-42	UH-97632-42	UH-96418-42	UH-95718-42	UH-95712-42
2.79	UH-06460-48	UH-95590-48	UH-07625-48	UH-95809-48	UH-06449-48	UH-97632-48	UH-96418-48	UH-95718-48	UH-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)	50 ft (15.2 m)
Price/pk									

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
- 06449-26 Tygon® E-LFL 0.89-mm ID tubing

L/S® Variable-Speed Economy Console Pumps

Economical and versatile variable-speed drive with a wide flow range

- Pump head flow rate: 0.42 to 2900 mL/min; cartridge head flow rate: 0.0035 to 1700 mL/min
- 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 $\pm 5\%$ speed control. Smooth operation and long service life.

APPLICATIONS

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



ISO9001:2008
CERTIFIED SUPPLIER



System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	16 to 480 mL/min	Easy-Load® 3 77800-60	C-Flex® ULTRA L/S 16 tubing 06434-16 10 ft (3 m)	Console drive 07554-90 20 to 600 rpm	115 VAC, 50/60 Hz	UH-77910-30	
				Console drive 07554-95 20 to 600 rpm	230 VAC, 50/60 Hz	UH-77910-35	
	56 to 1700 mL/min	Easy-Load II 77200-62	C-Flex ULTRA L/S 24 tubing 06434-24 10 ft (3 m)	Console drive 07554-90 20 to 600 rpm	115 VAC, 50/60 Hz	UH-77910-20	
				Console drive 07554-95 20 to 600 rpm	230 VAC, 50/60 Hz	UH-77910-25	

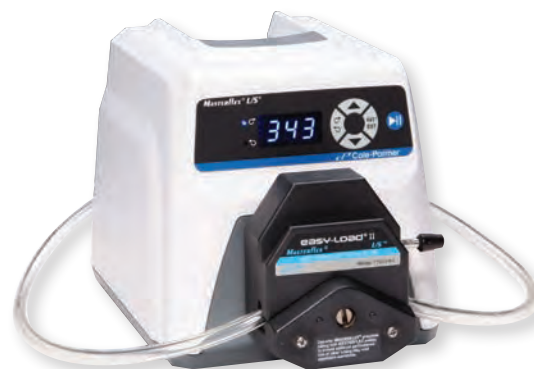
L/S® Precision Variable-Speed Console Pumps

Don't lose control of your metering applications—digital display gives you repeatable control

- Accurate and repeatable settings with 3-digit LED display of rpm
- Pump fluid in either direction with reversible motor—perfect for purging tubing
- Save space and increase productivity by stacking 2 or 4 pump heads on the same drive to create a multichannel pump system
- Maximize processes in a minimal footprint by stacking splash-resistant, IP33-rated drives
- Two ways to control speed, direction, and start/stop—use either the membrane keypad or remote control capabilities

APPLICATIONS

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



ISO9001:2008
CERTIFIED SUPPLIER



System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	4.8 to 480 mL/min	Easy-Load® 3 77800-60	C-Flex® ULTRA L/S 16 tubing 06434-16 10 ft (3 m)	Precision console drive 07528-10 6 to 600 rpm	90 to 260 VAC, 50/60 Hz	UH-77916-10	
	17 to 1700 mL/min	Easy-Load II 77200-62	C-Flex® ULTRA L/S 24 tubing 06434-24 10 ft (3 m)			UH-77916-20	

L/S® Precision Variable-Speed Modular Pumps

Place where convenient—ideal for limited spaces, hoods, or isolation chambers

- Flow rates: 0.06 to 3400 mL/min
- Easy up-front control of speed, direction, and start/stop
- Reversible motor—purge tubing before or after pumping; pump fluid in either direction
- Three-digit LED display shows motor rpm—confirm speed setting at a glance
- Remote control capabilities: speed, direction, and start/stop
- ±0.25% speed control for precise flow—ideal for metering applications

APPLICATIONS

- ✓ Epoxy resin delivery
- ✓ Bulk container pump
- ✓ Coolant/recirculation pump
- ✓ FDA tablet coating
- ✓ Adhesive resin delivery
- ✓ Packaging process pump



A. Modular Drives with Benchtop Controller




- Splash-resistant ABS plastic controller housing is IP33 rated; drive housing is epoxy finished steel, IP33 rated
- Remote control capabilities via a DB9 female connector on back of controller

B. Washdown Modular Drive with Wall-Mount Controller

- Wall-mount controller housing is powder-coated aluminum, IP66 / NEMA 4X rated for washdown; powder-coated steel drive housing is IP66 / NEMA 4X rated for washdown
- Remote control capabilities via weather-resistant connection on controller

ISO9001:2008
CERTIFIED SUPPLIER



System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
A. Precision modular drives with benchtop controller							
	4.8 to 480 mL/min	Easy-Load® 3 77800-60	C-Flex® ULTRA L/S 16 tubing 06434-16 10 ft (3 m)	Modular drive 07557-00 6 to 600 rpm	90 to 260 VAC, 50/60 Hz	UH-77913-60	
	17 to 1700 mL/min	Easy-Load II 77200-62	C-Flex ULTRA L/S 24 tubing 06434-24 10 ft (3 m)	Modular drive 07557-00 6 to 600 rpm	90 to 260 VAC, 50/60 Hz	UH-77913-70	
B. Precision washdown modular drive with washdown wall-mount controller							
	17 to 1700 mL/min	Easy-Load II 77200-62	C-Flex ULTRA L/S 24 tubing 06434-24 10 ft (3 m)	Modular drive 07557-60 6 to 600 rpm	90 to 260 VAC, 50/60 Hz	UH-77913-80	

UH-07557-51 Extension cable, 9 ft (2.7 m); extend distance between motor and controller

UH-07595-47 Cable assembly, for benchtop modular drives; DB9 male connector and 25 ft (7.9 m) cable with stripped wire terminal ends. Use for remote control

UH-77300-32 Cable assembly, for washdown modular drives; 18-pin round connector and 25 ft (7.9 m) cable with stripped wire terminal ends. Use for remote control

UH-17050-01 NIST-traceable calibration with data for peristaltic pump drive

Application Solution



Challenge: A printing press manufacturer was looking for a set of eight pumps to integrate into their new digital printing press model. Each pump would dispense a different color of ink during print runs, and the pumps needed to be kept separate to adjust the ink on demand. The press design required flexibility with placement of actual pump and its control. Because of the solvents used with the ink, chemical compatibility was of prime importance.

Solution: The L/S Precision Variable-Speed Modular Pump System 77913-70 suited the printing press design perfectly. Because of the modular construction, the pump itself could be integrated into the press while the controller could be mounted separately and remain easily accessible for last-minute adjustment of ink flow rate. The manufacturer opted for the Easy-Load II pump head 77200-62 for quick tubing changes, so that the press would experience minimal downtime for maintenance. The printer identified Tygon® Chemical tubing as best suited for the solvents used in their inks.

L/S® Variable-Speed Digital Pumps

Versatile, worry-free operation

- Brushless, maintenance-free motor provides $\pm 0.1\%$ speed control accuracy with 6000:1 turndown ratio
- Bright graphical LCD offers easy programming, four operating modes, and seven languages
- Ensure dispensing accuracy with antidrip function
- Get more accurate dispensing with preprogrammed calibration
- Change based on your needs—drives accept all L/S pump heads for more pumping versatility
- Programmable, reversible motor accepts up to four pump heads
- Choose how you want to dispense: volume, copy cycles, or time
- Hands-free dispensing via time interval dispense cycles
- Operate remotely via DB25 female connector

APPLICATIONS

- ✓ Acid/base pH control
- ✓ Media dispensing
- ✓ Precision fragrance delivery
- ✓ Automated fermentation

Four operating modes for more functionality: continuous run, time dispense, copy dispense, and volume dispense



Flow Rates in mL/min (flow rates in parentheses attained with High-Performance pump head—at ColeParmer.com)

rpm	Precision pump tubing						High-performance precision pump tubing			
	L/S 13	L/S 14	L/S 16	L/S 25	L/S 17	L/S 18	L/S 15	L/S 24	L/S 35	L/S 36
	Standard†, Easy-Load, Easy-Load II, Easy-Load 3						Multichannel‡, Standard, Easy-Load II, Easy-Load 3, High-Performance			
	Cartridge, Multichannel			Cartridge			Easy-Load			
0.1 to 600	0.006 to 36	0.021 to 130	0.08 to 480	0.17 to 1000	0.28 to 1700	0.38 to 2300	0.17 to 1000 (0.18 to 1100)	0.28 to 1700 (0.30 to 1800)	0.38 to 2300 (0.43 to 2600)	0.48 to 2900 (0.57 to 3400)
0.02 to 100	0.001 to 6	0.004 to 21	0.016 to 80	0.033 to 170	0.057 to 280	0.077 to 380	0.033 to 170 (0.036 to 183)	0.057 to 280 (0.057 to 300)	0.077 to 380 (0.086 to 433)	0.096 to 480 (0.113 to 566)

†The Standard pump head is not available for L/S® 25.

‡Multichannel head is not available for L/S 36. Multichannel and Cartridge heads are available for microbore tubing.

ISO9001:2008
CERTIFIED SUPPLIER



System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	0.08 to 480 mL/min	Easy-Load® 3 77800-60	C-Flex® ULTRA L/S 16 tubing 06434-16 10 ft (3 m)	Digital drive 07522-20 0.1 to 600 rpm	90 to 260 VAC, 50/60 Hz	UH-77921-65	
	0.28 to 1700 mL/min	Easy-Load II 77200-62	C-Flex ULTRA L/S 24 tubing 06434-24 10 ft (3 m)			UH-77921-75	

UH-07523-92 Foot switch, momentary start/stop; 6-ft (1.8-m) cable

UH-07523-94 DB25 male connector. Use to create your own cable

UH-07523-95 Cable assembly, DB25 male connector and 25 ft (7.9 m) cable with stripped wire ends for remote control

UH-07523-97 Handheld remote controller; route tubing through handle for dispensing into containers

UH-17050-01 NIST-traceable calibration with data for peristaltic pump drive

Application Solution



Challenge: A manufacturer of safety glass and laminated glass was looking for a pump that could dispense coating resins for plate glass to provide protection and build shatter resistance. The resins used in the process could be polyurethane, epoxy, or other coatings, and in the past the resins ate through dispensing tubing. As a result, the manufacturer needed to find a pump system with tubing that had the appropriate chemical compatibility. Likewise, the pump system needed to offer quick maintenance for tube changes.

Solution: The customer tested silicone tubing for chemical resistance and found it to be suitable for the resin being dispensed. The customer then chose the L/S® variable-speed digital drive 07522-20 for its precision pumping and speed control. The manufacturer also selected an Easy-Load II pump head for quick maintenance and reduced downtime during tubing changes.

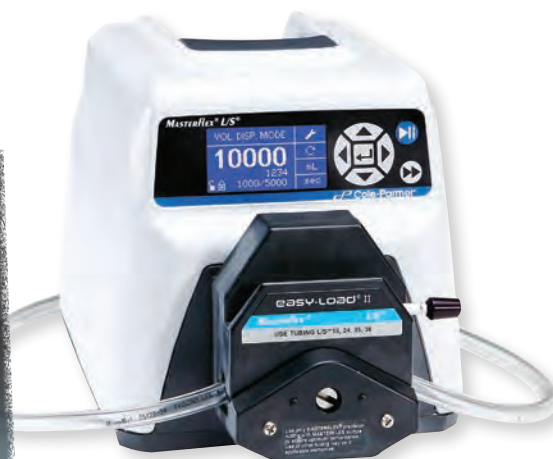
L/S® Computer-Compatible Digital Pumps

Automate your process by interfacing with a computer

- Interface drive to your PC via DB9 serial or USB connector
- Graphical LCD shows four operating modes: continuous run, time dispense, copy dispense, and volume dispense. View performance continually
- Antidrip function ensures dispensing accuracy
- Programmable, reversible motor accepts up to four pump heads
- Remote control capabilities via DB25 female connector on drive
- Menu driven interface—select one of seven languages for programming and operation



APPLICATIONS

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



ISO9001:2008
CERTIFIED SUPPLIER



System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	0.08 to 480 mL/min	Easy-Load® 3 77800-60	C-Flex® ULTRA L/S 16 tubing 06434-16 10 ft (3 m)	Computer-compatible drive 07551-20 0.1 to 600 rpm	115/230 VAC, 50/60 Hz	UH-77924-55	
	0.28 to 1700 mL/min	Easy-Load II 77200-62	C-Flex® ULTRA L/S 24 tubing 06434-24 10 ft (3 m)			UH-77924-65	

[UH-07523-92](#) Foot switch, momentary start/stop; 6-ft (1.8-m) cable

[UH-07523-94](#) DB25 male connector. Use to create your own cable

[UH-07523-95](#) Cable assembly, DB25 male connector and 25-ft (7.9-m) cable with stripped wire ends for remote control

[UH-07523-98](#) Tilt bail, use to securely elevate front of drive

[UH-07523-97](#) Handheld remote controller, DB9; for on/off control; route tubing through handle for filling and dispensing applications

[UH-17050-01](#) NIST-traceable calibration with data for peristaltic pump drive



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 sterility 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
- 07522-20 L/S digital console drive
- 07596-20 Pulse dampener

L/S® Four-Channel Digital Dispensing Pump

Accurate and synchronous multichannel dispensing applications

- Digital dispensing drive features maintenance-free brushless motor
- Program dispensing parameters—including volume, copy, time, and delay interval—for automated dispensing
- Four-channel, six-roller pump head offers low pulsation and synchronous flow between channels for high accuracy and consistent fills
- BioPharm Plus platinum silicone tubing delivers exceptional flow stability over time making it ideal for dispensing applications
- 1/10-hp continuous-duty brushless drive; tach feedback for $\pm 0.1\%$ speed control
- Remote control via DB25 female connector on drive
- Membrane keypad with lockout
- See page 23 for complete drive specifications

APPLICATIONS

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



ISO 9001:2008
CERTIFIED SUPPLIER



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)	Catalog number	Price
0.047 to 280	L/S four-channel 07535-04	BioPharm Plus silicone tube set, L/S 16 96116-16; pk of 8	L/S two-stop tube sets: L/S 13, 14, 16	07522-20	0.1 to 600	IP33	90 to 130 VAC, 2.2 A; 190 to 260 VAC, 1.1 A	UH-77921-85	

†Flow range per channel with included tubing; extend the flow range of this system with additional sizes of tubing; order L/S two-stop tube sets below.

L/S Two-Stop Precision Tubing Sets

Pump tubing formulation	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
Tygon® E-LFL	UH-06447-13 pk of 8	UH-06447-14 pk of 8	UH-06447-16 pk of 8	UH-06447-15 pk of 4	UH-06447-24 pk of 4	UH-06447-35 pk of 4
Silicone (platinum-cured)	UH-06421-13 pk of 8	UH-06421-14 pk of 8	UH-06421-16 pk of 8	UH-06421-15 pk of 4	UH-06421-24 pk of 4	UH-06421-35 pk of 4
BioPharm Plus Silicone (platinum-cured)	UH-96116-13 pk of 8	UH-96116-14 pk of 8	UH-96116-16 pk of 8	UH-96116-15 pk of 4	UH-96116-24 pk of 4	UH-96116-35 pk of 4
PharMed® BPT	UH-96114-13 pk of 8	UH-96114-14 pk of 8	UH-96114-16 pk of 8	UH-96114-15 pk of 4	UH-96114-24 pk of 4	UH-96114-35 pk of 4
Chem-Durance® Bio	UH-96117-13 pk of 8	UH-96117-14 pk of 8	UH-96117-16 pk of 8	UH-96117-15 pk of 4	UH-96117-24 pk of 4	UH-96117-35 pk of 4
Viton®	UH-96428-13 pk of 8	UH-96428-14 pk of 8	UH-96428-16 pk of 8	UH-96428-15 pk of 4	UH-96428-24 pk of 4	UH-96428-35 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 $\pm 1.5\%$. 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 Pumps

Multiple-channel low-flow transfer and perfusion!

- Cartridges accept multiple tubing sizes for wide flow range
- Change tubing in one channel without disturbing others—cartridges snap in and out for tubing changes
- 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
- 1/10-hp continuous-duty brushless drive
- Tach feedback for $\pm 0.1\%$ drive speed control
- Remote control via DB25 female connector on drive
- IP33 rated, stackable ABS housing
- Membrane keypad with lockout
- See page 23 for complete drive specifications



APPLICATIONS

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





ISO9001:2008
CERTIFIED SUPPLIER



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)	Catalog number	Price
L/S eight-channel four-roller cartridge pump system									
0.0034 to 18	L/S Cartridge head 07519-06 with eight small cartridges 07519-80	Tygon E-LFL microbore tube set, 1.42-mm ID 06447-34; pk of 12	Microbore tube sets; L/S 13, L/S 14	07522-30	0.02 to 100	IP33	90 to 130 VAC, 2.2 A; 190 to 260 VAC, 1.1 A	UH-77919-25	
L/S reduced-pulsation four-channel eight-roller cartridge pump system									
0.0024 to 12	L/S Cartridge head 07519-20 with four small cartridges 07519-85	Tygon E-LFL microbore tube set, 1.42-mm ID 06447-34; pk of 12	Microbore tube sets; L/S 13, L/S 14	07522-30	0.02 to 100	IP33	90 to 130 VAC, 2.2 A; 190 to 260 VAC, 1.1 A	UH-77919-35	

†Flow range with included tubing; extend the flow range of these systems with additional sizes of tubing; order microbore two-stop tube sets below.

Additional Microbore Two-Stop Pump Tube Sets

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	0.0015 to 7.4	0.0034 to 18	0.0074 to 37	0.0126 to 63
	Cartridge head 07519-20	0.0010 to 5.2	0.0024 to 12	0.0044 to 22	0.0068 to 34
Platinum-cured silicone		UH-06421-26 pk of 6	UH-06421-34 pk of 6	UH-06421-42 pk of 6	UH-06421-48 pk of 6
Santoprene®		UH-06431-26 pk of 12	UH-06431-34 pk of 12	UH-06431-42 pk of 12	UH-06431-48 pk of 12
Tygon® E-LFL		UH-06447-26 pk of 12	UH-06447-34 pk of 12	UH-06447-42 pk of 12	UH-06447-48 pk of 12
Viton®		UH-96428-26 pk of 12	UH-96428-34 pk of 12	UH-96428-42 pk of 12	UH-96428-48 pk of 12

Additional Cartridges

UH-07519-80 Small cartridge
for pump system
77919-25

UH-07519-85 Small cartridge
for pump system
77919-35



Masterflex® Advantage

Masterflex vs Syringe Pumps

Application

A university research lab needs to pump a fixative (formaldehyde and glutaldehyde 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
- Multichannel and able to pump particulates

Syringe Pump Disadvantages

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

Masterflex Products Applied

- 07519-06 L/S Multichannel cartridge pump head
- 07519-80 Small cartridges
- 06424-14 C-Flex L/S 14 Precision tubing
- 07522-30 L/S Brushless digital drive

L/S® PTFE-Tubing Pump

Worry-free transfer of aggressive organic solvents

- Limited chemical exposure with PTFE tubing as only wetted part
- Higher pressure pumping, up to 100 psi
- Adjustable occlusion—tighten for higher pressure, loosen for longer tubing life
- Contamination-free transfer of liquids containing small particulates
- Reversible motor accepts one pump head

APPLICATIONS

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

ISO9001:2008
CERTIFIED SUPPLIER



Specifications

Maximum suction lift: 8 ft (2.4 m) **Average tubing life (100 rpm, 0 psi):** 500 hours **Body material:** anodized aluminum, acetal **Roller material:** stainless steel

Flow range at 3 to 300 rpm		What's included			rpm	Rollers	Maximum continuous pressure	Power (50/60 Hz)	Catalog number	Price
4-mm OD tubing	6-mm OD tubing	Pump head	Tubing	Drive						
0.18 to 17 mL/min	0.75 to 65 mL/min	PTFE-tubing 77390-00	PTFE-tubing set 77390-60	Variable-speed 07528-20	3 to 300	6	100 psi (6.9 bar)	90 to 260 VAC	UH-77912-10	

PTFE-Tubing Sets include two 15" (38-cm) lengths and cannot be substituted with ordinary PTFE tubing.

[UH-77390-50](#) PTFE-tubing, 2-mm ID, 4-mm OD. Set of 2

[UH-77390-60](#) PTFE-tubing, 4-mm ID, 6-mm OD. Set of 2

L/S® PTFE-Diaphragm Pump

Won't contaminate reagents

- Maintain fluid purity with PTFE wetted parts
- Minimize downtime—holds prime up to two hours when pump is off
- High metering accuracy with minimal fluid churning and dead volume

APPLICATIONS

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

ISO9001:2008
CERTIFIED SUPPLIER



Specifications

Max drive speed: 400 rpm†

Max fluid temperature: 149°F (65°C)

Metering pressure range: 3 to 50 psig

Max dead volume: 16 mL

Wetted parts: PTFE diaphragm, body, ball check, and valve seat and springs

Max suction lift: 24" (61.0 cm) dry, 16 ft (4.8 m) wet

Viscosity range: 1 to 500 cp (6 to 2900 SSU)

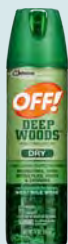
Flow range†		What's included			Max psi††	Connections	Power (50/60 Hz)	Catalog number	Price
GPH	mL/min	Pump head	Tubing	Drive					
1.3 to 12.7	80 to 800	PTFE-diaphragm 07090-42	PTFE tubing (1/4" ID x 3/8" OD)	Variable-speed console 07528-10	50	1/4" NPT(M)	90 to 260 VAC	UH-77915-10	

†Operation above 400 rpm will increase flow but may decrease pump head accuracy and life.

††Rated at 40 to 400 rpm motor speed.

‡‡Use a pressure relief valve to prevent higher pressures.

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 77912-10 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® Digital Console Process Pumps

Transfer, dispense, and meter in lab, process and washdown environments

- IP66 and NEMA 4X rated. Sealed housing and sealed keypad are protected from dust, water, and chemicals in the washdown environment—simply hose down to clean.
- Programmable, reversible motor accepts up to two pump heads and offers remote functionality
- Flow rate: 0.006 to 3400 mL/min with L/S tubing
- Graphical LCD shows six different parameters: motor rpm, flow rate, dispense volume, cumulative volume, dispense interval time, and copy number.
- Brushless, maintenance-free motor with $\pm 0.1\%$ speed control accuracy and a 6000:1 turndown
- Dispense by: volume—in milliliters (0.001 to 99,999), liters, and gallons; copy—1 to 99,999 dispense cycles. Set time interval of on/off cycles; 1 sec to 99 hr, 59 min, 59 sec.
- Remote control capabilities via 31-pin circular waterproof connection

APPLICATIONS




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



What's included: 6-ft (1.8-m) line cord—features IEC 320/CEE 22 connector coupler; watertight cord connection. Please specify destination country when ordering; drive is shipped with country-specific plug/cord set.

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System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	0.28 to 1700 mL/min	Easy-Load® II 77200-62	C-Flex® ULTRA L/S 24 tubing 06434-24 10 ft (3 m)	Digital console process drive with 316 SS housing 07575-30 0.1 to 600 rpm	90 to 260 VAC, 50/60 Hz	UH-77975-25	
	0.28 to 1800 mL/min	High-Performance 77250-62	C-Flex ULTRA L/S 24 tubing 06434-24 10 ft (3 m)			UH-77975-35	
	0.28 to 1700 mL/min	Easy-Load II 77200-62	C-Flex ULTRA L/S 24 tubing 06434-24 10 ft (3 m)	Digital console process drive with powder-coat steel housing 07575-40 0.1 to 600 rpm	90 to 260 VAC, 50/60 Hz	UH-77975-45	

UH-07575-84 Washdown foot switch, momentary start/stop; 6-ft (1.8-m) cable

UH-07575-80 Cable assembly, 31-pin round connector and 25-ft (7.9-m) cable with stripped wire ends for remote control

UH-17050-01 NIST-traceable calibration with data for peristaltic pump drive

Masterflex® Advantage

Masterflex vs Diaphragm Pumps

Application

A dairy processor needs to pump 30% hydrogen peroxide (H₂O₂) at a relatively high back pressure (30 to 40 psi) in an aseptic bottling system.

Masterflex Advantages

- H₂O₂ 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

- H₂O₂ decomposes in contact with metal, releasing O₂ 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
- 07575-30 L/S digital process drive

L/S® High-Pressure Pump

Save time and money—
no cleaning, just change tubing

- No more cleaning gears, valves, seals, or diaphragms
- Handles continuous pressures up to 150 psi
- Ideal for chemical injection, metering, and filtration
- Reversible motor for pumping in either direction
- Easy keypad control of pump speed and direction—view speed via LED display
- Smooth operation and long service life with soft start and back EMF for $\pm 0.25\%$ speed control
- Stackable housing is also splash- and fire-resistant

APPLICATIONS

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



The Masterflex L/S high-pressure pump system enables peristaltic fluid transfer using flexible tubing—at higher pressures. This innovative pump system transfers fluids at continuous pressure up to 150 psi (10.2 bar). It is also ideal for chemical injection or sterile filtration because the fluid remains in the tubing at all times, with absolutely no contact with the pump's moving parts.

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CERTIFIED SUPPLIER



Flow range	What's included			Power	Catalog number	Price
	Pump head	Tubing	Drive			
0.9 to 240 mL/min	High-Performance 77250-62	PharMed® BPT L/S 16HP high-pressure tubing 95664-16, 8 ft	Precision console drive 07528-30 1 to 100 rpm	90 to 260 VAC, 50/60 Hz	UH-77914-10	

L/S® Air-Powered Pump

Use where electrical power
is unsafe or unavailable

- 1/3-hp air motor requires little maintenance. Air motor generates less heat than electric motor
- IP44 rated—painted steel housing protects from gentle spray
- Rated to EEx II 3 G c IIC T6

APPLICATIONS

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



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ATEX
Zone 2
Drive only



Flow range	What's included			Power	Catalog number	Price
	Pump head	Tubing	Drive			
170 to 1700 mL/min [†]	Easy-Load® II 77200-62	C-Flex® ULTRA L/S 24 tubing 06434-24, 10 ft (3 m)	Air-powered drive 07569-00, 60 to 600 rpm	3 to 25 cfm (0.08 to 0.7 m³/min) at 20 to 100 psi (1.4 to 6.9 bar)	UH-77931-10	

[†]Flow range with included tubing.

L/S® Pump Heads

Completely interchangeable—
work with any Masterflex L/S drive

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)
- Stack heads to increase flow capacity and for multiple-channel applications



A
Easy-Load® 3
pump head



B
Easy-Load II
pump head



C
High-performance
pump head

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
- Mount up to four heads on a single drive

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 10.2 bar
- Compatible with all L/S drives that accept two or more pump heads (pump head is not stackable)

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Pump tubing size	mL per rev	Flow rates (mL/min)		Max system pressure* (bar)	Fixed occlusion		Adjustable occlusion	Pump head includes
		1 to 100 rpm	6 to 600 rpm		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	2.7	UH-77800-50	UH-77800-60	—	Mounting plate/adapter kit for L/S pump drives and a 43-cm (17") length of silicone pump tubing
L/S 14	0.22	0.22 to 22	1.3 to 130	2.7				
L/S 16	0.8	0.8 to 80	4.8 to 480	2.7				
L/S 25	1.7	1.7 to 170	10 to 1000	2.4				
L/S 17	2.8	2.8 to 280	17 to 1700	1.4				
L/S 18	3.8	3.8 to 380	23 to 2300	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	2.0	UH-77800-52	UH-77800-62	—	Mounting plate/adapter kit for L/S pump drives and a 43-cm (17") length of silicone pump tubing
L/S 24	2.8	2.8 to 280	17 to 1700	2.0				
L/S 35	3.8	3.8 to 380	23 to 2300	1.7				
L/S 36	4.8	4.8 to 480	29 to 2900	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	2.7	UH-77200-50	UH-77200-60	UH-77201-60	Single-channel mounting hardware and a 38-cm (15") length of silicone pump tubing
L/S 14	0.21	0.21 to 21	1.3 to 130	2.7				
L/S 16	0.8	0.8 to 80	4.8 to 480	2.7				
L/S 25	1.7	1.7 to 170	10 to 1000	2.4				
L/S 17	2.8	2.8 to 280	17 to 1700	1.4				
L/S 18	3.8	3.8 to 380	23 to 2300	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	2.7	UH-77200-52	UH-77200-62	UH-77201-62	Single-channel mounting hardware and a 38-cm (15") length of silicone pump tubing
L/S 24	2.8	2.8 to 280	17 to 1700	2.7				
L/S 35	3.8	3.8 to 380	23 to 2300	2.4				
L/S 36	4.8	4.8 to 480	29 to 2900	1.4				
C. High-performance pump head								
L/S 14HP†	0.3	0.3 to 30	Not recommended	10.2	—	UH-77250-62	—	Mounting hardware and a 38-cm (15") length of pump tubing
L/S 16HP†	0.9	0.9 to 90	Not recommended	8.5				
L/S 15HP†	1.7	1.7 to 170	Not recommended	6.8				
L/S 15	1.8	1.8 to 180	11 to 1100	2.7				
L/S 24	3.0	3.0 to 300	18 to 1800	2.7				
L/S 35	4.3	4.3 to 430	26 to 2600	2.4				
L/S 36	5.8	5.8 to 580	34 to 3400	1.4				

*Actual performance varies depending on pump tubing formulation—values shown are for firm pump tubing. **Note:** High-Performance pump head is not stackable.

†L/S HP 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.

L/S® Variable-Speed Pump Drives

Get the pump that meets your needs and your budget

A. Variable-Speed Economy Console Drives

- Flow range: 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 $\pm 5\%$ speed control
- Smooth operation and long service life



A

B. Precision Variable-Speed Console Drives

- Flow range: 0.6 to 3400 mL/min (depends on drive rpm and tubing size)
- Three-digit LED display shows motor rpm—confirm speed setting at a glance
- Separate speed and power (on/off) control—maintain speed setting while turning pump on/off
- 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 0 to 10 VDC
 - Start/stop via open collector or contact closure



B

C. Variable-Speed Modular Digital Dispensing Drive

- Flow range: 0.006 to 3400 mL/min (depends on drive rpm and tubing size)
- Graphical LCD shows four operating modes: continuous run, timed dispense, copy dispense, volume dispense. View pump performance continually.
- Brushless, maintenance-free motor offers $\pm 0.1\%$ speed control accuracy with a 6000 to 1 turndown ratio
- Menu-driven interface lets you select one of seven languages for programming and operation
- Remote control capabilities via DB25 female connector on drive
- Programmed calibration ensures dispense and display accuracy—drive stores one calibration value per tubing size.
- Benchtop controller is ABS plastic. 1.8-m cable connects motor and controller—place where convenient



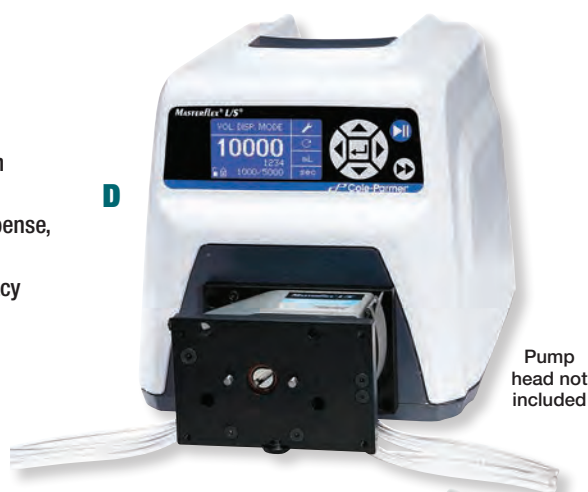
C

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rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)		Catalog number	Price
						VAC	Amps		
A. Variable-speed economy console drives									
20 to 600	±5%	1	37 W	IP22	22.9 x 18.1 x 13.3 cm	180 to 260	0.8 at 230 VAC	UH-07554-95	
7 to 200		2						UH-07554-85	
B. Precision variable-speed console drives									
6 to 600	±0.25%	2	75 W	IP33	25.4 x 21.6 x 21.6 cm	90 to 260	1.2 at 230 VAC	UH-07528-10	
3 to 300		2						UH-07528-20	
1 to 100		4						UH-07528-30	
C. Variable-speed modular digital dispensing drive									
0.1 to 600	±0.1%	2	75 W	IP33	Controller: 26.7 x 21 x 12.7 cm Drive: 26.7 x 9.7 x 11.7 cm	90 to 260	1.2 at 230 VAC	UH-77301-40	

D. Standard Digital Drives

- Antidrip function ensures dispensing accuracy
- Flow rate: 0.001 to 3400 mL/min with L/S tubing. Flow rate depends on drive rpm and tubing size.
- Graphical LCD shows four operating modes: continuous run, timed dispense, copy dispense, volume dispense. View pump performance continually.
- Brushless, maintenance-free motor offers $\pm 0.1\%$ speed control accuracy with a 6000 to 1 turndown ratio
- Menu-driven interface lets you select one of seven languages for programming and operation
- Remote control capabilities via DB25 female connector on drive
- Programmed calibration ensures dispense and display accuracy—drive stores one calibration value per tubing size.



E. Computer-Compatible Digital Drives

- Flow rate: 0.001 to 3400 mL/min with L/S tubing. Flow rate depends on drive rpm and tubing size.
- Graphical LCD shows four operating modes: continuous run, time dispense, copy dispense, and volume dispense. View pump performance continually.
- Interface drive to your PC via DB9 serial or USB connector
- Remote control capabilities via DB25 female connector on drive
- Use these computer-compatible drives as stand-alone digital drives or full-featured programmable drives when interfaced with a computer and software



F-G. Digital Console Process Drives

- IP66 and NEMA 4X rated. Sealed housing and sealed keypad are protected from dust, water, and chemicals in the washdown environment—simply hose down to clean.
- Flow rate: 0.006 to 3400 mL/min (0.0001 to 54 GPH) with L/S® tubing. Flow rate depends on drive rpm and tubing size.
- Graphical LCD shows four operating modes: continuous run, time dispense, copy dispense, and volume dispense. View pump performance continually.
- Brushless, maintenance-free motor with improved $\pm 0.1\%$ speed control accuracy
- Remote control capabilities via fluid-resistant input/output connector on back of drive



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rpm	Speed control	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)		Catalog number	Price
						VAC	Amps		
D. Standard digital drives									
0.1 to 600	±0.1%	2	75 W	IP33	25.4 x 21.6 x 21.6 cm	90 to 260	1.1 at 230 VAC	UH-07522-20	
0.02 to 100		4						UH-07522-30	
E. Computer-compatible digital drives									
0.1 to 600	±0.1%	2	75 W	IP33	25.4 x 21.6 x 21.6 cm	90 to 260	1.1 at 230 VAC	UH-07551-20	
0.02 to 100		4						UH-07551-30	
F. Digital console process drive with stainless steel housing									
0.1 to 600	±0.1%	2	75 W	IP66	30.5 x 22.9 x 23.6 cm	90 to 260	1.1 at 230 VAC	UH-07575-30	
G. Digital console process drive with powder-coated steel housing									
0.1 to 600	±0.1%	2	75 W	IP66	30.5 x 22.9 x 23.6 cm	90 to 260	1.1 at 230 VAC	UH-07575-40	

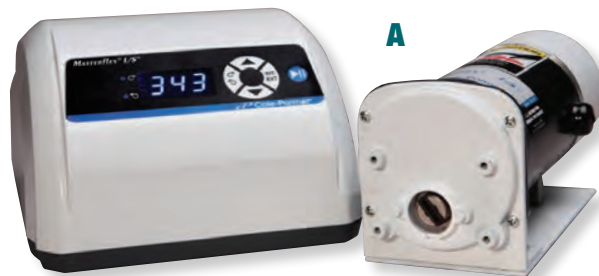
For additional information or to order, please contact your local representative.

Cole-Parmer®

L/S® Precision Variable-Speed Modular Drives

Place where convenient—ideal for limited spaces, hoods, or isolation chambers

- Easy up-front control of speed, direction, and start/stop
- Reversible motor—purge tubing before or after pumping; pump fluid in either direction
- Three-digit LED display shows motor rpm—confirm speed setting at a glance
- Remote control capabilities: speed, direction, and start/stop
- $\pm 0.25\%$ speed control for precise flow regulation—ideal for metering applications



A

A. Modular Drives with Benchtop Controller

- Splash-resistant ABS plastic controller housing is IP33 rated; drive housing is epoxy finished steel, IP33 rated
- Remote control capabilities via a DB9 female connector on back of controller

B. Washdown Modular Drives with Wall-Mount Controller

- Wall-mount controller housing is powder-coated aluminum, IP66 / NEMA 4X rated for washdown; powder-coated steel drive housing is IP66 / NEMA 4X rated for washdown
- Remote control capabilities via weather-resistant connection on controller



B

Models 07557-60 and -70 include wall-mount controller

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rpm	Speed control (resolution)	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)		Catalog number	Price
						VAC	Amps		
A. Precision modular drives with benchtop controller									
6 to 600	±0.25% (1 rpm at 600 rpm;	2	1/10 hp (75 W)	IP33	Controller: 10½" x 8¼" x 5" Drive: 10¾" x 4⅝" x 4½"	90 to 260	2.2 at 115 VAC, 1.1 at 230 VAC	UH-07557-00	
1 to 100	0.1 rpm at 100 rpm)	4						UH-07557-10	
B. Precision washdown modular drives with washdown wall-mount controller									
6 to 600	±0.25% (1 rpm at 600 rpm;	2	1/10 hp (75 W)	IP66	Controller: 9" x 11¾" x 4½" Drive: 15⅞" x 7" x 6"	90 to 260	2.2 at 115 VAC, 1.1 at 230 VAC	UH-07557-60	
1 to 100	0.1 rpm at 100 rpm)	4						UH-07557-70	

UH-07557-51 Extension cable, 9 ft (2.7 m); extend distance between motor and controller

UH-07595-47 Cable assembly, for benchtop modular drives; DB9 male connector and 25 ft (7.9 m) cable with stripped wire terminal ends. Use for remote control

UH-77300-32 Cable assembly, for washdown modular drives; 18-pin round connector and 25 ft (7.9 m) cable with stripped wire terminal ends. Use for remote control

L/S® Compact Variable-Speed Pumps

Make low-flow pumping easy!

- No confusing menus—easy-to-use speed controller and reversing switch get you pumping quicker
- No stress loading of tubing—new easy-loading Miniflex™ pump head with automatic tubing retention keeps tubing in place
- Easier on the budget—complete system accepts continuous tubing, no need to buy special tubing sets
- Dual-channel model delivers synchronous flow from two separate channels
- Remote start/stop via contact closure on back of pump
- Stack for smaller overall footprint

NEW



These easy-to-use complete pumps offer a wide occlusion angle, which prevents fluid backflow up to the rated pressure of the tubing. Prime or flush tubing quickly by depressing the MAX button. Self-lubricating thermoplastic polyester rollers are low friction and long wearing for smooth operation and long life.

What's included: L/S Miniflex pump head and dual-voltage (115/230 VAC) benchtop power supply.

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Number of channels	rpm	Speed control	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)	Catalog number	Price
1	35 to 200	$\pm 5\%$	IP22	8 5/8" x 5 1/4" x 4 1/2" (22 x 13.3 x 11.4 cm)	90 to 260 VAC	UH-77240-20	
2						UH-77240-30	




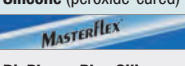
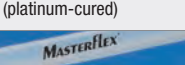
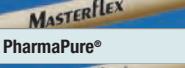

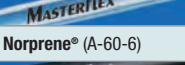


UH-77200-07 Replacement power supply, dual-voltage 115/230 VAC

UH-17050-01 NIST-traceable calibration with data for peristaltic pump drive

L/S® Precision Pump Tubing

Ensure optimal performance from your Masterflex pump

- Custom extruded to fit Masterflex pumps
- Engineered for long life in peristaltic pump applications

			Tubing size	L/S 13	L/S 14	L/S 16	L/S 25	L/S 17	L/S 18
			Inner diameter	0.8 mm (0.03")	1.6 mm (0.06")	3.1 mm (0.12")	4.8 mm (0.19")	6.4 mm (0.25")	7.9 mm (0.31")
			Hose barb size	1.6 mm (1/16")	1.6 mm (1/16")	3.2 mm (1/8")	4.8 mm (3/16")	6.4 mm (1/4")	9.5 mm (3/8")
Pump tubing formulation	Description	Tubing length							
 Silicone (platinum-cured)	<ul style="list-style-type: none">— Smooth surface—low protein binding levels— Fungus-resistant, phthalate- and latex-free	7.6 m (25 ft)/pk	UH-96410-13	UH-96410-14	UH-96410-16	UH-96410-25	UH-96410-17	UH-96410-18	
 Silicone (peroxide-cured)	<ul style="list-style-type: none">— Greater physical compression capability— Economical, longer tubing life	7.6 m (25 ft)/pk	UH-96400-13	UH-96400-14	UH-96400-16	UH-96400-25	UH-96400-17	UH-96400-18	
 BioPharm Plus Silicone (platinum-cured)	<ul style="list-style-type: none">— Smooth surface minimizes particle entrapment— Longest life and low spallation— Enhanced pressure capabilities	7.6 m (25 ft)/pk	UH-96440-13	UH-96440-14	UH-96440-16	UH-96440-25	UH-96440-17	UH-96440-18	
 Puri-Flex™	<ul style="list-style-type: none">— Heat sealable, weldable, and economical— Longer pump life, very low protein binding	7.6 m (25 ft)/pk	UH-96419-13	UH-96419-14	UH-96419-16	UH-96419-25	UH-96419-17	UH-96419-18	
 C-Flex®	<ul style="list-style-type: none">— Biocompatibility of silicone— Chemical resistance similar to Tygon	7.6 m (25 ft)/pk	UH-06424-13	UH-06424-14	UH-06424-16	UH-06424-25	UH-06424-17	UH-06424-18	
 C-Flex® ULTRA	<ul style="list-style-type: none">— Longest life of any C-Flex formulation— Lowest spallation and reduced residue	7.6 m (25 ft)/pk	—	UH-06434-14	UH-06434-16	UH-06434-25	UH-06434-17	UH-06434-18	
 PharMed® BPT	<ul style="list-style-type: none">— Over 10,000 hours of tubing life— Resists ozone and UV radiation	7.6 m (25 ft)/pk	UH-06508-13	UH-06508-14	UH-06508-16	UH-06508-25	UH-06508-17	UH-06508-18	
 PharmaPure®	<ul style="list-style-type: none">— Biocompatibility similar to PharMed BPT— Long life under continuous pressure	7.6 m (25 ft)/pk	UH-06435-13	UH-06435-14	UH-06435-16	UH-06435-25	UH-06435-17	UH-06435-18	
 Chem-Durance® Bio	<ul style="list-style-type: none">— Excellent chemical resistance— Plasticizer-free inner liner	15.2 m (50 ft)/pk	UH-06442-13	UH-06442-14	UH-06442-16	UH-06442-25	UH-06442-17	UH-06442-18	
 Solve-Flex® 	<ul style="list-style-type: none">— Excellent chemical resistance to solvents— Low spallation fluoropolymer-lined tubing	3.6 m (12 ft)/pk	—	—	—	—	UH-96446-17	—	
 Tygon® E-LFL	<ul style="list-style-type: none">— Longest life of all Tygon formulations— USP Class VI, EU Pharmacopoeia 3.2.9, FDA 21	7.6 m (25 ft)/pk	UH-06440-13	UH-06440-14	UH-06440-16	UH-06440-25	UH-06440-17	UH-06440-18	
 Tygon E-Food (B-44-4X)	<ul style="list-style-type: none">— Complies with FDA, NSF, 3A, and EU Food regulations (10/2011)	15.2 m (50 ft)/pk	UH-06418-13	UH-06418-14	UH-06418-16	UH-06418-25	UH-06418-17	UH-06418-18	
 Tygon E-Lab (E3603)	<ul style="list-style-type: none">— Ideal for general transfer applications— Clear for easy monitoring	15.2 m (50 ft)/pk	UH-06509-13	UH-06509-14	UH-06509-16	UH-06509-25	UH-06509-17	UH-06509-18	
 Tygon Fuel & Lubricant	<ul style="list-style-type: none">— Ideal for transferring hydrocarbons, gasoline, kerosene, and heating oil	15.2 m (50 ft)/pk	UH-06401-13	UH-06401-14	UH-06401-16	UH-06401-25	UH-06401-17	UH-06401-18	
 Tygon Chemical (2001)	<ul style="list-style-type: none">— Best chemical resistance of Tygon tubing— Compatible with some organics	15.2 m (50 ft)/pk	UH-06475-13	UH-06475-14	UH-06475-16	UH-06475-25	UH-06475-17	UH-06475-18	
 Norprene® (A-60-6)	<ul style="list-style-type: none">— Up to 10,000 hours of tubing life— Best choice for pressure/vacuum applications	15.2 m (50 ft)/pk	UH-06404-13	UH-06404-14	UH-06404-16	UH-06404-25	UH-06404-17	UH-06404-18	
 Norprene Food (A-60-F)	<ul style="list-style-type: none">— Ideal for high-temperature food applications— Resists heat, ozone, acids, and alkalis	15.2 m (50 ft)/pk	UH-06402-13	UH-06402-14	UH-06402-16	UH-06402-25	UH-06402-17	UH-06402-18	
 Viton®	<ul style="list-style-type: none">— Excellent chemical resistance— Resists corrosives, solvents, and oils	7.6 m (25 ft)/pk	UH-96412-13	UH-96412-14	UH-96412-16	UH-96412-25	UH-96412-17	UH-96412-18	
 GORE® STA-PURE® PCS	<ul style="list-style-type: none">— Long life—even under pressures up to 60 psi— Excellent flow stability	30.5 cm (12")/pk	—	UH-96211-14	UH-96211-16	UH-96211-25	UH-96211-17	UH-96211-18	
 GORE® STA-PURE® PFL	<ul style="list-style-type: none">— Long life—even under pressures up to 60 psi— Excellent biocompatibility and flow stability	30.5 cm (12")/pk	—	UH-96212-14	UH-96212-16	UH-96212-25	UH-96212-17	UH-96212-18	

For additional information or to order, please contact your local representative.

Cole-Parmer®

L/S® High-Performance Precision Pump Tubing

Thicker wall compared to our Precision pump tubing

- Best choice for applications involving pressure, suction lift, viscous fluids, or long tubing life

		Tubing size	L/S 15	L/S 24	L/S 35	L/S 36
		Inner diameter	4.8 mm (0.19")	6.4 mm (0.25")	7.9 mm (0.31")	9.7 mm (0.38")
		Hose barb size	4.8 mm (3/16")	6.4 mm (1/4")	9.5 mm (3/8")	9.5 mm (3/8")
Pump tubing formulation	Description	Tubing length				
 Silicone (platinum-cured)	<ul style="list-style-type: none"> – Smooth surface—low protein binding levels – Fungus-resistant, phthalate- and latex-free 	7.6 m (25 ft)/pk	UH-96410-15	UH-96410-24	UH-96410-35	UH-96410-36
 Silicone (peroxide-cured)	<ul style="list-style-type: none"> – Greater physical compression capability – Economical, longer tubing life 	7.6 m (25 ft)/pk	UH-96400-15	UH-96400-24	UH-96400-35	UH-96400-36
 BioPharm Plus Silicone (platinum-cured)	<ul style="list-style-type: none"> – Smooth surface minimizes particle entrapment – Longest life and low spallation – Enhanced pressure capabilities 	7.6 m (25 ft)/pk	UH-96440-15	UH-96440-24	UH-96440-35	UH-96440-36
 Puri-Flex™	<ul style="list-style-type: none"> – Heat sealable, weldable, and economical – Longer pump life, very low protein binding 	7.6 m (25 ft)/pk	UH-96419-15	UH-96419-24	UH-96419-35	UH-96419-36
 C-Flex®	<ul style="list-style-type: none"> – Biocompatibility of silicone – Chemical resistance similar to Tygon 	7.6 m (25 ft)/pk	UH-06424-15	UH-06424-24	UH-06424-35	UH-06424-36
 C-Flex® ULTRA	<ul style="list-style-type: none"> – Longest life of any C-Flex formulation – Lowest spallation and reduced residue 	7.6 m (25 ft)/pk	UH-06434-15	UH-06434-24	UH-06434-35	UH-06434-36
 PharMed® BPT	<ul style="list-style-type: none"> – Over 10,000 hours of tubing life – Resists ozone and UV radiation 	7.6 m (25 ft)/pk	UH-06508-15	UH-06508-24	UH-06508-35	UH-06508-36
 PharmaPure®	<ul style="list-style-type: none"> – Biocompatibility similar to PharMed BPT – Long life under continuous pressure 	7.6 m (25 ft)/pk	UH-06435-15	UH-06435-24	—	—
 Chem-Durance® Bio	<ul style="list-style-type: none"> – Excellent chemical resistance – Plasticizer-free inner liner 	15.2 m (50 ft)/pk	UH-06442-15	UH-06442-24	UH-06442-35	UH-06442-36
 Solve-Flex® NEW	<ul style="list-style-type: none"> – Excellent chemical resistance to solvents – Low spallation fluoropolymer-lined tubing 	3.6 m (12 ft)/pk	—	UH-96446-24	—	—
 Tygon® E-LFL	<ul style="list-style-type: none"> – Longest life of all Tygon formulations – USP Class VI, EU Pharmacopoeia 3.2.9, FDA 21 	7.6 m (25 ft)/pk	UH-06440-15	UH-06440-24	UH-06440-35	UH-06440-36
 Tygon E-Food (B-44-4X)	<ul style="list-style-type: none"> – FDA, NSF, 3A, EU Food regs (10/2011) compliant – Smooth inner surface 	15.2 m (50 ft)/pk	UH-06418-15	UH-06418-24	UH-06418-35	UH-06418-36
 Tygon E-Lab (E3603)	<ul style="list-style-type: none"> – Ideal for general transfer applications – Clear for easy monitoring 	15.2 m (50 ft)/pk	UH-06509-15	UH-06509-24	UH-06509-35	UH-06509-36
 Tygon Fuel & Lubricant	<ul style="list-style-type: none"> – Ideal for transferring hydrocarbons, gasoline, kerosene, and heating oil 	15.2 m (50 ft)/pk	UH-06401-15	UH-06401-24	UH-06401-35	UH-06401-36
 Tygon Chemical (2001)	<ul style="list-style-type: none"> – Best chemical resistance of Tygon tubing – Compatible with some organics 	15.2 m (50 ft)/pk	UH-06475-15	UH-06475-24	—	—
 Norprene® (A-60-6)	<ul style="list-style-type: none"> – Up to 10,000 hours of tubing life – Best choice for pressure/vacuum applications 	15.2 m (50 ft)/pk	UH-06404-15	UH-06404-24	UH-06404-35	UH-06404-36
 Norprene Food (A-60-F)	<ul style="list-style-type: none"> – Ideal for high-temperature food applications – Resists heat, ozone, acids, and alkalis 	15.2 m (50 ft)/pk	UH-06402-15	UH-06402-24	UH-06402-35	UH-06402-36
 Viton®	<ul style="list-style-type: none"> – Excellent chemical resistance – Resists corrosives, solvents, and oils 	7.6 m (25 ft)/pk	UH-96412-15	UH-96412-24	UH-96412-35	UH-96412-36
 GORE® STA-PURE® PCS	<ul style="list-style-type: none"> – Long life—even under pressures up to 60 psi – Excellent flow stability 	35.6 cm (14")/pk	UH-96211-15	UH-96211-24	UH-96211-35	—
 GORE® STA-PURE® PFL	<ul style="list-style-type: none"> – Long life—even under pressures up to 60 psi – Excellent biocompatibility and flow stability 	35.6 cm (14")/pk	UH-96212-15	UH-96212-24	UH-96212-35	UH-96212-36

I/P® Process Pumps

Powerful, low-maintenance drives keep you pumping



- Don't worry about moisture, chemicals, or dust—IP55-rated nonchip epoxy-coated steel housing
- Goes where you need it—compact and light enough to carry with one hand, powerful enough to drive two pump heads
- Get up to speed quickly—easy to adjust speed knob and LED display for improved repeatability
- Model 77411-00 offers remote control of speed, direction, and start/stop
- Accept up to two pump heads

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



APPLICATIONS

- ✓ Media transfer
- ✓ Filling/emptying large carboys and bags
- ✓ Pumping dyes and pigments
- ✓ Pumping fermentation chemicals
- ✓ Purification/filtration/media transfer
- ✓ Automated process
- ✓ Food and pharma process pump
- ✓ Pumping antifoaming agents
- ✓ Chemical feed and metering
- ✓ Wastewater process pump
- ✓ Sewage and sludge sampling

System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	0.4 to 8 LPM	Easy-Load® 77602-10	C-Flex® ULTRA I/P 73 tubing 06434-73 10 ft (3 m)	Brushless process drive 77410-10 33 to 650 rpm	90 to 260 VAC, 50/60 Hz	UH-77963-10	
				Brushless process drive with remote I/O 77411-00 33 to 650 rpm		UH-77965-00	
	0.7 to 17 LPM	High-Performance 77600-62	Tygon® E-LFL I/P 88 tubing 06440-88 3 ft (1 m)	Brushless process drive 77410-10 33 to 650 rpm	90 to 260 VAC, 50/60 Hz	UH-77963-20	
				Brushless process drive with remote I/O 77411-00 33 to 650 rpm		UH-77965-10	

Accessories

[UH-07595-43](#) Washdown foot switch for model 77411-00

[UH-77300-32](#) Remote cable kit. Required for model 77411-00 to operate the remote inputs and outputs

Application Solution



Challenge: A research institute needed to produce neutrons for scientific research by striking a liquid mercury target with a stream of protons. To set up neutron production, the research team had to pump mercury from a reservoir into a smaller receptacle quickly and efficiently. Likewise, the researchers required a pumping technology that would not allow the transfer equipment to become contaminated. Due to the hazardous nature of mercury, the pumping operation had to be carried out under a fume hood at a distance from the operator.

Solution: The researchers opted to use the Masterflex I/P brushless drive 77411-00 with the Easy-Load pump head 77602-10 for its efficient and rapid pumping capabilities. The customer opted to use Tygon E-LFL tubing; as the only part of the pump system coming into contact with the mercury, it was easy to replace when contaminated, while preserving the integrity of the rest of the system. The I/P process drive also offers remote input/output, making it ideal to position in the fume hood while allowing the researcher to operate the pump from a safe distance away.

I/P® Precision Variable-Speed Modular Pumps

Place motor and controller where convenient with modular design

- Easy control of speed, direction, and start/stop with membrane keypad
- Ideal for metering and critical transfer applications
- Accuracy of $\pm 0.25\%$ speed control
- Accepts up to two pump heads

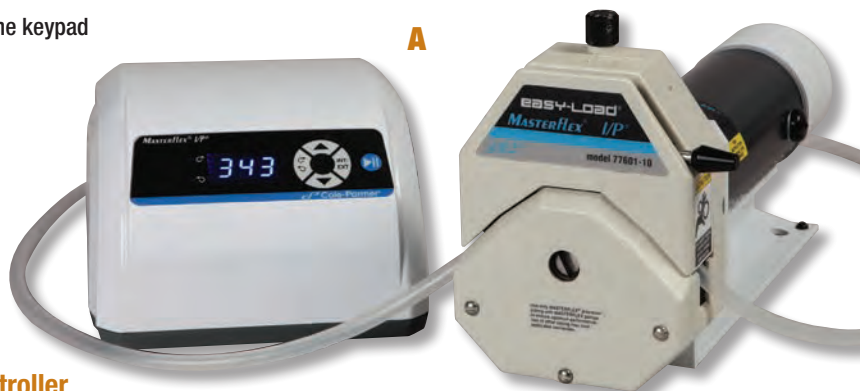
A. Modular Drive with Benchtop Controller

- Splash-resistant ABS plastic controller housing is IP33 rated; drive housing is epoxy finished steel, IP33 rated
- 6-ft (1.8-m) cable connects drive and controller; optional extension cable is available
- Remote control via DB9 female connector on controller

B. Washdown Modular Drive with Wall-Mount Controller

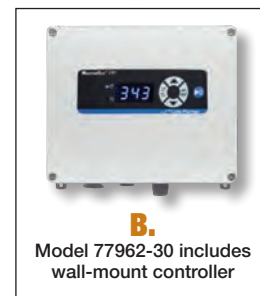
- Wall-mount controller housing is powder-coated aluminum, IP66 / NEMA 4X rated for washdown; powder-coated steel drive housing is IP66 / NEMA 4X rated for washdown
- 6-ft (1.8-m) cable connects drive and controller; optional extension cable is available
- Remote control via weather-resistant connection on controller

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket. These models are shipped with country-specific plug/cord set; please specify ultimate destination when ordering.





APPLICATIONS

- ✓ Printing
- ✓ Laboratory research
- ✓ Polishing/lapping
- ✓ Chemical recirculation
- ✓ Sterile fluid transfer
- ✓ Pumping from 55-gallon drums
- ✓ Filtration
- ✓ Dye dispensing
- ✓ Food applications



B.
Model 77962-30 includes wall-mount controller

System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	0.06 to 8 LPM	Easy-Load® 77602-10	C-Flex® ULTRA I/P 73 tubing 06434-73 10 ft (3 m)	Modular drive with benchtop controller 07591-20 6 to 650 rpm	90 to 260 VAC, 50/60 Hz	UH-77962-20	
	0.06 to 8 LPM	Easy-Load 77602-10	C-Flex ULTRA I/P 73 tubing 06434-73 10 ft (3 m)	Modular drive with wall-mount controller 07591-30 6 to 650 rpm	90 to 260 VAC, 50/60 Hz	UH-77962-30	

UH-07557-51 Extension cable, 9 ft (2.7 m); extend distance between motor and controller

UH-07595-47 Cable assembly for benchtop drive 07591-20; DB9 male connector and 25-ft (7.9-m) cable with stripped wire terminal ends. Use for remote control

UH-77300-32 Cable assembly for washdown drive 07591-30; 18-pin round connector and 25-ft (7.9-m) cable with stripped wire terminal ends. Use for remote control

UH-17050-01 NIST-traceable calibration for peristaltic pump drive

Application Solution



Challenge: A potato chip manufacturer wanted to add flavorings to their snacks during the production process, transferring flavoring agents suspended in oil from a reservoir into a coating drum with the chips. To maximize efficiency, production runs were quite large in a line that ran almost continuously. The coating drum was prone to leaking oil, and other pumps used in the process had failed due to penetration of this oil into the controllers. This had caused repeated failures and shut down the production line for pump repair.

Solution: A Masterflex I/P precision modular pump system 77962-20 with I/P 82 Norprene® Food tubing met the customer's exact needs. The pump drive strength was ideal for pumping the highly viscous oil. The system's modular design allowed the pump controller to be placed away from the actual feed line and coating drum, removing the potential for damage to the pump and for line shutdown. Norprene Food tubing complied with regulatory requirements for food manufacturing, too. Best of all, the I/P modular system had a lower cost of ownership for the customer and cut their maintenance expenses significantly.

I/P® Digital Console Process Pumps

Maintenance-free drives built for process applications

- Graphical LCD shows four operating modes: continuous run, timed dispense, copy dispense, volume dispense
- Dispense by mL—volume in mL of each dispense, 0.001 to 9999 mL; Copy—1 to 9,999 dispense cycles; or SEC—time interval of on/off cycles (1 sec to 99 hr, 59 min, 59 sec per cycle)
- Antidrip, reversible motor
- Accepts up to two pump heads
- NEMA 4X and IP66-rated for easy washdown

Model 77420-10 features a 316 stainless steel housing with an anodized aluminum base. Ideal for pharmaceutical, dairy, biotech, and food and beverage applications.

Model 77420-20 features a powder-coated steel housing with anodized aluminum base. Use in process, manufacturing, and water-treatment applications where stainless steel is not a critical requirement.

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket. These models are shipped with country-specific plug/cord set; please specify ultimate destination when ordering.





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

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System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	0.001 to 8.0 LPM	Easy-Load® 77602-10	C-Flex® ULTRA I/P 73 tubing 06434-73 10 ft (3 m)	Digital process drive with stainless steel housing 77420-10 0.1 to 650 rpm	90 to 260 VAC, 50/60 Hz	UH-77964-20	
	0.001 to 8.0 LPM	Easy-Load 77602-10	C-Flex® ULTRA I/P 73 tubing 06434-73 10 ft (3 m)	Digital process drive with powder-coat steel housing 77420-20 0.1 to 650 rpm	90 to 260 VAC, 50/60 Hz	UH-77964-30	

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
- 06440-88 Tygon® E-LFL I/P 88 High-performance precision tubing
- 77420-10 I/P Digital brushless process drive

I/P® Variable-Speed Modular Digital Dispensing Pumps

Get precise digital dispensing with virtually no maintenance

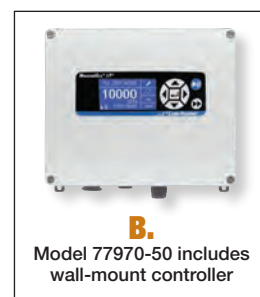
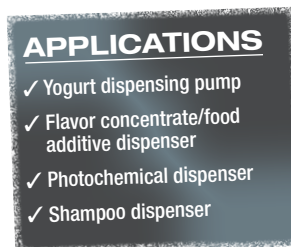
- Graphical LCD shows four operating modes: continuous run, timed dispense, copy dispense, and volume dispense
- Programmable dispense interval lets you set the delay between dispense cycles for convenient, automated dispensing by time or by volume
- Brushless motor gives you quiet, maintenance-free reliability
- Accept up to two pump heads

A. Modular Drive with Benchtop Controller

- Splash-resistant ABS plastic controller housing is IP33 rated; drive housing is epoxy finished steel, IP33 rated
- 6-ft (1.8-m) cable connects drive and controller; optional extension cable is available
- Remote control capabilities via a DB25 female connector on controller

B. Washdown Modular Drive with Wall-Mount Controller

- Wall-mount controller housing is powder-coated aluminum, IP66 / NEMA 4X rated for washdown; powder-coated steel drive housing is IP66 / NEMA 4X rated for washdown
- 6-ft (1.8-m) cable connects drive and controller; optional extension cable is available
- Remote control capabilities via weather-resistant 31-pin round connection on controller



What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket. These models are shipped with country-specific plug/cord set; please specify ultimate destination when ordering.



System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	0.001 to 8 LPM	Easy-Load® 77602-10	C-Flex® ULTRA I/P 73 tubing 06434-73 10 ft (3 m)	Digital dispensing drive with benchtop controller 07594-00 0.1 to 650 rpm	90 to 260 VAC, 50/60 Hz	UH-77970-40	
	0.001 to 8 LPM	Easy-Load 77602-10	C-Flex ULTRA I/P 73 tubing 06434-73 10 ft (3 m)	Digital dispensing drive with wall-mount controller 07594-10 0.1 to 650 rpm	90 to 260 VAC, 50/60 Hz	UH-77970-50	

[UH-77301-82](#) Extension cable, 9 ft (2.7 m); extend distance between motor and controller

[UH-07523-95](#) Cable assembly for benchtop drive 07594-00; DB25 male connector and 25-ft (7.9-m) cable with stripped wire ends for remote control

[UH-07575-80](#) Cable assembly for washdown drive 07594-10; 31-pin round connector and 25-ft (7.9-m) cable with stripped wire ends for remote control

[UH-17050-01](#) NIST-traceable calibration for peristaltic pump drive

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 pump system 77970-50 fulfills the customer's needs to accurately dispense wax into a range of container capacities in quick succession with time-controlled intervals. Plus, the option to control the pump remotely allows the operator to be a safe distance away.

I/P® Hazardous-Duty and Air-Powered Pumps

Pump safely in hazardous environments

- Ideal for areas where electrical precautions are needed for safe operation
- Wide flow range and maximum flexibility with variable-speed drives
- Accept all I/P pump heads

A. Variable-Speed Hazardous-Duty Drive

- Be safer with fully mechanical speed control—adjust with lever, then lock
- UL-listed for Class 1, Groups C and D, Division 1 hazardous locations
- Pump up to 11.2 LPM (3 GPM) with High-Performance pump head or up to 17 LPM (45 GPM) with two Standard or Easy-Load® heads
- Drive is also compatible with L/S® pump heads
- Power must be connected using protected connections—power switch and line cord not included

APPLICATIONS



- ✓ Transfer of hazardous materials
- ✓ Transfer of chemicals where hazardous vapors are present
- ✓ Transfer of printing inks
- ✓ Transfer of heat-sensitive fluids
- ✓ Production fermentation

B. Variable-Speed Air-Powered Drive

- Ideal for environments where electricity is unsafe or unavailable—ground unit to protect from static electricity
- Easily adjust motor speed by using included regulator
- Smooth-start motor requires very little maintenance and generates less heat than electric motors
- Pump up to 19 LPM (5 GPM) with High-Performance pump head or up to 26 LPM (6.9 GPM) with two Standard or Easy-Load® heads
- ATEX Zone 2 approved; rated to EEXII 3 G c IIC T6; NEC Class 1, Division 2, Groups A, B, C, D, T6

Air-Powered Drive includes: regulator with 5-mm air filter and 1/4" NPT(F) connection, automatic lubricator, 0 to 30 psi pressure gauge, and muffler.



System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing	Drive			
	0.12 to 5.3 LPM	Easy-Load® 77602-10	C-Flex® ULTRA I/P 73 tubing 06434-73 10-ft (3 m)	Hazardous-duty drive 07583-50 10 to 430 rpm	115 VAC, 60 Hz	UH-77981-10	
	1.2 to 8 LPM	ATEX-rated Easy-Load® 77602-80	—	Air-powered drive 07589-30 100 to 650 rpm	3 to 25 cfm (0.08 to 0.7 m³/min) at 20 to 100 psi (1.4 to 6.9 bar)	UH-77980-00 UH-77980-10	

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 difficult to maintain.

Masterflex Advantages

- Easy to control flow
- 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

- 77602-10 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® Fixed-Speed Pumps

Easy operation and easy on the budget

- Simply hose down the IP55-rated housing after use
- Get more flow—capable of driving multiple pump heads for multichannel pumping
- Purge system or pump in either direction with combination on/off/reverse switch
- Simply plug in and flip the switch for desired direction

These fixed-speed drives are IP55-rated for protection from dust and water. Accept I/P standard, Easy-Load®, or High-Performance pump heads. Stack up to two Standard or Easy-Load pump heads to double flow, or select a three- or four-channel pump system for even greater output.

What's included:

6-ft (1.8-m) line cord—115

VAC models: US standard plug;

220 VAC models: European plug.

APPLICATIONS

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





Flow Rates in LPM (GPM) per Channel

Speed (rpm)	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
150	0.9 (0.25)	1.8 (0.5)	3.0 (0.8)	1.8 (0.5)	3.9 (1.0)	4.3 (1.1)
180	1.1 (0.3)	2.2 (0.6)	3.6 (1.0)	2.2 (0.6)	4.7 (1.2)	5.3 (1.4)

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System	Flow range	What's included			Power	Catalog number	Price
		Pump head	Tubing†	Drive			
Three-channel I/P fixed-speed pump systems							
	2.2 LPM (0.6 GPM) per channel	Three Easy-Load® pump heads 77602-10	C-Flex® ULTRA I/P 73 tubing 06434-73 10-ft (3 m)	Fixed-speed drive 180 rpm	115 VAC, 60 Hz	UH-07588-80	
	1.8 LPM (0.5 GPM) per channel			Fixed-speed drive 150 rpm	230 VAC, 50 Hz	UH-07588-87	
Four-channel I/P fixed-speed pump systems							
	2.2 LPM (0.6 GPM) per channel	Four Easy-Load® pump heads 77602-10	C-Flex® ULTRA I/P 73 tubing 06434-73 10-ft (3 m)	Fixed-speed drive 180 rpm	115 VAC, 60 Hz	UH-07588-90	
	1.8 LPM (0.5 GPM) per channel			Fixed-speed drive 150 rpm	230 VAC, 50 Hz	UH-07588-97	

†Accept only Masterflex® Silicone and C-Flex® tubing.

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 1.0 to 3.5 LPM (0.5 to 0.9 GPM). The application requires frequent batch and color changes.

Solution: The three- or four-channel systems allow the customer to achieve the flow rates he needs. The multichannel pump drive is ideal for this situation where several colors can be pumped simultaneously. Multiple tubing sizes let the customer find the desired flow range. Plus, the Easy-Load pump head allows for easy and quick changes of the tubing when necessary.

I/P® Easy-Load® Pump Heads

Minimize downtime with faster tubing changes

- Optimize pressure capabilities and tubing life with adjustable occlusion
- Less maintenance and quieter operation with included tang boot
- No more loose pump heads—five-screw mounting for more secure attachment
- Adjust flow rate to your needs—can pump from 0.6 to 13 LPM
- PPS housing with CRS or SS rotor available. CRS rotors have sealed bearings; SS rotors have PTFE-sealed bearings



PPS pump head
77602-00

PPS pump head
77601-60

FEATURES

- ✓ Load tubing without removing pump head from drive
- ✓ Automatic tubing retention
- ✓ Stack up to two pump heads
- ✓ ATEX Zone 2 rated model available

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ATEX
Zone 2
77602-80



Pump tubing sizes accepted	mL per rev	Flow rates (LPM) at indicated rpm			Maximum system psi (bar)	Catalog number†			
		100	540	20 to 650		White PPS housing, CRS rotor	White PPS housing, SS rotor	Black PPS housing, SS rotor	ATEX-approved; PPS housing, SS rotor
I/P 26	6.15	0.6	3.2	0.12 to 4	40 (2.7)	UH-77602-00	UH-77602-10	UH-77601-60	UH-77602-80
I/P 73	12.3	1.2	6.8	0.2 to 8					
I/P 82	20.0	2.0	11.0	0.4 to 13	20 (1.4)				
Price									

†PPS = polyphenylene sulfide CRS = cold-rolled steel SS = stainless steel

[UH-77601-96](#) Dual-channel mounting hardware for two pump heads, stainless steel

I/P® High-Performance Pump Heads

Get higher flow rates and pressure ratings

- Easily transfer viscous fluids
- Pump up to 19 LPM for higher volume processing
- Durable design for longer life—made of stainless steel rollers, bearings, rotor plates, and rotor shaft. Occlusion bed is made of thermoset polyester
- Compatible with I/P drives that accept two or more pump heads; pump head is not stackable

FEATURES

- ✓ Easy to load tubing
- ✓ Adjustable tubing retention
- ✓ “C”-shaped design—tubing enters/exits the same side
- ✓ ATEX Zone 2 rated model available



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ATEX
Zone 2
77600-82



Pump tubing sizes accepted	mL per rev	Flow rates (LPM) at 20 to 650 rpm	Maximum system psi (bar)	Catalog number†	
				Polyester and SS housing, SS rotor	ATEX-approved; polyester and SS housing, SS rotor
I/P 70	12.3	0.26 to 8	40 (2.7)	UH-77600-62	UH-77600-82
I/P 88	26.2	0.4 to 17	35 (2.4)		
I/P 89	29.2	0.52 to 19	20 (1.4)		
Price					

†SS = stainless steel

I/P® Brushless Process Drives

Carry this powerful drive where you need it

- Non-chip epoxy-coated, IP55-rated steel enclosure protects against moisture, chemicals, and dust
- Flow range: 0.2 to 26 LPM (depends on rpm and tubing size; achieve 26 LPM by stacking two I/P Easy-Load® pump heads)
- Model 77411-00 features remote inputs, outputs, and start/stop

These I/P process drives feature robust, 250 W brushless motors that drive up to two pump heads with most tubing formulations. Adjust the drive speed quickly using the speed control knob—speed is displayed on an easy-to-read LED display from 5 to 100% of full speed, with 1% resolution.

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



I/P variable-speed brushless process drive 77410-10 is powerful, compact, and portable.

Specifications

Remote controls (model 77411-00)

Input: 4 to 20 mA, 0 to 10 V, start/stop, and reverse

Output: "pump ready" signal and 4 to 20 mA

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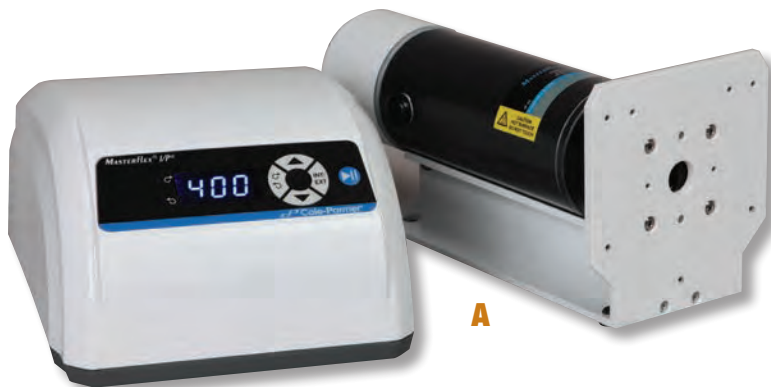


rpm	Speed control (repeatability)	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)		Catalog number	Price
						VAC	Amps		
Variable-speed brushless process drive									
33 to 650	±0.25% (2% of max rpm)	2	1/3 hp (0.25 kW)	IP55	14"L x 10"W x 9"H (35.6 x 25.4 x 22.9 cm)	90 to 260	4.5 at 115 VAC, 2.6 at 230 VAC	UH-77410-10	
Variable-speed brushless process drive with remote input/output									
33 to 650	±0.25% (2% of max rpm)	2	1/3 hp (0.25 kW)	IP55	14"L x 10"W x 9"H (35.6 x 25.4 x 22.9 cm)	90 to 260	4.5 at 115 VAC, 2.6 at 230 VAC	UH-77411-00	

I/P® Precision Variable-Speed Modular Drives

Place motor and controller where convenient

- Flow range: 0.036 to 19 LPM
- Easy control of speed, direction, and start/stop with membrane keypad
- Ideal for metering and critical transfer applications



A. Modular Drive with Benchtop Controller

- Splash-resistant ABS plastic controller housing is IP33 rated; drive housing is epoxy finished steel, IP33 rated
- 6-ft (1.8-m) cable connects drive and controller; optional extension cable 07557-51 is available (see page 28)
- Remote control via DB9 female connector on controller

B. Washdown Modular Drive with Wall-Mount Controller

- Wall-mount controller housing is powder-coated aluminum, IP66 / NEMA 4X rated for washdown; powder-coated steel drive housing is IP66 / NEMA 4X rated for washdown
- 6-ft (1.8-m) cable connects drive and controller; optional extension cable 07557-51 is available (see page 28)
- Remote control via weather-resistant connection on controller

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket. These models are shipped with country-specific plug/cord set; please specify ultimate destination when ordering.

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rpm	Speed control (resolution)	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)		Catalog number	Price
						VAC	Amps		
A. Precision modular drive with benchtop controller									
6 to 650	±0.25% (1 rpm at 650 rpm)	2†	1/5 hp (149 W)	IP33	Controller: 10⅜" x 8⅜" x 5½" Drive: 13⅞" x 5½" x 6⅛"	90 to 260	4.4 at 115 VAC, 2.2 at 230 VAC	UH-07591-20	
B. Precision washdown modular drive with wall-mount controller									
6 to 650	±0.25% (1 rpm at 650 rpm)	2†	1/5 hp (149 W)	IP66	Controller: 10⅞" x 11" x 4¾" Drive: 14¼" x 7" x 6½"	90 to 260	4.4 at 115 VAC, 2.2 at 230 VAC	UH-07591-30	

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

I/P® Variable-Speed Modular Digital Dispensing Drives

Get precise digital dispensing with virtually no maintenance

- Flow rate from 0.0006 to 19 LPM
- Graphical LCD shows four operating modes: continuous run, timed dispense, copy dispense, and volume dispense
- Programmable dispense interval lets you set the delay between dispense cycles for convenient, automated dispensing by time or by volume
- 6-ft (1.8-m) cable connects drive and controller; optional extension cable is available

A. Modular Drive with Benchtop Controller

- Splash-resistant ABS plastic controller housing is IP33 rated; drive housing is epoxy finished steel, IP33 rated
- Remote control capabilities via a DB25 female connector on controller

B. Washdown Modular Drive with Wall-Mount Controller

- Wall-mount controller housing is powder-coated aluminum, IP66 / NEMA 4X rated for washdown; powder-coated steel drive housing is IP66 / NEMA 4X rated for washdown
- Remote control capabilities via weather-resistant 31-pin round connection on controller

What's included: 6-ft (1.8-m) line cord with IEC 320/CEE22 socket. Shipped with country-specific plug/cord set; please specify ultimate destination when ordering.

rpm	Speed control (resolution)	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)		Catalog number	Price
						VAC	Amps		
A. Digital modular dispensing drive with benchtop controller									
0.1 to 650	±0.1% (0.1 rpm at 650 rpm)	2	¾ hp (280 W)	IP33	Controller: 10½" x 8¼" x 5" Drive: 15½" x 7" x 6"	90 to 260	4.5 at 115 VAC, 2.5 at 230 VAC	UH-07594-00	
B. Digital washdown modular dispensing drive with wall-mount controller									
0.1 to 650	±0.1% (0.1 rpm at 650 rpm)	2	¾ hp (280 W)	IP66	Controller: 9" x 11¾" x 4½" Drive: 15½" x 7" x 6"	90 to 260	4.5 at 115 VAC, 2.5 at 230 VAC	UH-07594-10	

[UH-77301-82](#) Extension cable, 9 ft (2.7 m); extend distance between motor and controller

[UH-07523-95](#) Cable assembly for benchtop drive 07594-00; DB25 male connector and 25-ft (7.9-m) cable with stripped wire ends for remote control

[UH-07575-80](#) Cable assembly for washdown drive 07594-10; 31-pin round connector and 25-ft (7.9-m) cable with stripped wire ends for remote control

[UH-17050-01](#) NIST-traceable calibration for peristaltic pump drive

I/P® Digital Brushless Process Drives

Designed for demanding process conditions

- Flow rate from 0.0006 to 26 LPM with two stacked I/P Easy-Load® pump heads
- Graphical LCD shows four operating modes: continuous run, timed dispense, copy dispense, volume dispense
- Remote control capabilities via watertight connection include speed control, pumping direction, start/stop/purge, and tachometer output

Model 77420-10 features a 316 stainless steel housing with an anodized aluminum base. Ideal for pharmaceutical, dairy, biotech, and food and beverage applications.

Model 77420-20 features a powder-coated steel housing with anodized aluminum base. Use this drive where stainless steel is not a critical requirement.

What's included: 1.8-m line cord with IEC 320/CEE22 socket. These models are shipped with country-specific plug/cord set; please specify ultimate destination when ordering.

rpm	Speed control (resolution)	Pump heads accepted	Motor size	IP rating	Dimensions (L x W x H)	Power (50/60 Hz)		Catalog number	Price
						VAC	Amps		
Digital process drive with 316 stainless steel housing									
0.1 to 650	±0.1%	2	¾ hp (280 W)	IP66	16 ¹ / ₁₆ " x 11 ¹ / ₈ " x 12 ⁵ / ₈ "	90 to 260	4.5 at 115 VAC, 2.5 at 230 VAC	UH-77420-10	
Digital process drive with powder-coat steel housing									
0.1 to 650	±0.1%	2	¾ hp (280 W)	IP66	16 ¹ / ₁₆ " x 11 ¹ / ₈ " x 12 ⁵ / ₈ "	90 to 260	4.5 at 115 VAC, 2.5 at 230 VAC	UH-77420-20	

[UH-07575-80](#) Cable assembly, 31-pin round connector and 25-ft (7.9-m) cable with stripped wire ends for remote control

[UH-17050-01](#) NIST-traceable calibration for peristaltic pump drive



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ETL
US

CE

IP 66
07594-10

2



I/P® digital console drive 77420-10 shown with I/P Easy-Load pump head 77602-10

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IP 66

2

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

















Engineered for long life in peristaltic pumps

- Ensure optimal Masterflex pump performance
- Custom extruded to fit Masterflex pumps
- Lot-to-lot consistency provides superior accuracy and repeatability
- High-Performance precision tubing has a thicker wall—best for applications involving pressure, suction lift, or viscous fluids

Pump tubing cross sections	I/P Precision pump tubing			I/P High-performance precision pump tubing		
						
	I/P 26	I/P 73	I/P 82	I/P 70	I/P 88	I/P 89
Inside diameter (nominal)	6.4 mm (0.25")	9.5 mm (0.37")	12.7 mm (0.5")	9.5 mm (0.37")	12.7 mm (0.5")	15.88 mm (0.62")
Hose barb size (nominal)	6.4 mm (1/4")	9.5 mm (3/8")	12.7 mm (1/2")	9.5 mm (3/8")	12.7 mm (1/2")	15.88 mm (5/8")
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)	0.02 to 8 LPM (0.004 to 2.6 GPM)	0.03 to 17 LPM (0.006 to 4.5 GPM)	0.03 to 19 LPM (0.008 to 5.0 GPM)
Maximum pressure [‡]	2.7 bar (40 psi)	2.7 bar (40 psi)	1.4 bar (20 psi)	2.7 bar (40 psi)	2.4 bar (35 psi)	1.4 bar (20 psi)
Maximum vacuum [‡]	660 mm Hg (26" Hg)	660 mm Hg (26" Hg)	510 mm Hg (20" Hg)	660 mm Hg (26" Hg)	660 mm Hg (26" Hg)	610 mm Hg (24" Hg)
Suction lift [‡]	8.8 m H ₂ O (29 ft H ₂ O)	8.8 m H ₂ O (29 ft H ₂ O)	7.0 m H ₂ O (23 ft H ₂ O)	8.8 m H ₂ O (29 ft H ₂ O)	8.8 m H ₂ O (29 ft H ₂ O)	8.2 m H ₂ O (27 ft H ₂ O)

[†]Determined under the following conditions: 0 psi at inlet, 0.5 psi at outlet; water temperature at 22°C (72°F).

[‡]Actual performance varies depending on tubing formulation—values shown are for firm tubing.

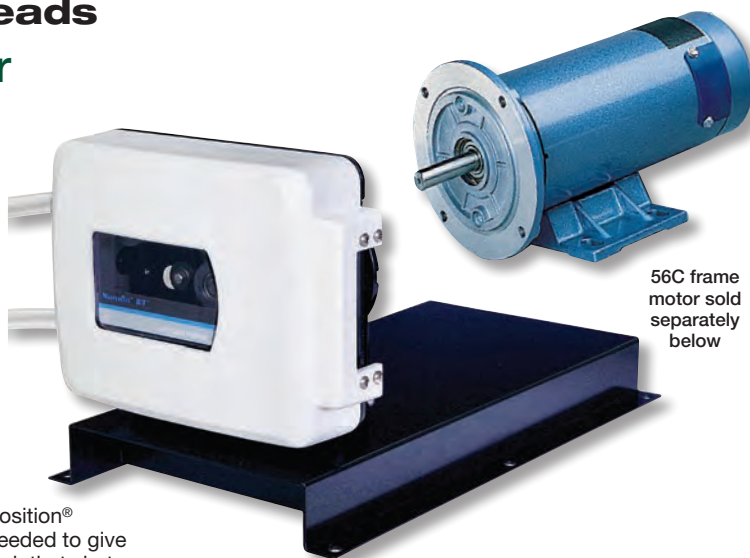
Pump tubing formulation		Tubing length	Precision pump tubing			High-performance precision pump tubing		
			I/P 26	I/P 73	I/P 82	I/P 70	I/P 88	I/P 89
Silicone (platinum cured)		7.6 m (25 ft) per pack	UH-96410-26	UH-96410-73	UH-96410-82	—	UH-96510-88 3-m pk	UH-96510-89 3-m pk
Silicone (peroxide cured)		7.6 m (25 ft) per pack	UH-96400-26	UH-96400-73	UH-96400-82	—	—	—
BioPharm silicone (platinum)		7.6 m (25 ft) per pack	UH-96420-26	UH-96420-73	UH-96420-82	UH-96421-70 3-m pk	UH-96421-88 3-m pk	UH-96421-89 3-m pk
BioPharm Plus silicone (platinum)		7.6 m (25 ft) per pack	UH-96440-26	UH-96440-73	UH-96440-82	UH-96441-70 3-m pk	UH-96441-88 3-m pk	UH-96441-89 3-m pk
Puri-Flex™		7.6 m (25 ft) per pack	UH-96419-26	UH-96419-73	UH-96419-82	UH-96419-70 3-m pk	UH-96419-88 3-m pk	UH-96419-89 3-m pk
C-FLEX®		7.6 m (25 ft) per pack	UH-06424-26	UH-06424-73	UH-06424-82	UH-06424-70 3-m pk	UH-06424-88 3-m pk	UH-06424-89 3-m pk
C-Flex® ULTRA		7.6 m (25 ft) per pack	UH-06434-26	UH-06434-73	UH-06434-82	—	—	—
PharMed® BPT		7.6 m (25 ft) per pack	UH-06508-26	UH-06508-73	UH-06508-82	UH-06508-70	UH-06508-88	—
PharmaPure® ††		7.6 m (25 ft) per pack	UH-06435-26	UH-06435-73	UH-06435-82	—	—	—
Chem-Durance® Bio††		15.2 m (50 ft) per pack	UH-06442-26	UH-06442-73	UH-06442-82	UH-06442-70	UH-06442-88	UH-06442-89 7.6-m pk
GORE® STA-PURE® PCS		0.6 m (2 ft) per pack	UH-96211-26	UH-96211-73	UH-96211-82	—	UH-96211-88	—
GORE® STA-PURE® PFL		0.6 m (2 ft) per pack	UH-96212-26	UH-96212-73	UH-96212-82	—	—	—
Tygon® E-LFL		7.6 m (25 ft) per pack	UH-06440-26	UH-06440-73	UH-06440-82	UH-06440-70	UH-06440-88	UH-06440-89
Tygon E-Food (B-44-4X)		15.2 m (50 ft) per pack	UH-06418-26	UH-06418-73	UH-06418-82	UH-06418-70	UH-06418-88	UH-06418-89
Tygon E-Lab (E-3603)		15.2 m (50 ft) per pack	UH-06509-26	UH-06509-73	UH-06509-82	UH-06509-70	UH-06509-88	UH-06509-89
Tygon Fuel & Lubricant (F-4040-A)		15.2 m (50 ft) per pack	UH-06401-26	UH-06401-73	UH-06401-82	—	—	—
Tygon Chemical (2001)††		15.2 m (50 ft) per pack	UH-06475-26	UH-06475-73	UH-06475-82	—	—	—
Norprene® (A 60 G)		15.2 m (50 ft) per pack	UH-06404-26	UH-06404-73	UH-06404-82	UH-06404-70 7.6-m pk	UH-06404-88 7.6-m pk	UH-06404-89 7.6-m pk
Norprene Food (A 60 F)		15.2 m (50 ft) per pack	UH-06402-26	UH-06402-73	UH-06402-82	—	UH-06402-88 7.6-m pk	UH-06402-89 7.6-m pk
FDA Viton®		7.6 m (25 ft) per pack	UH-96412-26	UH-96412-73	—	—	—	—

††Recommended for use with Easy-Load® and Easy-Load II pump heads only

B/T® Rapid-Load® Pump Heads

Convert your existing motor into a high-capacity pump

- Compatible with standard 56C frame or IEC 72-71-14F130 motors with B5 motor flange
- Easy clean-up and change-over between batches—simply throw the tubing away and install a new piece in seconds
- Tubing is the only wetted part, simplifying chemical compatibility and maintenance is quick and easy



56C frame motor sold separately below

Pump head features an improved occlusion mechanism that slides tubing occlusion bed out of the way for easy tube loading and improved occlusion of the tubing when closed; an epoxy-powder coating which prevents chemical corrosion and improves cleanup; an easy-opening cover that swings away to allow for CIP or SIP protocols; PerfectPosition® tubing retention marks that indicate exact length of tubing needed to give best tubing performance and life; an integrated pump interlock that shuts the pump down when head is opened; and an easy closure that provides one-handed opening and closing without use of tools.

What's included: mounting hardware and 3 ft (1 m) of B/T 91 tubing.

Flow Rates in LPM (GPM)

Motor rpm	Pump head gear ratio	Pump head rpm	PerfectPosition® tubing	
			B/T 87	B/T 91
1425	5.6:1	254	15.0 (4.0)	33.3 (8.8)
1725	5.6:1	308	18.2 (4.8)	40.3 (10.6)
1750	5.6:1	313	18.5 (4.9)	41.0 (10.8)
1800	5.6:1	321	18.9 (5.0)	42.0 (11.1)
Liters (gal.) per pump head revolution			0.059 (0.0156)	0.131 (0.035)

APPLICATIONS

- ✓ Bulk fluid transfer
- ✓ Shear-sensitive fluid transfer
- ✓ Large-volume chemical/additive feed
- ✓ Drain or fill tanks and drums

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Motor mount	Motor size	rpm	IP rating	Mounting type	Dimensions (L x W x H)	Power	Catalog number	Price
NEMA Type 56C	Motor size (½ hp), rpm, and IP rating (up to IP56) depend on specifications of motor selected			Direct-coupled	27" x 15.8" x 15.1" (68.6 x 40 x 38.4 cm)	Power specifications depend on the type of motor selected	UH-77111-50	
IEC 72-71-14F130 with B5 flange†				Direct-coupled			UH-77111-55	

†160 mm flange

56C Frame Motors

hp	Frame	rpm	Type†	Voltage	Frequency	Phase	Amps	IP rating	Overall dimensions (L x W x H)	Catalog number	Price
DC Motors											
1	56C	1750	TEFC	90 VDC	—	—	10	IP44	16½" x 5½" x 4" (41.5 x 14 x 10 cm)	UH-70071-40	
1	56C	1750	TEFC	180 VDC	—	—	5	IP44	14½" x 5½" x 4" (37.7 x 14 x 10 cm)	UH-70071-50	
AC Motors											
1	56C	1750	WSDN	115/208–230 VAC	60	1	12.8/6.4-6.4	IP55	11½" x 4¾" x 7" (28.8 x 12.4 x 17.8 cm)	UH-71012-45	
1	56HC	1750	WSDN	208–230/460 VAC	60	3	3.2-3.2-1.6	IP55	11½" x 4¾" x 7" (28.8 x 12.4 x 17.8 cm)	UH-71015-45	

†TEFC = totally enclosed, fan cooled WSDN = washdown

[UH-70100-00](#) DC motor controller, 10 A maximum

[UH-70100-10](#) DC motor controller, 5 A maximum

[UH-70022-32](#) Frequency controller for AC motors, NEMA 1, 200 to 240 VAC input

[UH-70022-41](#) Frequency controller for AC motors, NEMA 1, 400 to 480 VAC input

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

- B/T variable-speed washdown pump system 77111-60
- Norprene® Food B/T 91 High-performance precision tubing 06399-91

B/T® Fixed- and Variable-Speed Pumps

Achieve the highest flow rates of any Masterflex pump—up to 42 LPM (11.1 GPM)

- Interlock switch shuts off power when pump head is opened
- Washdown pumps handle the toughest process and production applications, then clean up with ease
- Gentle peristaltic action is ideal for pumping shear-sensitive or viscous fluids (up to 10,000 cps)
- Rotor and occlusion bed design allow easier tube loading and prevent “tubing roll” during operation



A

A. Fixed-Speed Pumps

- Economical and easy to operate
- Reversible motor: purge before or after pumping, pump fluid in either direction
- IP55-rated motor—wash off dirt and debris

APPLICATIONS

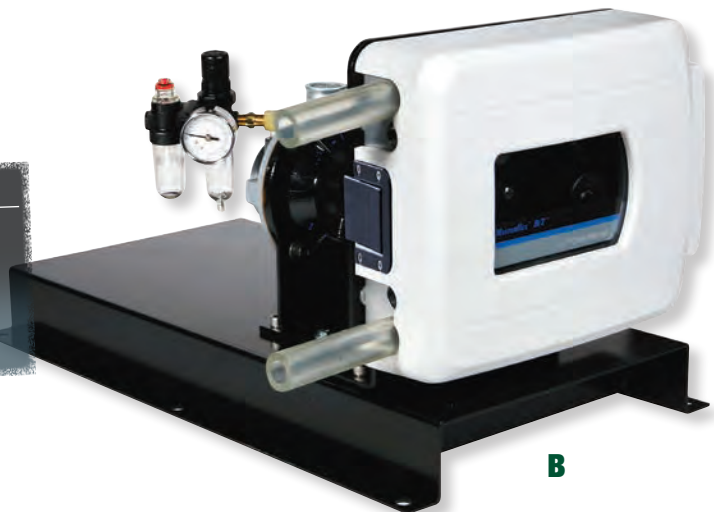
- ✓ Bulk fluid pumping
- ✓ High-volume tank transfer and filling
- ✓ Transfer shear-sensitive and viscous fluids
- ✓ Process vat pumping

B. Air-Powered Pump

- Use in locations where electricity is unsafe or impractical
- Includes pressure regulator—control your compressor air to match pump requirements
- 24 cfm (0.68 m³), 100 psi (6.9 bar) minimum air required, supply your own compressor to power pump
- IP56-rated motor protects against dust and strong water jets
- Rated for ATEX Zone 2 EEx II 3 G c IIC T6; NEC Class 1, Division 2, Groups A, B, C, D, T6

APPLICATIONS

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



B

Flow Rates in LPM (GPM)

Key letter	rpm	PerfectPosition pump tubing	
		B/T 87	B/T 91
A	321	18.9 (5.0)	42 (11.1)
	271	16.0 (4.2)	35 (9.4)
B	35 to 321	1.9 to 17.7 (0.5 to 4.7)	4.0 to 37 (1.06 to 9.8)
C and D	12 to 321	0.71 to 18.9 (0.19 to 5.0)	1.4 to 42 (0.4 to 11.1)

Application Solution



Challenge: A dairy farm that produces more than 7 million liters (1.9 million gallons) of milk annually needed a pump for transferring raw milk from a storage tank to its treatment and bottling line. The dairy farm absolutely required a pump system whose wetted parts were in compliance with regulatory guidelines, but also wanted a system that would minimally agitate the milk during the transfer operation. The dairy was considering other sanitary pumps, such as a rotary lobe pump, for the application. While the pump would not see continual use, it must be ready to operate on demand.

Solution: The customer chose the B/T fixed speed pump 77111-30 along with Tygon® E-Food tubing. Because the milk only touched the tubing and not any of the pump's mechanical parts, the dairy was assured of compliance with regulatory guidelines and protected against contamination. The fixed speed pump offers high flow rates for efficient pumping but also ensures minimal agitation to the fluid. Finally, when compared with the stainless steel rotary lobe pump, the B/T system was much less expensive.



Detachable wall-mount controller for variable-speed pump 77111-60

APPLICATIONS

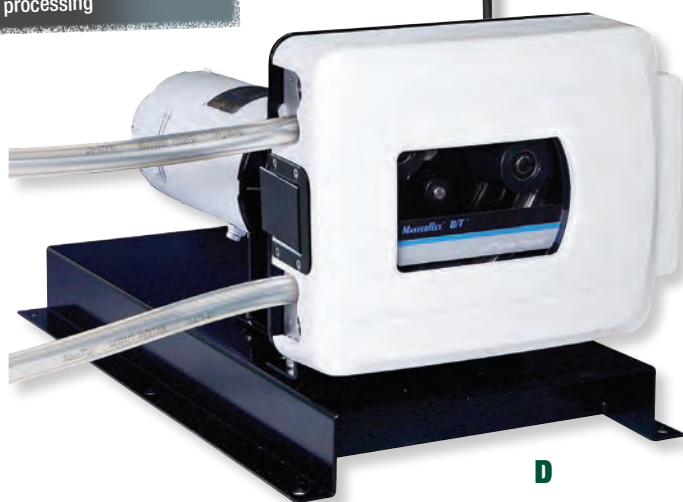
- ✓ Caustic detergents
- ✓ Car wash chemicals
- ✓ Polishing slurry pump
- ✓ Filling media bags
- ✓ Food processing

C. Variable-Speed Modular Pump

- Place washdown controller wherever it's convenient
- Controller with 16-ft (4.9-m) cord mounts on pump or wall
- IP56-rated motor protects against dust and strong water jets
- Reversible motor: purge before or after pumping, pump fluid in either direction

D. Variable-Speed Modular Digital Pump

- High-volume filling and dispensing
- Dispense by volume or time, or pump continuously
- Separate motor and controller by up to 6 feet (1.8 meters) for convenient operation
- IP56-rated controller and motor protect against dust and water



What's included: a Rapid-Load® pump head, 3 ft (1 m) of Tygon® E-LFL B/T 91 tubing 06440-91, and a 6-ft (1.8-m) power cord (115 VAC: US standard plug; 230 VAC: European plug) for models "A, C, D."



77111-30, -37



77111-37, -47, -67, -80



Zone 2 77111-80 only



77111-30, -37



Except 77111-30, -37



Key letter	Motor type	Motor size	rpm	IP rating	Mounting type	Dimensions (L x W x H)	Power		Catalog number	Price
							VAC (Hz)	Amps		
A	Fixed-speed	1 hp (0.75 kW)	321	IP55	Direct drive	27" x 15.8" x 15.1" (68.6 x 40 x 38.4 cm)	115 (60)	12.6	UH-77111-30	
			271				220 (50)	6.3	UH-77111-37	
B	Variable-speed, air powered	¾ hp (0.56 kW)	35 to 321	IP56	Direct drive	27" x 15.8" x 15.1" (68.6 x 40 x 38.4 cm)	Requires 24 cfm (0.68 m³) 100 psi (6.9 bar) minimum		UH-77111-80	
C	Variable-speed (±5%)	½ hp (0.37 kW)	12 to 321	Controller: IP56 Drive: IP56	Direct drive	27" x 15.8" x 17.4" (68.6 x 40 x 44.2 cm)	115 (50/60)	6.5	UH-77111-60	
							230 (50/60)	3.3	UH-77111-67	
D	Variable-speed (±0.3%)	½ hp (0.37 kW)	12 to 321	Controller: IP56 Drive: IP56	Direct drive	Controller: 9" x 11" x 4½" (22.9 x 27.9 x 11.4 cm) Drive: 27" x 15¾" x 15" (68.6 x 40.0 x 38.4 cm)	90 to 130 (50/60)	6.5	UH-77111-40	
							190 to 260 (50/60)	3.3	UH-77111-47	

[UH-77300-32](#) Remote cable, required for remote control operation of models 77111-40 and -47; 25 ft (7.6 m)

[UH-77111-90](#) Bracket for digital controller on models 77111-40 and -47

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 100-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.

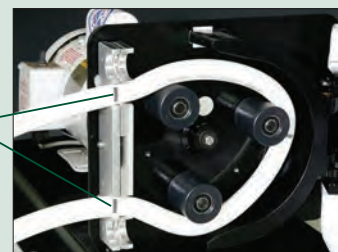
Solution: We recommend using the B/T digital pump (77111-40, -47) because it dispenses large volumes precisely and quickly. The controller and drive are both washdown IP56-rated; an important feature for the extremely clean pharmaceutical production environment. Plus, the easy-opening cover swings away to allow for CIP or SIP protocols. Using size B/T 91 pump tubing will provide the company with a ±1% accuracy at a dispense volume of 10 L, ensuring that very little diluent is lost during the dispensing process.

B/T® PerfectPosition® Pump Tubing














Position more easily—retention marks indicate exact placement

- Optimized for use in B/T pumps to provide the pumping life, flow, and repeatability that you expect

PerfectPosition indicator marks confirm proper loading and ensure optimal performance.






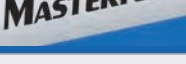




Tubing size	B/T 87	B/T 91
Inner diameter	12.7 mm (0.5")	19.0 mm (0.75")
Hose barb size	12.7 mm (½")	19.0 mm (¾")
Flow range (approximate) [†]	0.67 to 18.9 LPM (0.17 to 5.0 GPM)	1.4 to 42 LPM (0.4 to 11.1 GPM)

Pump tubing formulation	Description		
Silicone (platinum-cured) 	<ul style="list-style-type: none"> Complies with USP Class V, EP, FDA, REACH, RoHS, ADFC Low protein binding, fungus-resistant, phthalate and latex free Accommodates a wide temperature range 	UH-96510-87 3 m (10 ft)/pk	UH-96510-91 3 m (10 ft)/pk
Silicone (peroxide-cured) 	<ul style="list-style-type: none"> Complies with USP Class VI, EP, FDA, 3A, REACH, RoHS, ADFC Greater physical compression capability Economical, long life 	UH-96400-87 3 m (10 ft)/pk	UH-96400-91 3 m (10 ft)/pk
BioPharm Plus Silicone (platinum-cured) 	<ul style="list-style-type: none"> Complies with USP Class VI, EP, FDA, 3A, REACH, RoHS, ADFC Ultra-smooth inner surface minimizes particle entrapment Very low extractable—ideal for lab, biotech pharma applications 	UH-96445-87 3 m (10 ft)/pk	UH-96445-91 3 m (10 ft)/pk
Puri-Flex™ 	<ul style="list-style-type: none"> Complies with USP Class VI, FDA, REACH, RoHS, ADFC Heat sealable, weldable, and economical Long pump life compared to silicone or many TPE tubings 	UH-96419-87 3 m (10 ft)/pk	UH-96419-91 3 m (10 ft)/pk
C-Flex® 	<ul style="list-style-type: none"> Complies with USP Class VI, EP, REACH, RoHS, ADFC Heat sealable, weldable, economical Better resistance to pH fluctuations 	UH-06424-87 3 m (10 ft)/pk	UH-06424-91 3 m (10 ft)/pk
PharMed® BPT 	<ul style="list-style-type: none"> Complies with USP Class VI, EP, FDA, NSF-51, REACH, RoHS Over 10,000 hours of tubing life, sealable, weldable Ideal for tissue and cell culture work 	UH-06507-87 3 m (10 ft)/pk	UH-06507-91 3 m (10 ft)/pk
PharmaPure® 	<ul style="list-style-type: none"> Complies with USP Class VI, EP, FDA, REACH, RoHS Nontoxic and nonhemolytic biocompatible Long life even under pressure with VERY low spallation 	UH-06437-87 3 m (10 ft)/pk	UH-06437-91 3 m (10 ft)/pk
Chem-Durance® Bio 	<ul style="list-style-type: none"> Complies with USP Class VI, FDA, REACH, RoHS Excellent chemical compatibility and biocompatibility Excellent pump life and durability under pressure 	UH-06443-87 3 m (10 ft)/pk	UH-06443-91 3 m (10 ft)/pk
Tygon® E-LFL 	<ul style="list-style-type: none"> Complies with USP Class VI, EP, FDA, EU Food, REACH, RoHS, ADFC Longest life of all Tygon formulations Broad chemical resistance 	UH-06440-87 3 m (10 ft)/pk	UH-06440-91 3 m (10 ft)/pk
Tygon® E-Food (B-44-4X) 	<ul style="list-style-type: none"> Complies with FDA, EU Food, NSF-51, 3A, REACH, RoHS, ADFC Smooth inner surface unaffected by commercial sanitizers Nontoxic, will not affect taste or odor 	UH-06418-87 3 m (10 ft)/pk	UH-06418-91 3 m (10 ft)/pk
Norprene® Food (A-60-F) 	<ul style="list-style-type: none"> Complies with FDA, 3A, NSF-51, REACH, RoHS Ideal for high-temperature food applications Resists heat, ozone, acids, and alkalis 	UH-06399-87 3 m (10 ft)/pk	UH-06399-91 3 m (10 ft)/pk

[†] Determined under the following conditions: Using a 11 to 321 rpm drive; 0 bar (0 psi) at inlet, 0.03 bar (0.5 psi) at outlet; water temperature at 22°C (72°F).

Masterflex® Tubing Formulations

Pump tubing formulation	Advantages	Application suitability†						Meets classifications	Sterilization
		Acids	Alkalies	Organic solvents	Pressure	Vacuum	Viscous fluids		
Silicone (platinum-cured) 	Excellent biocompatibility. No leachable additives, DOP, or plasticizers; phthalate and latex-free; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Weather, ozone, corona, and radiation resistant. Minimal tendency to take a set. Translucent, clear to light amber.	N/R	N/R	N/R	F	G	F	USP Class V Extractables Exceeds Class VI European Pharmacopoeia (EP 3.1.9) FDA 21 CFR 177.2600; FDA 21 CFR 210 and 211; Exceeds 3A sanitary cGMPs; REACH (non-DEHP) compliant RoHS compliant ADCF compliant	EtO, autoclave, or gamma irradiation.
Silicone (peroxide-cured) 	Excellent biocompatibility. No additives, plasticizers or DOP; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Weather, ozone, corona, and radiation resistant. Minimal tendency to take a set. Translucent, clear to light amber.	N/R	N/R	N/R	F	G	F	USP Class VI European Pharmacopoeia (EP 3.1.9) FDA 21 CFR 177.2600 Exceeds 3A sanitary standards REACH (non-DEHP) compliant RoHS compliant ADCF compliant	EtO or autoclave.
BioPharm Silicone (platinum-cured) 	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. Translucent, clear to light amber.	N/R	N/R	N/R	F	G	F	USP Class VI European Pharmacopoeia (EP 3.1.9) FDA 21 CFR 177.2600 Exceeds 3A sanitary standards REACH (non-DEHP) compliant RoHS compliant	EtO, autoclave, or gamma irradiation.
BioPharm Plus Silicone (platinum-cured) 	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. Translucent, clear to light amber.	N/R	N/R	N/R	F	G	F	USP Class VI European Pharmacopoeia (EP 3.1.9) FDA 21 CFR 177.2600 Exceeds 3A sanitary standards REACH (non-DEHP) compliant RoHS compliant	EtO, autoclave, or gamma irradiation.
Puri-Flex™ 	Biocompatible. Heat sealable and weldable. Long pump life when compared to silicone or other TPE tubings. Low spallation when compared to silicone or some other TPE tubings. Very low protein binding. Cost effective. No halogens or phthalates. Translucent, clear to light white.	G	G	N/R	G	G	E	USP Class VI FDA 21 CFR 177.2600 and 177.1810 REACH (non-DEHP) compliant RoHS compliant ADCF compliant	EtO, autoclave, or gamma irradiation.
C-Flex® 	Physical properties similar to silicone with chemical compatibility of Tygon®. Inexpensive. Biocompatible. Heat sealable and weldable. Opaque, white.	G	G	N/R	F	G	F	USP Class VI European Pharmacopoeia (EP 3.2.9) REACH (non-DEHP) compliant RoHS compliant ADCF compliant	EtO, autoclave, or gamma irradiation.
C-Flex® ULTRA 	Physical properties similar to silicone with chemical compatibility of Tygon®. Biocompatible. Heat sealable and weldable. Longer pump life and lower spallation than C-Flex. Translucent.	G	G	N/R	F	G	F	USP Class VI European Pharmacopoeia (EP 3.2.9) REACH (non-DEHP) compliant RoHS compliant ADCF compliant	Gamma irradiation or autoclave.
PharMed® BPT 	Great for tissue and cell work—nontoxic and nonhemolytic. Long service life (up to 10,000 hrs); reduces tubing costs and pump downtime. Opaque to UV and visible light to protect light-sensitive fluids. Low gas permeability. High-pressure 10.3 bar (150 psi) version available. Opaque, beige	G	G	N/R	G	G	E	USP Class VI European Pharmacopoeia (EP 3.2.9) FDA 21 CFR 177.2600 NSF-51 REACH (non-DEHP) compliant RoHS compliant	EtO, autoclave, or gamma irradiation.

†E = Excellent, G = Good, F = Fair, N/R = not recommended

Masterflex® Tubing Formulations (continued)

Pump tubing formulation	Advantages	Application suitability†						Meets classifications	Sterilization
		Acids	Alkalies	Organic solvents	Pressure	Vacuum	Viscous fluids		
Solve-Flex® 	Excellent chemical resistance, especially with solvents. Chemically inert. Low spallation. Nontoxic. Low coefficient of friction. Fluoropolymer-lined tubing. Opaque, blue.	E	E	E	F	G	G	USP Class VI	EtO.
		Temperature range: Static: -51 to 132°C (-60 to 270°F) Dynamic (pumping): -20 to 100°C (-4 to 212°F)							
PharmaPure® 	Nontoxic and nonhemolytic (similar to PharMed® BPT); biocompatible. Long life even under pressure; up to 1000 hours at 2.7 bar (40 psi). Very low spallation—protects fluid purity. Low extractables. Low gas permeability. Opaque, off-white.	G	G	N/R	G	G	E	USP Class VI FDA 21 CFR 177.2600 European Pharmacopoeia (EP 3.2.9) REACH (non-DEHP) compliant RoHS compliant	EtO, autoclave or gamma irradiation.
		Temperature range: Static: -51 to 132°C (-60 to 270°F) Dynamic (pumping): -20 to 100°C (-4 to 212°F)							
Chem-Durance® Bio 	Excellent chemical resistance. Excellent life and durability under pressure. Low spallation. Plasticizer-free inner liner. High dielectric constant. Excellent biocompatibility. Opaque, beige.	E	E	G	E	E	E	USP Class VI FDA 21 CFR 177.2600 REACH (non-DEHP) compliant RoHS compliant	EtO, autoclave, or gamma irradiation.
		Temperature range: Static: -60 to 74°C (-71 to 165°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)							
PTFE 	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. Translucent, white.	E	E	E	G	G	E	USP Class VI REACH (non-DEHP) compliant RoHS compliant ADCF compliant	EtO, autoclave, or gamma irradiation.
		Temperature range: Static: -240 to 260°C (-400 to 500°F) Dynamic (pumping): -40 to 150°C (-40 to 302°F)							
Tygon® E-LFL 	Longest life of all Tygon® peristaltic tubing. Clear for easy flow monitoring. Broad chemical resistance. Nonaging, nonoxidizing. Low gas permeability. Smooth bore. Good for viscous fluids. High dielectric constant. Transparent, clear.	G	G	N/R	G	G	E	USP Class VI European Pharmacopoeia (EP 3.2.9) FDA 21 CFR 175.300 EU Food REACH (non-DEHP) compliant RoHS compliant ADCF compliant	EtO or autoclave.
		Temperature range: Static: -46 to 74°C (-51 to 165°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)							
Tygon® E-Food (B-44-4X) 	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. Transparent, clear.	G	G	N/R	G	G	E	FDA 21 CFR 175.300 EU Food NSF-51 REACH (non-DEHP) compliant RoHS compliant ADCF compliant Meets 3A sanitary standards	EtO or autoclave.
		Temperature range: Static: -36 to 74°C (-32 to 165°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)							
Tygon® E-Lab (E-3603) 	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. Transparent, clear.	G	G	N/R	G	G	E	USP Class VI FDA 21 CFR 175.300 EU Food NSF-51 REACH (non-DEHP) compliant RoHS compliant ADCF compliant	EtO or autoclave.
		Temperature range: Static: -46 to 74°C (-51 to 165°F) Dynamic (pumping): 0 to 40°C (32 to 104°F)							








†E = Excellent, G = Good, F = Fair, N/R = not recommended

Masterflex® Tubing Test Kit

Our FREE Tubing Test Kit is a simple way to test your chemicals against different tubing formulations. Kit contains samples of 19 different pump tubing formulations, formulation descriptions, a selection guide, instructions on how to test your tubing, and complete ordering information. Call today! Request item 00101-10.

Contact your dealer to request your FREE test kit today!



Pump tubing formulation	Advantages	Application suitability†						Meets classifications	Sterilization
		Acids	Alkalies	Organic solvents	Pressure	Vacuum	Viscous fluids		
Tygon® Chemical (2001) 	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. Transparent, clear.	E	E	G	G	G	E	FDA 21 CFR 175.300 REACH (non-DEHP) compliant RoHS compliant ADCF compliant	EtO, autoclave, or gamma irradiation.
Tygon® Fuel & Lubricant (F-4040-A) 	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. Transparent, yellow.	G	G	N/R	G	G	E	REACH (non-DEHP) compliant RoHS compliant ADCF compliant	Not recommended.
Norprene® (A 60 G) 	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. Opaque, black.	G	G	N/R	E	E	E	NSF-51 REACH (non-DEHP) compliant RoHS compliant	EtO, autoclave, or gamma irradiation.
Norprene® Food (A 60 F) 	Similar to Norprene® 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. Opaque, beige.	G	G	N/R	E	E	E	FDA 21 CFR 177.2600 NSF-51 REACH (non-DEHP) compliant RoHS compliant	EtO, autoclave, or gamma irradiation.
Viton® 	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. Opaque, black.	E	E	Variable—test before using	G	G	G	FDA 21 CFR 177.2600 ADCF compliant	Not recommended.
GORE® STA-PURE® PCS 	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. Low extractables. ePTFE (expanded PTFE) and platinum-cured silicone. Excellent tensile strength. Firm (stiff) material. Opaque, white.	N/R	N/R	N/R	E	G	G	USP Class VI European Pharmacopoeia (EP) REACH compliant RoHS compliant ADCF compliant	EtO or autoclave.
GORE® STA-PURE® PFL 	Similar to STA-PURE® PCS 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. ePTFE (expanded PTFE) and fluoroelastomer. Excellent tensile strength. Firm (stiff) material. Opaque, white.	E	G	E	E	G	G	USP Class VI REACH compliant RoHS compliant ADCF compliant	EtO or autoclave.

†E = Excellent, G = Good, F = Fair, N/R = not recommended

Pump Tubing Compatibility Charts Don't risk it!

- Check chemical compatibility before selecting tubing to ensure best performance
- For use with all Masterflex tubing sizes
- All ratings indicate tubing condition after exposure to the chemical at 21°C (70°F)

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, Puri-Flex™
 CF: C-Flex® and C-Flex® ULTRA
 S: Silicone (peroxide/platinum-cured),
 BioPharm, BioPharm Plus,
 GORE® STA-PURE® PCS
 T: Tygon® E-Lab, Tygon® E-FL, Tygon® E-Food
 TU: Tygon® Fuel & Lubricant
 TC: Tygon® Chemical
 CD: Chem-Durance® Bio
 PFL: GORE® STA-PURE® PFL
 V: Viton®
 FP: Solve-Flex®, Polytetrafluoroethylene (PTFE)

Pump head materials

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

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.



Fluid	Tubing formulation										Pump head material				
	PN	CF	S	T	TU	TC	CD	PFL	V	FP	PSF	PC	PPS	SS	PP
Acetaldehyde	D	A	B	D	D	D	C	D	A	D	A	—	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	D	—	A	A	B
Acetic acid >5%	A	A	C	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
Aliphatic hydrocarbons	D	D	—	D	B	D	D	—	—	—	—	—	—	A	—
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	D	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	A
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
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	C	A	C	C	—	B	A	D	—	D	C	D
Chloroacetic acid	B	A	—	A	D	A	B	D	A	A	D	D	A	B	D
Chlorobenzene	D	D	D	D	D	D	D	A	B	D	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	C	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	B	C	A	A	A	A	A	D	D	A	A	C
Cyclohexane	D	D	D	D	C	D	D	B	A	A	A	D	B	A	A
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
Dimethyl Sulfoxide (DMSO)	A	—	—	—	—	—	—	—	—	A	A	C	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	C	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	D	A	B
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	—	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	C	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	B	C	A	A	A	D	A	C	D	A	B	A
Freon® TMS	D	C	—	D	B	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, PVA	A	A	A	A	A	—	A	—	A	A	—	—	—	A	C
Glycerin	A	B	A	A	A	A	A	—	A	A	A	A	—	A	A
Hydroiodic acid	D	A	—	A	A	A	A	—	A	—	—	—	—	—	—
Hydrobromic acid, 30%	D	A	D	B	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	C	D	A	A	A	A	A	A	D	D	D	A
Hydrochloric acid (conc)	—	B	D	C	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

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

Fluid	Tubing formulation										Pump head material				
	PN	CF	S	T	TU	TC	CD	PFL	V	FP	PSF	PC	PPS	SS	PP
Hydrofluoric acid, 75%	—	A	D	D	D	—	D	D	D	A	—	D	A	D	C
Hydrogen peroxide (dil)	A	A	A	A	A	A	A	A	A	A	A	D	—	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	—	—	—	—	—	—
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	B	A
Linseed oil	C	D	A	D	A	B	B	A	A	A	A	A	A	B	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 ₂ SO ₄ , 15% HNO ₃)	—	A	—	B	D	—	A	—	—	A	D	—	—	B	A
Molybdenum disulfide	—	—	—	—	—	—	A	—	—	A	—	—	—	—	—
Monothanolamine	C	B	B	D	D	D	D	—	D	A	A	—	A	A	B
Naphtha	D	D	D	D	B	D	D	B	A	B	A	—	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	C	A	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	C	D	A	A	A	A	A	—	A	B	A	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	C	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	A	—	—	—	—	—
Potassium carbonate	A	A	—	A	A	A	A	A	A	A	—	A	A	B	A
Potassium chlorate	B	A	B	B	A	—	A	A	A	A	A	—	A	B	A
Potassium hydroxide (med)	A	A	B	B	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	—	—	—	B	A
Tannic acid	B	A	B	C	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
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	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	A
Water, fresh	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
Water, salt	A	A	D	A	D	A	A	A	A	A	A	D	A	B	A
Xylene	D	A	A	A	A	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.

Tubing for Food Products

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

Caution

The ratings in the charts do not reflect the extent to which extraction or leaching may occur or the extent to which fluids may undergo any physical changes in properties or composition as a result of coming into contact with the wetted materials. It is the user's responsibility to test and ensure the suitability of wetted materials for all intended users, including establishing the compatibility of any fluid with the material through which it is coming into contact.

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 44. 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.

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.

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.



Description	Catalog number	Price
Pulse dampener	UH-07596-20	

B. On/Off Footswitch

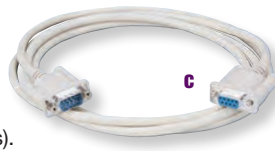
Footswitches allow for remote control of specific functions of your Masterflex drive. All units have a 6-ft (1.8 m) cord. Verify the connector type on your drive before ordering.



Description	Cat. no.	Price
DB9 male connector; for 07528-, 07557-, and 07591-series Masterflex drives	UH-77595-35	
DB25 male connector; for 07522-, 07523-, 07551-, 77301-, and 07594-series Masterflex drives	UH-07523-92	
18-pin round water-tight connector; for 07557-, 07591-, and 77411-series Masterflex drives	UH-07595-43	
31-pin round water-tight connector; for 07575-, 77301-, 07594-, and 77420-series Masterflex drives	UH-07575-84	

C. DB9 Cable Assembly

Use these 9-pin interface cable assemblies with Masterflex L/S® drives (07550- and 07551-series). Cable measures 6 ft (1.8 m) long.



Description	Catalog number	Price
Interface cable with DB9 (M/F)	UH-22050-54	

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

Use this cable to connect the Masterflex 07550- and 07551-series Computer Compatible drives to a PC with USB port. Will also connect other peripheral devices equipped with RS-232 serial interface including balances, printers, scanners, and PDA's. Includes 2-ft cable and driver software. Supports data transfer speeds up to 12 Mbps; compatible with Windows® 2000/XP/Vista/7.



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

E. Remote Control Connectors

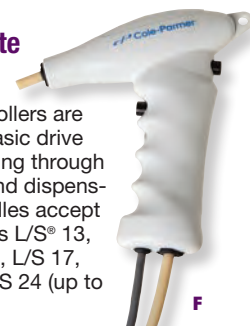
Combine these connectors with 20 to 22 gauge shielded wire to create your own interface cable. Maximum cable length is 1000 ft (300 m).



Description	Cat. no.	Price
DB9 male connector. Wire only the pins needed	UH-07595-45	
DB25 male connector. Wire only the pins needed	UH-07523-94	

F. Handheld Remote Controllers

These handheld controllers are designed to control basic drive operations. Route tubing through the handle for filling and dispensing applications. Handles accept Masterflex tubing sizes L/S® 13, L/S 14, L/S 16, L/S 25, L/S 17, L/S 18, L/S 15, and L/S 24 (up to 7/16" nominal OD).



Description	Cat. no.	Price
DB9 male connector; for 07528-series Masterflex L/S drives; control start/stop and direction	UH-07528-80	
DB25 male connector; for 07522-, 07523-, and 07551-series Masterflex L/S drives; control start/stop, direction, and prime	UH-07523-97	
Stripped wire ends; control start/stop, direction, and prime	UH-07595-62	

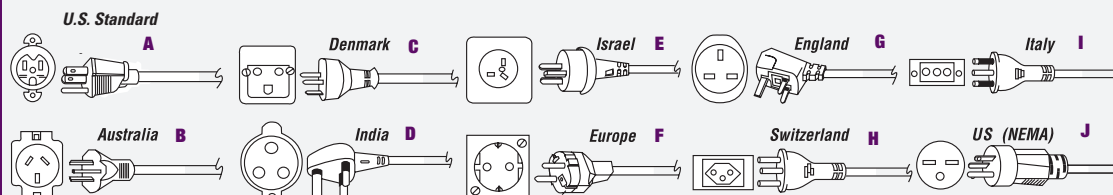
G. Remote Control Cable Assemblies

Cable assemblies include terminal connector and 25 ft (7.9 m) cable with stripped wire ends. Verify the connector type on your drive before ordering.



Description	Cat. no.	Price
DB9 male connector; for 07528-, 07557-, and 07591-series Masterflex drives	UH-07595-47	
DB25 male connector; for 07522-, 07523-, 07551-, 77301-, and 07594-series Masterflex drives	UH-07523-95	
18-pin round water-tight connector; for 07557-, 07591-, and 77411-series Masterflex drives	UH-77300-32	
31-pin round water-tight connector; for 07575-, 77301-, 07594-, and 77420-series Masterflex drives	UH-07575-80	

Power Cord/Plug Set Reference Guide for Masterflex® Drives



IEC 320 socket is featured on most Masterflex drives.

A detachable cord/plug set will automatically be included with most 230 VAC drives and will be selected based on the country of destination. At right is a reference table of the available cord/plug sets. Cord/plug sets feature a country-specific male plug on one end and an IEC 320 female plug on the other end. Order a cord/plug set to replace a lost or damaged set or to use your 230 VAC drive in another country. Most 230 VAC drives use the country-specific cord/plug sets; see the specific Masterflex drive page in this catalog to determine if your drive uses these cord/plug sets.

Specs & Ordering Information—Replacement Cord/Plug Sets

Key	Description	Catalog number	Price/ea	Key	Description	Catalog number	Price/ea
A	US Standard	UH-50001-68		F	Europe	UH-50001-70	
B	Australia	UH-50001-60		G	England	UH-50001-72	
C	Denmark	UH-50001-62		H	Switzerland	UH-50001-74	
D	India	UH-50001-64		I	Italy	UH-50001-76	
E	Israel	UH-50001-69		J	US (NEMA)	UH-50001-78	

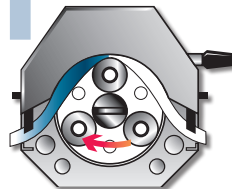
Precision, versatility, and ease of use make Masterflex peristaltic pump technology the preferred solution to increasing numbers of applications in the processing industry and in the lab.

The following comparisons prove that under real-world conditions,

Masterflex sets the standard for excellence.

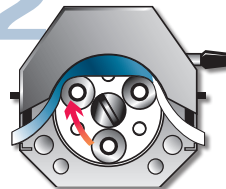
How Do Masterflex® Pump Heads Work?

1



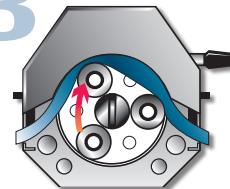
A pump head consists of only two parts: the rotor and the housing. The tubing is placed in the tubing bed—between the rotor and housing—where it is occluded (squeezed).

2



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.

3



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 42 LPM.

What flow precision can I expect?

You can obtain a flow precision of better than $\pm 1\%$ with calibrated flow systems. For other systems, $\pm 3\%$ precision is possible for general transfer applications.

Are measured volumes repeatable?

Yes. Volumes are repeatable with accuracies of $\pm 0.1\%$ 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 10.2 bar (150 psi); nominal pressure is 1.7 bar (25 psi).

What is the maximum inlet pressure?‡

Typically 2.7 bar (40 psi), depending on tubing ID, wall thickness, and formulation.

What is the maximum suction lift?

The maximum suction lift is 8.8 m H₂O (29 ft H₂O).

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 are the temperature ranges of tubing?

The temperature range for tubing is from -240 to 260°C (-400 to 500°F). For details on specific formulations, see pages 41–43.

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. See pages 41–43 for information.

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®, Chem-Durance® Bio, Puri-Flex™, Tygon® E-LFL, silicone, BioPharm Plus, and C-Flex® last the longest. See pages 41–43 for information.

Is tubing available that is compatible for food and sanitary applications?

Yes. Some tubing formulations comply with NSF specifications, 3A, FDA, and USDA requirements for food handling. Many can be sterilized. See pages 41–43 for more information.

Is the tubing easy to replace?

Yes. The Easy-Load®, Easy-Load® II, Easy-Load® 3, High-performance, Multichannel cartridge, and Rapid-Load® pump heads make tubing changes quick and easy. Tubing in the Standard pump head is easy to change with the loading key provided.

Drives

Why are drives sold 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.

Are drive systems other than those shown in this catalog available?

Yes. Our Engineering Department can customize, design, or modify a drive or drive package to your specifications for quantity purchases and OEM applications. Contact your local representative for details.

†PTFE-pump head can operate at pressures up to 6.8 bar (100 psi). (See page 18.)

‡Except the PTFE-pump head which can overheat when run dry.



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MASTERFLEX® Peristaltic Pumps

C/L®

Compact, low flow



L/S®

Precise flow control
and dispensing



I/P®

Better protection
from industrial
hazards



B/T®

Highest flow rates
for batch transfers



Right Pump. Right Size. Right Solution.

Contact your local Cole-Parmer representative for more information: ColeParmer.com/Dealers