avantor™

MASTERFLEX®

Masterflex® OEM Pumps with EtherNet/IP™



TECHNICAL DATASHEET

GENERAL DESCRIPTION

These Masterflex® panel mount pumps provide all the advantages of Masterflex pump technology in an easy-to-integrate panel mount configuration. The compact overall size makes these ideal for OEMs building fluid systems controlled by the latest PLCs or distributed control systems (DCS). All systems accept Masterflex pump tubing. All pump systems share the same control interface. Connection is made via the EtherNet/IP™ DIN mount controller (required accessory).

MARKETS & APPLICATIONS

Versatile EtherNet/IP-ready pumps are perfect for a broad range of life science, biopharma production and industrial applications. More than 20 pump tubing formulations are available to optimize performance for specific applications. Masterflex OEM products can be configured to suit a variety of markets and applications requiring clean, low-shear fluid transfer or metering.

KEY BIOPHARMA APPLICATIONS

- Bioreactor feed and chemistry control
- Formulation and precision filling systems
- TFF and UF/DF filtration systems
- Bulk transfer
- Chromatography systems
- Buffer preparation and media preparation systems
- Fermenter recirculation
- Viscous spray coatings

FEATURES & BENEFITS

- Compact size allows easy integration into small-space applications
- Same control interface for all pump series, low flow up to 42 L/min
- Up to four pumps can be controlled via a single controller
- Control more than just the pump — 13 additional digital or analog inputs available per controller
- Masterflex pump heads feature single-action-to-open pump head and occlusion surface, which allows for efficient tubing changes with built-in tubing retention
- Two designs are available for flow path configurations:
  - Rapid-Load® — provides sliding occlusion bed with same side entry and exit flow path
  - Easy-Load® — provides lever opening system with straight-through flow path
- Swappable Quattroflow™ and Dual I/P® system offers a single-pump solution with both peristaltic and quaternary diaphragm technology, for quick changes based on application requirements
- Open-head sensors help reduce operation errors
- Choose from more than 20 Masterflex tubing formulations for wide application optimization
- 2-year warranty
- Fully customizable OEM options available for tailored workflow solutions

Masterflex® OEM pumps with EtherNet/IP™

Five pump options. One complete flow range solution.

1.



L/S® Easy-Load® II

Precision Pump Head
0.1 to 2.3 LPM L/S®

High Performance Pump Head
0.1 to 2.9 LPM L/S®

2.



I/P® Easy-Load®

Precision pump head
0.1 to 13 LPM I/P®

3.



I/P® Rapid-Load®

0.1 to 20 LPM I/P®

4.



Swappable QF & Dual I/P® Easy-Load®

Quattroflow™ 1200 pump head
0.1 to 20 LPM

Dual I/P® Precision pump head
0.1 to 19.0 LPM

5.



B/T® Rapid-Load®

0.7 to 42 LPM B/T®

Masterflex® L/S®, I/P®, B/T®, Rapid-Load® and Easy-Load® are registered trademarks of Avantor®.
Quattroflow™ is a registered trademark of PSG Dover.
EtherNet/IP™ is a registered trademark of ODVA.

ORDERING INFORMATION

PUMP SYSTEMS

Order number	Model number	Max. flow	Tubing sizes accepted	Description
L/S Easy-Load II panel mount pumps with EtherNet/IP				
MFLX90026-17	900-2617	2.3 LPM	L/S 13, 14, 16, 25, 17, 18	**L/S Easy-Load II** OEM pump with EtherNet/IP for L/S precision tubing
MFLX90026-30	900-2630	2.9 LPM	L/S 15, 24, 35, 36	**L/S Easy-Load II** OEM pump with EtherNet/IP for L/S high-performance tubing
I/P Easy-Load panel mount pump with EtherNet/IP				
MFLX90026-15	900-2615	4.8 LPM (24 V) 13 LPM (48 V)	I/P 26, 73, 82	**I/P Easy-Load** OEM pump with EtherNet/IP
I/P Rapid-Load panel mount pumps with EtherNet/IP				
MFLX90026-19	900-2619	4.8 LPM (24 V) 13 LPM (48 V)	I/P 26, 73, 82	**I/P Rapid-Load** OEM pump with EtherNet/IP for I/P precision tubing
MFLX90026-20	900-2620	7.7 LPM (24 V) 20 LPM (48 V)	I/P 70, 86, 88	**I/P Rapid-Load** OEM pump with EtherNet/IP for I/P high-performance tubing
Swappable Quattroflow and Dual I/P Easy-Load panel mount pump with EtherNet/IP				
MFLX90026-14	900-2614	20 LPM (48 V)	I/P 26, 73, 82	**Swappable I/P** and Quattroflow OEM pump with EtherNet/IP™
B/T Pump panel mount pump with EtherNet/IP				
Contact for quote	Contact for quote	42 LPM	B/T 87, 91	**B/T Rapid-Load** OEM pump with EtherNet/IP

REQUIRED ACCESSORY

Order number	Model number	Description
MFLX90025-98	900-2598	24V DIN mount EtherNet/IP controller; one controller needed for up to four pumps

MORE L/S PUMP HEAD OPTIONS AVAILABLE

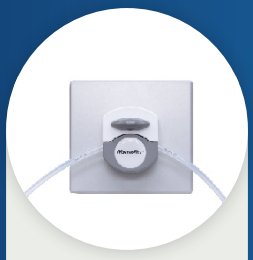
Stack two L/S Easy-Load II pump heads for higher flow or high-accuracy dispensing and reduced pulsation. Additional L/S pump head options are available.



L/S Cytoflow™



L/S High-Performance

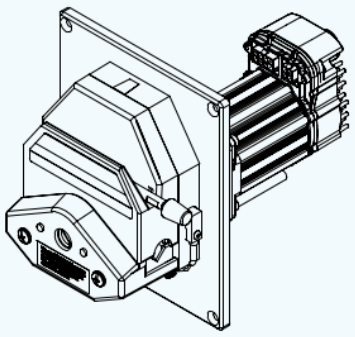


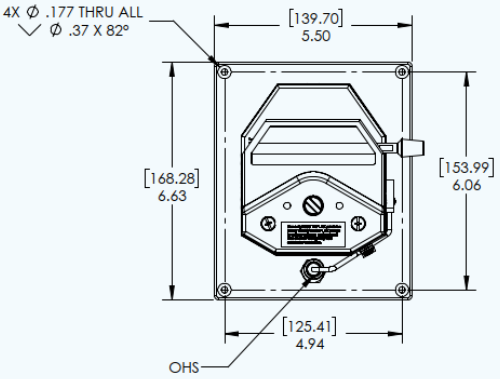
L/S Miniflex



Masterflex Ultrapharm™ L/S

L/S Easy Load II





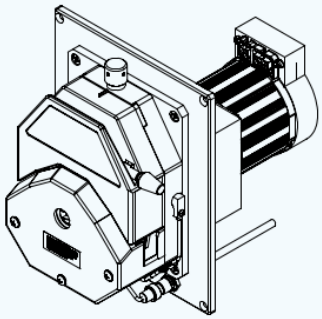


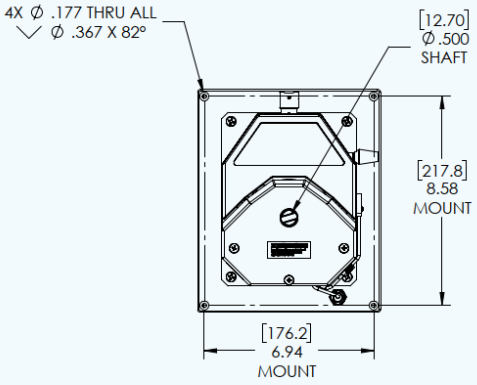
L/S Easy-Load II L/S high-performance tubing (900-2630)			Nominal flow rates		
Tubing size	**Barb size (ID)**	**ml/revolution**	**Min. RPM**	**Max. RPM @ 24V**	**Max. RPM @ 48V**
L/S high-performance tubing			**0.1**	**600**	**600**
L/S 15	3/16 (4.8 mm)	1.7	0.17	1,000 ml/min	1,000 ml/min
L/S 24	1/4 (6.4 mm)	2.8	0.28	1,700 ml/min	1,700 ml/min
L/S 35	3/8 (7.9 mm)	3.8	0.38	2,300 ml/min	2,300 ml/min
L/S 36	3/8 (9.7 mm)	4.8	0.48	2,900 ml/min	2,900 ml/min
Tubing size	**Barb size (ID)**	**ml/revolution**	**Min. RPM**	**Max. RPM @ 24V**	**Max. RPM @ 48V**
L/S Easy-Load II for L/S precision tubing (900-2617)			**Nominal flow rates**		
Tubing size	**Barb size (ID)**	**ml/revolution**	**Min. RPM**	**Max. RPM @ 24 V**	**Max. RPM @ 48 V**
L/S precision tubing			**0.1**	**600**	**600**
L/S 13	1/16 (0.8 mm)	0.06	0.006	36 ml/min	36 ml/min
L/S 14	1/16 (1.6 mm)	0.21	0.021	126 ml/min	126 ml/min
L/S 16	1/8 (3.1 mm)	0.8	0.08	480 ml/min	480 ml/min
L/S 25	3/16 (4.8 mm)	1.7	0.17	1,000 ml/min	1,000 ml/min
L/S 17	1/4 (6.4 mm)	2.8	0.28	1,600 ml/min	1,600 ml/min
L/S 18	3/8 (6.4 mm)	3.8	0.38	2,200 ml/min	2,200 ml/min

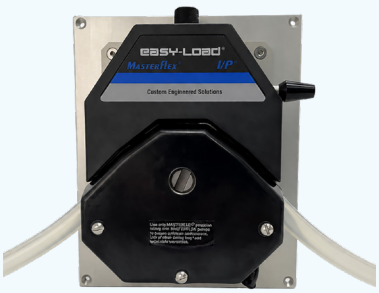
L/S high-performance precision pump tubing				
Pump tubing cross sections				
	L/S 15	**L/S 24**	**L/S 35**	**L/S 36**
Inside diameter (nominal)	4.8 mm (0.19″)	6.4 mm (0.25″)	7.9 mm (0.31″)	9.7 mm (0.38″)
Hose barb size	4.8 mm (3⁄16″)	6.4 mm (1⁄4″)	9.5 mm (3⁄8″)	9.5 mm (3⁄8″)

L/S precision pump tubing						
Pump tubing cross sections						
	L/S 13	**L/S 14**	**L/S 16**	**L/S 25**	**L/S 17**	**L/S 18**
Inside diameter (nominal)	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″)

I/P Easy-Load

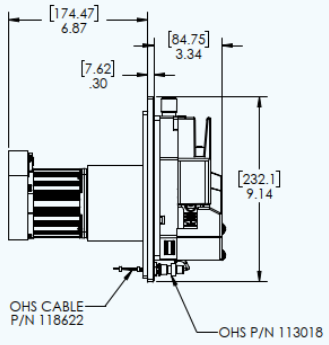




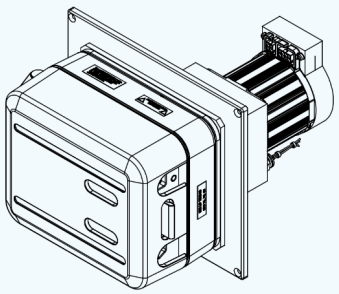


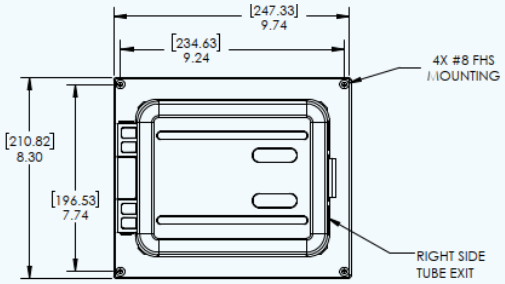
I/P Easy-Load for I/P precision tubing (900-2615)			Nominal flow rates		
Tubing size	**Barb size (ID)**	**ml/revolution**	**Min. RPM**	**Max. RPM @ 24 V**	**Max. RPM @ 48 V**
	precision tubing		**0.1**	**300**	**650**
I/P 26	1/4"	6.2	0.0006 LPM	1.5 LPM	4.0 LPM
I/P 73	3/8"	12.3	0.001 LPM	2.9 LPM	8.0 LPM
I/P 82	1/2"	20	0.002 LPM	4.8 LPM	13.0 LPM

I/P precision pump tubing			
Pump tubing cross sections			
	I/P 26	**I/P 73**	**I/P 82**
Inside diameter (nominal)	6.4 mm (0.25 ")	9.5 mm (0.37")	12.7 mm (0.5")
Hose barb size (nominal)	6.4 mm (¼")	9.5 mm (⅜")	12.7 mm (½")



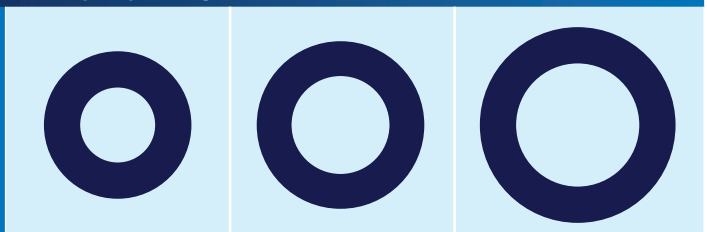
I/P Rapid-Load

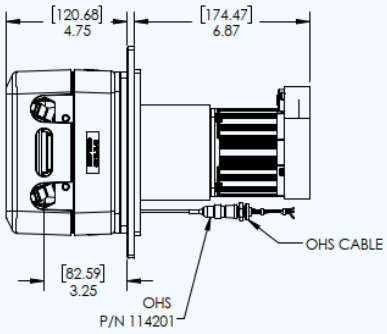




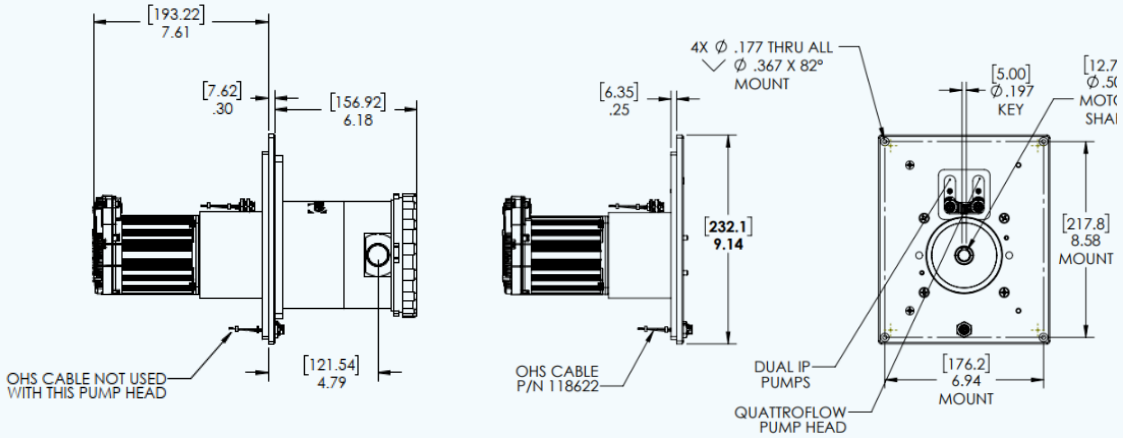


I/P Rapid-Load Pump for high-performance tubing (900-2620)			Nominal flow rates		
Tubing size	Barb size (ID)	ml/revolution	Min. RPM	Max. RPM @ 24 V	Max. RPM @ 48 V
	precision tubing		0.1	240	650
I/P 70	3/8"	13.4	0.001 LPM	3.2 LPM	8.0 LPM
I/P 88	1/2"	23.2	0.002 LPM	5.5 LPM	15.0 LPM
I/P 89	5/8"	32.1	0.004 LPM	7.7 LPM	19.0 LPM

High-performance precision pump tubing			
Pump tubing cross sections			
	I/P 70	I/P 88	I/P 89
Inside diameter (nominal)	9.5 mm (0.37")	12.7 mm (0.5")	15.88 mm (0.62")
Hose barb size	9.5 mm (3/8")	12.7 mm (1/2")	15.88 mm (5/8")

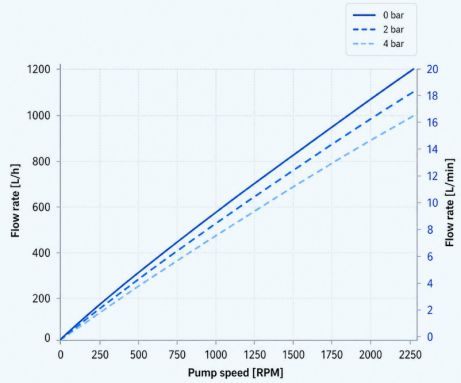


Swappable I/P Easy-Load and Quattroflow

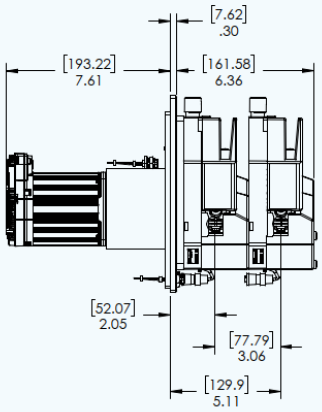




Quattroflow 1200 flow rate



Quattroflow 1200 SU head	ml/revolution	Nominal flow rates		
Process connection		Min. RPM	Max. RPM @ 24 V	Max. RPM @ 48 V
		0.1	1,300	2,650
3/4" TC	6.2	0.6 ml/min	2.2 LPM	20.0 LPM





Dual I/P Easy-Load for I/P precision tubing (Y-assembly)			Nominal flow rates		
Tubing size	Barb size (ID)	ml/revolution	Min. RPM	Max. RPM @ 24 V	Max. RPM @ 48 V
	precision tubing		0.1	270	550
I/P 26	1/4"	6.2	0.6 ml/min	2.8 LPM	5.7 LPM
I/P 73	3/8"	12.3	1.2 ml/min	5.6 LPM	11.2 LPM
I/P 82	1/2"	20	2.0 ml/min	9.0 LPM	18.5 LPM

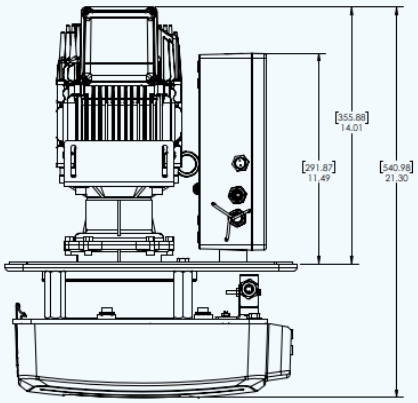
Note: Dual-head performance for single channel with 1" ID inlet and outlet flow path and Y fittings using Masterflex PharmaPure® Pump tubing.

I/P Easy-Load for I/P precision tubing (single-head performance)			Nominal flow rates		
Tubing size	Barb size (ID)	ml/ revolution	Min. RPM	Max. RPM @ 24 V	Max. RPM @ 48 V
	precision tubing		0.1	270	550
I/P 26	1/4"	6.2	0.6 ml/min	1.5 LPM	3.4 LPM
I/P 73	3/8"	12.3	1.2 ml/min	2.9 LPM	6.7 LPM
I/P 82	1/2"	20	2.0 ml/min	4.8 LPM	11.0 LPM

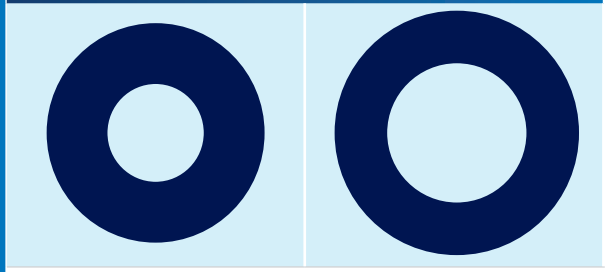


B/T Rapid-Load

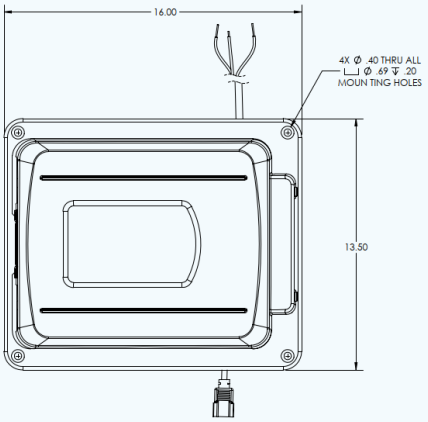




B/T rapid-load head	Nominal flow rates			
Tubing size	Barb size (ID)	ml/revolution	Min. RPM	Max. RPM
	precision tubing		11	321
B/T 87	1/2"	6.2	0.65 LPM	18.9 LPM
B/T 91	3/4"	123	1.4 LPM	42 LPM

Tubing cross sections	B/T PerfectPosition® pump tubing	
		
	B/T 87	B/T 91

Pump tubing size	B/T PerfectPosition pump tubing	
	B/T 87	B/T 87



Pump tubing size	B/T PerfectPosition pump tubing	
Inside diameter (nominal)	12.7 mm (0.5")	19.0 mm (0.75")
Hose barb size	12.7 mm (½")	19.0 mm (¾")

ETHERNET/IP COMMUNICATION

- Communication for motor speed is performed via EtherNet/IP through the 900-2598 controller
- EDS examples are available
- Thirteen additional I/O connections accessible through EtherNet/IP (including open-head sensor)
- There are multiple control options; the most common implementation is shown below using the unipolar PWM motor configuration with the MLFB output selection

OUTPUTS (PLC → CONTROLLER)

Function	Object	Assembly	Bytes	Bit	Data type	Notes
Motor speed Cmd	B PWM	113	28–29	N/A	UINT	0 = 0% speed limit 5,000 = 100% speed limit
Motor direction Cmd	Output reg	113	38–39	1	USINT	0 = CCW, 1 = CW
Enable/disable	Output reg	113	38–39	0	USINT	0 = disable, 1 = enable

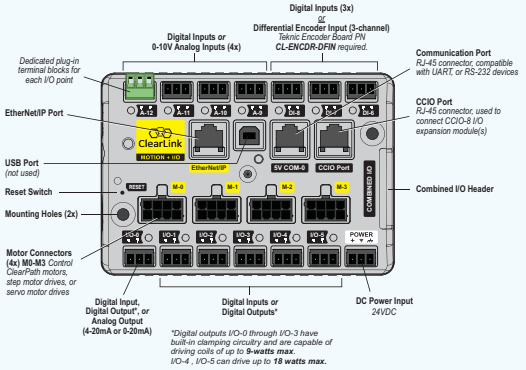
INPUTS (CONTROLLER → PLC)

Function	Object	Assembly	Bytes	Bit	Data type	Notes
Motor statusword	Motor status reg	101	68-69	N/A	WORD	Important bits: 0 = HLFB on 1 = HLFB has PWM
Actual speed	M0 HLFB duty	101	52–55	N/A	REAL	

3-WIRE OPEN-HEAD SENSOR, AS WIRED INTO THE DI-6 PORT ON THE CLEAR LINK CONTROLLER (INPUTS)

EtherNet/IP-compatible controller (DIN mount)

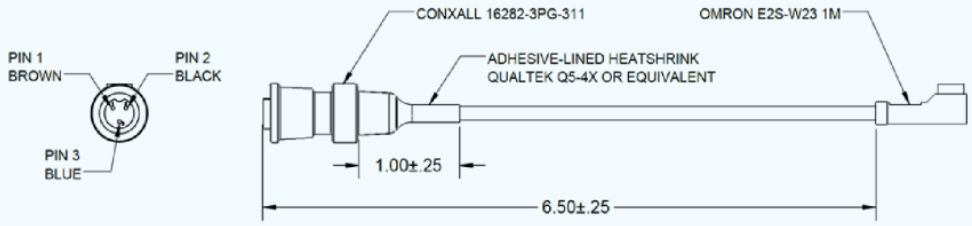
- Up to four pumps connect to a single controller
- 20–28 V DC power requirements
- CE and RoHS compliant
- The controller provides functionality beyond pump control, enabling EtherNet/IP communication for up to 13 configurable I/O points:
  - Digital inputs and outputs
  - Analog inputs and outputs, including 4–20 mA

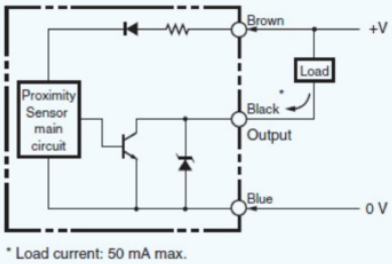


MOTOR SPECIFICATIONS

Model number(s)	900-2617, 900-2630	900-2615, 900-2620, 900-2619	900-2614
Voltage range	24 or 48 V DC (24–75 V DC)	24 or 48 V DC (24–75 V DC)	24 or 48 V DC (24–75 V DC)
Gear reduction	Direct couple	4.8:1	4.8:1 I/P Easy-Load; direct couple for Quattroflow head
Max. pump RPM @ 48 V	600	650	550
Max. pump RPM @ 24 V	600	300	270
Max. motor RPM @ 48 V	2,000	3,380	2,650
Max. motor RPM @ 24 V	1,010	1,160	1,300
Max. motor running torque @ 48 V	97 oz in	180 oz-in	239 oz-in
Peak motor torque @ 48 V	300 oz-in	474 oz-in	605 oz-in
Effective running torque (pump)	97 oz-in	864 oz-in	1140 oz-in
Peak power @ 48 V	0.21 hp 157 W	1.20 hp 894 W	1.25 hp 932 W
Peak power @ 24 V	0.06 hp	0.44 hp	0.47 hp
Motor ingress	IP53 (IP67 optional)	IP53 (IP67 optional)	IP53 (IP67 optional)
Motor compliance	UL recognized; cUL recognized; CE; RoHS	UL recognized; cUL recognized; CE; RoHS	UL recognized; cUL recognized; CE; RoHS

Open-head Sensor





Timing chart

Operation mode	Timing Chart
NO	Sensing object: Yes / No Output transistor (Load): ON / OFF Operation indicator (orange): ON / OFF

TOP TUBING FORMULATIONS

WIDE SELECTION OF PERISTALTIC AND TRANSFER TUBING FOR DIVERSE BIOPROCESS FLUID TYPES AND PROCESS CONDITIONS









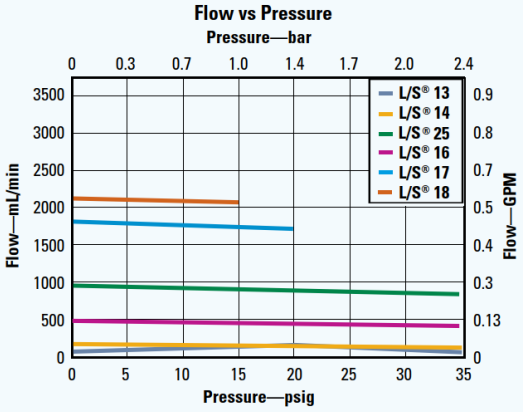
	SILICONES	THERMOPLASTIC ELASTOMERS (TPEs)	THERMOPLASTICS	COEXTRUSION & SPECIALTY
Pump tubing examples	• Puri-Sil™ silicone — platinum cured • Silicone — platinum cured (96410) • BioPharm silicone — platinum cured	• PharMed® BPT • C-Flex® • Puri-Flex®	• Tygon® S3 E-LFL • Tygon E-Lab	• Chem-Durance® • PharmaPure® • Gore® STA-PURE®
Features	• Biocompatibility • Low extractables and leachables • Wide temperature range • Smooth inner bore • Translucence	• Heat sealable, weldable • Biocompatibility	• Clarity • Chemical compatibility • Low gas permeability	• Long tubing life • Biocompatibility • Low spallation • Chemical resistance
Recommended applications	• Critical unit operations • Commonly used in bioprocessing • Single-use assemblies	• Single-use assemblies • Aseptic sampling and transfer	• General transfer • Viscous fluids	• Critical unit operations • Fill-finish, accurate dispensing
Tubing sizes	• Nominal internal diameter (ID) from 0.13 to 19 mm • Available for all pump series • All examples meet USP Class VI			

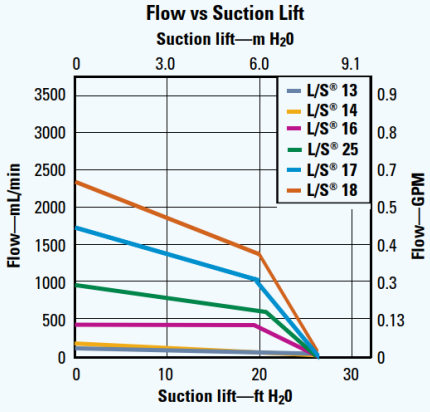
Visit **vwr.com** for more tubing Masterflex pump tubing options.

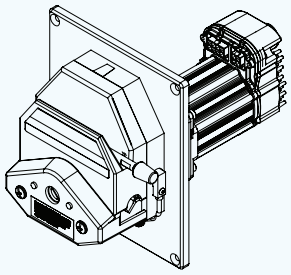
PERFORMANCE CURVES

*Single-channel values

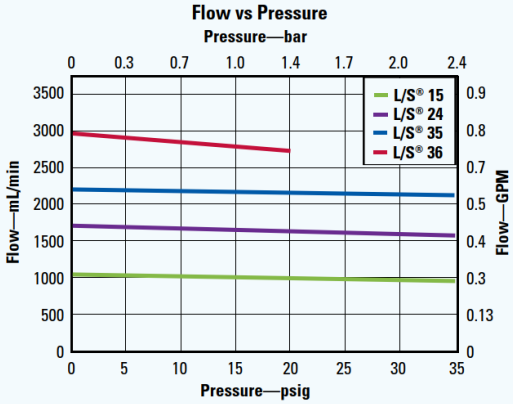
L/S Easy-Load II @ 24 AND 48 V precision (thin wall)

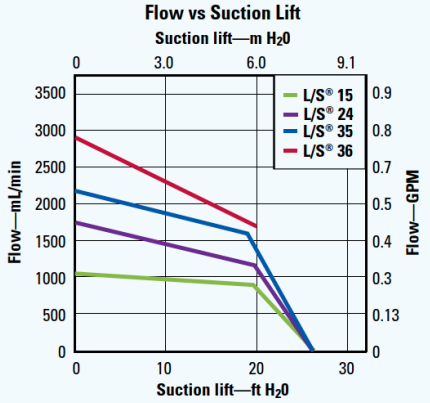




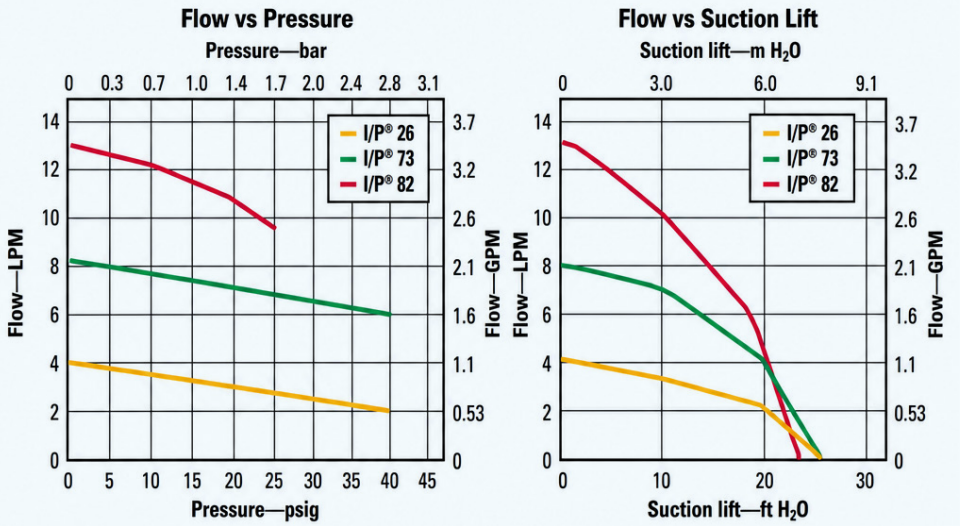


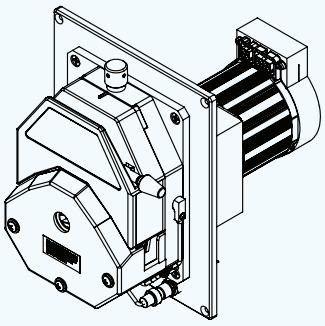
L/S Easy-Load II @ 24 AND 48 V high performance (thick wall)





I/P Easy-Load pump head @ 48 V





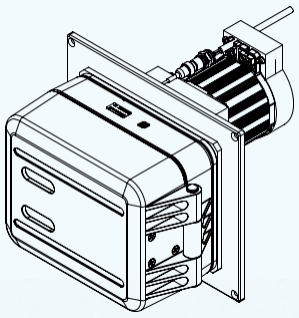
PERFORMANCE CURVES

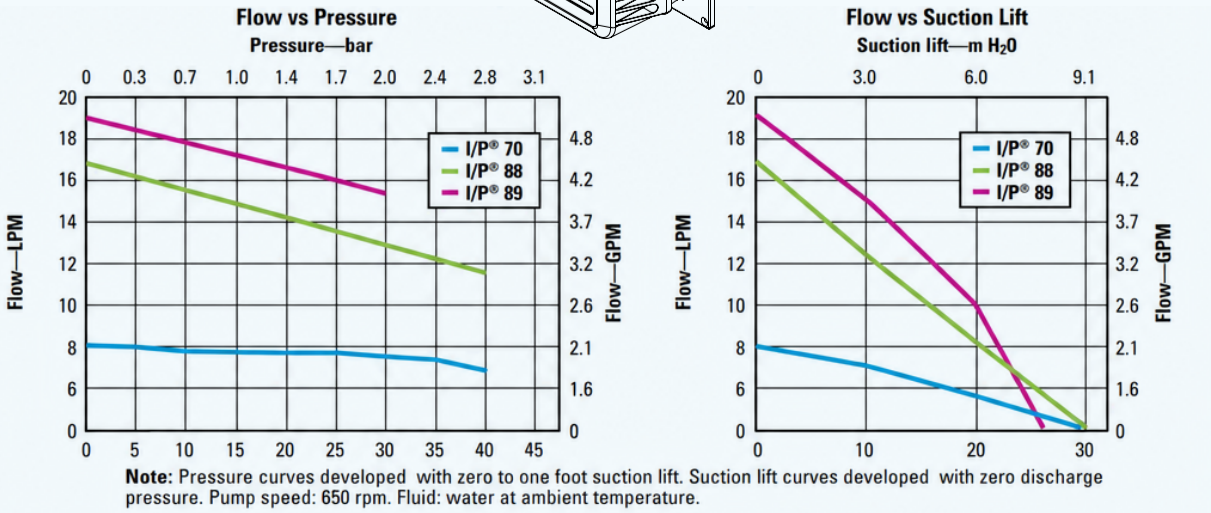
Nominal flow rates (LPM) versus pressure (bar)

Model	Tubing size	RPM	Back pressure (bar									
			0	0.3	0.7	1	1.4	1.7	2	2.4	2.8	3.1
900-2615 I/P Easy-Load @ 48 V	I/P 26	650	4.0	3.8	3.6	3.4	3.1	2.8	2.4	2.2	2.0	–
	I/P 73	-	8.0	8.0	7.9	7.8	7.6	7.5	7.3	7.1	6.0	–
	I/P 82	-	13.0	12.7	12.2	11.6	10.7	9.7	–	–	–	–
900-2615 900-2614 I/P Easy-Load @ 24 V	I/P 26	240	1.5	1.4	1.4	1.3	1.2	1.1	0.9	0.8	0.7	–
	I/P 73	-	2.9	3.0	2.9	2.9	2.9	2.8	2.7	2.7	2.3	–
	I/P 82	-	4.8	4.7	4.5	4.3	4.0	3.6	–	–	–	–
900-2614 Dual I/P Easy-Load Stacked @ 48 V (Y-assembly)	I/P 26	550	5.7	5.6	5.4	–	–	–	–	–	–	–
	I/P 73	-	11.2	11.0	10.7	–	–	–	–	–	–	–
	I/P 82	-	18.5	18.3	18.0	–	–	–	–	–	–	–
	I/P 26	450	4.4	4.6	4.8	–	–	–	–	–	–	–
	I/P 73	-	8.6	9.1	9.5	–	–	–	–	–	–	–
	I/P 82	-	14.4	15.2	16.0	–	–	–	–	–	–	–
	I/P 26	350	3.5	3.6	3.6	3.0	2.4	–	–	–	–	–
	I/P 73	-	6.9	6.9	7.0	8.4	10.3	–	–	–	–	–
	I/P 82	-	13.4	13.5	13.6	11.4	9.2	–	–	–	–	–

Note: Dual-head performance for single channel with 1" ID inlet and outlet flow path and Y fittings using Masterflex PharmaPure pump tubing.

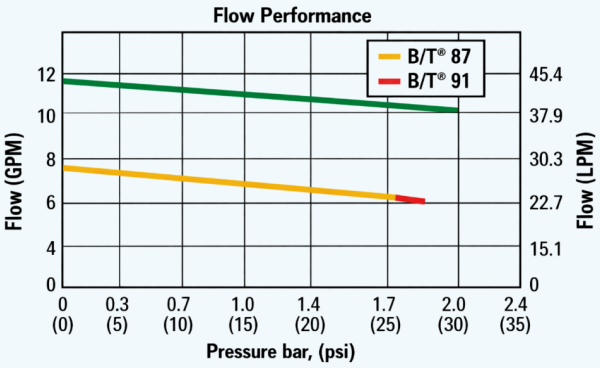
I/P Rapid-Load pump head

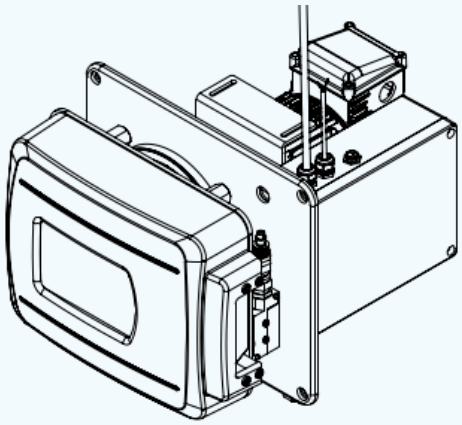




Note: Pressure curves developed with zero to one foot suction lift. Suction lift curves developed with zero discharge pressure. Pump speed: 650 rpm. Fluid: water at ambient temperature.

B/T Rapid-Load head





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