OEM

If you use pumps, we can improve your products and save you money

Peristaltic Pumps for Engineers

WATSON MARLOW Bredel PUMPS

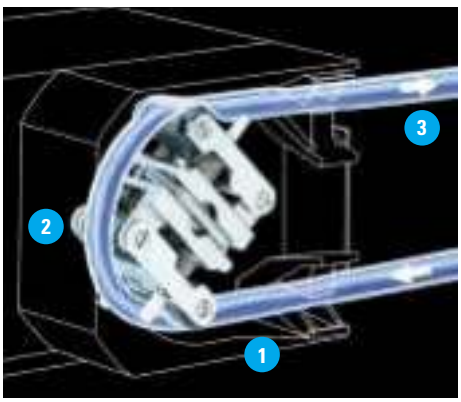
Pump Success into your Products

Where others saw a novelty, we saw the perfect pump. Forty-five years ago, peristaltic pumping was just a curiosity. Squeeze a rubber tube filled with fluid between your fingers; slide them along; the fluid moves.

But the people who founded Watson-Marlow Bredel could also see that the peristaltic was the perfect pump. Nothing but the tube touched the fluid, eliminating the risk of contaminating either the fluid or the pump. From that simple idea was founded a company that has developed products that can pump from microlitres per minute up to hundreds of gallons per minute. Watson-Marlow Bredel is the world's peristaltic pump specialist, exporting two-thirds of production to over fifty countries.

And if you ask Watson-Marlow Bredel what has turned an unlikely pump into an international success, the answer will be engineering. The company designs and makes its product extremely well. They are always seeking to improve products and expand performance capabilities.

Watson-Marlow Bredel specialises in supplying the right pump for the job, where other vendors try to force-fit a standard solution. Sales Engineers will help you apply and integrate one of the hundreds of standard choices, or help you make custom modifications. Watson-Marlow Bredel will evolve with your own product design. Start with a standard product for the early prototypes, and add custom options as the project moves towards production. If this is not enough, a completely new pump can be designed from scratch to meet a specification. There are no limits to providing the best solution for OEM customers.



What is peristaltic pumping

The drawing shows a pumphead loaded with tubing.

1. The advancing roller occludes the tube.
2. It recovers to its normal size and draws in fluid, which is then trapped by the next roller.
3. The fluid is then finally expelled from the pump.

This is the peristaltic flow-inducing action, and the full occlusion of the tube provides positive displacement. Together, the flow-inducer and tube make the pump, and both are equally important. The Watson-Marlow Bredel range of pumps and tubes provides flow rates from 15 microlitres to over 80m3/hr, pressures of up to 16 bar (230 psi).

The benefits of peristaltic pumping

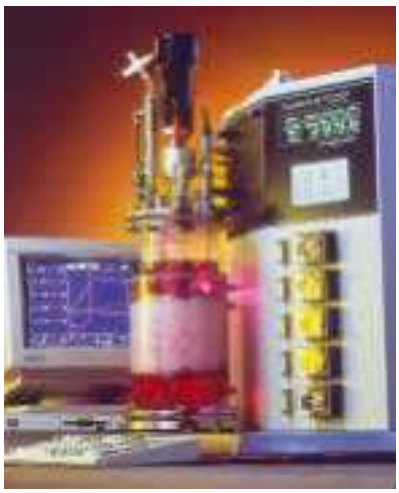
Compared to lobe pumps, diaphragm pumps, gear pumps and piston pumps, and every other type of pump, the advantages of Watson-Marlow Bredel pumps include:

- **No contamination of the fluid**
- **No contamination of the pump**
- **Ideal for shear-sensitive and aggressive fluids**
- **Self-priming, dry-running**
- **No valves, seals or glands**
- **Automatic check valve action prevents backflow**
- **Reversible**

B. Braun Biotech the world's leading supplier of fermenters, typically uses no less than three pumps and or pumpheads in all their standard products. The pumps and pumpheads individually meter nutrients, acids, bases, and surfactants.

M&O Perry Industries Inc installs 505Di/L dispensing units on their automated filling and capping equipment. The pumps were selected for their validated sterility, and rapid changeover of batches.

Margar Industries uses 313D pumpheads on their patented concrete mixing systems. The pumps are used to meter the various additives that improve strength and drying time. The unique system mounts directly to the trucks, allowing for small batches of concrete to be produced. The pump was selected for its ability to precisely meter the chemicals, and their ability to withstand the harsh environment.



New Brunswick Scientific, producers of a wide range of bioprocessing and fermentation equipment, uses single channel pumpheads to precisely meter acids, bases, and surfactants on computer controlled fomenters. Pumpheads are also used for nutrient feed in continuous culture applications.

Packard Instruments, a leading manufacturer of life science research equipment chose the 501RL pumphead for their MultiProbe™ system used for high throughput screening for drug discovery. They required a long lasting pump capable of high flow rates. The spring-loaded pumphead offers optimal tube life and minimal maintenance.

Where are peristaltic pumps used?

There are thousands of processes where confining the fluid to a tube, and nothing else, is ideal. Instead of stripping and cleaning the pump, just fit a new pump tube - which takes only minutes, or even seconds. A sterile tube creates a sterile pump. Think of peristaltic pumps especially for pharmaceuticals, fermentation, cell culture, filtration, automated laboratory test equipment, separation, sampling, spray coating, pollution control, food processing, beverage dispensing, inks, pigments and photographic solutions, as well as abrasive and aggressive fluids. If a fluid will pass through a tube, then a peristaltic pump can speed its flow, control its flow rate, or dispense it in precise volumes.

Contents

100 Series OEM Systems

The 100 series of OEM systems offers a choice of pumps in a range of speeds, based on the 102R low-flow pumphead, and uses either synchronous or DC motors. The 102R pumphead is also available on its own, for use with users' own drives. Recently introduced into the range is the 100 series CIRA 1990! OEM speed control board providing direction and speed control for the 12V DC OEM pumps.

102R low flow pumphead

The 102R low-flow OEM pumphead accepts, without adjustment, all Watson-Marlow Bredel tubing from 0.5mm (1/50") to 4.8mm (3/16") internal diameter with 1.6mm (1/16") wall thickness. It has a spring-loaded, two-roller rotor and is suitable for continuous use up to 65 rpm, providing flow rates up to 106 ml/min (intermittent use up to 130rpm giving flow rates up to 212 ml/min).

The 102R may be driven in either direction: clockwise rotation will give a longer tube life, but anti-clockwise rotation can be used for working against greater pressures. It is available with a choice of track material and rotor springs and is suitable for either a 6mm or 8mm drive shaft if mounted on users' own drive. All 102R pumpheads have a choice of mounting points and a shatterproof clear polycarbonate guard which is hinged to allow easy access for tube changing.

For certain applications, the 102R can be supplied with snap-in connectors (as shown in the photograph bottom left) in place of the sprung tube clamps.

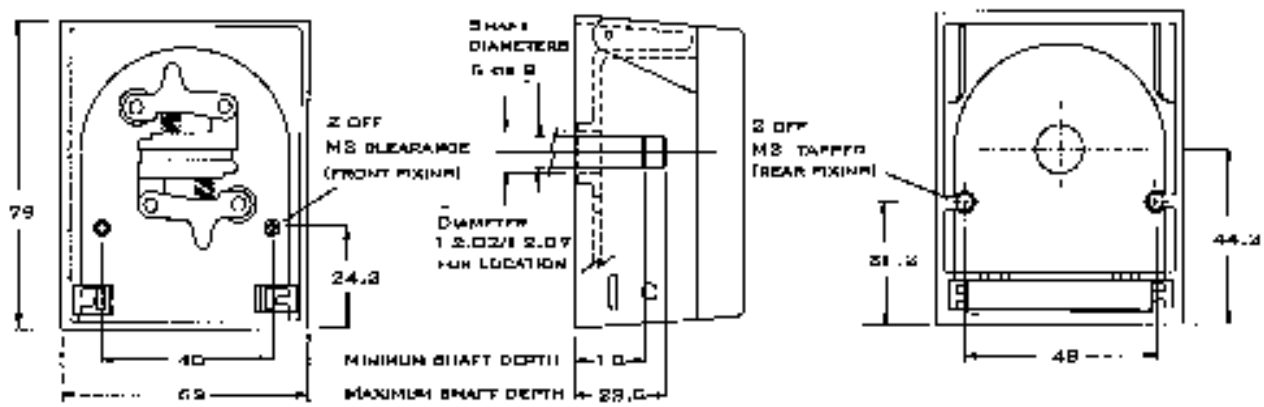
Ordering information

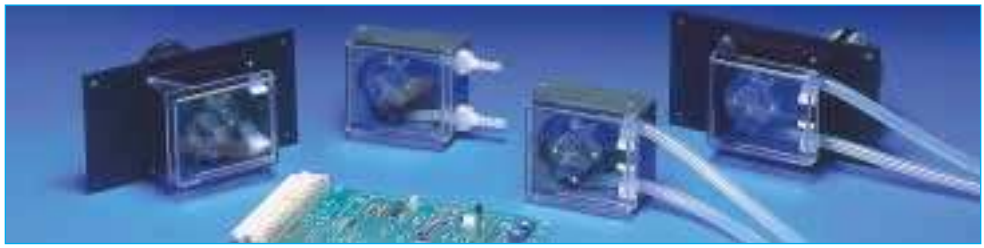
For 6mm drive shaft	Suitable for	
Kematal track with standard springs	*Platinum cured Silicone/Neoprene*	*013.2001.000*
Kematal track with hard springs	*Marprene/PVC/Fluorel*	*013.2011.000*
PVDF track with standard springs	*Platinum cured Silicone/Neoprene*	*013.3001.000*
PVDF track with hard springs	*Marprene/PVC/Fluorel*	*013.3011.000*
For 8mm drive shaft	Suitable for	
Kematal track with standard springs	*Platinum cured Silicone/Neoprene*	*013.2101.000*
Kematal track with hard springs	*Marprene/PVC/Fluorel*	*013.2111.000*
PVDF track with standard springs	*Platinum cured Silicone/Neoprene*	*013.3101.000*
PVDF track with hard springs	*Marprene/PVC/Fluorel*	*013.3111.000*

Materials of construction

IXEF (Polyarylamide)	*Rotor*
MOS2 filled Nylon 6 (Nylatron)	*Rollers*
Acetal copolymer (Kematal) or PVDF	*Track*
Acetal copolymer (Kematal)	*Tube clamps*
Polycarbonate	*Guard*
Stainless steel	*Spindles, Guide pins*

ALL DIMENSIONS IN MILLIMETRES





Flow rates

	1.6mm (1/16") wall tubing				
Bore mm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm
Bore "	1/50"	1/32"	1/16"	1/8"	3/16"
Flow rate: ml/revolution	*0.02*	*0.05*	*0.22*	*0.81*	*1.66*
Maximum continuous flow rate (65rpm): ml/min	*1.38*	*3.22*	*14.0*	*52.0*	*106*
Maximum intermittent flow rate (130rpm): ml/min	*2.76*	*6.44*	*28.0*	*104*	*212*

For tube selections, see Table A on page 47.

Specifications

	1.6mm (1/16") wall tubing				
Bore mm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm
Bore "	1/50"	1/32"	1/16"	1/8"	3/16"
Maximum continuous speed: rpm	*65*	*65*	*65*	*65*	*65*
Maximum intermittent speed: rpm	*130*	*130*	*130*	*130*	*130*
With silicone tubing (standard springs, clockwise rotation)					
Required torque up to 0.5 bar: kg cm	1.1	1.1	1.2	1.5	1.8
Required torque up to 1 bar: kg cm	1.2	1.2	1.25	1.8	2.1
Maximum pressure: bar	*3.0*	*3.0*	*3.0*	*1.0*	*1.0*
With Marprene tubing (hard springs, clockwise rotation)					
Required torque up to 0.5 bar: kg cm	3.5	3.5	3.6	4.2	4.6
Maximum pressure: bar	*1.6*	*1.6*	*1.6*	*1.6*	*1.6*

For counter-clockwise rotation, increase required torque figures by 80%.

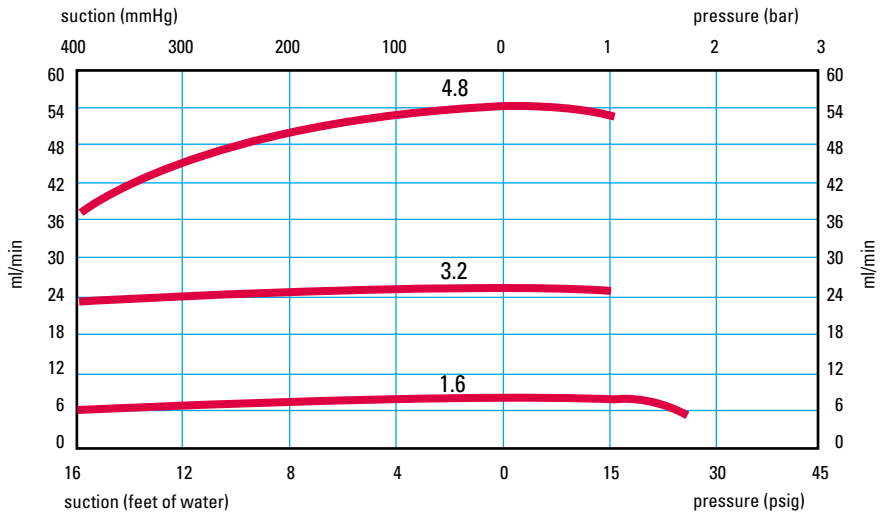
Performance against pressure

Conditions:

- Suction curves obtained with zero output pressure.
- Pressure curves obtained with zero lift.
- Pumphead speed 32 rpm

Conversion Factors:

Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi



102FS/R fixed speed AC pump

The 102FS/R comprises a 102R pumphead plus synchronous motor and mounting plate. It will accept 1.6mm wall thickness silicone tubing from 0.5 to 4.8mm internal diameter, and provides a choice of speeds giving flow rates up to 32.6 at 50Hz ml/min. No tube connectors are required and a continuous length of tubing can be run from source to delivery point. Long tube life and precise flow rates are assured by the sprung roller design.

Ordering information

100-120V AC		200-250V AC	
0.67/0.8rpm 50/60Hz	*010.2102.000*	0.67rpm 50Hz	*010.2112.000*
4.0/4.8rpm 50/60Hz	*010.2202.000*	4.0rpm 50Hz	*010.2212.000*
6.0/7.2rpm 50/60Hz	*010.2302.000*	6.0rpm 50Hz	*010.2312.000*
12rpm 50Hz	*010.2402.000*	12rpm 50Hz	*010.2422.000*
14.4rpm 60Hz	*010.2412.000*	20rpm 50Hz 200-220V	*010.2512.000*
20/24rpm 50/60Hz	*010.2502.000*	20rpm 50Hz 230- 250V	*010.2522.000*

Specifications

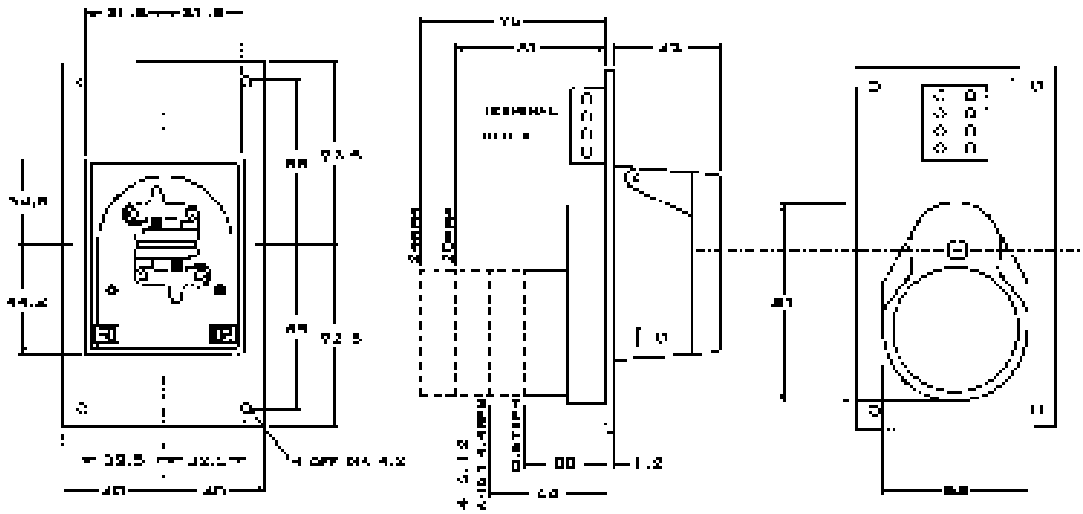
Motor type	*Synchronous*
Motor torque output	*2.5kg cm*
Power consumption	*25VA*
Weight	*600g*

Flow rates (ml/min)

		1.6mm (1/16") wall silicone tubing				
		0.5mm	0.8mm	1.6mm	3.2mm	4.8mm
Hz	rpm	1/50"	1/32"	1/16"	1/8"	3/16"
50	*0.67*	*0.014*	*0.03*	*0.15*	*0.54*	*1.08*
	4.0	*0.087*	*0.20*	*0.87*	*3.17*	*6.35*
	6.0	*0.130*	*0.30*	*1.30*	*4.75*	*9.53*
	12	*0.250*	*0.60*	*2.55*	*9.44*	*19.0*
	20	*0.420*	*0.98*	*4.36*	*16.0*	*32.6*
60	*0.8*	*0.017*	*0.04*	*0.18*	*0.65*	*1.32*
	4.8	*0.104*	*0.24*	*1.05*	*3.80*	*7.62*
	7.2	*0.150*	*0.36*	*1.53*	*5.67*	*11.4*
	14.4	*0.300*	*0.72*	*3.06*	*11.3*	*22.9*
	24	*0.500*	*1.18*	*5.23*	*19.2*	*39.1*

For tube selections, see Table A on page 47.

ALL DIMENSIONS IN MILLIMETRES



102FD/R fixed/variable speed DC pump

The 102FD/R comprises a 102R pumphead plus a 12V DC motor and mounting plate. It will accept 1.6 mm wall thickness silicone tubing from 0.5 to 4.8mm internal diameter, and provides a choice of speeds giving flow rates up to 106 ml/min. It may be used with the 100 series speed control board to provide a variable speed pumping system, giving a speed control ratio of 10:1, direction control and stop/start facilities.

Ordering information

12V DC	
4rpm	*010.1002.000*
65rpm	*010.1042.000*

Specifications

Motor type	*Standard 12V DC*
Motor torque output	*2.5kg cm*
Power consumption	*25VA*
Weight	*500g*
Brush life	*3000 hours*

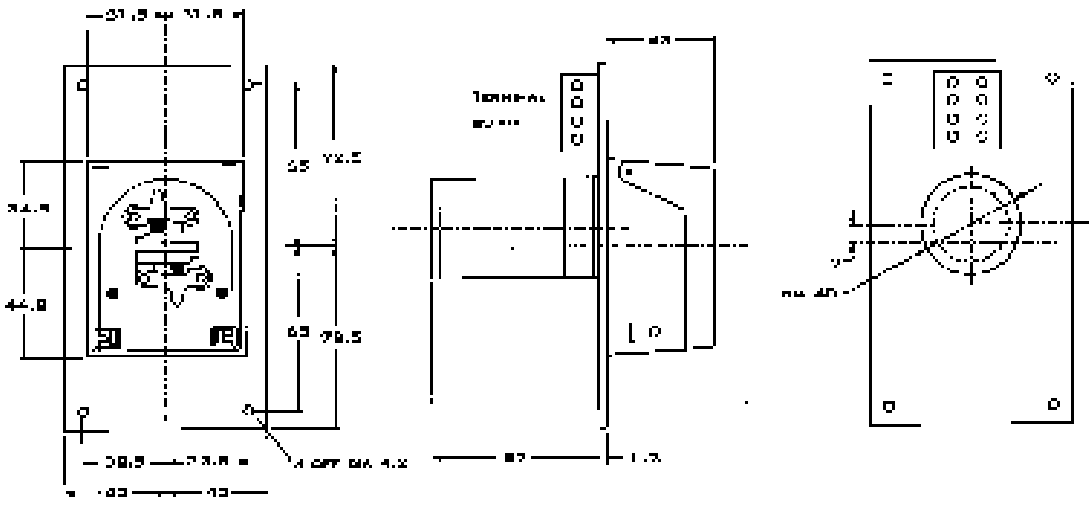
Flow rates (ml/min)

	1.6mm (1/16") wall silicone tubing				
	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm
rpm	1/50"	1/32"	1/16"	1/8"	3/16"
4	*0.09*	*0.20*	*0.87*	*3.17*	*6.40*
65	*1.38*	*3.22*	*14.0*	*52.0*	*106*

Note: Minimum flows are 10% of rates given when using the 100 series OEM speed control board.

For tube selections, see Table A on page 47.

ALL DIMENSIONS IN MILLIMETRES



OEM speed control board

The OEM speed control board is designed to give speed control and remote stop facilities for the 102FD/R and 313FD/D 12-24V DC OEM pumps, and is capable of accepting a remote speed control signal input from users' own equipment.

With the addition of extra components to the standard board, options of direction reverse, power on LED, AC supply input, board mounted speed control potentiometer and instant prime are available.

Two different boards are available, both in 'Eurocard' format with a 32 way edge connector. The 100 series OEM speed control board for the 102FD/R incorporates an on-board power transistor, whereas the power transistor for the 300 series board has to be mounted on an external heat sink with a 1,000 sq cm surface area and is rated for higher loads.

Ordering information

For 102FD/R	*019.2021.000*
For 313FD/D	*039.2021.000*

Specifications

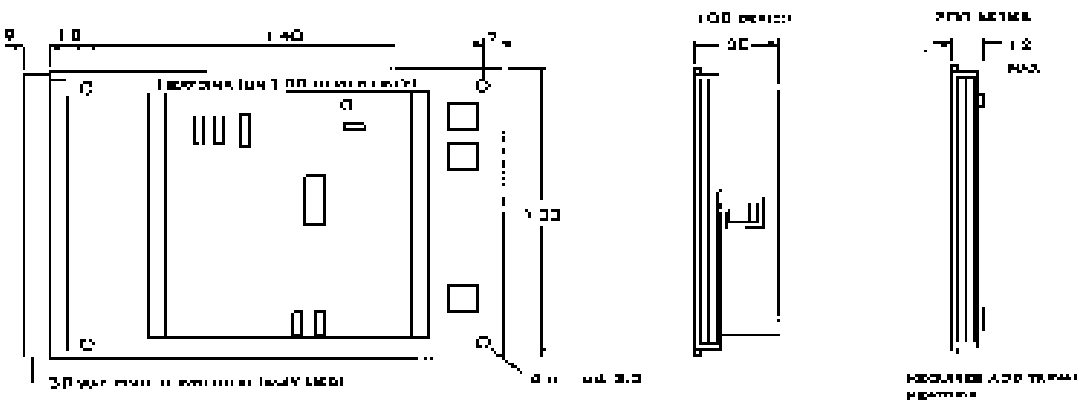
Power supply input	*20-30V DC, (AC/Mains voltage optional)*
Power supply rating	*100 series: 0.5A, 300 series: 2.0A*
Output	*12V DC (variable)*
Circuit board format	*Eurocard (pillar mounting points as alternative)*
Connections	*32 way edge*
Speed control input	*Remote potentiometer or 0 to 5V DC input (board mounted potentiometer optional)*
Speed control ratio	*10:1*
Weight	*100 series 150g, 300 series 100g plus external heat sink*

Board features

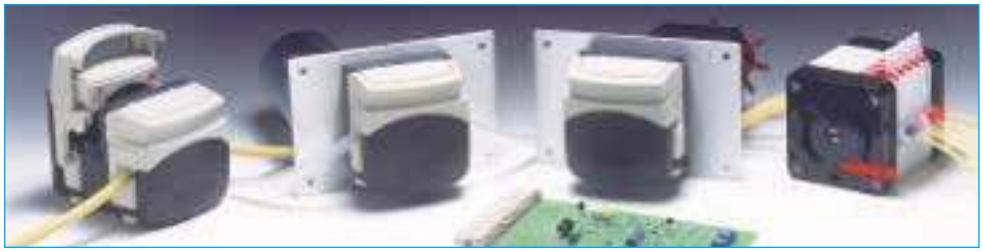
- Speed control by potentiometer (not supplied) or 0 to 5V DC control signal
- Motor stop/start control by remote switch, TTL or CMOS
- Motor may be connected for either clockwise or anti-clockwise rotation
- Full connection and calibration instructions

Optional features requiring additional components

- Instant direction change
- Power on LED indication
- AC or DC power supply
- Prime maximum speed switch
- Board-mounted potentiometer for speed control
- 100 or 300 series OEM system
- 32 way edge connector (supplied)



300 Series OEM Systems



Designed around the 313D flip-top pumphead, these OEM pumps provide high quality, single channel pumps, with a choice of AC, DC or brushless DC drive units, and controls. The pumps provide flow rates up to 2 litres per minute (3 litres per minute for intermittent use).

Standard features/options of 313D and 314D pumpheads

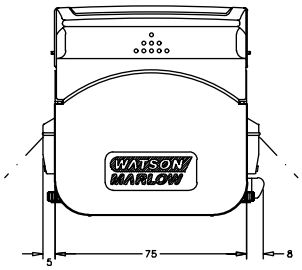
- **313 has 3 rollers for maximum flows. 314 has 4 rollers for minimum pulsation. Both accept 1.6mm wall thickness tubing from 0.5mm to 8mm bore.**
- **313 and 314 pumpheads can also be ordered with dedicated tube clamps for 0.5 - 1.6mm, 3.2mm, 4.8mm and 6.4 - 8.0mm bore tubing.**
- **313D and 314D with bayonet mounting plate and adjustable clamps. Fits Watson-Marlow Bredel OEM drives.**
- **313D/A and 314D/A with bayonet mounting plate, bayonet adapter and adjustable clamps. Fits 500 series cased drives.**
- **313X and 314X extension pumpheads.**
- **313B and 314B bare-shaft versions with bayonet plate and adjustable clamps.**
- **For higher pressure applications order 2.4mm wall tubing versions by adding "2" suffix e.g. 313D2 or 313X2.**
- **AC, DC and brushless DC motor drives are available.**

Custom-Tailored Designs

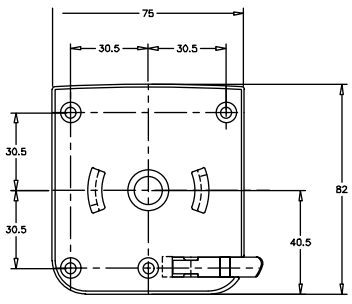
Features

Simple, ingenious tube loading - slide open the track to expose the rotor, load the tubing, slide the track down and the tubing is clamped and stretched as the track clicks shut. It takes longer to describe than do!

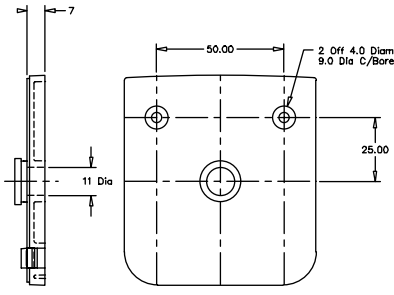
The 313 pump range has hundreds of standard options to choose from. We can also do custom colours, tube sizes and drives. We can also create new products custom-tailored to your unique requirements, such as the tube element version shown at top left. Contact one of our sales engineers for more information on custom products.



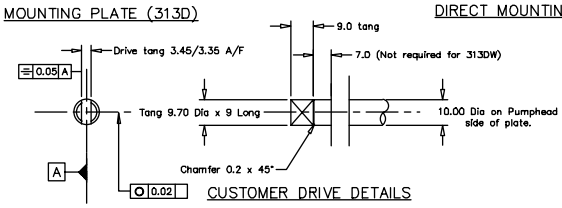
ALL DIMENSIONS IN MILLIMETRES



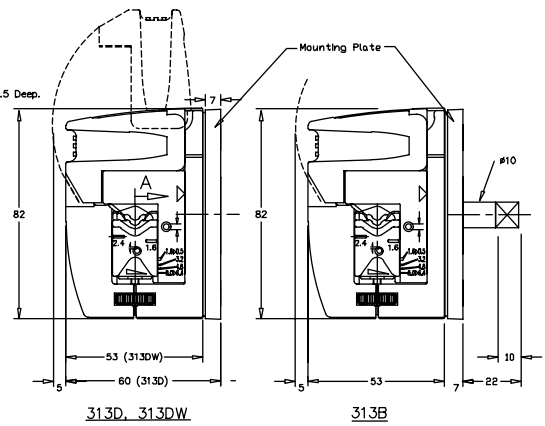
MOUNTING PLATE (313D)



DIRECT MOUNTING (313DW)



CUSTOMER DRIVE DETAILS



313D, 313DW 313B

313 rapid load pumpheads, three rollers

These pumpheads are fast loading, handle tube sizes with 1.6mm wall thickness from 0.5mm to 8.0mm bore, and extension pumpheads can be snapped on up to the power limit of the drive. 313 pumpheads have three Nylatron rollers and are suitable for continuous use up to a speed of 400 rpm, giving flow rates up to 2000 ml/min, or intermittently up to 600 rpm, giving flow rates up to 3000 ml/min.

The 313 range of pumpheads includes the 313D pumphead for mounting on either Watson-Marlow 300 series OEM drives or users' own drive shaft arrangement, the 313B bare shaft pumphead for drives with a flexible coupling, and the 313X extension pumphead for use with the 313D.

The 313D pumpheads accept up to five extension pumpheads for multi-channel installations, depending on the power limit of the drive. A mounting plate, which must be incorporated into the installation, is supplied with 313B and 313D pumpheads. Extension pumpheads snap fit directly behind 313D pumpheads.

A pumphead is available that will accept 2.4mm wall tube, for applications that will benefit from using a thicker wall tube. To order a 313 pumphead for 2.4mm wall thickness tubing, add suffix "2" - 313D2.

The ordering information below shows the full range of 313 pumpheads as detailed on page 7.

Ordering information

Three roller 1.6 mm wall thickness tubing

Clamp setting	313D	313X	313B	313XB	313DW	313BW
Variable	*033.3411.000*	*033.3431.000*	*033.3421.000*	*033.3441.000*	*033.3451.000*	*033.3461.000*
0.5 - 1.6	*033.3411.00c*	*033.3431.00c*	*033.3421.00c*	*033.3441.00c*	*033.3451.00c*	*033.3461.00c*
3.2	*033.3411.00f*	*033.3431.00f*	*033.3421.00f*	*033.3441.00f*	*033.3451.00f*	*033.3461.00f*
4.8	*033.3411.00k*	*033.3431.00k*	*033.3421.00k*	*033.3441.00k*	*033.3451.00k*	*033.3461.00k*
6.4 - 8.0	*033.3411.00n*	*033.3431.00n*	*033.3421.00n*	*033.3441.00n*	*033.3451.00n*	*033.3461.00n*

Three roller 2.4 mm wall thickness tubing

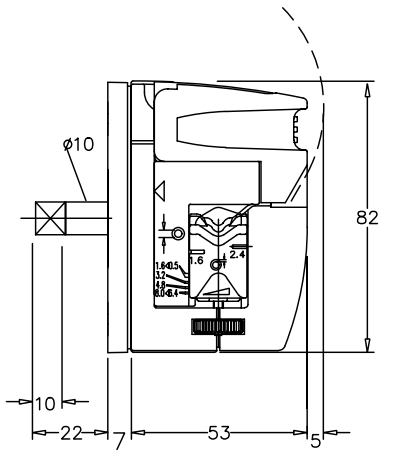
Clamp setting	313D2	313X2	313B2	313XB2	313DW2	313BW2
Variable	*033.3511.000*	*033.3531.000*	*033.3521.000*	*033.3541.000*	*033.3551.000*	*033.3561.000*
0.5 - 1.6	*033.3511.00c*	*033.3531.00c*	*033.3521.00c*	*033.3541.00c*	*033.3551.00c*	*033.3561.00c*
3.2	*033.3511.00f*	*033.3531.00f*	*033.3521.00f*	*033.3541.00f*	*033.3551.00f*	*033.3561.00f*
4.8	*033.3511.00k*	*033.3531.00k*	*033.3521.00k*	*033.3541.00k*	*033.3551.00k*	*033.3561.00k*
6.4	*033.3511.00n*	*033.3531.00n*	*033.3521.00n*	*033.3541.00n*	*033.3551.00n*	*033.3561.00n*

Flow rates

	1.6mm (1/16") wall tubing						
Bore mm	0.5	0.8	1.6	3.2	4.8	6.4	8.0
Bore "	1/50	1/32	1/16	1/8	1/16	1/4	5/16
Flow rate: ml/revolution	*0.03*	*0.06*	*0.26*	*1.0*	*2.2*	*3.6*	*5.0*
Maximum continuous flow: ml/min	*12*	*24*	*104*	*400*	*880*	*1400*	*2000*
Maximum intermittent flow: ml/min	*18*	*36*	*156*	*600*	*1320*	*2160*	*3000*

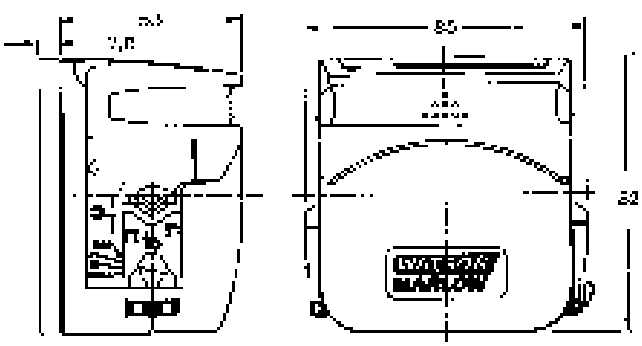
For tube selections, see Table A and B on page 47.

314B BARESHAFT PUMPHEAD

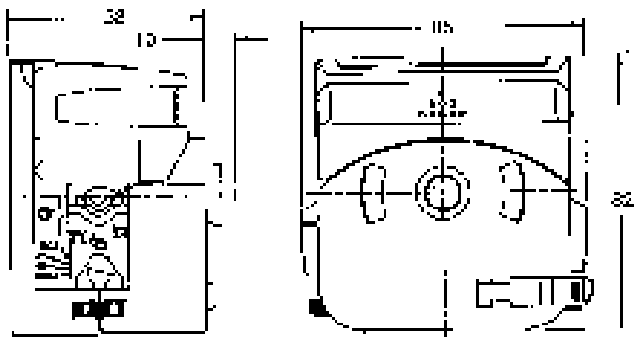


ALL DIMENSIONS IN MILLIMETRES

313D PUMPHEAD



313X EXTENSION PUMPHEAD



OEM

Materials of construction

Body rear	*Glass filled polypropylene*
Body front, body front extension, mounting plate, track and lever	*IXEF*
Rotor, tube clamps and mounting plate locking tab	*Glass filled Nylon*
Rollers	*MoS2 filled Nylon 6 (Nylatron)*
Spindles	*Electroless nickel plated, hardened steel*
Screws	*Stainless steel*
Sealed bearings	*Bronze Bush*

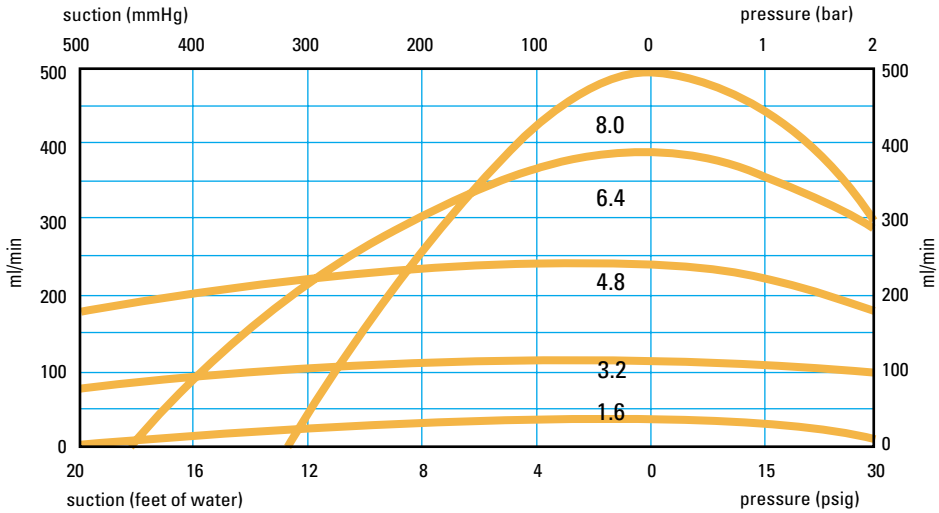
Specifications

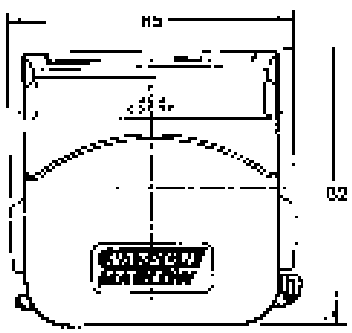
	1.6mm (1/16") wall tubing						
Bore mm	0.5	0.8	1.6	3.2	4.8	6.4	8.0
Bore "	1/50	1/32	1/16	1/8	3/16	1/4	5/16
Maximum continuous speed: rpm	*400*	*400*	*400*	*400*	*400*	*400*	*400*
Maximum intermittent speed: rpm	*600*	*600*	*600*	*600*	*600*	*600*	*600*
With Marprene tubing							
Required torque up to 0.5 bar: kgcm	1.4	1.4	2.0	2.8	4.2	4.8	6.3
Required torque up to 2.0 bar: kgcm	1.5	1.5	2.1	4.0	6.1	6.8	7.8
Maximum continuous pressure: bar	*2*	*2*	*2*	*2*	*1.3*	*1.3*	*1.3*
Maximum intermittent pressure: bar	*3*	*3*	*3*	*2.5*	*2*	*2*	*1.7*
With Silicone tubing							
Required torque up to 0.5 bar: kgcm	1.1	1.1	1.7	2.3	2.9	3.5	4.0
Required torque up to 2.0 bar: kgcm	1.5	1.5	2.1	3.2	4.3	5.2	6.7
Maximum continuous pressure: bar	*2*	*2*	*1.5*	*1.5*	*1*	*1*	*1*
Maximum intermittent pressure: bar	*2.5*	*2.5*	*2*	*2*	*1.3*	*1.3*	*1.3*

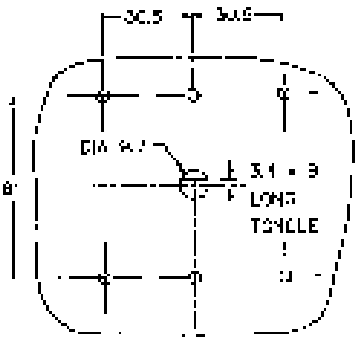
Performance against pressure

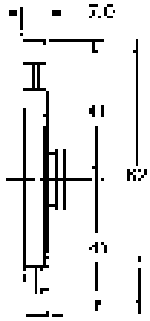
Conditions:
- Suction curves obtained with zero output pressure.
- Pressure curves obtained with zero lift.
- Pumphead speed 100 rpm.

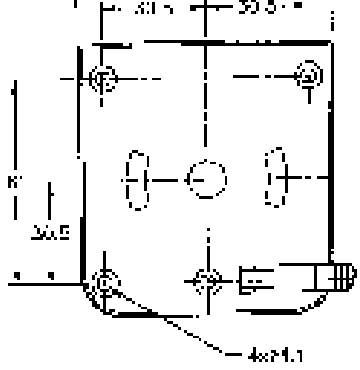
Conversion Factors:
Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi











314 rapid load pumpheads, four rollers

With the same bayonet mounting system, 314 pumpheads may be interchanged with the 313 pumpheads or specified as an alternative head when ordering 300 series OEM pumps. Their four roller design gives higher precision and less pulsation and is suitable for continuous use up to 300 rpm giving flow rates up to 1200 ml/min (intermittent use up to 600 rpm giving flow rates up to 2400 ml/min).

The 314 range of pumpheads includes the 314D pumphead for mounting on either Watson-Marlow 300 series OEM drives or users' own drives having the same drive shaft arrangement, the 314B bare shaft pumphead for drives with a flexible coupling and the 314X extension pumphead for use with the 314D.

The 314D and 314B pumpheads accept up to five extension pumpheads for multi-channel installations depending on the power limit of the drive. A mounting plate, which must be incorporated into the installation, is supplied with 314B and 314D pumpheads. Extension pumpheads snap fit directly behind 314D pumpheads. To use 2.4mm wall thickness tubing, please add the suffix "2" - 314D2

The ordering information below shows the full range of 314 pumpheads as detailed on page 7.

Ordering information

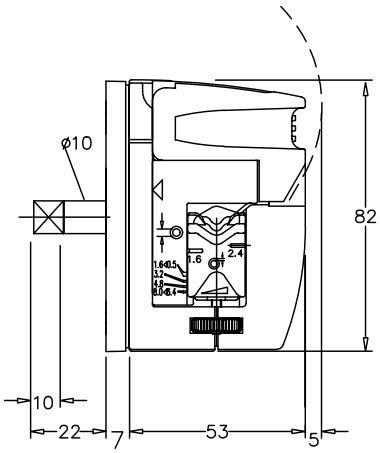
Four roller 1.6 mm wall thickness tubing

Clamp setting	314D	314X	314B	314XB	314DW	314BW
Variable	*033.4411.000*	*033.4431.000*	*033.4421.000*	*033.4441.000*	*033.4451.000*	*033.4461.000*
0.5 - 1.6	*033.4411.00c*	*033.4431.00c*	*033.4421.00c*	*033.4441.00c*	*033.4451.00c*	*033.4461.00c*
3.2	*033.4411.00f*	*033.4431.00f*	*033.4421.00f*	*033.4441.00f*	*033.4451.00f*	*033.4461.00f*
4.8	*033.4411.00k*	*033.4431.00k*	*033.4421.00k*	*033.4441.00k*	*033.4451.00k*	*033.4461.00k*
6.4 - 8.0	*033.4411.00n*	*033.4431.00n*	*033.4421.00n*	*033.4441.00n*	*033.4451.00n*	*033.4461.00n*

Four roller 2.4 mm wall thickness tubing

Clamp setting	314D2	314X2	314B2	314XB2	314DW2	314BW2
Variable	*033.4511.000*	*033.4531.000*	*033.4521.000*	*033.4541.000*	*033.4551.000*	*033.4561.000*
0.5 - 1.6	*033.4511.00c*	*033.4531.00c*	*033.4521.00c*	*033.4541.00c*	*033.4551.00c*	*033.4561.00c*
3.2	*033.4511.00f*	*033.4531.00f*	*033.4521.00f*	*033.4541.00f*	*033.4551.00f*	*033.4561.00f*
4.8	*033.4511.00k*	*033.4531.00k*	*033.4521.00k*	*033.4541.00k*	*033.4551.00k*	*033.4561.00k*
6.4	*033.4511.00n*	*033.4531.00n*	*033.4521.00n*	*033.4541.00n*	*033.4551.00n*	*033.4561.00n*

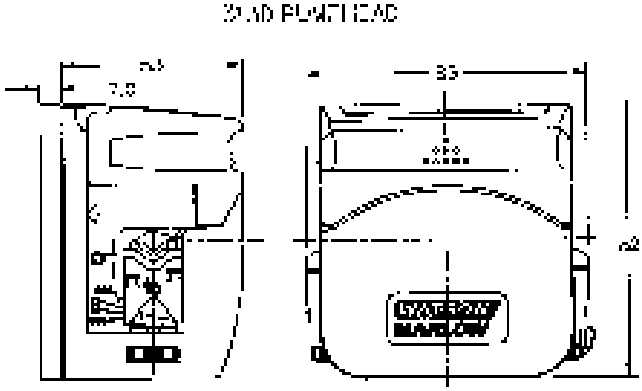
314B BARESHAFT PUMPHEAD

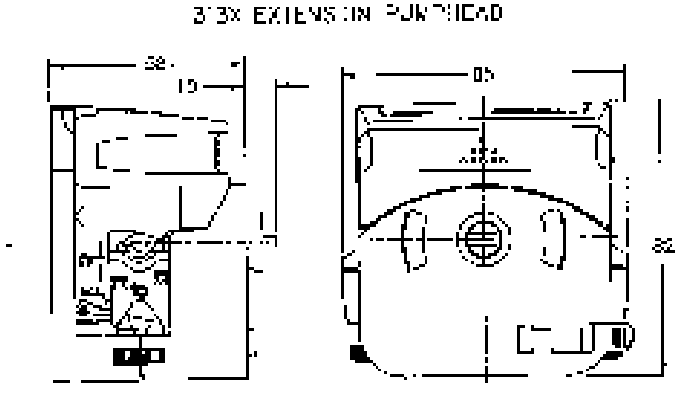


Flow rates

	1.6mm (1/16") wall tubing						
Bore mm	0.5	0.8	1.6	3.2	4.8	6.4	8.0
Bore "	1/50	1/32	1/16	1/8	3/16	1/4	5/16
Flow rate: ml/revolution	*0.03*	*0.06*	*0.25*	*0.85*	*1.9*	*3.0*	*4.0*
Maximum continuous flow: ml/min	*9*	*18*	*75*	*255*	*570*	*900*	*1200*
Maximum intermittent flow: ml/min	*18*	*36*	*150*	*510*	*1140*	*1800*	*2400*

For tube selections, see Tables A and B on page 47.





Materials of construction

Body rear	*Glass filled polypropylene*
Body front, body front extension, mounting plate, track and lever	*IXEF*
Rotor, tube clamps and mounting plate locking tab	*Glass filled Nylon*
Rollers	*MoS2 filled Nylon 6 (Nylatron)*
Spindles	*Electroless nickel plated, hardened steel*
Screws	*Stainless steel*
Bearings	*Bronze Bush*

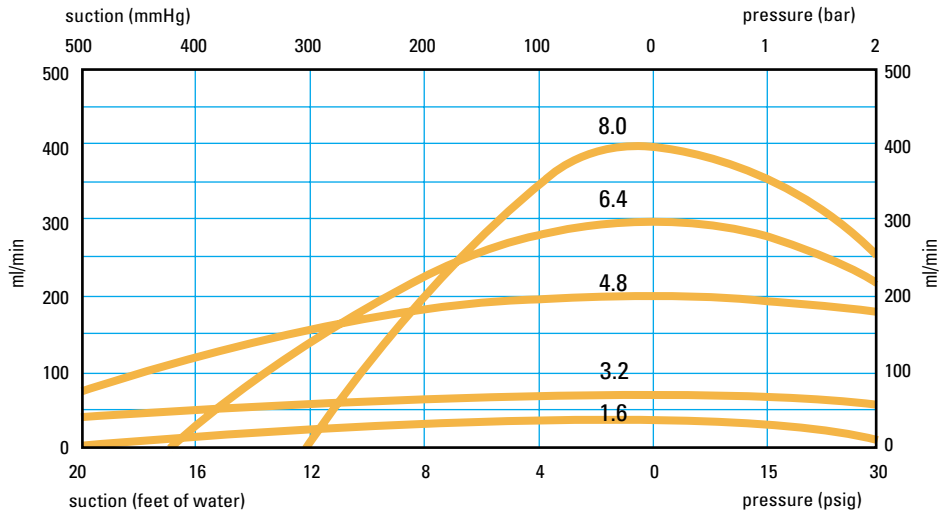
Specifications

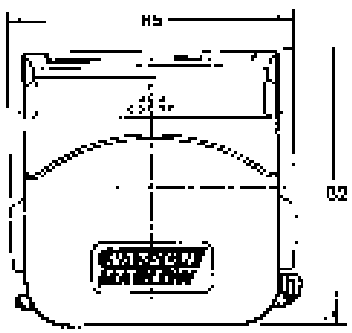
	1.6mm (1/16") wall thickness tubing						
Bore mm	0.5	0.8	1.6	3.2	4.8	6.4	8.0
Bore "	1/50	1/32	1/16	1/8	3/16	1/4	5/16
Maximum continuous speed: rpm	*400*	*400*	*400*	*400*	*400*	*400*	*400*
Maximum intermittent speed: rpm	*600*	*600*	*600*	*600*	*600*	*600*	*600*
With Marprene tubing							
Required torque up to 0.5 bar: kgcm	1.4	1.4	2.0	2.8	4.2	4.8	6.3
Required torque up to 2.0 bar: kgcm	1.5	1.5	2.1	4.0	6.1	6.8	7.8
Maximum continuous pressure: bar	*2*	*2*	*2*	*2*	*1.3*	*1.3*	*1.3*
Maximum intermittent pressure: bar	*3*	*3*	*3*	*2.5*	*2*	*2*	*1.7*
With Silicone tubing							
Required torque up to 0.5 bar: kgcm	1.1	1.1	1.7	2.3	2.9	3.5	4.0
Required torque up to 2.0 bar: kgcm	1.5	1.5	2.1	3.2	4.3	5.2	6.7
Maximum continuous pressure: bar	*2*	*2*	*1.5*	*1.5*	*1*	*1*	*1*
Maximum intermittent pressure: bar	*2.5*	*2.5*	*2*	*2*	*1.3*	*1.3*	*1.3*

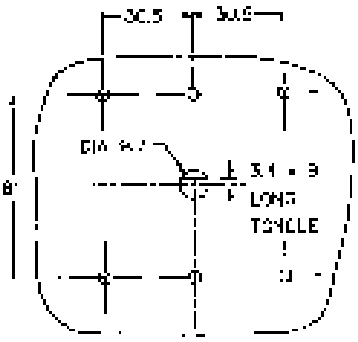
Performance against pressure

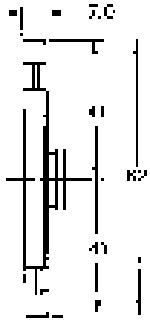
Conditions:
- Suction curves obtained with zero output pressure
- Pressure curves obtained with zero lift
- Pumphead speed 100 rpm

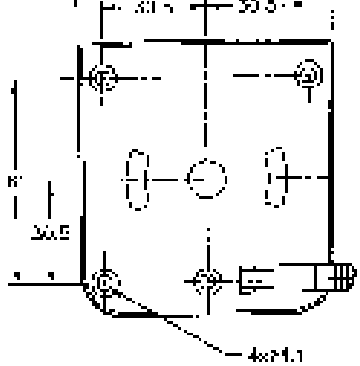
Conversion Factors:
Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi











313FDP/D fixed/variable speed DC pump, precision motors

The 313FDP/D uses our highest quality DC motor, offering precise speed adjustment, low electrical and audible noise, and a long operating life.

The 313FDP/D OEM pump is made up of a single channel 313D pumphead and a powerful 12 or 24 volt DC motor-gearbox, mounted on an aluminum faceplate. The coreless DC motors provide high torque output, and speed in a small case size. When fitted with 8.0mm x 1.6mm tubing, these pumps provide flow rates of up to 1250 ml/min. Snap on the 313X extension pumpheads to enable multi-channel pumping, depending on the torque limit of the drive (see page 18 for details on pumphead torque figures). When used with the 400 series OEM speed control board, the 313FDP/D provides a variable speed pumping system with a speed control ratio of 20:1, as well as stop/start and direction facilities, and analog control of speed. See page 37 for speed controls.

Ordering information

12V DC		24V DC		Power Consumption
50rpm	*040.MK10.3D0*	50rpm	*040.LK10.3D0*	5 VA
100rpm	*040.MP10.3D0*	100rpm	*040.LP10.3D0*	30 VA
250rpm	*040.MT10.3D0*	250rpm	*040.LT10.3D0*	30 VA

Specifications

Motor type	12 or 24V DC
Motor torque output	*50rpm 11kg cm* *100rpm 14kg cm* *250rpm 6kg cm*
Weight	*2kg (4.4lbs)*

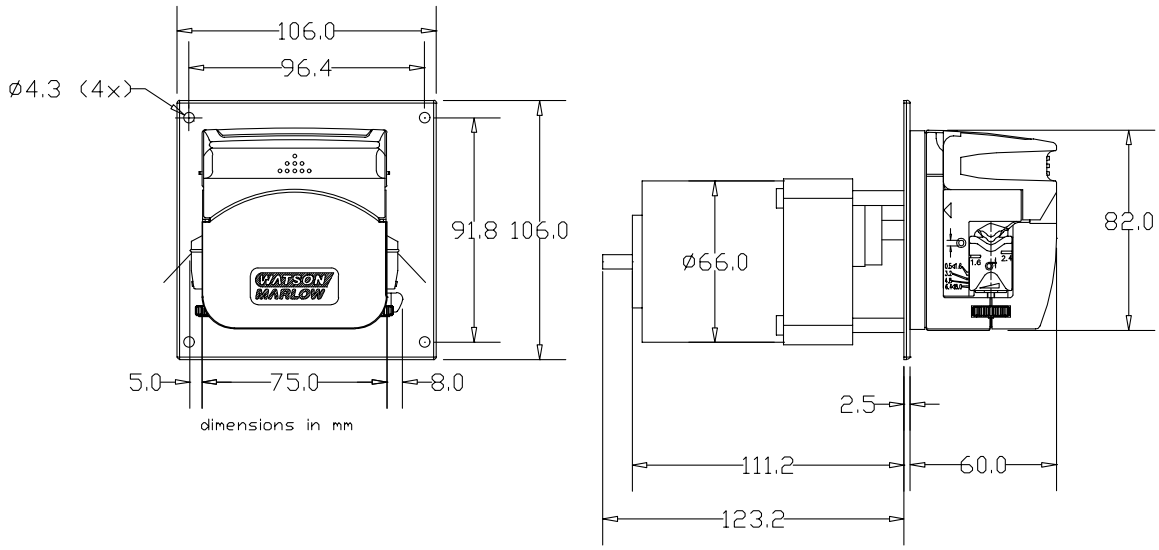
Flow rates

	1.6mm (1/16") wall thickness tubing						
	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
rpm	1/50"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
50	*1.50*	*3.00*	*13.0*	*50.0*	*110*	*180*	*250*
100	*3.00*	*6.00*	*26.0*	*100*	*220*	*360*	*500*
250	*7.50*	*15.0*	*65.0*	*250*	*550*	*900*	*1250*

Minimum flows are 5% of rates given with OEM speed control board

For tube selections, see Tables A and B on page 47.

ALL DIMENSIONS IN MILLIMETRES



313VDL/D variable speed pumps with brushless DC motor

The 313VDL/D uses a high quality brushless DC motor that provides precise speed adjustment, and low electrical and audible noise. Brushless DC motors have an extremely long service life because they have no internal wearing components. The 313VDL/D OEM pump is made up of a single channel 313D pumphead and a powerful 24V brushless DC gearmotor with built in controller, mounted on an aluminum faceplate. When fitted with 8.0mm x 1.6mm tubing, these pumps provide flow rates of up to 1750 ml/min. Snap on the 313X extension pumpheads to enable multi-channel pumping, depending on the torque limit of the drive (see page 18 for details on pumphead torque figures). The built-in controller allows control of speed, stop/start, direction, and a frequency tacho output.

Ordering information

	24V DC Brushless
100rpm	*040.NP10.3D0*
350rpm	*040.NU10.3D0*

For tube selections, see Tables A and B on inside back cover.

Specification Motor

Motor type	*24 Volt Brushless DC with built in controller*
Motor torque output	*100rpm, 21.0kg cm* *350rpm, 7.3kg cm*
Power consumption	*35VA*
Weight	*1.0kg (2.2 lbs)*

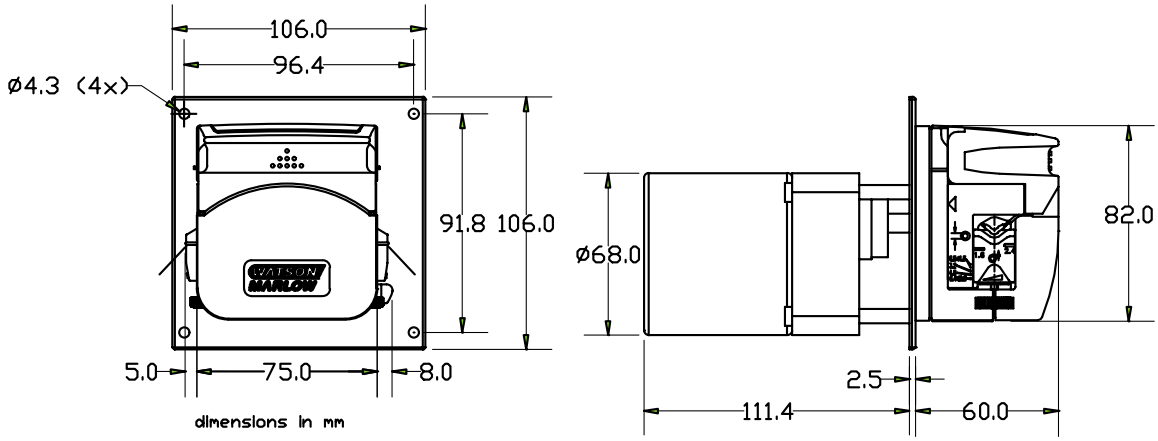
Motor/Controller Connections

Lead no.	Lead Color	Function	Descriptions
1	brown	FW/RV	Direction control input: 'High' CW, ' Low' CC (shaft side)
2	white	Vin	Input voltage (set-point) for speed loop. Resulting speed approx. 1000 rpm/V Vin < 4V: motor at full speed, speed loop off (open loop)
3	green	FG	Frequency generator output, 36 ppr; R out = 4kOhm (approx.)
4	black	GND	Motor return, ground (0v)
5	red	Vp	Motor supply voltage +24V (min 14V – Max 30V)
6	bare	shield	Shield for cable and connection to motor housing

Flow rates (ml/min)

	1.6mm (1/16") wall tubing						
	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
rpm	1/50"	1/32"	1/16"	1/32"	3/16"	1/16"	5/16"
100	*3.00*	*6.00*	*26.0*	*100*	*220*	*360*	*500*
350	*10.5*	*21.0*	*91.0*	*350*	*770*	*1260*	*1750*

For tube selections, see Tables A and B on page 47.



313FD/D fixed/variable speed DC pump

Made up of one 313D pumphead, a 12 or 24V DC motor, a gearbox, and a faceplate, these pumps provide flow rates up to 500 ml/min from 8.0mm bore tubing. Additionally, snap on the 313X extension pumpheads to enable multi-channel pumping, depending on the torque limit of the drive (see page 18 for details of pumphead torque figures). The six drives available give a choice of speeds and voltages.

When used with the 300 series OEM speed control board 039.2021.000 (see page 6), the 12V 313FD/D provides a variable speed pumping system with a speed control ratio of 10:1 and other facilities.

Ordering information

12V DC		24V DC	
10rpm	*030.7002.000*	10rpm	*030.7502.000*
50rpm	*030.7022.000*	50rpm	*030.7522.000*
100rpm	*030.7062.000*	100rpm	*030.7562.000*

Specifications

Motor type	*12 or 24V DC*
Motor torque output	*10rpm 24kg cm; 50rpm 11kg cm; 100rpm 6kg cm*
Power consumption	*17VA*
Weight	*2kg*
Brush life	*2500 hours*

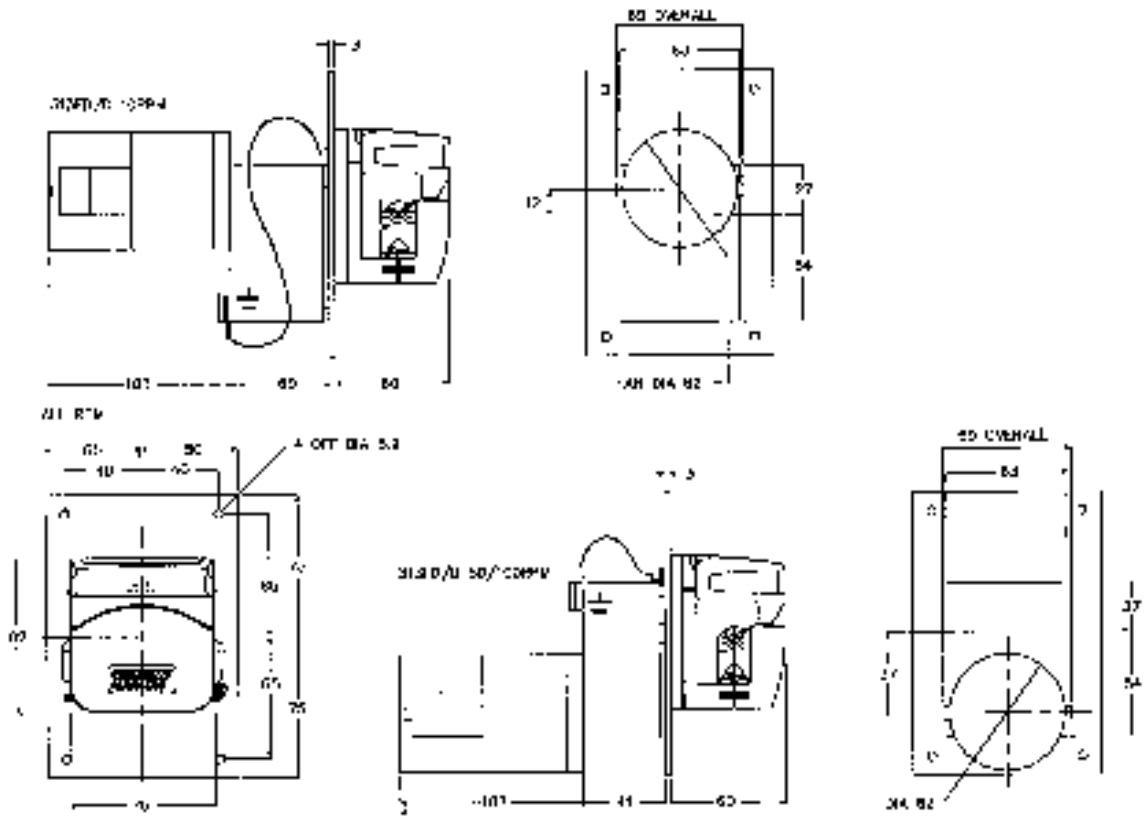
Flow rates

	1.6mm (1/16") wall thickness tubing						
rpm	0.5mm 1/50"	0.8mm 1/32"	1.6mm 1/16"	3.2mm 1/8"	4.8mm 3/16"	6.4mm 1/4"	8.0mm 5/16"
10	*0.30*	*0.70*	*2.60*	*10.0*	*22.0*	*36.0*	*50.0*
50	*1.50*	*3.00*	*13.0*	*50.0*	*110*	*180*	*250*
100	*3.00*	*6.00*	*26.0*	*100*	*220*	*360*	*500*

Minimum flows are 10% of rates given with OEM speed control board

For tube selections, see Tables A and B on page 47.

ALL DIMENSIONS IN MILLIMETRES



313FDC/D fixed speed 12V DC pump

The 313FDC/D OEM pump is made up of one 313D pumphead, a 12V DC motor, the Watson-Marlow gearbox, and a faceplate. These pumps are available for applications that require more torque than is available from the 313FD/D, providing flow rates up to 1100 ml/min for continuous use from 8.0mm bore tubing.

Additionally, snap on 313X extension pumpheads for multi-channel pumping, depending on the torque limit of the drive (see pumphead torque figures on page 18).

Ordering information

12V DC 220rpm	*030.8932.000*

Specifications

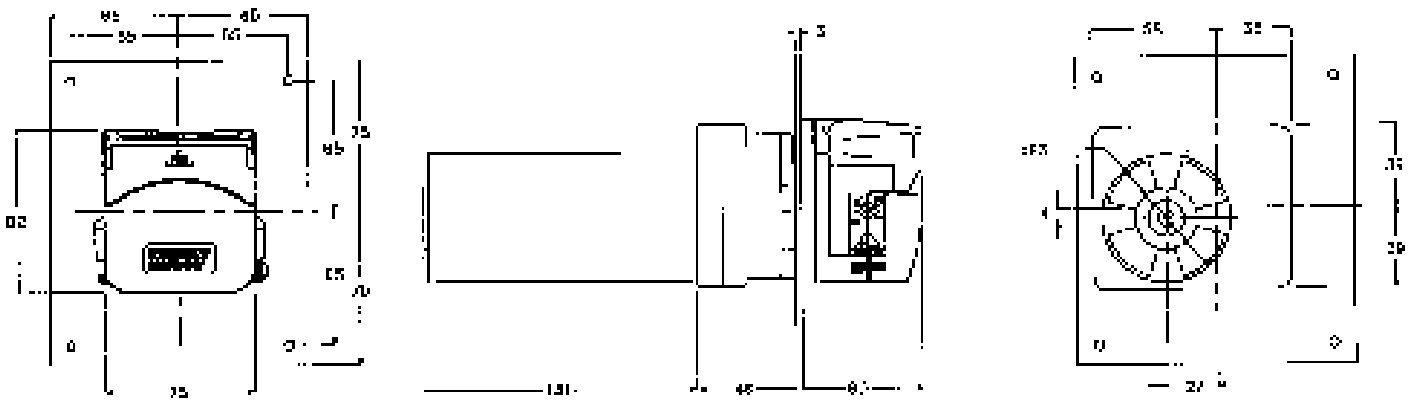
Motor type	*12V DC*
Motor torque output	*14kg cm*
Motor consumption	*35VA*
Weight	*2.2kg*
Brush life	*2500 hours*

Flow rates

	1.6mm (1/16") wall thickness tubing						
	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
rpm	1/50"	1/32"	1/16"	1/8"	3/16"	1/16"	5/16"
220	*6.60*	*13.2*	*57.2*	*220*	*484*	*792*	*1100*

For tube selections, see Tables A and B on page 47.

ALL DIMENSIONS IN MILLIMETRES



313FAC/D fixed speed AC pump

The 313FAC/D is made up of one 313D pumphead, an induction motor, Watson-Marlow's purpose-designed gearbox, and a faceplate. It is available in three standard voltages with a choice of four speeds, providing flow rates up to 1620 ml/min from 8.0 mm bore tubing (1350 ml/min if used on 50 Hz supplies).

Snap on up to five 313X extension pumpheads for multi-channel pumping depending on the torque limit of the drive (see pumphead torque figures on page 18).

Ordering information

	100-120V AC	220V AC	240V AC
33/40rpm 50/60Hz	*030.8802.000*	*030.8803.000*	*030.8812.000*
67/80rpm 50/60Hz	*030.8822.000*	*030.8823.000*	*030.8832.000*
135/162rpm 50/60Hz	*030.8842.000*	*030.8843.000*	*030.8852.000*
270/324rpm 50/60Hz	*030.8862.000*	*030.8863.000*	*030.8872.000*

Specification

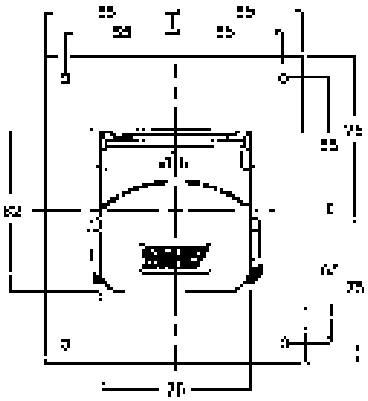
Motor type	*Induction*
Motor torque output	*33/67rpm 20kg cm* *40/80rpm 16kg cm* *135/270rpm 10kg cm* *162/324rpm 8kg cm*
Power consumption	*50VA*
Weight	*2.5kg*

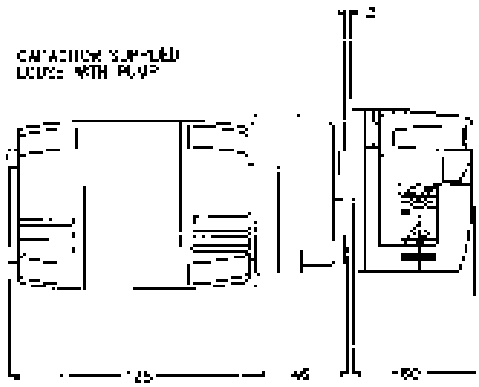
Flow rates

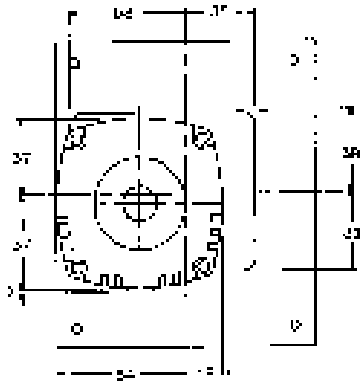
		1.6mm (1/16") wall thickness tubing						
		0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Hz	rpm	1/50"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
50	*33*	*1.00*	*2.00*	*8.6*	*33.0*	*72.6*	*119*	*165*
	67	*2.00*	*4.00*	*17.4*	*67.0*	*147*	*241*	*335*
	135	*4.00*	*8.10*	*35.1*	*135*	*297*	*486*	*675*
	270	*8.10*	*16.2*	*70.2*	*270*	*594*	*972*	*1350*
60	*40*	*1.20*	*2.40*	*10.4*	*40.0*	*88.0*	*144*	*200*
	80	*2.40*	*4.90*	*20.8*	*80.0*	*176*	*288*	*400*
	162	*4.80*	*9.70*	*42.1*	*162*	*356*	*583*	*810*
	324	*9.70*	*19.4*	*84.2*	*324*	*713*	*1166*	*1620*

For tube selections, see Tables A and B on page 47.

ALL DIMENSIONS IN MILLIMETRES







313FC/D fixed speed AC Pump

Made up of one 313D pumphead, a shaded pole motor, a gearbox and a faceplate, these pumps provide flow rates up to 500 ml/min from 8.0mm bore tubing. The motor is rated for continuous duty, making this pump ideal for both dosing and transfer duties. Extension pumpheads may be snapped on for multi-channel pumping, depending on the torque limit of the drive (see pumphead torque figures on page 18). With a choice of speeds and voltages, the 313FC/D provides a low cost OEM pumping system. The 313FC/D is supplied with a motor cooling fan. U.L. listed motors are available upon request.

Ordering information

	220-240V AC	100-120V AC
10rpm 50Hz	*030.6032.000*	*030.6002.000*
50rpm 50Hz	*030.6232.000*	*030.6202.000*
100rpm 50Hz	*030.6632.000*	*030.6602.000*

Specifications

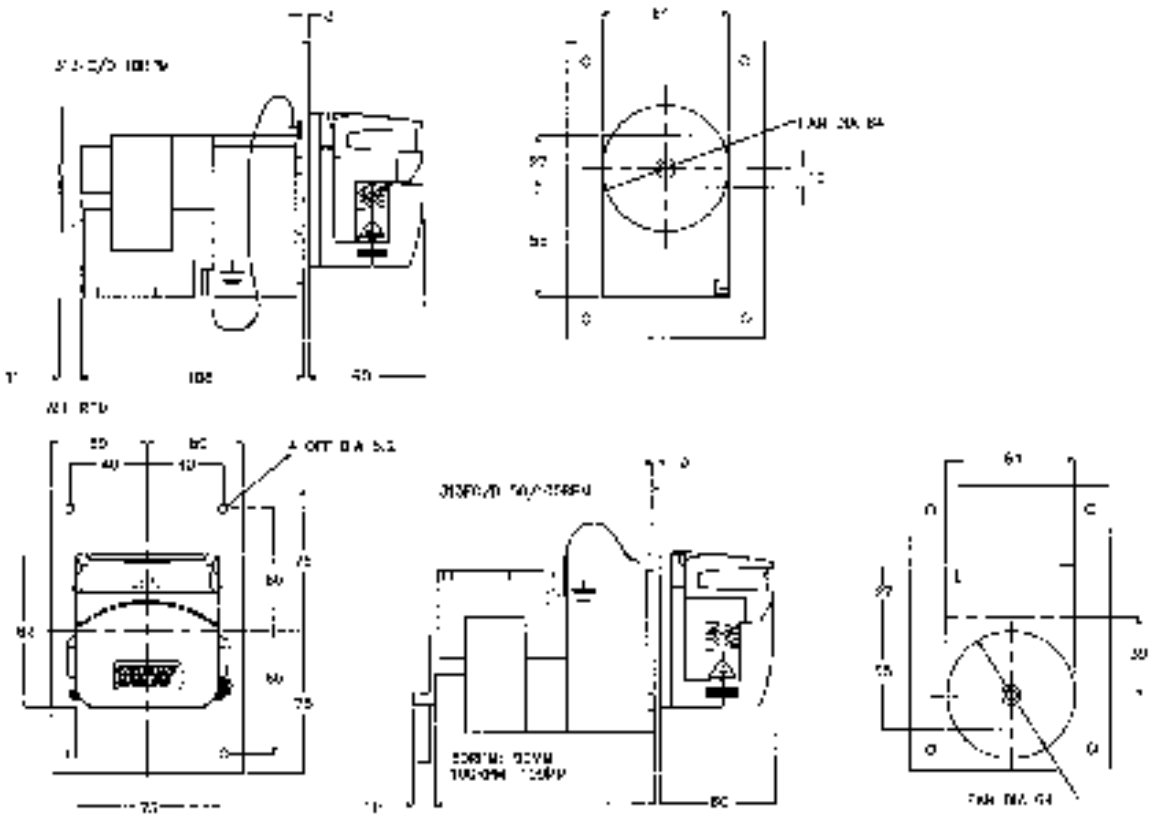
Motor type	*Shaded pole induction*
Motor torque output	*10rpm 19.5kg cm; 50rpm 7.5kg cm; 100rpm 6.5kg cm*
Power consumption	*10rpm 21VA; 50, 100rpm 40VA*
Weight	*2.2kg*

Flow rates

		1.6mm (1/16") wall thickness tubing						
		0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
HZ	rpm	1/50"	1/32"	1/16"	1/8"	3/16"	1/16"	5/16"
50	*10*	*0.30*	*0.60*	*2.60*	*10.0*	*22.0*	*36.0*	*50.0*
	50	*1.50*	*3.00*	*13.0*	*50.0*	*110*	*180*	*250*
	100	*3.00*	*6.00*	*26.0*	*100*	*220*	*360*	*500*
60	*12*	*0.40*	*0.70*	*3.10*	*12.0*	*26.4*	*43.2*	*60.0*
	60	*1.80*	*3.60*	*15.6*	*60.0*	*132*	*216*	*300*
	115	*3.45*	*6.90*	*30.0*	*115*	*253*	*414*	*575*

For tube selections, see Tables A and B on page 47.

ALL DIMENSIONS IN MILLIMETRES



313/314 maximum number of pumpheads permissible

Permissible pumpheads

Maximum number of gangable 313/314 pumpheads using Marprene tubing

Pressure limits	Up to 0.5 bar →							Up to 2 bar →						
Tube bore mm	0.5	0.8	1.6	3.2	4.8	6.4	8.0	0.5	0.8	1.6	3.2	4.8	6.4	8.0
Tube bore "	1/50	1/32	1/16	1/8	3/16	1/4	5/16	1/50	1/32	1/16	1/8	3/16	1/4	5/16
313FAC 33/40rpm	6	6	6	6	4	4	3	6	6	6	5	3	2	2
67/80rpm	6	6	6	5	3	3	2	6	6	6	4	2	2	2
135/162rpm	6	6	5	3	2	2	1	6	6	4	2	1	1	1
270/324rpm	5	5	4	2	1	1	1	5	5	3	2	1	1	1
313FDC 220rpm	6	6	6	5	3	2	2	6	6	6	3	2	2	1
313FC 10rpm	6	6	6	6	4	4	3	6	6	6	4	3	2	2
50rpm 5	5	3	2	1	1	1	5	5	3	1	1	1	0	
100rpm 4	4	3	2	1	1	1	4	4	3	1	1	0	0	
313FD 10rpm	6	6	6	6	5	5	3	6	6	6	6	3	3	3
50rpm 6	6	5	3	2	2	1	6	6	5	2	1	1	1	
100rpm 4	4	3	2	1	1	0	4	4	2	1	0	0	0	
313FDP 50rpm	6	6	4	3	2	1	1	6	6	4	2	1	1	1
100rpm 6	6	6	3	2	2	2	6	6	5	2	1	1	1	
250rpm 3	3	2	1	1	1	1	3	3	2	1	0	0	0	
313FBD 100rpm	6	6	6	6	5	4	3	6	6	6	5	3	3	2
350rpm	4	4	4	2	1	1	1	4	4	3	1	1	1	0

Maximum number of gangable 313/314 pumpheads using Silicone tubing

Pressure limits	Up to 0.5 bar →							Up to 2 bar →						
Tube bore mm	0.5	0.8	1.6	3.2	4.8	6.4	8.0	0.5	0.8	1.6	3.2	4.8	6.4	8.0
Tube bore "	1/50	1/32	1/16	1/8	3/16	1/4	5/16	1/50	1/32	1/16	1/8	3/16	1/4	5/16
313FAC 33/40rpm	6	6	6	6	6	5	4	6	6	6	6	4	3	2
40/80rpm	6	6	6	6	5	4	4	6	6	6	5	3	3	2
135/160rpm	6	6	5	4	3	2	2	6	6	5	3	2	1	1
270/324rpm	6	6	4	3	2	2	2	5	5	3	2	1	1	1
313FDC 220rpm	6	6	6	6	5	4	3	6	6	6	4	4	2	2
313FC 10rpm	6	6	6	6	6	5	4	6	6	6	6	4	3	2
50rpm 6	6	4	3	2	2	1	5	5	3	2	1	1	1	
100rpm 5	5	3	2	2	1	1	4	4	3	2	1	1	1	
313FD 10rpm	6	6	6	6	6	6	6	6	6	6	6	5	4	3
50rpm 6	6	6	4	3	3	2	6	6	5	3	2	2	1	
100rpm 5	5	3	2	2	1	1	4	4	2	1	1	1	0	
313FDP 50rpm	6	6	6	3	3	2	2	6	6	4	2	2	1	1
100rpm 6	6	6	5	3	3	2	6	6	5	3	2	2	1	
250rpm 4	4	2	1	1	1	1	2	2	1	1	1	1	0	
313FBD 100rpm	6	6	6	6	5	5	3	6	6	6	6	5	4	3
350rpm	5	5	3	2	2	1	1	3	3	2	1	1	1	1

Microcassette pumpheads

The 300 series of interchangeable OEM pumpheads also includes the 304MC and 308MC microcassette pumpheads, with a choice of four rollers for higher flow or eight rollers for higher precision. Microcassette pumpheads are available with three or five pumping channels.

Designed to give affordable precision for multi-channel applications, each pumphead contains removable cassettes which may be preloaded with tubing elements. Up to two MCX or three MCX3 extension pumpheads may be added to a maximum twelve or fifteen channels, depending on the drive selected.

Cassettes may be removed and tubing changed at any time without stopping the drive or disturbing neighboring channels, and each cassette will accept any of the twenty tube sizes available.

Double segment manifold tubing elements are available in Marprene, PVC and Platinum-cured Silicone and feature two pumping segments to give double tube life. Adjacent cassettes may contain tubing of a different type or size.

Microcassette pumpheads are compatible with all 300 Series motors and controllers.

Ordering information

304MC four roller five channel pumphead	*033.6450.000*
308MC eight roller five channel pumphead	*033.6850.000*
304MCX four roller five channel extension pumphead	*033.6451.000*
308MCX eight roller five channel extension pumphead	*033.6851.000*
304MC3 four roller three channel pumphead	*033.6460.000*
308MC3 eight roller three channel pumphead	*033.6860.000*
304MCX3 four roller three channel extension pumphead	*033.6462.000*
308MCX3 eight roller three channel extension pumphead	*033.6862.000*

Materials of construction

Bayonet mounting plate	*IXEF*
Spindles, shaft, screws	*Stainless steel*
Cassette	*Kematal*
Sealed bearings	*Carbon steel*
Rollers, locking rods	*MOS2 filled Nylon 6 (Nylatron)*
Body, rotor	*Aluminium*

304MC Flow rates

Double segment manifold tubing

Bore mm	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm	0.63mm	0.76mm
Bore "	0.005"	0.007"	0.01"	0.015"	0.02"	0.025"	0.03"
Flow rate: ml/revolution	*0.001*	*0.003*	*0.005*	*0.008*	*0.015*	*0.028*	*0.042*
Maximum continuous flow: ml/min	*0.1*	*0.3*	*0.52*	*0.92*	*1.7*	*3.1*	*4.6*
Bore mm	0.88mm	1.02mm	1.14mm	1.29mm	1.42mm	1.47mm	1.52mm
Bore "	0.035"	0.04"	0.045"	0.05"	0.055"	0.058"	0.06"
Flow rate: ml/revolution	*0.058*	*0.074*	*0.09*	*0.12*	*0.15*	*0.16*	*0.17*
Maximum continuous flow: ml/min	*6.40*	*8.10*	*9.90*	*13.0*	*17.0*	*18.0*	*19.0*
Bore mm	1.65mm	1.85mm	2.05mm	2.29mm	2.54mm	2.79mm	
Bore "	0.065"	0.07"	0.08"	0.09"	0.1"	0.11"	
Flow rate: ml/revolution	*0.2*	*0.25*	*0.3*	*0.36*	*0.43*	*0.48*	
Maximum continuous flow: ml/min	*22.0*	*28.0*	*33.0*	*40.0*	*47.0*	*53.0*	

For tube selections, see Table F on page 47.

304MC Specifications

Bore mm	0.5mm	1.02mm	1.52mm	2.05mm	2.54mm	2.79mm
Bore "	0.02"	0.04"	0.06"	0.08"	0.1"	0.11"
Maximum continuous speed: rpm	*110*	*110*	*110*	*110*	*110*	*110*
With Marprene tubing (Cam lever vertical, all cassettes full)						
Required torque: kg cm	1.8	2.9	3.6	3.6	3.6	3.6
Maximum pressure: bar	*2*	*2*	*2*	*1.3*	*1.3*	*1*
Maximum vacuum: mmHg	*400*	*400*	*300*	*300*	*200*	*200*
Maximum vacuum: feet of water	*16*	*16*	*12*	*12*	*8*	*8*
With Silicone tubing (Cam lever vertical, all cassettes full)						
Required torque: kg cm	1.6	2.6	3.2	3.2	3.2	3.2
Maximum pressure: bar	*2*	*2*	*1.3*	*1.3*	*1*	*1*
Maximum vacuum: mmHg	*400*	*400*	*300*	*300*	*200*	*200*
Maximum vacuum: feet of water	*16*	*16*	*12*	*12*	*8*	*8*

308MC Flow rates

Double segment manifold tubing

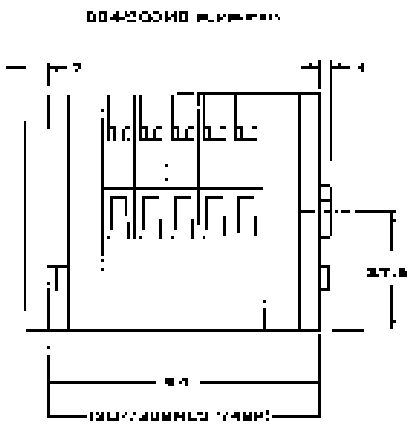
Bore mm	0.13mm	0.19mm	0.25mm	0.38mm	0.5mm	0.63mm	0.76mm
Bore "	0.005"	0.007"	0.01"	0.015"	0.02"	0.025"	0.03"
Flow rate: ml/revolution	*0.001*	*0.003*	*0.004*	*0.008*	*0.013*	*0.024*	*0.035*
Maximum continuous flow: ml/min	*0.1*	*0.30*	*0.47*	*0.83*	*1.40*	*2.60*	*3.90*
Bore mm	0.88mm	1.02mm	1.14mm	1.29mm	1.42mm	1.47mm	1.52mm
Bore"	0.035"	0.04"	0.045"	0.05"	0.055"	0.058"	0.06"
Flow rate: ml/revolution	*0.048*	*0.06*	*0.08*	*0.95*	*0.11*	*0.12*	*0.13*
Maximum continuous flow: ml/min	*5.30*	*6.60*	*8.80*	*10.0*	*12.0*	*13.0*	*14.0*
Bore mm	1.65mm	1.85mm	2.05mm	2.38mm	2.54mm	2.79mm	
Bore "	0.065"	0.07"	0.08"	0.09"	0.1"	0.11"	
Flow rate: ml/revolution	*0.15*	*0.18*	*0.22*	*0.26*	*0.30*	*0.33*	
Maximum continuous flow: ml/min	*17.0*	*20.0*	*24.0*	*29.0*	*33.0*	*36.0*	

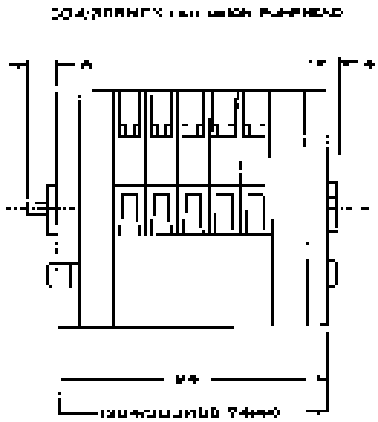
For tube selections, see Table F on page 47.

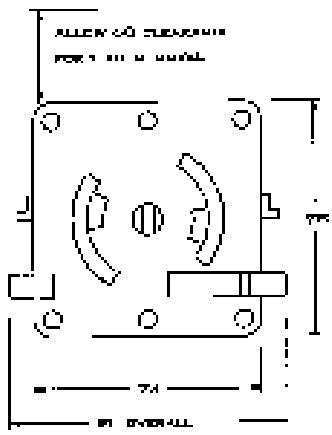
308MC Specifications

Bore mm	0.5mm	1.02mm	1.52mm	2.05mm	2.54mm	2.79mm
Bore "	0.02"	0.04"	0.06"	0.08"	0.1"	0.11"
Maximum continuous speed: rpm	*110*	*110*	*110*	*110*	*110*	*110*
With Marprene tubing (Cam lever vertical, all cassettes full)						
Required torque: kg cm	4.1	4.5	5.5	5.8	6.0	6.0
Maximum pressure: bar	*2*	*2*	*2*	*1.3*	*1.3*	*1*
Maximum vacuum: mmHg	*400*	*400*	*300*	*300*	*200*	*200*
Maximum vacuum: feet of water	*16*	*16*	*12*	*12*	*8*	*8*
With Silicone tubing (Cam lever vertical, all cassettes full)						
Required torque: kg cm	2.6	2.8	3.5	3.7	3.8	3.8
Maximum pressure: bar	*2*	*2*	*1.3*	*1.3*	*1*	*1*
Maximum vacuum: mmHg	*400*	*400*	*300*	*300*	*200*	*200*
Maximum vacuum: feet of water	*16*	*16*	*12*	*12*	*8*	*8*

Note: To work against higher pressures, the cam lever may be moved beyond the vertical position. Torque requirement will be approximately 2 to 3 times that listed, and tube life could be shortened.







400 Series OEM Systems

The 400 Series is a complete range of pumps for low and medium flow applications. These pumps are designed in a modular way, giving them a large number of standard versions, and the ability to customise. If you don't see exactly what you are looking for, our sales engineers can help you make changes ranging from simple modifications, to a completely new pump design.

The 400 Series is organized in a 3 tiered system. Tier I is our standard product offering as shown in the catalogue. Each one can be ordered using the part numbers listed. A Tier II product is a customized version of the standard. The modifications tend to be simple things, such as an alternate gear ratio, or tube holder. Table A lists some of the more common options available to Tier II products. A Tier III product is also a custom product, but there are no limits on what can be done. Tier III can take any form, such as a stepper drive with a custom mounting plate, or an entirely new pump designed and built from scratch. Three examples of Tier III products are pictured below. This system allows the pump design to evolve with your product design. Start with a standard product for your early prototypes, and add custom options as your design moves towards production.

Table A Tier II Pump Options for 400 Series pumps

Option	Pumphead									
	B1	D2	D3	DM2-3	M1	N	VM	G	R1	L2
Multiple channel versions	2	2			2,3,4	4,6,8	2,3,4	2,3,4	1,2	2
Tube WT	1.6,1.0				1.6,1.0					
Pumphead-only version					X	X				
# of rollers	4	4	4	4	4	4	10	4,8	4,8	4
PVDF track & rotor	X	X	X	X	X	X			X	
Low pulsation dual offset pumpheads	X									X
Continuous tubing	X								X	X
Tube elements with barb/luer connectors		X	X		X	X			X	X
Manifold tubing				X			X	X		
High speed intermittent duty pumps	X	X	X	X	X	X	X	X	X	X
Alternate gear ratios	X	X	X	X	X	X	X	X	X	X
Speed controls	X	X	X	X	X	X	X	X	X	X

Tier III Products

The precise flow of the B1 pumphead was required for this 8 channel variant.

This customer needed a completely new closed pump for a medical application.

This was required for an extremely small application; the pump is only 50mm long by 75mm wide.

400F/B1 series one channel peristaltic pumps

400F/B1

The 400F/B1 is our standard instrument-quality peristaltic pump for low flow rates. The 400F/B1 has a spring-loaded track, which gives superior tube life and flow-accuracy. The tubing occlusion can be adjusted to produce higher pressures. The pump is available with four gearmotors options. Each one is extremely small in size and has low power requirements. The pump accepts continuous tubing with a 1.6mm wall. The tubing is available in six bore sizes, allowing the user to precisely match the pump to the required flow. See page 21 for additional options.

Flow capacity

	1.6mm (1/16") wall thickness continuous tubing					
Bore mm	0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm
Bore "	1/50"	1/32"	1/16"	3/32"	3/16"	5/32"
Flow rate ml/revolution	*0.01*	*0.03*	*0.11*	*0.24*	*0.41*	*0.59*
Max continuous flow ml/min 200 rpm	*2.0*	*6.0*	*22*	*44*	*81*	*117*
Max intermittent flow ml/min 400 rpm	*4.4*	*12*	*46*	*96*	*164*	*236*

Materials of construction

Rotor, rollers, track, tube holder	*Black Acetal (POM)*
Mounting plate	*Black anodized aluminium*
Screws, springs, shafts	*Acid resistant stainless steel*

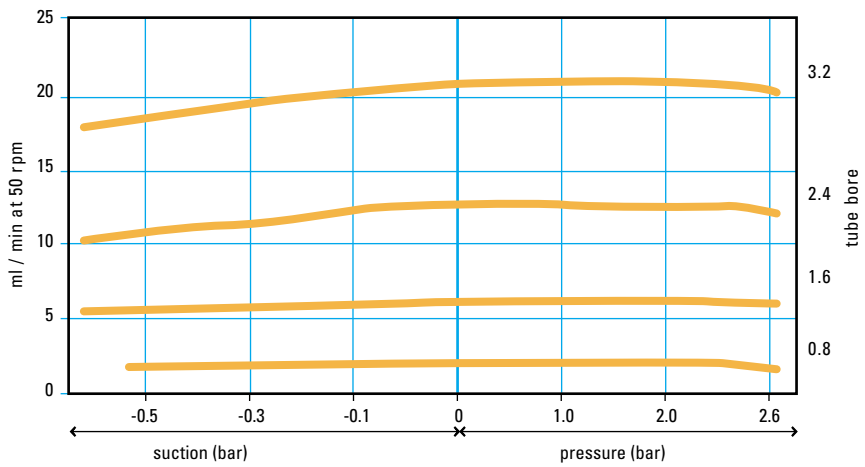
Specifications

Maximum continuous speed	*200 rpm*
Maximum intermittent speed	*400 rpm*
Weight of complete pump	*240-420 g*
Tube type	*Tube elements with fittings*

Performance against pressure

The spring-loaded tension arm makes it possible to adjust the pump to operate at higher back pressures/suction heights without overloading the tubing. In the diagram shown below, the arm is set for optimal performance at back pressures up to approx. 2.5 bar. The pump is capable of operating against pressures up to 3 bar.

Conversion Factors:
Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi



Ordering information

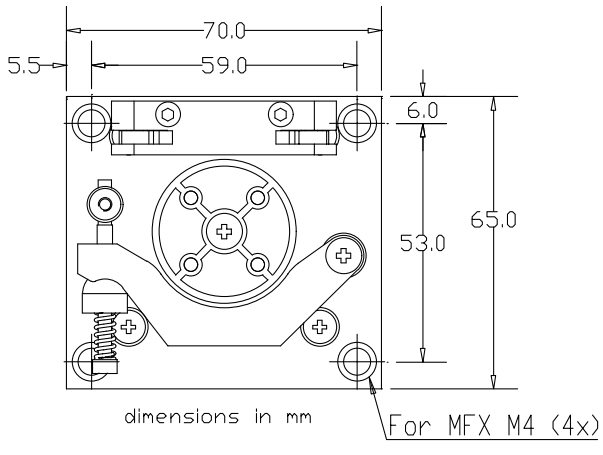
Standard DC	12rpm	40rpm	100rpm	200rpm
400FDC/B1 12V	*040.D81B.01C*	*040.DH1B.01C*	*040.DP1B.01C*	*040.DS1B.01C*
400FDC/B1 24V	*040.E81B.01C*	*040.EH1B.01C*	*040.EP1B.01C*	*040.ES1B.01C*
Economy DC	**25rpm**	**75rpm**	**200rpm**	**350rpm**
400FD/B1 12V	*040.AC1B.01C*	*040.AN1B.01C*	*040.AS1B.01C*	*040.AU1B.01C*
400FD/B1 24V	*040.BC1B.01C*	*040.BN1B.01C*	*040.BS1B.01C*	*040.BU1B.01C*
Brushless DC	**15rpm**	**50rpm**	**130rpm**	**250rpm**
400FDL/B1 24V	*040.F91B.01C*	*040.FK1B.01C*	*040.FQ1B.01C*	*040.FT1B.01C*
Synchronous AC 115V	**5rpm**	**12rpm**	**25rpm**	
400FS/B1 115VAC 60Hz	*040.H41B.01C*	*040.H81B.01C*	*040.HC1B.01C*	
Synchronous AC 220V	**4rpm**	**10rpm**	**20rpm**	
400FS/B1 230 V 500Hz	*040.J31B.01C*	*040.J71B.01C*	*040.JA1B.01C*	

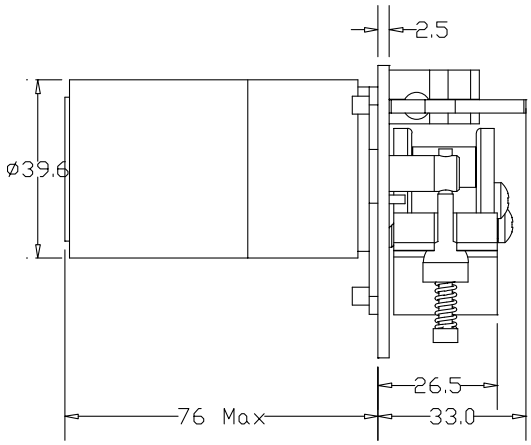
See motor descriptions on page 45.

Flow rates

	Single Channel 1.6mm (1/16") wall thickness tubing					
Bore mm	0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm
Bore "	1/50"	1/32"	1/16"	3/32"	3/16"	5/32"
Standard DC 12rpm	*0.120*	*0.360*	*1.32*	*2.88*	*4.92*	*7.08*
Standard DC 40rpm	*0.400*	*1.20*	*4.40*	*9.60*	*16.4*	*23.6*
Standard DC 100rpm	*1.00*	*3.00*	*11.0*	*24.0*	*41.0*	*59.0*
Standard DC 200rpm	*2.00*	*6.00*	*22.0*	*48.0*	*82.0*	*118*
Economy DC 25rpm	*0.250*	*0.750*	*2.75*	*6.00*	*10.25*	*14.8*
Economy DC 75rpm	*0.750*	*2.25*	*8.25*	*18.0*	*30.8*	*44.3*
Economy DC 200rpm	*2.00*	*6.00*	*22.0*	*48.0*	*82.0*	*118*
Economy DC 350rpm	*3.50*	*10.5*	*38.5*	*84.0*	*144*	*207*
Brushless DC 15rpm	*0.150*	*0.450*	*1.65*	*3.60*	*6.15*	*8.85*
Brushless DC 50rpm	*0.500*	*1.50*	*5.50*	*12.0*	*20.5*	*29.5*
Brushless DC 130rpm	*1.30*	*3.90*	*14.3*	*31.2*	*53.3*	*76.7*
Brushless DC 250rpm	*2.50*	*7.50*	*27.5*	*60.0*	*103*	*148*
Synchronous AC 60Hz 5rpm	*0.050*	*0.150*	*0.55*	*1.20*	*2.1*	*3.0*
Synchronous AC 60Hz 12rpm	*0.120*	*0.360*	*1.32*	*2.88*	*4.92*	*7.08*
Synchronous AC 60Hz 25rpm	*0.250*	*0.750*	*2.75*	*6.00*	*10.25*	*14.8*
Synchronous AC 50Hz 4rpm	*0.040*	*0.120*	*0.44*	*0.96*	*1.6*	*2.4*
Synchronous AC 50Hz 10rpm	*0.100*	*0.300*	*1.10*	*2.40*	*4.10*	*5.90*
Synchronous AC 50Hz 20rpm	*0.200*	*0.600*	*2.20*	*4.80*	*8.20*	*11.8*

See motor descriptions on page 45.
For tube selections, see Table A on page 47.





400F/D2-D3 two or three channel peristaltic pumps

400F/D2

The 400F/D is our standard instrument-quality peristaltic pump for low flow rates. The pumps have a spring-loaded track, which gives superior tube life and flow-accuracy. The tubing occlusion can be adjusted to produce higher pressures. The pump is available with four standard gearmotors. Each one is extremely small in size and has low power requirements. The pump accepts tube elements with a 1.0mm wall thickness. The tubing is available in four bore sizes, allowing the user to precisely match the pump to the required flow. See page 21 for additional options.

Flow capacity

	1.0mm wall thickness tubing elements			
Bore mm	0.5mm	1.0mm	2.0mm	3.0mm [1]
Flow rate ml/revolution	*0.013*	*0.05*	*0.18*	*0.33*
Max continuous flow ml/min	*2.6*	*10*	*36*	*66*
Max intermittent flow ml/min	*5.2*	*20*	*72*	*132*

[1] *rated for silicone tubing only*

Materials of construction

Rotor, rollers, track, tube holder	*Black Acetal (POM)*
Mounting plate	*Black anodized aluminium*
Screws, springs, shafts	*Acid resistant stainless steel*

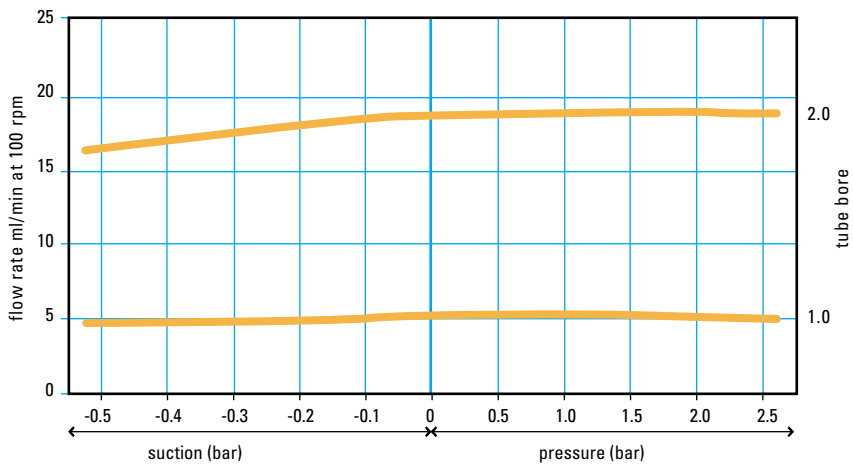
Specifications

Maximum continuous speed	*200 rpm*
Maximum intermittent speed	*400 rpm*
Weight of complete pump	*240-420 g*
Tube type	*Tube elements with fittings*

Performance against pressure

The spring-loaded tension arm makes it possible to adjust the pump to operate at higher back pressures/suction heights without overloading the tubing. In the diagram shown below, the arm is set for optimal performance at back pressures up to approx. 2.5 bar. The pump is capable of operating against pressures up to 2.5 bar.

Conversion Factors:
Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi



400F/D3

Ordering information

Standard DC	12rpm	40rpm	100rpm	200rpm
400FDC/D2 12V Two channel	*040.D81D.N2C*	*040.DH1D.N2C*	*040.DP1D.N2C*	*040.DS1D.N2C*
400FDC/D2 24V Two channel	*040.E81D.N2C*	*040.EH1D.N2C*	*040.EP1D.N2C*	*040.ES1D.N2C*
400FDC/D3 12V Three channel	*040.D81D.N3C*	*040.DH1D.N3C*	*040.DP1D.N3C*	
400FDC/D3 24V Three channel	*040.E81D.N3C*	*040.EH1D.N3C*	*040.EP1D.N3C*	
Economy DC		**25rpm**	**75rpm**	**200rpm**
400FD/D2 12V Two channel		*040.AC1D.N2C*	*040.AN1D.N2C*	*040.AS1D.N2C*
400FD/D2 24V Two channel		*040.BC1D.N2C*	*040.BN1D.N2C*	*040.BS1D.N2C*
400FD/D3 12V Three channel		*040.AC1D.N3C*	*040.AN1D.N3C*	
400FD/D3 24V Three channel		*040.BC1D.N3C*	*040.BN1D.N3C*	
Brushless DC	**15rpm**	**50rpm**	**130rpm**	**250rpm**
400FDL/D2 24V Two channel	*040.F91D.N2C*	*040.FK1D.N2C*	*040.FQ1D.N2C*	*040.FT1D.N2C*
400FDL/D3 24V Three channel	*040.F91D.N3C*	*040.FK1D.N3C*	*040.FQ1D.N3C*	
Synchronous AC 110V		**5rpm**	**12rpm**	**25rpm**
400FS/D2 110VAC 60Hz Two channel		*040.H41D.N2C*	*040.H81D.N2C*	*040.HC1D.N2C*
Synchronous AC 220V		**4rpm**	**10rpm**	**20rpm**
400FS/D2 220VAC 50Hz Two channel		*040.J31D.N2C*	*040.J71D.N2C*	*040.JA1D.N2C*

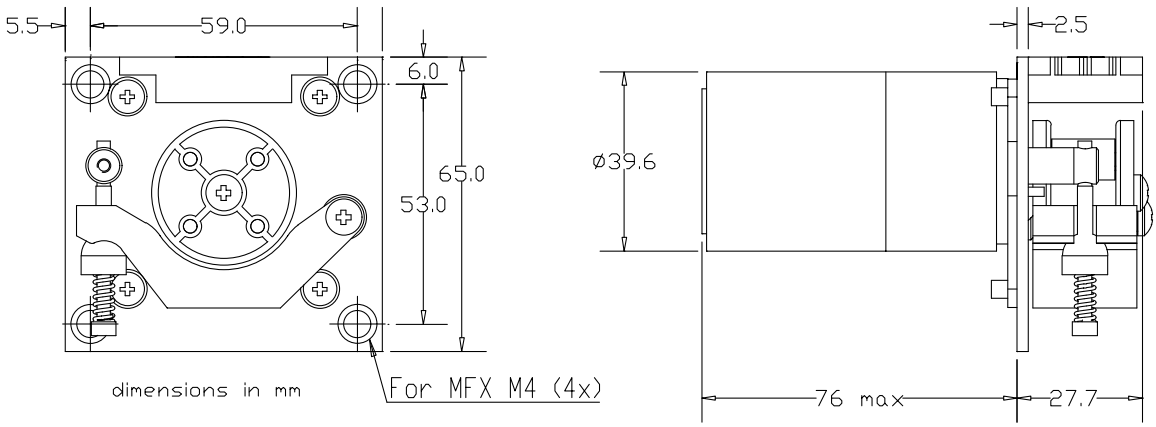
See motor descriptions on page 45.

Flow rates

	Per channel 1.0mm wall thickness			
Bore mm	0.5mm	1.0mm	2.0mm	3.0mm[1]
Standard DC 12rpm	*0.16*	*0.6*	*2.2*	*4.0*
Standard DC 40rpm	*0.52*	*2.0*	*7.2*	*13.2*
Standard DC 100rpm	*1.3*	*5.0*	*18.0*	*33.0*
Standard DC 200rpm	*2.6*	*10.0*	*36.0*	*66.0*
Economy DC 25rpm	*0.33*	*1.3*	*4.5*	*8.3*
Economy DC 75rpm	*1.0*	*3.8*	*13.5*	*24.8*
Economy DC 200rpm	*2.6*	*10.0*	*36.0*	*66.0*
Brushless DC 15rpm	*0.20*	*0.75*	*2.7*	*5.0*
Brushless DC 50rpm	*0.65*	*2.5*	*9.0*	*16.5*
Brushless DC 130rpm	*1.7*	*6.5*	*23.4*	*42.9*
Brushless DC 250rpm	*3.3*	*12.5*	*45.0*	*82.5*
Synchronous AC 60Hz 5rpm	*0.07*	*0.25*	*0.90*	*1.7*
Synchronous AC 60Hz 12rpm	*0.16*	*0.6*	*2.2*	*4.0*
Synchronous AC 60Hz 25rpm	*0.33*	*1.3*	*4.5*	*8.3*
Synchronous AC 50Hz 4rpm	*0.05*	*0.20*	*0.72*	*1.3*
Synchronous AC 50Hz 10rpm	*0.13*	*0.5*	*1.8*	*3.3*
Synchronous AC 50Hz 20rpm	*0.26*	*1.0*	*3.6*	*6.6*

[1] *rated for silicone tubing only*

For tube selection, see inside back cover.



400F/DM2-DM3 two or three channel peristaltic pumps for manifold tubing

400F/DM2

The 400F/DM is our standard instrument-quality peristaltic pump for low flow rates. The pumps have a spring-loaded track, which gives superior life and flow-accuracy. The tubing occlusion can be adjusted to produce higher pressures. The pump is available with four standard gearmotors option. Each one is extremely small in size and has low power requirements. The pump accepts standard manifold tube elements, with three colour-coded stops. The tubing is available in twenty bore sizes, allowing the user to precisely match the pump to the required flow. See page 21 for additional options.

Ordering information

Standard DC	**12rpm**	**40rpm**	**100rpm**
400FDC/DM2 12V Two channel	*040.D81D.M2M*	*040.DH1D.M2M*	*040.DP1D.M2M*
400FDC/DM2 24V Two channel	*040.E81D.M2M*	*040.EH1D.M2M*	*040.EP1D.M2M*
400FDC/DM3 12V Three channel	*040.D81D.M3M*	*040.DH1D.M3M*	*040.DP1D.M3M*
400FDC/DM3 24V Three channel	*040.E81D.M3M*	*040.EH1D.M3M*	*040.EP1D.M3M*
Economy DC		**25rpm**	**75rpm**
400FD/DM2 12V Two channel		*040.AC1D.M2M*	*040.AN1D.M2M*
400FD/DM2 24V Two channel		*040.BC1D.M2M*	*040.BN1D.M2M*
400FD/DM3 12V Three channel		*040.AC1D.M3M*	*040.AN1D.M3M*
400FD/DM3 24V Three channel		*040.BC1D.M3M*	*040.BN1D.M3M*
Brushless DC		**15rpm**	**50rpm**
400FDL/DM2 24V Two channel		*040.FK1D.M2M*	*040.F91D.M2M*
400FDL/DM3 24V Three channel		*040.FK1D.M3M*	*040.F91D.M3M*
Synchronous AC 110V	**5rpm**	**12rpm**	**25rpm**
400FS/DM2 110VAC 60Hz Two channel	*040.H41D.M2M*	*040.H81D.M2M*	*040.HC1D.M2M*
Synchronous AC 220V	**4rpm**	**10rpm**	**20rpm**
400FS/DM2 220VAC 50Hz Two channel	*040.J31D.M2M*	*040.J71D.M2M*	*040.JA1D.M2M*

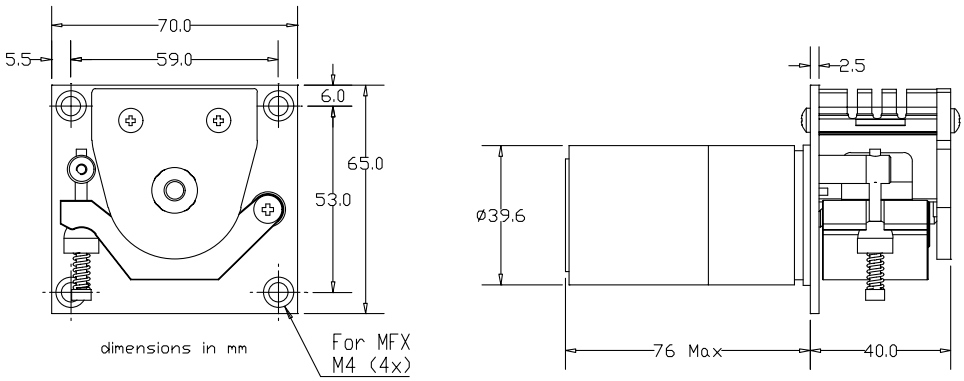
See motor descriptions on page 45.

Materials of construction

Rotor track	*Black Acetal (POM)*
Rollers	*Black Acetal (POM),*
Mounting plate, tube holder,	*Anodized aluminium*
Screws, springs, shafts	*Acid-resistant stainless steel*

Specifications

Maximum continuous speed	*100 rpm*
Maximum intermittent speed	*200 rpm*
Weight of complete pump	*240-420 g*
Tube type	*Three-stop manifold tube elements*



400F/DM3

Flow rates

Colour	Orange/Black	Orange/Red	Orange/Blue	Orange/Green	Orange/Yellow
Bore	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm
Flow ml/revolution	*0.001*	*0.002*	*0.004*	*0.008*	*0.014*
4	*0.004*	*0.008*	*0.016*	*0.03*	*0.06*
5	*0.005*	*0.010*	*0.020*	*0.04*	*0.07*
10	*0.010*	*0.020*	*0.040*	*0.08*	*0.14*
12	*0.012*	*0.024*	*0.048*	*0.096*	*0.168*
15	*0.015*	*0.032*	*0.056*	*0.12*	*0.21*
20	*0.020*	*0.040*	*0.080*	*0.16*	*0.28*
25	*0.025*	*0.050*	*0.100*	*0.20*	*0.35*
40	*0.040*	*0.080*	*0.160*	*0.32*	*0.56*
50	*0.050*	*0.100*	*0.200*	*0.40*	*0.70*
75	*0.075*	*0.150*	*0.300*	*0.60*	*1.105*
100	*0.100*	*0.200*	*0.400*	*0.80*	*1.4*

Colour	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Bore	0.63mm	0.76mm	0.88mm	1.02mm	1.14mm
Flow ml/revolution	*0.022*	*0.031*	*0.043*	*0.055*	*0.070*
4	*0.09*	*0.12*	*0.17*	*0.22*	*0.28*
5	*0.11*	*0.16*	*0.22*	*0.28*	*0.35*
10	*0.22*	*0.31*	*0.43*	*0.55*	*0.70*
12	*0.26*	*0.37*	*0.52*	*0.66*	*0.84*
15	*0.33*	*0.47*	*0.65*	*0.83*	*1.05*
20	*0.44*	*0.62*	*0.86*	*1.10*	*1.40*
25	*0.55*	*0.78*	*1.1*	*1.4*	*1.8*
40	*0.88*	*1.2*	*1.7*	*2.2*	*2.8*
50	*1.1*	*1.6*	*2.2*	*2.8*	*3.5*
75	*1.7*	*2.3*	*3.2*	*4.1*	*5.3*
100	*2.2*	*3.1*	*4.3*	*5.5*	*7.0*

Colour	Grey/Grey	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Bore	1.29mm	1.42mm	1.52mm	1.65mm	1.85mm
Flow ml/revolution	*0.089*	*0.11*	*0.12*	*0.14*	*0.18*
4	*0.36*	*0.44*	*0.48*	*0.56*	*0.72*
5	*0.45*	*0.55*	*0.60*	*0.70*	*0.90*
10	*0.89*	*1.1*	*1.2*	*1.4*	*1.8*
12	*1.1*	*1.3*	*1.4*	*1.7*	*2.2*
15	*1.3*	*1.7*	*1.8*	*2.1*	*2.7*
20	*1.8*	*2.2*	*2.4*	*2.8*	*3.6*
25	*2.2*	*2.8*	*3.0*	*3.5*	*4.5*
40	*3.6*	*4.4*	*4.8*	*5.6*	*7.2*
50	*4.5*	*5.5*	*6.0*	*7.0*	*9.0*
75	*6.7*	*8.3*	*9.0*	*10.5*	*13.5*
100	*8.9*	*11.0*	*12.0*	*14.0*	*18.0*

Colour		Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Bore		2.05mm	2.29mm	2.54mm	2.79mm
Flow ml/revolution		*0.21*	*0.26*	*0.31*	*0.36*
4		*0.84*	*1.04*	*1.24*	*1.44*
5		*1.1*	*1.3*	*1.6*	*1.8*
10		*2.1*	*2.6*	*3.1*	*3.6*
12		*2.5*	*3.1*	*3.7*	*4.3*
15		*3.2*	*3.9*	*4.7*	*5.4*
20		*4.2*	*5.2*	*6.2*	*7.2*
25		*5.3*	*6.5*	*7.8*	*9.0*
40		*8.4*	*10.4*	*12.4*	*14.4*
50		*10.5*	*13.0*	*15.5*	*18.0*
75		*15.8*	*19.5*	*23.3*	*27.0*
100		*21.0*	*26.0*	*31.0*	*36.0*

For tube selections, see Table F on page 47.

400F/M economy peristaltic pump

The 400F/M pump has premium features in an economical price. The pump shaft is supported by ball bearings which insure a long gearmotor life. The pump uses tube elements for simple tube loading, and luer fittings for easy connection to transfer tubes. The tubes are completely enclosed in the pumping chamber. The pump is available with four standard gearmotors. Each one is extremely small in size and has low power requirements. The pump accepts tube elements with a 1.6mm wall thickness. The tubing is available in six bore sizes, allowing the user to precisely match the pump to the required flow. See page 21 for additional options.

Flow capacity

	1.6mm (1/16") wall thickness continuous tubing					
Bore mm	0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm
Bore "	1/50"	1/32"	1/16"	3/32"	1/8"	5/32"
Flow rate ml/revolution	*0.01*	*0.03*	*0.11*	*0.24*	*0.41*	*0.59*
Max continuous flow ml/min 200 rpm	*2.0*	*6*	*22*	*48*	*82*	*118*
Max intermittent flow ml/min 400 rpm	*4.0*	*12*	*44*	*96*	*164*	*236*

Materials of construction

Housing, rotor, rollers, track, tube holder	*Acetal (POM)*
Mounting plate	*Anodized aluminium*
Screws, shafts	*Acid resistant stainless steel*
Bearing	*Carbon Steel*

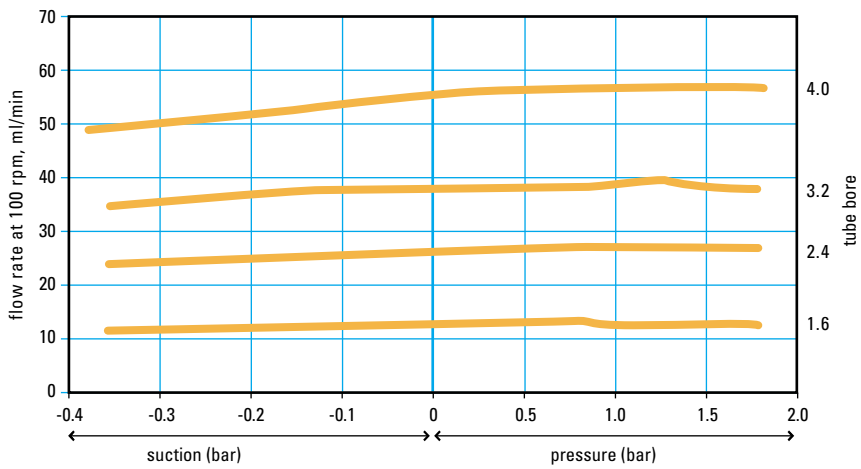
Specifications

Maximum continuous speed	*200 rpm*
Maximum intermittent speed	*400 rpm*
Weight of complete pump	*0.25 - 0.43kg*
Tube type	*Tube elements with luer fittings*

Performance against pressure

The M1-pumphead is designed to perform at its best against back pressures up to 2 Bar. The diagram below shows performance at 100 rpm.

Conversion Factors:
Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi



Ordering information

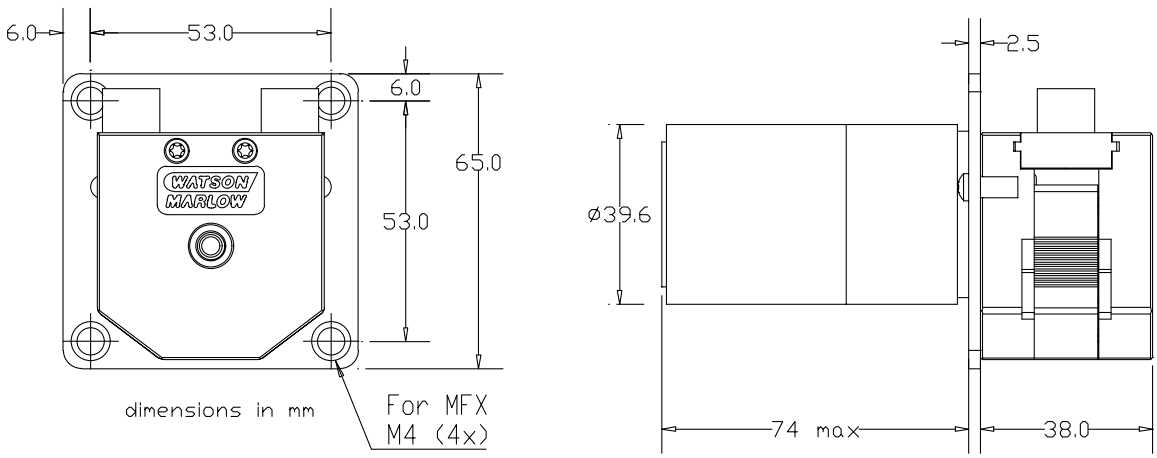
Standard DC	12rpm	40rpm	100rpm	200rpm
400FDC/M1 12V	*040.D81M.E1C*	*040.DH1M.E1C*	*040.D1PM.E1C*	*040.DS1M.E1C*
400FDC/M1 24V	*040.E81M.E1C*	*040.EH1M.E1C*	*040.EP1M.E1C*	*040.ES1M.E1C*
Economy DC	**25rpm**	**75rpm**	**200rpm**	**350rpm**
400FD/M1 12V	*040.AC1M.E1C*	*040.AN1M.E1C*	*040.AS1M.E1C*	*040.AU1M.E1C*
400FD/M1 24V	*040.BC1M.E1C*	*040.BN1M.E1C*	*040.BS1M.E1C*	*040.BU1M.E1C*
Brushless DC	**15rpm**	**50rpm**	**130rpm**	**250rpm**
400FDL/M1 24V	*040.F91M.E1C*	*040.FK1M.E1C*	*040.FQ1M.E1C*	*040.FT1M.E1C*
Synchronous AC 110V		**5rpm**	**12rpm**	**25rpm**
400FS/M1 110V 60Hz		*040.H41M.E1C*	*040.H81M.E1C*	*040.HC1M.E1C*
Synchronous AC 220V		**4rpm**	**10rpm**	**20rpm**
400FS/M1 220VAC 50Hz		*040.J31M.E1C*	*040.J71M.E1C*	*040.JA1M.E1C*

See motor descriptions on page 45.

Flow rates

	Single Channel 1.6mm (1/16") wall thickness tubing					
Bore mm	0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm
Bore "	1/50"	1/32"	1/16"	3/32"	1/8"	5/32"
Standard DC 12rpm	*0.120*	*0.360*	*1.32*	*2.88*	*4.92*	*7.08*
Standard DC 40rpm	*0.400*	*1.20*	*4.40*	*9.60*	*16.4*	*23.6*
Standard DC 100rpm	*1.00*	*3.00*	*11.0*	*24.0*	*41.0*	*59.0*
Standard DC 200rpm	*2.00*	*6.00*	*22.0*	*48.0*	*82.0*	*118*
Economy DC 25rpm	*0.250*	*0.750*	*2.75*	*6.00*	*10.25*	*14.8*
Economy DC 75rpm	*0.750*	*2.25*	*8.25*	*18.0*	*30.8*	*44.3*
Economy DC 200rpm	*2.00*	*6.00*	*22.0*	*48.0*	*82.0*	*118*
Economy DC 350rpm	*3.50*	*10.5*	*38.5*	*84.0*	*144*	*207*
Brushless DC 15rpm	*0.150*	*0.450*	*1.65*	*3.60*	*6.15*	*8.85*
Brushless DC 50rpm	*0.500*	*1.50*	*5.50*	*12.0*	*20.5*	*29.5*
Brushless DC 130rpm	*1.30*	*3.90*	*14.3*	*31.2*	*53.3*	*76.7*
Brushless DC 250rpm	*2.50*	*7.50*	*27.5*	*60.0*	*103*	*148*
Synchronous AC 5rpm	*0.050*	*0.150*	*0.55*	*1.20*	*2.05*	*2.95*
Synchronous AC 12rpm	*0.120*	*0.360*	*1.32*	*2.88*	*4.92*	*7.08*
Synchronous AC 25rpm	*0.250*	*0.750*	*2.75*	*6.00*	*10.25*	*14.8*
Synchronous AC 4rpm	*0.040*	*0.120*	*0.44*	*0.96*	*1.64*	*2.36*
Synchronous AC 10rpm	*0.100*	*0.300*	*1.10*	*2.40*	*4.10*	*5.90*
Synchronous AC 20rpm	*0.200*	*0.600*	*2.20*	*4.80*	*8.20*	*11.8*

For tube selections, see page 48.



400F/N economy two channel peristaltic pump

The 400F/N pump has premium features in an economical price. The pump shaft is supported by ball bearings which insure a long gearmotor life. The pump uses tube elements with barbed fittings for easy tube loading, and connection to transfer tubes. The tube is completely enclosed in the pumping chamber. The pump is available with four standard gearmotors. Each one is extremely small in size and has low power requirements. The pump accepts tube elements with a 1.0mm wall thickness. The tubing is available in four bore sizes, allowing the user to precisely match the pump to the required flow. See page 21 for additional options.

Flow capacity

	1.0mm wall thickness tubing elements			
Bore mm	0.5mm	1.0mm	2.0mm	3.0mm[1]
Flow rate ml/revolution	*0.013*	*0.05*	*0.18*	*0.33*
Max continuous flow ml/min	*2.6*	*10*	*36*	*66*
Max intermittent flow ml/min	*5.2*	*20*	*72*	*132*

[1] *rated for silicone tubing only*

Materials of construction

Rotor, rollers, track, tube holder	*Acetal (POM)*
Mounting plate	*Anodized aluminium*
Screws, shafts	*Acid resistant stainless steel*

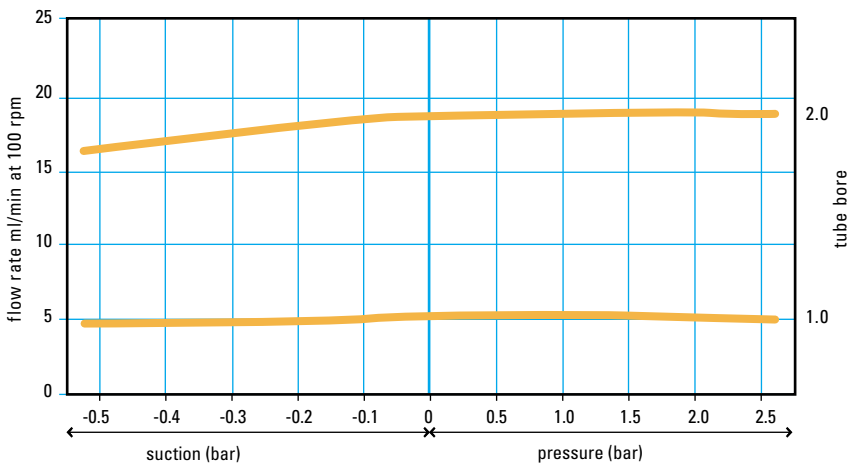
Specifications

Maximum continuous speed	*200 rpm*
Maximum intermittent speed	*400 rpm*
Weight of complete pump	*0.25 - 0.43kg*
Tube type	*Tube elements with fittings*

Performance against pressure

The N pumphead is designed to perform best against back pressures up to 2 bar. The diagram shows pumphead performance up to 2 bar.

Conversion Factors:
Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi



Ordering information

Standard DC	12rpm	40rpm	100rpm	200rpm
400FDC/N 12V	*040.D81N.N2C*	*040.DH1N.N2C*	*040.DP1N.N2C*	*040.DS1N.N2C*
400FDC/N 24V	*040.E81N.N2C*	*040.EH1N.N2C*	*040.EP1N.N2C*	*040.ES1N.N2C*
Economy DC	**25rpm**	**75rpm**		**200rpm**
400FD/N 12V	*040.AC1N.N2C*	*040.AN1N.N2C*		*040.AS1N.N2C*
400FD/N 24V	*040.BC1N.N2C*	*040.BN1N.N2C*		*040.BS1N.N2C*
Brushless DC	**15rpm**	**50rpm**	**130rpm**	**250rpm**
400FDL/N 24V	*040.F91N.N2C*	*040.FK1N.N2C*	*040.FQ1N.N2C*	*040.FT1N.N2C*
Synchronous AC		**5rpm**	**12rpm**	**25rpm**
400FS/N 110 VAC 60Hz		*040.H41N.N2C*	*040.H81N.N2C*	*040.HC1N.N2C*
Synchronous AC		**4rpm**	**10rpm**	**20rpm**
400FS/N 220 VAC 50Hz		*040.J31N.N2C*	*040.J71N.N2C*	*040.JA1N.N2C*

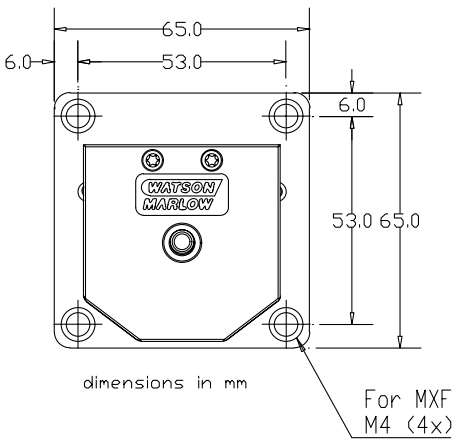
See motor descriptions on page 45.

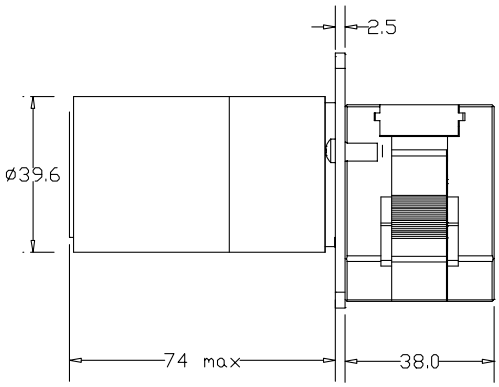
Flow rates

	Per channel 1.05mm WT Tubing			
Bore mm	0.5mm	1.0mm	2.0mm	3.0mm[1]
Standard DC 12rpm	*0.16*	*0.6*	*2.2*	*4.0*
Standard DC 40rpm	*0.52*	*2.0*	*7.2*	*13.2*
Standard DC 100rpm	*1.3*	*5.0*	*18.0*	*33.0*
Standard DC 200rpm	*2.6*	*10.0*	*36.0*	*66.0*
Economy DC 25rpm	*0.33*	*1.3*	*4.5*	*8.3*
Economy DC 75rpm	*1.0*	*3.8*	*13.5*	*24.8*
Economy DC 200rpm	*2.6*	*10.0*	*36.0*	*66.0*
Brushless DC 15rpm	*0.20*	*0.75*	*2.7*	*5.0*
Brushless DC 50rpm	*0.65*	*2.5*	*9.0*	*16.5*
Brushless DC 130rpm	*1.7*	*6.5*	*23.4*	*42.9*
Brushless DC 250rpm	*3.3*	*12.5*	*45.0*	*82.5*
Synchronous AC 5rpm	*0.07*	*0.25*	*0.90*	*1.7*
Synchronous AC 12rpm	*0.16*	*0.6*	*2.2*	*4.0*
Synchronous AC 25rpm	*0.33*	*1.3*	*4.5*	*8.3*
Synchronous AC 4rpm	*0.05*	*0.20*	*0.72*	*1.3*
Synchronous AC 10rpm	*0.13*	*0.5*	*1.8*	*3.3*
Synchronous AC 20rpm	*0.26*	*1.0*	*3.6*	*6.6*

[1] *rated for silicone tube only*

For tube selections, see page 48.





400F/VM precision low pulsation manifold tubing pump

400F/VM2

The 400F/VM is our highest precision, instrument-quality peristaltic pump for low flow rates. The pump is designed with ten rollers and other special design features to provide fluid flow with very low pulsation. Each channel has individual occlusion adjustment to allow fine-tuning of flow and pressure performance. The pumps have a spring-loaded track, which gives superior life and flow accuracy. The tracks are machined to precision tolerances, and the rollers are stainless steel with ball bearings. The pump accepts standard manifold tube elements, with two colour-coded stops. The tubing is available in 20 bore sizes in five materials, allowing the user to precisely match the pump to the required flow. See page 21 for additional options.

Materials of construction

Rotor, track	*Anodized aluminium*
Rollers, screws, springs, shafts	*Acid resistant stainless steel*
Tube holder	*Black acetal (POM)*
Mounting plate	*Black anodized aluminium*
Bearings	*Carbon steel*

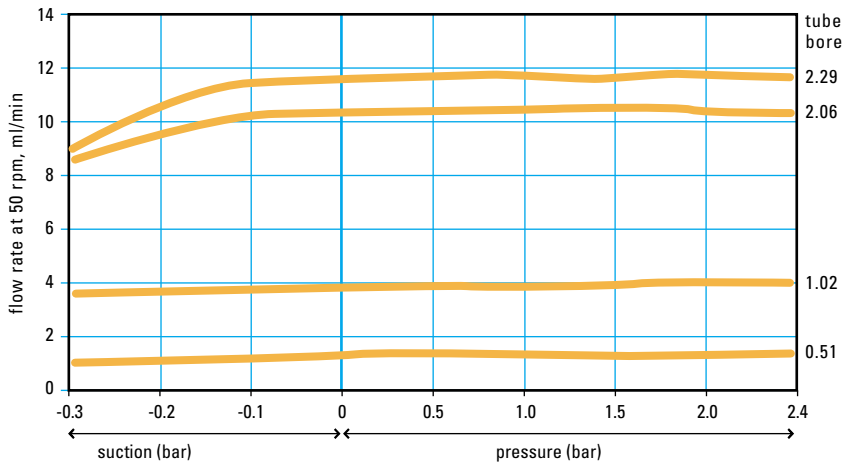
Specifications

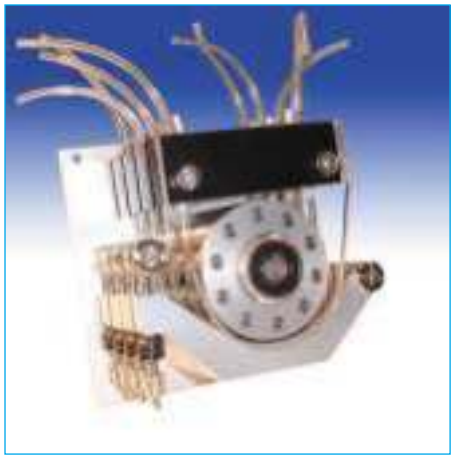
Maximum speed	*100 rpm*
Weight of complete pump	*1.3 – 2.1 kg (depending on gearmotor and number of channels)*
Tube type	*Two stop manifold tubing elements*

Performance against pressure

The spring-loaded tension arm makes it possible to adjust the pump to operate at higher back pressures/suction heights without overloading the tubing. In the diagram shown below, the arm is set for optimal performance at back pressures up to approx. 2.4 bar. The pump is capable of operating against pressures up to 3 bar.

Conversion Factors:
Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi





400F/VM4

Ordering information

Standard 5 VA or *30 VA motor	12rpm	25rpm	60rpm	*100 rpm
400FDC/VM2 12V Two channel	*040.C81V.M2S*	*040.CC1V.M2S*	*040.CM1V.M2S*	*040.MP1V.M2S*
400FDC/VM2 24V Two channel	*040.E81V.M2S*	*040.EC1V.M2S*	*040.EM1V.M2S*	*040.LP1V.M2S*
400FDC/VM3 12V Three channel	*040.C81V.M3S*	*040.CC1V.M3S*	*040.CM1V.M3S*	
400FDC/VM3 24V Three channel	*040.E81V.M3S*	*040.EC1V.M3S*	*040.EM1V.M3S*	
400FDC/VM4 12V Four channel	*040.C81V.M4S*	*040.CC1V.M4S*	*040.CM1V.M4S*	
400FDC/VM4 24V Four channel	*040.E81V.M4S*	*040.EC1V.M4S*	*040.EM1V.M4S*	
Brushless DC 35 VA			**30rpm**	**100rpm**
400VDL/VM2 24V Two channel			*040.NE1V.M2S*	*040.NP1V.M2S*
400VDL/VM3 24V Three channel			*040.NE1V.M3S*	
400VDL/VM4 24V Four channel			*040.NE1V.M4S*	

See motor descriptions on page 45.

Flow rates

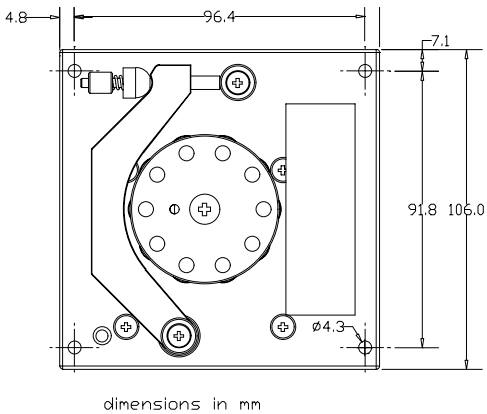
Colour	Orange/Black	Orange/Red	Orange/Blue	Orange/Green	Orange/Yellow
Bore	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm
Flow ml/revolution	*0.001*	*0.003*	*0.004*	*0.010*	*0.018*
12 rpm	*0.012*	*0.036*	*0.048*	*0.12*	*0.22*
25 rpm	*0.025*	*0.075*	*0.10*	*0.25*	*0.45*
30 rpm	*0.030*	*0.090*	*0.12*	*0.30*	*0.54*
60 rpm	*0.060*	*0.180*	*0.24*	*0.60*	*1.08*
100 rpm	*0.10*	*0.30*	*0.40*	*1.00*	*1.80*

Colour	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Bore	0.63mm	0.76mm	0.88mm	1.02mm	1.14mm
Flow ml/revolution	*0.028*	*0.039*	*0.053*	*0.068*	*0.085*
12 rpm	*0.34*	*0.47*	*0.64*	*0.82*	*1.02*
25 rpm	*0.70*	*0.98*	*1.33*	*1.70*	*2.13*
30 rpm	*0.84*	*1.17*	*1.59*	*2.04*	*2.55*
60 rpm	*1.68*	*2.34*	*3.18*	*4.08*	*5.10*
100 rpm	*2.80*	*3.90*	*5.30*	*6.80*	*8.50*

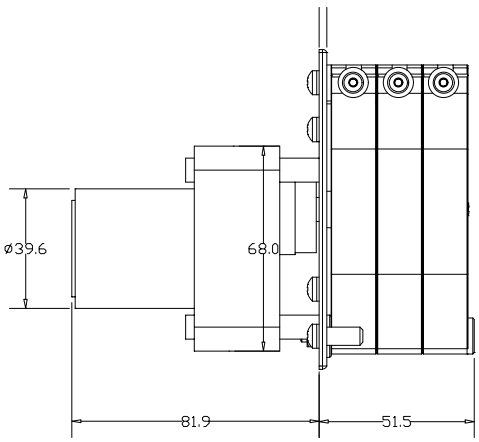
Colour	Grey/Grey	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Bore	1.29mm	1.42mm	1.52mm	1.65mm	1.85mm
Flow ml/revolution	*0.11*	*0.13*	*0.14*	*0.17*	*0.20*
12 rpm	*1.30*	*1.54*	*1.73*	*1.98*	*2.40*
25 rpm	*2.70*	*3.20*	*3.60*	*4.13*	*5.00*
30 rpm	*3.24*	*3.84*	*4.32*	*4.95*	*6.00*
60 rpm	*6.48*	*7.68*	*8.64*	*9.90*	*12.0*
100 rpm	*10.8*	*12.8*	*14.4*	*16.5*	*20.0*

Colour		Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Bore		2.05mm	2.29mm	2.54mm	2.79mm
Flow ml/revolution		*0.24*	*0.27*	*0.31*	*0.34*
12 rpm		*2.82*	*3.29*	*3.74*	*4.10*
25 rpm		*5.88*	*6.85*	*7.80*	*8.55*
30 rpm		*7.05*	*8.22*	*9.36*	*10.3*
60 rpm		*14.1*	*16.4*	*18.7*	*20.5*
100 rpm		*23.5*	*27.4*	*31.2*	*34.2*

For tube selections, see page 48.



dimensions in mm



400F/GM precision high flow manifold tubing pump

400F/GM4

The 400F/GM is a precision, instrument-quality peristaltic pump. The 400F/GM pump offers a higher flow than the 400F/VM series, but has fewer rollers (four), and channels cannot be individually adjusted. The pumps have a spring-loaded track, which gives superior tube life and flow accuracy. The tracks are machined to precision tolerances, and rollers are stainless steel with ball bearings. The pump accepts standard manifold tube elements, with two colour-coded stops. The tubing is available in 20 bore sizes, in five materials allowing the user to precisely match the pump to the required flow. See page 21 for additional options.

Ordering information

Standard 5 VA or *30 VA motor	12rpm	25rpm	60rpm	*100 rpm
400FDC/GM4 12V Four channel	*040.C81G.M4S*	*040.CC1G.M4S*	*040.CM1G.M4S*	*040.MP1G.M4S*
400FDC/GM4 24V Four channel	*040.E81G.M4S*	*040.EC1G.M4S*	*040.EM1G.M4S*	*040.LP1G.M4S*
Brushless DC 35 VA			**30rpm**	**100rpm**
400FVDL/GM4 24V Four channel			*040.NE1G.M4S*	*040.NP1G.M4S*

See motor descriptions on page 45.

Flow rates

Color	Orange/Black	Orange/Red	Orange/Blue	Orange/Green	Orange/Yellow
Bore	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm
Flow ml/revolution	*0.001*	*0.003*	*0.005*	*0.012*	*0.022*
12 rpm	*0.012*	*0.036*	*0.060*	*0.14*	*0.26*
25 rpm	*0.025*	*0.075*	*0.13*	*0.30*	*0.55*
30 rpm	*0.030*	*0.090*	*0.15*	*0.36*	*0.66*
60 rpm	*0.060*	*0.180*	*0.30*	*0.72*	*1.32*
100 rpm	*0.10*	*0.30*	*0.50*	*1.20*	*2.20*

Color	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Bore	0.63mm	0.76mm	0.88mm	1.02mm	1.14mm
Flow ml/revolution	*0.034*	*0.049*	*0.066*	*0.086*	*0.11*
12 rpm	*0.41*	*0.59*	*0.79*	*1.03*	*1.32*
25 rpm	*0.85*	*1.23*	*1.65*	*2.15*	*2.75*
30 rpm	*1.02*	*1.47*	*1.98*	*2.58*	*3.30*
60 rpm	*2.04*	*2.94*	*3.96*	*5.16*	*6.60*
100 rpm	*3.40*	*4.90*	*6.60*	*8.60*	*11.00*

Color	Grey/Grey	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Bore	1.29mm	1.42mm	1.52mm	1.65mm	1.85mm
Flow ml/revolution	*0.14*	*0.17*	*0.19*	*0.22*	*0.28*
12 rpm	*1.68*	*2.04*	*2.28*	*2.64*	*3.36*
25 rpm	*3.50*	*4.25*	*4.75*	*5.50*	*7.00*
30 rpm	*4.20*	*5.10*	*5.70*	*6.60*	*8.40*
60 rpm	*8.40*	*10.2*	*11.4*	*13.2*	*16.8*
100 rpm	*14.0*	*17.0*	*19.0*	*22.0*	*28.0*

Color		Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Bore		2.05mm	2.29mm	2.54mm	2.79mm
Flow ml/revolution		*0.34*	*0.41*	*0.50*	*0.59*
12 rpm		*4.08*	*4.92*	*6.00*	*7.08*
25 rpm		*8.50*	*10.3*	*12.5*	*14.8*
30 rpm		*10.2*	*12.3*	*15.0*	*17.7*
60 rpm		*20.4*	*24.6*	*30.0*	*35.4*
100 rpm		*34.0*	*41.0*	*50.0*	*59.0*

For tube selection, see page 48.

400F/R1 precision one channel and 400F/L2 two channel pumps

400F/R1

These models are our highest precision, instrument-quality peristaltic pumps for medium flow rates Both models have a spring-loaded track, which gives superior tube life and flow accuracy. The tubing occlusion can be adjusted to produce higher pressures. The tracks are machined to precision tolerances, and the rollers are stainless steel with ball bearings. The pump is available with three standard gearmotors. The pump accepts continuous tubing with a 1.6mm wall thickness, in seven bore sizes, allowing the user to precisely match the pump to the required flow. The R1 is a single tube pumphead and the L2 has two individual flow channels, each with a separate rotor. The L2 can also be used with a tube element that combines flows of the two tubes to create a single, low pulsation flow. These two channel models will use a maximum bore accept size of 4.8mm. These models offer our widest range of options, allowing you to customise a pump for your application. See page 21 for additional options.

Flow capacity

	1.6mm (1/16") wall thickness continuous tubing						
Bore mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm	4.8mm	6.4mm
Bore "	1/32"	1/16"	3/32"	1/8"	5/32"	3/16"	1/4"
Flow rate ml/revolution	*0.06*	*0.2*	*0.50*	*0.86*	*1.3*	*1.8*	*3.0*
Max continuous flow ml/min 200 rpm	*11*	*44*	*98*	*170*	*262*	*367*	*606*
Max intermittent flow ml/min 400 rpm	*22*	*88*	*196*	*340*	*524*	*734*	*1212*

Materials of construction

Tube holder	*Black acetal (POM)*
Rotor, track, mounting plate	*Anodized aluminium*
Ball bearings	*Carbon steel*
Rollers, screws, springs, shafts	*Acid resistant stainless steel*

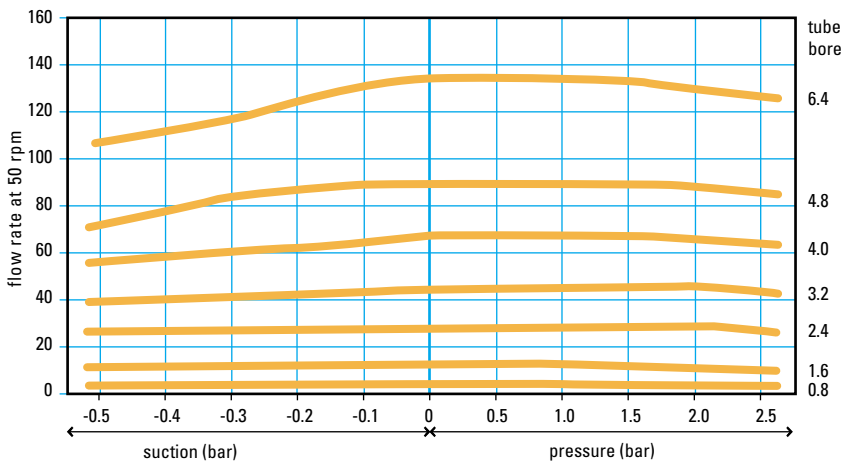
Specifications

Maximum continuous speed	*200 rpm*
Maximum intermittent speed	*400 rpm*
Weight of complete pump	*1.0 –1.5kg*

Performance against pressure

The spring-loaded tension arm makes it possible to adjust the pump to operate at higher back pressures/suction heights without overloading the tubing. In the diagram shown below, the arm is set for optimal performance at back pressures up to approx. 2.3 bar. The pump is capable of operating against pressures up to 3 bar.

Conversion Factors:
Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi



400F/L2

Ordering information

5W DC	12rpm	25rpm	60rpm
400FDC/R1 12V One channel	*040.C81R.01S*	*040.CC1R.01S*	*040.CM1R.01S*
400FDC/R1 24V One channel	*040.E81R.01S*	*040.EC1R.01S*	*040.EM1R.01S*
400FDC/L2 12V Two channel	*040.C81L.E2S*	*040.CC1L.E2S*	*040.CM1L.E2S*
400FDC/L2 24V Two channel	*040.E81L.E2S*	*040.EC1L.E2S*	*040.EM1L.E2S*
30W DC		**100rpm**	**200rpm**
400FDC/R1 12V One channel		*040.MP1R.01S*	*040.MS1R.01S*
400FDC/R1 24V One channel		*040.LP1R.01S*	*040.LS1R.01S*
400FDC/L2 12V Two channel		*040.MP1L.E2S*	*040.MS1L.E2S*
400FDC/L2 24V Two channel		*040.LP1L.E2S*	*040.LS1L.E2S*
Brushless DC 35 Watt	**30rpm**	**100rpm**	**350rpm**
400VDL/R1 24V One channel	*040.NE1R.01S*	*040.NP1R.01S*	*040.NP1R.01S*
400VDL/L2 12V Two channel	*040.NE1L.E2S*	*040.NP1L.E2S*	*040.NP1L.E2S*

See motor descriptions on page 45.

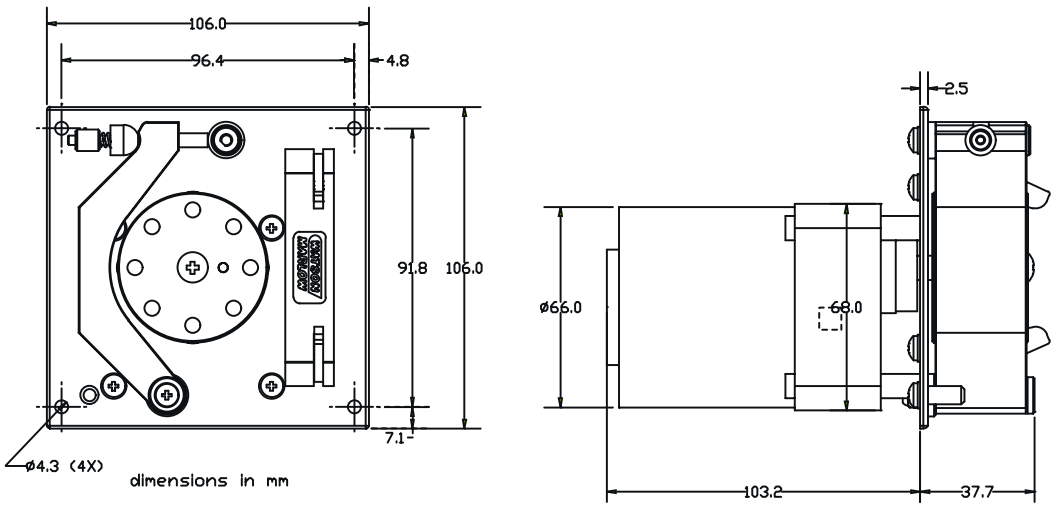
Flow rates

Single Channel 1.6mm (1/16") wall thickness tubing

Bore mm Bore "	0.5mm 1/50"	0.8mm 1/32"	1.6mm 1/16"	2.4mm 3/32"	3.2mm 1/8"	4.0mm 5/32"	4.8mm 3/16"	6.4mm 1/4"
5W DC 12rpm	*0.24*	*0.72*	*2.40*	*6.00*	*10.3*	*15.6*	*21.6*	*36.0*
5W DC 25rpm	*0.50*	*1.50*	*5.00*	*12.5*	*21.5*	*32.5*	*45.0*	*75.0*
5W DC 60rpm	*1.20*	*3.60*	*12.0*	*30.0*	*51.6*	*78.0*	*108*	*180*
30W DC 100rpm	*2.00*	*6.00*	*20.0*	*50.0*	*86.0*	*130*	*180*	*300*
30W DC 200rpm	*4.00*	*12.0*	*40.0*	*100.0*	*172.0*	*260*	*360*	*600*
Brushless DC 30rpm	*0.60*	*1.80*	*6.00*	*15.0*	*25.8*	*39.0*	*54.0*	*90.0*
Brushless DC 100rpm	*2.00*	*6.00*	*20.0*	*50.0*	*86.0*	*130*	*180*	*300*
Brushless DC 350rpm	*7.00*	*21.00*	*70.0*	*175*	*301*	*455*	*630*	*1050*

For tube selections for 400F/RI, see Table A on page 47.

For tube elements for 400F/L2, see inside rear cover.



400 SCB speed controls for 400 Series, 313FDP/D, and 501FDP/RL DC pumps

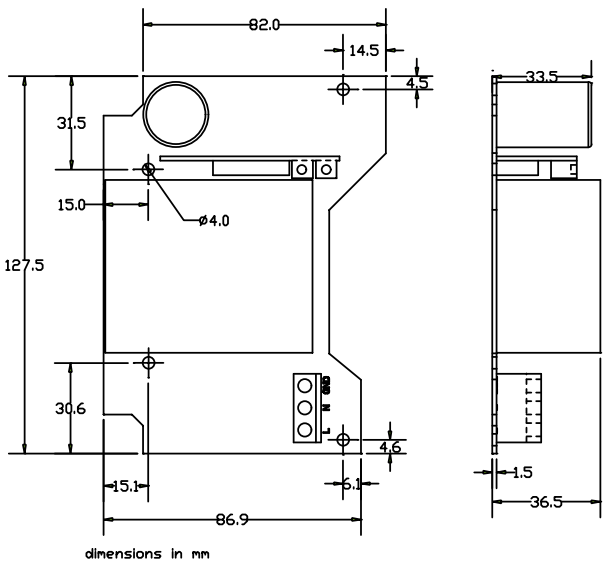
These OEM motor speed controls are designed for operating permanent magnetic DC motors up to 30 VA. They are linear type controllers that provide smooth acceleration and deceleration under load, and a turndown of 20:1. The low voltage unit will accept AC or DC inputs. The high voltage will work directly off the main supply.

Ordering information

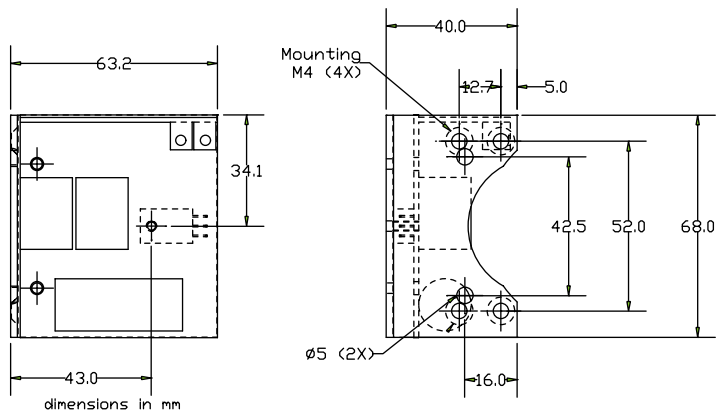
Model	Supply Voltage	Output Voltage	Motor	
400SCB/534	15-30VDC or 12-22VAC 50/60 Hz	0-12V DC or 0-24V DC	5/30 VA	*049.C534.000*
400SCB/424	110 VAC 50/60 Hz	0-12V DC	5 VA	*049.C424.05A*
400SCB/424	110 VAC 50/60 Hz	0-21V DC	30 VA	*049.C424.30A*
400SCB/424	220 VAC 50/60 Hz	0-12V DC	5 VA	*049.C424.05E*
400SCB/424	220 VAC 50/60 Hz	0-21V DC	30 VA	*049.C424.30E*

Specifications

Speed control ratio	*20:1 (stable, speed independent of load)*
Remote speed options	*0-20 mA or 4-20 mA, 0-1V or 0-10V, remote potentiometer (10K ohm)*
Stop/Start	*Remote switch, or 5V logic (on 534 models only)*
Direction	*Remote switch, or 5V logic (on 534 models only)*
User adjustments	*Max speed and signal selection*
Temperature range	*-30°C to 40°C*
Cooling	*10W (4°C/W)*



High Voltage 049.C424.***



Low Voltage 049.C534.000

500 Series OEM Systems

Designed around the 501RL twin roller, spring-loaded pumphead, the 500 series OEM pumps provide high quality single channel pumps, with a choice of both AC, DC, and brushless DC drive units, and flow rates up to 3 litres per minute (5 litres per minute for intermittent use). In addition, the 501F/RL faceplate-mounted pumpheads are available, with an integral bearing for use with users' own drive systems. The pumps are also available in a close-coupled version directly mounted to a gearmotor.

501RL spring-loaded 2-roller pumpheads

The 501RL pumphead features adjustable tube clamps and a rotor crank handle for easy tube loading. They are suitable for continuous use at speeds up to 300 rpm, giving flow rates of up to 3 litres/min (intermittent use up to 500 rpm, flow rates up to 5 litres/min). The 501RL may be driven in either direction: clockwise rotation will give a longer tube life but anti-clockwise rotation can be used for working against greater pressures. The 501RL accepts standard 1.6mm wall tubing, and the 501RL2 accepts 2.4mm thick-walled tubing.

The faceplate adapter allows ease of connection to "third party" drives. This eliminates the need for a specific drive shaft/nose arrangement when using the standard 501RL.

Ordering information

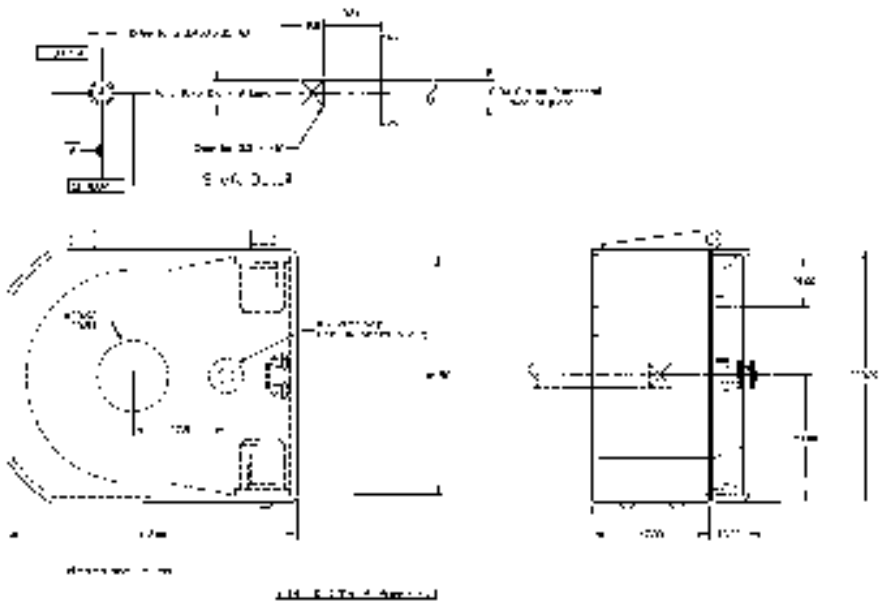
501RL pumphead for 1.6mm wall thickness tubing	*056.0001.L00*
502RL2 pumphead for 2.4mm wall thickness tubing	*056.0001.L20*
501F faceplate adapter (no pumphead)	*056.8001.000*

Materials of construction

Track	*Mazak, aklyd melamine enamel*
Rotor	*Mazak, copper/nickel/chrome plated*
Main rollers	*MOS2 filled Nylon 6 (Nylatron)*
Tube clamps, hinges, guide rollers	*Acetal copolymer (Kematal)*
Guard	*Polycarbonate*
Springs, spindles, fixings	*Stainless steel*
Faceplate	*Aluminium*

Specifications

	1.6mm (1/16") wall tubing						
Bore mm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Bore "	1/5"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
Maximum continuous speed: rpm	*300*	*300*	*300*	*300*	*300*	*300*	*300*
Maximum intermittent speed: rpm	*500*	*500*	*500*	*500*	*500*	*500*	*500*
Marprene tubing (standard springs, clockwise rotation)							
Required torque up to 0.5bar: kg cm	*3.2*	*3.2*	*3.8*	*4.8*	*5.0*	*6.6*	*6.6*
Required torque up to 1 Bar: kg cm	*4.0*	*4.0*	*4.3*	*5.0*	*6.5*	*9.2*	*9.2*
Maximum pressure: Bar	*2*	*2*	*2*	*2*	*2*	*1*	*1*
501F/RL and 501F/RL2 weight	*1.15kg and 2.3kg*						



Flow rates

	1.6mm (1/16") wall thickness tubing						
Bore mm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Bore "	1/5"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
Flow rate: ml/revolution	*0.04*	*0.12*	*0.43*	*1.86*	*4.05*	*6.35*	*10.0*
Maximum continuous flow rate: ml/min	*12.0*	*36.0*	*129*	*558*	*1215*	*1905*	*3000*
Maximum intermittent flow rate: ml/min	*20.0*	*60.0*	*215*	*930*	*2025*	*3175*	*5000*

For tube selections, see tables A & B on page 48.

Specifications

	1.6mm (1/16") wall thickness tubing						
Bore mm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Bore "	1/5"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
Maximum continuous speed: rpm	*300*	*300*	*300*	*300*	*300*	*300*	*300*
Maximum intermittent speed: rpm	*500*	*500*	*500*	*500*	*500*	*500*	*500*
Marprene tubing (standard springs, clockwise rotation)							
Required torque up to 0.5 bar: kg cm	3.2	3.2	3.8	4.8	5.0	6.6	6.6
Required torque up to 1 bar: kg cm	4.0	4.0	4.3	5.0	6.5	9.2	9.2
Maximum pressure: Bar	*2*	*2*	*2*	*2*	*2*	*1*	*1*

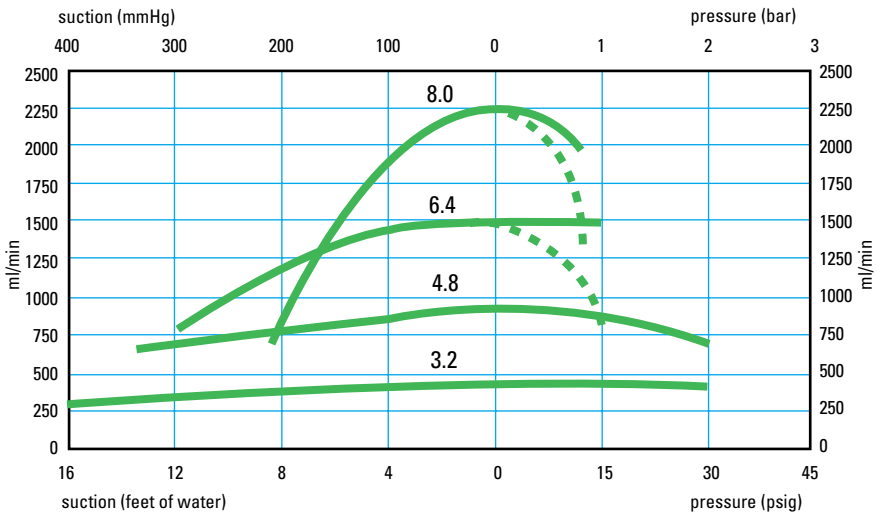
Performance against pressure

Conditions:

- Suction curves obtained with zero output pressure.
- Pressure curves obtained with zero lift.
- Pumphead speed 220rpm.
- Anti-clockwise rotation
- Clockwise rotation

Conversion Factors:

Suction pressure in bar x 760 = mm Hg
Suction pressure in bar x 33.5 = Ft H_2O
Back pressure in bar x 14.5 = psi



501FDP/RL fixed/variable speed DC pump

The 501FDP/RL is our highest quality, high flow OEM DC pump offering precise speed regulation, low electrical and audible noise, and long operating life.

The 501FDP/RL OEM pump is made up of a single channel 501RL pumphead, a powerful 12 or 24V direct current motor-gearbox, and an aluminium faceplate. The spring-loaded rotor assembly provides long tube life and accurate flows. The coreless DC motors provide high torque output, and speed in a small case size. When fitted with 8.0mm bore tubing, these pumps provide flow rates of up to 2500 ml/min. Select from 7 tube bore sizes to precisely match the pump to your flow requirements.

Ordering information

12V DC		24V DC	
50rpm	*040.MK10.RL0*	50rpm	*040.LK10.RL0*
100rpm	*040.MP10.RL0*	100rpm	*040.LP10.RL0*
250rpm	*040.MT10.RL0*	250rpm	*040.LT10.RL0*

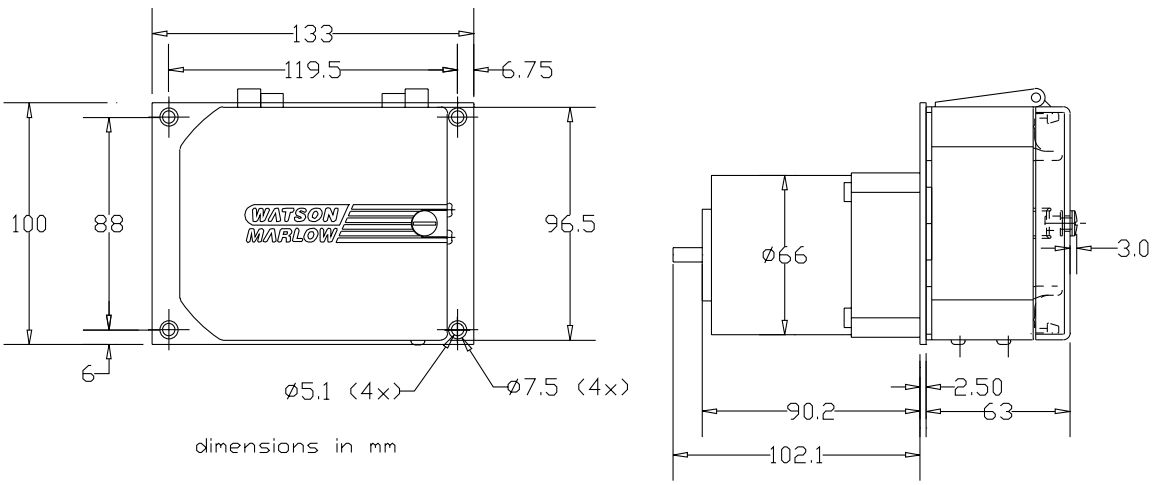
Specifications

Motor type	*12 or 24V DC*
Motor torque output	*50rpm 11kgcm* *100rpm 14kgcm* *250rpm 6kgcm*
Power consumption	*5/30VA*
Weight	*3kg*

Flow rates

	1.6mm (1/16") wall tubing						
Bore mm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Bore "	1/5"	1/32"	1/16"	1/32"	3/16"	1/16"	5/16"
50rpm	*2.00*	*6.00*	*21.5*	*93.0*	*203*	*318*	*500*
100rpm	*4.00*	*12.0*	*43.0*	*186*	*405*	*635*	*1000*
200rpm	*8.00*	*24.0*	*86.0*	*372*	*810*	*1270*	*2000*
250rpm	*10.00*	*30.0*	*107.5*	*465*	*1013*	*1588*	*2500*

For tube selections, see tables A and B on page 47.



501VDL/RL variable speed brushless DC pump

The 501VDL/RL combines our highest quality pump with a brushless DC motor, that providing precise speed regulation and low electrical and audible noise. Brushless DC motors have an extremely long service life as they have no internal wear parts. The 501VDL/RL OEM pump is made up of a single channel 501RL pumphead, a powerful 24V brushless DC gearmotor with built-in controller, and an aluminium faceplate. The spring-loaded rotor assembly provides long tube life and accurate flows. When fitted with 8.0 mm bore tubing, these pumps provide flow rates of up to 3500 ml/min. The built-in controller allows control of speed, stop/start, direction, and a frequency tacho output.

Ordering information

	24V DC Brushless
100rpm	*040.NP10.RL0*
350rpm	*040.NU10.RL0*

Specifications

Motor type	*24V DC*
Motor torque output	*100rpm 21.0kg cm* *350rpm 7.3kg cm*
Power consumption	*35 VA*
Weight	*3kg*

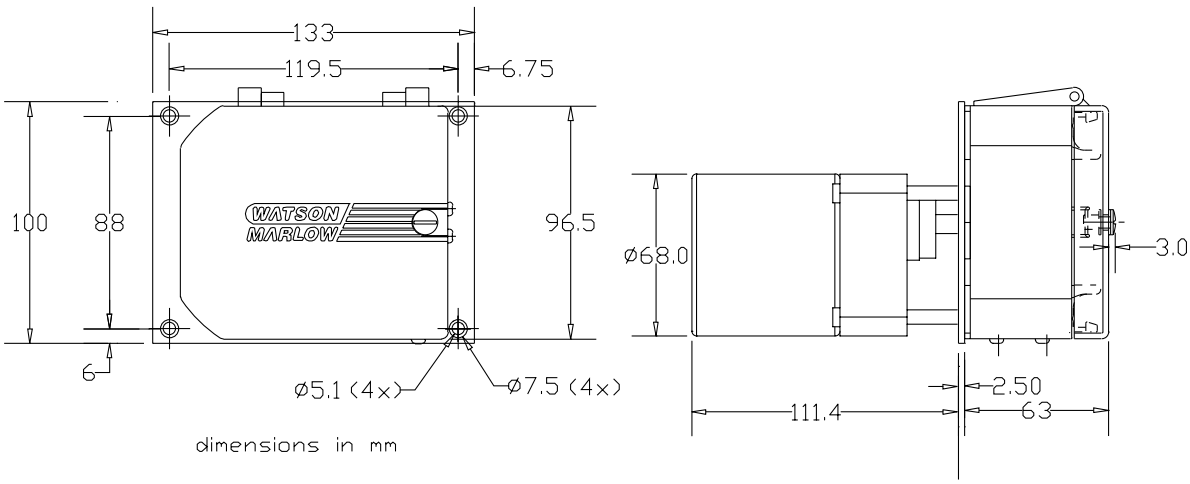
Motor/controller connections

Lead no.	Lead Colour	Function	Descriptions
1	brown	FW/RV	*Direction control input: 'High' CW, 'Low' CC (shaft side)*
2	white	Vin	*Input voltage (set-point) for speed loop.* *Resulting speed approx. 1000 rpm/V* *Vin < 4V: motor at full speed, speed loop off (open loop)*
3	green	FG	*Frequency generator output, 36 ppr; R out = 4kOhm (approx.)*
4	black	GND	*Motor return, ground (0v)*
5	red	Vp	*Motor supply voltage +24V (min 14V – Max 30V)*
6	bare	shield	*Shield for cable and connection to motor housing*

Flow rates

	1.6mm (1/16") wall tubing						
Bore mm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Bore "	1/5"	1/32"	1/16"	1/32"	3/16"	1/16"	5/16"
100rpm	*4.00*	*12.0*	*43.0*	*186*	*405*	*635*	*1000*
350rpm	*14.0*	*42.0*	*151*	*651*	*1418*	*2223*	*3500*

For tube selections, see Tables A and B on page 47.



501FAC/RL single channel OEM pump

The 501FAC/RL has been introduced to the 500 series OEM system as a quality, single-channel OEM pump, and is made up of a 501RL spring loaded pumphead, an induction motor, Watson-Marlow's purpose-designed gearbox, and a faceplate. This pump is available in a choice of three voltages and four speeds, providing flow rates up to 3240 ml/min from 8.0 mm bore tubing (2700 ml/min when used at 50Hz).

All 501FAC/RL OEM pumps are suitable for use with either 50Hz or 60Hz supplies and may be wired to give either clockwise or anti-clockwise rotation.

Ordering information

	220VAC	240VAC	100-120VAC
33/40rpm 50/60Hz	*050.1812.L00*	*050.1811.L00*	*050.1801.100*
67/80rpm 50/60Hz	*050.1832.L00*	*050.1831.L00*	*050.1821.100*
135/162rpm 50/60Hz	*050.1852.L00*	*050.1851.L00*	*050.1841.100*
270/324rpm 50/60Hz	*050.1872.L00*	*050.1871.L00*	*050.1861.100*

Specification

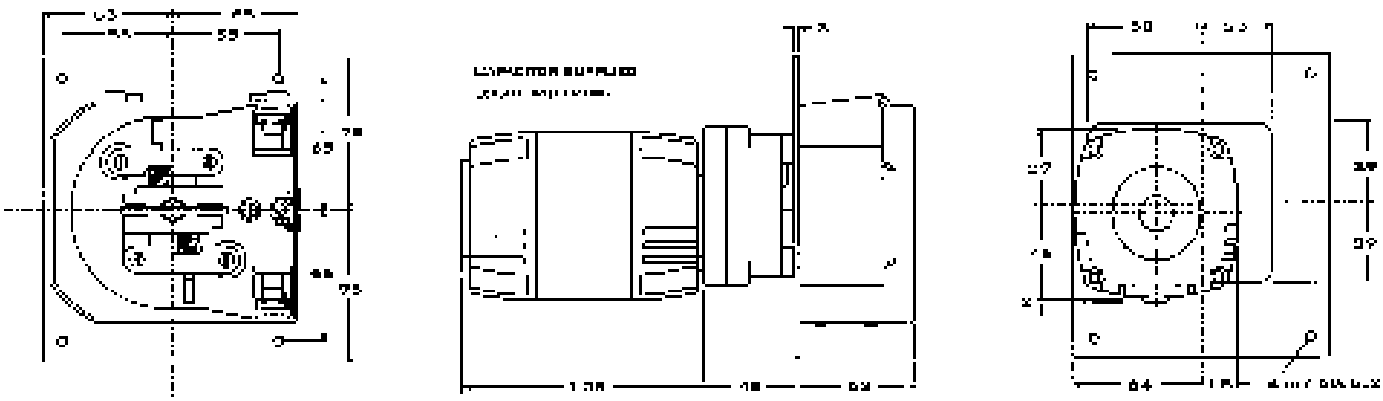
Motor type	*Induction*
Motor torque output	*33/67rpm 20kg cm* *40/80rpm 16kg cm* *135/270rpm 10kg cm* *162/324rpm 8kg cm*
Power consumption	*50VA*
Weight	*3.2kg*

Flow rates (ml/min)

		1.6mm (1/16") wall tubing						
Hz	rpm	0.5mm 1/5"	0.8mm 1/32"	1.6mm 1/16"	3.2mm 1/8"	4.8mm 3/16"	6.4mm 1/4"	8.0mm 5/16"
50	*33*	*1.32*	*3.96*	*14.2*	*61.4*	*134*	*210*	*330*
	67	*2.68*	*8.04*	*28.8*	*125*	*271*	*425*	*670*
	135	*5.40*	*16.2*	*58.0*	*251*	*547*	*857*	*1350*
	270	*10.8*	*32.4*	*116*	*502*	*1093*	*1715*	*2700*
60	*40*	*1.60*	*4.80*	*17.2*	*74.4*	*162*	*254*	*400*
	80	*3.20*	*9.60*	*34.4*	*149*	*324*	*508*	*800*
	162	*6.50*	*19.4*	*69.6*	*301*	*656*	*1029*	*1620*
	324	*13.0*	*39.0*	*139*	*603*	*1312*	*2057*	*3240*

For tube selections, see Tables A and B on page 47.

ALL DIMENSIONS IN MILLIMETRES



501FDC/RL fixed speed DC pump

The 501FDC/RL OEM pump is made up of a single channel 501RL pumphead, a powerful 12V direct current motor, the new Watson-Marlow gearbox, and an aluminum faceplate. When fitted with 8.0mm x 1.6mm tubing, these pumps provide flow rates of up to 2200 ml/min.

The 501FDC/RL provides the highest torque output, pump speeds and flow rates of all Watson-Marlow 500 series OEM pumps.

The pump is also available without the lock on the guard and is known as the 501FDC/R.

Ordering information

12V DC	
220rpm	*050.1931.L00*

Specifications

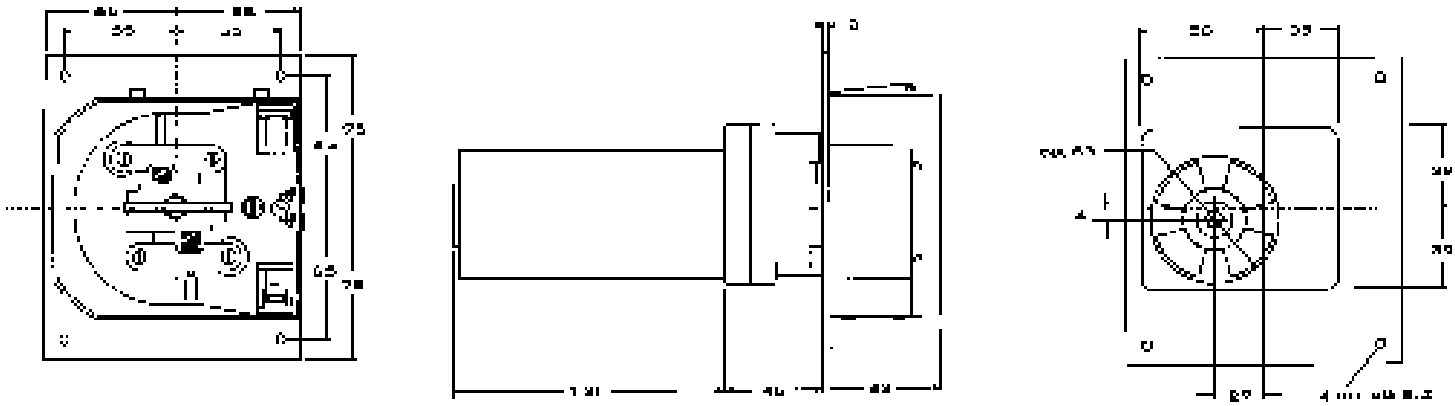
Motor type	*12V DC*
Motor torque output	*14kg cm*
Power consumption	*35VA*
Weight	*3kg*
Brush life	*2500 hours*

Flow rates (ml/min)

	1.6mm (1/16") wall tubing						
	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
rpm	1/5"	1/32"	1/16"	1/32"	3/16"	1/16"	5/16"
220	*8.80*	*26.4*	*94.6*	*409.2*	*891*	*1397*	*2200*

For tube selections, see Tables A and B on page 47.

ALL DIMENSIONS IN MILLIMETRES



OEM

621F/R close coupled high flow pumps

The close coupled pump features the 620RE pumphead that accepts tube elements for flow up to 18 litre/min (4.8 GPM). The unique LoadSure tube element design makes tube changes fast and error-free and secures process pressures up to 4 bar (60psi).

The pumphead has retractable rollers, to make tube loading easier, and allows for SIP or CIP to be run with the tubing installed in the pump. The pumphead can be configured for LoadSure elements or continuous tubing, two rollers for higher flow, or four rollers for lower pulsation.

The standard pump comes with an AC induction motor and gearbox that bolts directly to the pumphead, saving space. It can also be provided with an air motor, gear reducer only, and explosion proof drives. Please contact one of our sales engineers who can help you select the right pump for your application.

Ordering information

The 620R allows you to build a pump with the components you need to customize to your needs. Please contact our factory for a quote on a specific unit. Some of the more standard options are listed below.

Pumphead Options

Number of Rollers	*2 higher flow, 4 lower pulsation*
LoadSure tube elements	*4.0 mm WT, 3/4 cam and groove or tri-clamp fittings, pressure to 4bar (60 psi) (Table D on page 47)*
Continuous tubing	*3.2mm WT, free ends, pressure to 30 psi (Table E on page 47)*

Drive Options

Simplex	*Single drive pumphead*
Duplex	*Single drive with right angle gearbox for driving two heads simultaneously*
Fixed/variable speed	*Add a VFD for variable speed over a 10:1 range*
Gear motor finish	*Standard orange, or FDA white finish*
Gear reducer only	*Supply your own 56C motor to complete the unit*
Explosion proof	*Consult Watson-Marlow Bredel for specific Class ratings*
Voltages	*Available 230/460VAC 3-ph or 120/240VAC 1-ph*
Pneumatic	*Requires (100 psi) filtered and lubricated air source*

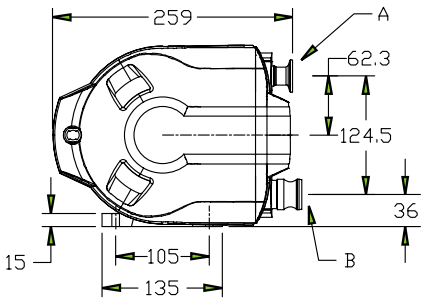
Flow rates liters/min (GPM)

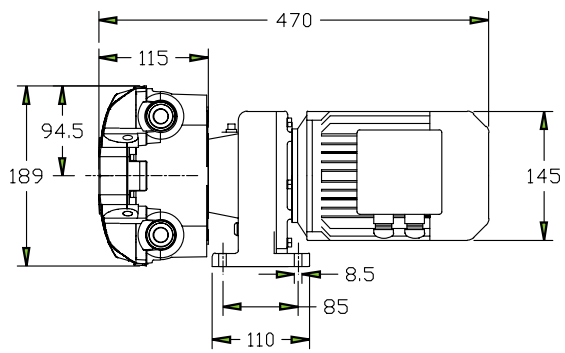
	Pumphead Type R					Type RE	
	Bore mm	6.4mm	9.6mm	12.7mm	15.9mm	Loadsure™12mm	Loadsure™17mm
	Bore"	1/16"	3/8"	1/2"	5/8"	LoadSure™15/32"	LoadSure™11/16"
Tubing material	Speed range (rpm)						
MarpreneTM, BiopreneTM	*77/251*	-	-	-	-	*2.85/9.29*	*4.54/14.8*
MarpreneTL, BiopreneTL	*77/251*	*1.00/3.26*	*1.93/6.28*	*3.08/10.0*	*4.21/11.3*	*2.85/9.29*	*5.18/16.9*
Silicone	*77/251*	*0.92/3.01*	*2.08/6.78*	*3.23/10.5*	*4.74/14.5*	*2.98/9.71*	*4.69/15.3*
Neoprene, STA-PURE	*77/251*	*0.92/3.01*	*1.93/6.28*	*3.08/10.0*	*4.70/15.3*	*3.06/9.99*	*5.66/18.1*

Flow rates vary depending on tube material. Contact Watson-Marlow Bredel for a complete flow table by tube material.

Materials of construction

Track	*Aluminium LM24M Powder coated*
Guard	*Polyurethane PBA/Grilamid TR55*
Rotor	*Body: Forton 114OL4 (PPS) Rollers: 304SS*
Gearbox	*Cast iron epoxy powder coated (FDA white available.*
Tube clamps	*Polypropylene*
Tube fittings	*Tri Clamp style: PVDF Cam and Groove style: polypropylene*





Motor Specifications

102R, B1, D, M and N pumps

Motor Type		No Load Speed
Standard 5 Watt DC	*An instrument-quality DC motor. This motor is powerful for its size, whisper-quiet, and has a brush life up to 10,000 hours. A wide speed reduction ratio (20:1) can be obtained with the speed controllers on page 37.*	*3000rpm*
Economy DC 5 Watt	*Used primarily for fixed speed intermittent duty applications. This motor is small in size and a high rpm capability for its size.*	*6000rpm*
Brushless DC 5 Watt	*A 1 phase, 2 core reluctance motor with 4 pole ferrite magnet. Hall position sensors and has commutation electronics are integrated. The design is brushless, giving it a long service life. Speed is adjusted by varying the 24V DC supply.*	*4000rpm*
Synchronous AC	*Motors run on mains voltages. The motor speed is based on supply frequency giving a consistent reproducible motor speed. This design is brushless giving it an extremely long service life.*	*500/600rpm (50/60 Hz)*

313D, 501RL, R1, L2, GM and VM pumps

Motor Type		No Load Speed
Standard 5 Watt DC	*An instrument-quality DC motor. This motor is powerful for its size, whisper-quiet, and has a brush life up to 10,000 hours. A wide speed reduction ratio (20:1) can be obtained with the speed controllers on page 37.*	*3000rpm*
Standard 30 Watt DC	*An instrument-quality DC motor. This motor is powerful for its size, whisper-quiet, and has a brush life up to 10,000 hours. A wide speed turndown ratio (20:1) can be obtained with the speed controllers on page 37.*	*2000rpm*
Brushless DC 35 Watt 24VDC	*This brushless DC motor features a built-in controller that can be remotely operated via analog signals from a PC or PLC. Speed can be controlled by a 0-4 Volt control signal, and stop/start and direction can be controlled by relays. The controller has a pulsed tachometer output.*	*3650rpm*

Additional options for 313D & 501RL

Motor Type		No Load Speed
DC motor for 313FD /D	*This is an economical DC motor with a brush life of approximately 2000 hours, and speeds up to 100 rpm. The 313SCB on page 6 can be used to control speed with a turndown ratio of 10:1*	*2500 rpm*
DC motor for 313FDC/D & 501FDC/RL	*These are economical motors offering a speed of 220 rpm at 12 volts, and a brush life of approximately 2500 hours. Contact Watson-Marlow Bredel for speed controller.*	*2500 rpm*
AC Induction Motors	*A high torque output permanent split capacitor AC motor. The motors run at a constant speed are rated for continuous duty, and reversible.*	*2500 rpm*
AC Shaded Pole Motors	*Feature a low cost, and reliability at relatively constant speeds. Motors are limited by torque capability, but are rated for continuous duty.*	*2700 rpm*

Non-standard motors

Motor Type		No Load Speed
Stepper Motors	*Gives the user precise control down to a fraction of a revolution, making them the choice when dispensing a set volume. The stepper must be controlled by a specialized drivers and logic circuits provided by the end user. Steppers are a custom option that can be provided for most pump models.*	

Tube Selection and Sample Compatibility

CHOOSING THE BEST TUBE

Watson-Marlow tubing is available in seven materials and over forty sizes, giving an extraordinary range of chemical and application capability. Watson-Marlow pumps are designed for Watson-Marlow tubing tolerances and performance, and no other tubing will provide comparable results.

The tubing largely dictates pump performance: its restitution creates suction; its strength resists pressure; its flex resistance determines pumping life; its bore defines the flow rate; and its wall thickness controls pumping efficiency.

Marprene is Watson-Marlow's exclusive thermoplastic elastomer.

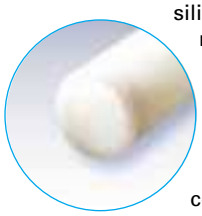
Always our first recommendation, Marprene is the longest-life tubing with a wide chemical compatibility, and is highly resistant to oxidizing agents such as ozone and peroxides and sodium hypochlorite. Marprene is beige in color, opaque to both visible and ultra-violet light, with low permeability to gases such as oxygen, carbon dioxide and nitrogen, and meets USDA standards for food handling. Working temperature range 5C to 80C. Autoclavable.

Bioprene has the same long life as Marprene but complies with USP Class VI, FDA requirements 21 CFR 177.2600 and NSF and USDA standards for food handling. It has a wide chemical compatibility, and can handle repeated autoclaving. Bioprene can be sterilized by ethylene oxide or gamma irradiation. Working temperature range is 5C to 80C. Beige. Available in 15 meter packs only.

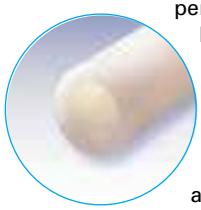
Silicone is the standard laboratory tubing used for small bore sizes up to 9.6mm. Food and medical quality, meets USP and NSF Class VI standards and autoclavable.

Watson-Marlow manufactures a specially developed **platinum-cured silicone tubing** for additional protection from contamination during the pumping process. Platinum-cured tubing produces a smoother surface; less protein binding offers high levels of purity. It is ideal for medical devices, chemical analysis and pharmaceutical production applications, particularly where there is long term contact with the process fluid. Working temperature range -20C to 80C. High permeability to gases. Translucent. Autoclavable.

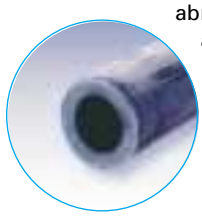
Sta-Pure has a unique composite construction of silicone in a PTFE lattice, giving it superior burst resistance up to 7 Bar (100psi) and 18 times longer life than silicone tubing. It produces virtually no spalling, is USP Class VI approved and is classified as non-toxic. Working temperature range is 0C to 80C. Opaque white. Autoclavable, SIP and CIP compatible.



Chem-Sure is effectively pumpable PTFE - a high performance composite of PTFE and a high-grade fluoroelastomer - offering extraordinary chemical resistance, long life and very high burst pressures. Chem-Sure is USP Class VI and food grade approved, making it suitable for foods and pharmaceuticals as well as aggressive chemicals.



Neoprene offers excellent performance with abrasive slurries and sustained pressure applications. Good suction and pressure capabilities. Food quality. Working temperature range is 0C to 80C. Black.



PVC has a high Shore hardness giving excellent pressure and suction performance and low gas permeability. FDA approved for use with food and is NFS listed. Working temperature range 0C - 60C. Glass clear.

Sample Compatibility

The best way to select a tube is to first decide which materials are chemically suitable, and then choose the one which best meets the physical demands of the application. Normally, use the longest tube life material, which will usually be Bioprene or Marprene if they are chemically and physically suitable. Otherwise, silicone tubing is most often chosen for sizes up to (9.6mm) 3/8", and Neoprene tubing for bore sizes of (12.7mm) 1/2" or more.

Checking your choice with an immersion test

Always conduct an immersion test before choosing a tube material for critical applications. Immerse a short length of the tubing or a disk of rubber sample (always available from Watson-Marlow or its distributors) in a closed container of the fluid for 48 hours, and then examine for signs of attack, swelling, embrittlement or other deterioration.

TUBING

Ordering information

Table A 1. 6mm wall thickness tubing for 102R, 313, 314, 400F/B1, 400F/R1, and 501RL pumps

Tube#	Tube bore		Bioprene	Marprene	Silicone	Sta-Pure	Chem-Sure
112	0.5mm	1/50"	*903.0005.016*	*902.0005.016*	*913.A005.016*		
13	0.8mm	1/32"	*903.0008.016*	*902.0008.016*	*913.A008.016*		
14	1.6mm	1/16"	*903.0016.016*	*902.0016.016*	*913.A016.016*	*960.0016.016*	*965.0016.016*
	2.4mm	3/32"		*902.0024.016*	*910.0016.016*		
16	3.2mm	1/8"	*903.0032.016*	*902.0032.016*	*913.A032.016*	*960.0032.016*	*965.0032.016*
	4.0mm	5/32"		*902.0040.016*	*910.0040.016*		
25	4.8mm	3/16"	*903.0048.016*	*902.0048.016*	*913.A048.016*	*960.0048.016*	*965.0048.016*
17	6.4mm	1/4"	*903.0064.016*	*902.0064.016*	*913.A064.016*	*960.0064.016*	*965.0064.016*
18	8.0mm	5/16"	*903.0080.016*	*902.0080.016*	*913.A080.016*	*960.0080.016*	*965.0080.016*
Tube#	Tube bore		Neoprene	Butyl	PVC	Fluorel	
112	0.5mm	1/50"				*970.0005.016*	
13	0.8mm	1/32"	*920.0008.016*			*970.0008.016*	
14	1.6mm	1/16"	*920.0016.016*	*932.0016.016*	*950.0016.016*	*970.0016.016*	
16	3.2mm	1/8"	*920.0032.016*	*932.0032.016*	*950.0032.016*	*970.0032.016*	
25	4.8mm	3/16"	*920.0048.016*	*932.0048.016*	*950.0048.016*	*970.0048.016*	
17	6.4mm	1/4"	*920.0064.016*	*932.0064.016*	*950.0064.016*	*970.0064.016*	
18	8.0mm	5/16"	*920.0080.016*	*932.0080.016*	*950.0080.016*	*970.0080.016*	

Table B 2.4mm wall thickness tubing for 313D2, 314D2, and 501RL pumpheads

Tube#	Tube bore		Bioprene	Marprene	Silicone	Sta-Pure	Chem-Sure
105	0.5mm	1/50"			*913.A005.024*		
108	0.8mm	1/32"			*913.A008.024*		
119	1.6mm	1/16"	*903.0016.024*	*902.0016.024*	*913.A016.024*	*960.0016.024*	*965.0016.024*
120	3.2mm	1/8"	*903.0032.024*	*902.0032.024*	*913.A032.024*	*960.0032.024*	*965.0032.024*
15	4.8mm	3/16"	*903.0048.024*	*902.0048.024*	*913.A048.024*	*960.0048.024*	*965.0048.024*
24	6.4mm	1/4"	*903.0064.024*	*902.0064.024*	*913.A064.024*	*960.0064.024*	*965.0064.024*
121	8.0mm	5/16"	*903.0080.024*	*902.0080.024*	*913.A080.024*	*960.0080.024*	*965.0080.024*
122	9.6mm	3/8"	*903.0096.024*	*902.0096.024*	*913.A096.024*	*960.0096.024*	*965.0096.024*

Table C 1.0mm wall thickness tubing for 400F/D2-D3, and 400F/N, not elements

	Bore Size	Marprene	Silicone
	0.5	*903.0005.010*	*910.0005.010*
	1.0	*903.0010.010*	*910.0010.010*
	2.0	*903.0020.010*	*910.0020.010*
	3.0	*903.0030.010*	*910.0030.010*
	4.0	*903.0040.010*	*910.0040.010*

Table D LoadSure® tube elements for 620RE pumpheads

Bore/Connector	Bioprene TM	Bioprene TL	Sta-Pure	Plat Silicone	Marprene TM	Marprene TL	Neoprene
12.0mm / 15/32" Tri Clamp	*903.M120.PFT*	*903.L120.PFT*	*960.0120.PFT*	*913.A120.PFT*			
17.0mm / 11/16" Tri Clamp	*903.M170.PFT*	*903.L170.PFT*	*960.0170.PFT*	*913.A170.PFT*			
12.0mm / 15/32" Cam Lock					*902.M120.PPC*	*902.L120.PPC*	*902.0120.PPC*
17.0mm / 11/16" Cam Lock					*902.M170.PPC*	*902.L170.PPC*	*902.0170.PPC*

Table E 3.2mm wall thickness tubing for 620R close coupled pumphead

Tube#	Tube bore		Bioprene	Marprene	Sta-Pure	Silicone
123	4.8mm	3/16"			*960.0048.032*	*913.A048.032*
26	6.4mm	1/4"	*903.0064.032*	*902.0064.032*	*960.0064.032*	*913.A064.032*
73	9.6mm	3/8"	*903.0096.032*	*902.0096.032*	*960.0096.032*	*913.A096.032*
82	12.7mm	1/2"	*903.0127.032*	*902.0127.032*	*960.0127.032*	*913.A127.032*
184	15.9mm	5/8"	*903.0159.032*	*902.0159.032*	*960.0159.032*	*913.A159.032*
Tube#	Tube bore		Neoprene	Butyl	PVC	Flourel
125	3.2mm	1/8"		*932.0032.032*		
26	6.4mm	1/4"	*920.0064.032*	*932.0064.032*	*950.0064.032*	*970.0064.032*
73	9.6mm	3/8"	*920.0096.032*	*932.0096.032*	*950.0096.032*	*970.0096.032*
82	12.7mm	1/2"	*920.0127.032*	*932.0127.032*	*950.0127.032*	*970.0127.032*
184	15.9mm	5/8"	*920.0159.032*	*932.0159.032*	*950.0159.032*	*970.0159.032*

Table F 3-Stop Manifold Tubing for 400F/DM and microcassette pumps

		Colour Code	Marprene	Silicone	PVC
0.13	0.005"	orange/black			*981.0013.000*
0.19	0.007"	orange/red			*981.0019.000*
0.25	0.010"	orange/blue	*979.0025.000*		*981.0025.000*
0.38	0.015"	orange/green	*979.0038.000*		*981.0038.000*
0.50	0.020"	orange/yellow	*979.0050.000*		*981.0050.000*
0.63	0.025"	orange/white	*979.0063.000*	*983.0063.000*	*981.0063.000*
0.76	0.030"	black/black	*979.0076.000*	*983.0076.000*	*981.0076.000*
0.88	0.035"	orange/orange	*979.0088.000*	*983.0088.000*	*981.0088.000*
1.02	0.040"	white/white	*979.0102.000*	*983.0102.000*	*981.0102.000*
1.14	0.045"	red/grey	*979.0114.000*	*983.0114.000*	*981.0114.000*
1.29	0.050"	grey/grey	*979.0129.000*	*983.0129.000*	*981.0129.000*
1.42	0.055"	yellow/yellow	*979.0142.000*	*983.0142.000*	*981.0142.000*
1.47	0.058"	translucent		*983.0417.000*	
1.52	0.060"	yellow/blue	*979.0152.000*	*983.0152.000*	*981.0152.000*
1.65	0.065"	blue/blue	*979.0165.000*	*983.0165.000*	*981.0165.000*
1.85	0.070"	green/green	*979.0185.000*	*983.0185.000*	*981.0185.000*
2.05	0.080"	purple/purple	*979.0205.000*	*983.0205.000*	*981.0205.000*
2.29	0.090"	purple/black	*979.0238.000*	*983.0238.000*	*981.0238.000*
2.54	0.100"	purple/orange	*979.0254.000*	*983.0254.000*	*981.0254.000*
2.79	0.110"	purple/white	*979.0279.000*	*983.0279.000*	*981.0279.000*

Ordering information

Table G) 2-Stop Manifold Tubing for 400F/VM and 400F/GM pumps

		Colour Code	Marprene	Silicone	PVC	PVC Solvent Resist	Acid Resistant
0.13	0.005″	orange/black			*980.0013.000*	*984.0013.000*	
0.19	0.007″	orange/red			*980.0019.000*	*984.0019.000*	
0.25	0.010″	orange/blue	*978.0025.000*		*980.0025.000*	*984.0025.000*	
0.38	0.015″	orange/green	*978.0038.000*		*980.0038.000*	*984.0038.000*	
0.50	0.020″	orange/yellow	*978.0050.000*		*980.0050.000*	*984.0050.000*	*986.0050.000*
0.63	0.025″	orange/white	*978.0063.000*	*982.0063.000*	*980.0063.000*	*984.0063.000*	*986.0063.000*
0.76	0.030″	black/black	*978.0076.000*	*982.0076.000*	*980.0076.000*	*984.0076.000*	*986.0076.000*
0.88	0.035″	orange/orange	*978.0088.000*	*982.0088.000*	*980.0088.000*	*984.0088.000*	*986.0088.000*
1.02	0.040″	white/white	*978.0102.000*	*982.0102.000*	*980.0102.000*	*984.0102.000*	*986.0102.000*
1.14	0.045″	red/grey	*978.0114.000*	*982.0114.000*	*980.0114.000*	*984.0114.000*	*986.0114.000*
1.29	0.050″	grey/grey	*978.0129.000*	*982.0129.000*	*980.0129.000*	*984.0129.000*	*986.0129.000*
1.42	0.055″	yellow/yellow	*978.0142.000*	*983.0142.000*	*980.0142.000*	*984.0142.000*	*986.0142.000*
1.47	0.058″	translucent		*982.0417.000*			
1.52	0.060″	yellow/blue	*978.0152.000*	*982.0152.000*	*980.0152.000*	*984.0152.000*	*986.0152.000*
1.65	0.065″	blue/blue	*978.0165.000*	*982.0165.000*	*980.0165.000*	*984.0165.000*	*986.0165.000*
1.85	0.070″	green/green	*978.0185.000*	*982.0185.000*	*980.0185.000*	*984.0185.000*	*986.0185.000*
2.05	0.080″	purple/purple	*978.0205.000*	*982.0205.000*	*980.0205.000*	*984.0205.000*	*986.0205.000*
2.29	0.090″	purple/black	*978.0238.000*	*982.0238.000*	*980.0238.000*	*984.0238.000*	*986.0238.000*
2.54	0.100″	purple/orange	*978.0254.000*	*982.0254.000*	*980.0254.000*	*984.0254.000*	*986.0254.000*
2.79	0.110″	purple/white	*978.0279.000*	*982.0279.000*	*980.0279.000*	*984.0279.000*	*986.0279.000*

** For autoclavable tubing, please replace last "0" of Product code with "*" - for example, 978.0229.00**

Standard 410 Elements for 400F/M1

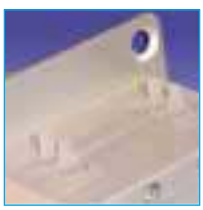
Tube ordering codes

Bore / wall (mm)	Tubing material Marprene	PVC	Peroxide Silicone	Connects to
0,5 / 1,6	*049.EF6M.E05*	*Not available*	*Not available*	*FTLL, see Transfer Connections below*
0,8 / 1,6	*049.EF6M.E08*	*Not available*	*049.EH6M.E08*	*FTLL, see Transfer Connections below*
1,6 / 1,6	*049.EF6M.E16*	*049.ET6M.E16*	*049.EH6M.E16*	*FTLL, see Transfer Connections below*
2,4 / 1,6	*049.EF6M.E24*	*049.ET6M.E24*	*049.EH6M.E24*	*FTLL, see Transfer Connections below*
3,2 / 1,6	*049.EF6M.E32*	*049.ET6M.E32*	*049.EH6M.E32*	*FTLL, see Transfer Connections below*
4,0 / 1,6	*049.EF6M.E40*	*049.ET6M.E40*	*049.EH6M.E40*	*FTLL, see Transfer Connections below*

Transfer connections

Connects to	Ordering codes
Tube bore 1,6	*FTLL210-6*
Tube bore 2,4	*FTLL220-6*
Tube bore 3,2	*FTLL230-6*
Tube bore 4,0	*FTLL240-6*
Tube bore 4,8	*FTLL250-6*

Standard 420 Elements for 400F/N2



Tube ordering codes

Bore / wall (mm)	Tubing material Marprene	Peroxide Silicone	Connects to
0,5 / 1,0	*049.EF6N.N05*	*Not available*	*Tube bore 3,0*
1,0 / 1,0	*049.EF6N.N10*	*049.EH6N.N10*	*Tube bore 3,0*
2,0 / 1,0	*049.EF6N.N20*	*049.EH6N.N20*	*Tube bore 3,0*
3,0 / 1,0	*049.EF6N.N30*	*049.EH6N.N30*	*Tube bore 3,0*

Standard 430 Elements for 400F/D2 and 400F/D3

Tube ordering codes

Bore / wall (mm)	Tubing material Marprene	Peroxide Silicone	Connects to
0,5 / 1,0	*049.EF6D.N05*	*Not available*	*Tube bore 3,0*
1,0 / 1,0	*049.EF6D.N10*	*049.EH6D.N10*	*Tube bore 3,0*
2,0 / 1,0	*049.EF6D.N20*	*049.EH6D.N20*	*Tube bore 3,0*
3,0 / 1,0	*Not available*	*049.EH6D.N30*	*Tube bore 3,0*

Standard 440 Elements for 400F/L2

Tube ordering codes

Bore / wall (mm)	Tubing material Marprene	PVC	Peroxide Silicone	Connects to
0,8 / 1,6	*049.EF6L.E08*	*049.ET6L.E08*	*049.EH6L.E08*	*FTLL, see Transfer Connections below*
1,6 / 1,6	*049.EF6L.E16*	*049.ET6L.E16*	*049.EH6L.E16*	*FTLL, see Transfer Connections below*
2,4 / 1,6	*049.EF6L.E24*	*049.ET6L.E24*	*049.EH6L.E24*	*FTLL, see Transfer Connections below*
3,2 / 1,6	*049.EF6L.E32*	*049.ET6L.E32*	*049.EH6L.E32*	*FTLL, see Transfer Connections below*
4,0 / 1,6	*049.EF6L.E40*	*049.ET6L.E40*	*049.EH6L.E40*	*FTLL, see Transfer Connections below*
4,8 / 1,6	*049.EF6L.E48*	*049.ET6L.E48*	*049.EH6L.E48*	*FTLL, see Transfer Connections below*

Transfer connections

Connects to	Ordering codes
Tube bore 1,6	*FTLL210-6*
Tube bore 2,4	*FTLL220-6*
Tube bore 3,2	*FTLL230-6*
Tube bore 4,0	*FTLL240-6*
Tube bore 4,8	*FTLL250-6*

Y Connectors transforming 2 channels to 1 low pulse channel

Standard 440 Y Elements for 400F/L2

Tube ordering codes

Bore / wall (mm)	Tubing material Marprene	PVC	Peroxide Silicone	Connects to
1,6 / 1,6	*049.EF6L.Y16*	*049.ET6L.Y16*	*049.EH6L.Y16*	*FTLL, see Transfer Connections below*
2,4 / 1,6	*049.EF6L.Y24*	*049.ET6L.Y24*	*049.EH6L.Y24*	*FTLL, see Transfer Connections below*
3,2 / 1,6	*049.EF6L.Y32*	*049.ET6L.Y32*	*049.EH6L.Y32*	*FTLL, see Transfer Connections below*
4,0 / 1,6	*049.EF6L.Y40*	*049.ET6L.Y40*	*049.EH6L.Y40*	*FTLL, see Transfer Connections below*
4,8 / 1,6	*049.EF6L.Y48*	*049.ET6L.Y48*	*049.EH6L.Y48*	*FTLL, see Transfer Connections below*

Transfer connections

Connects to	Ordering codes
Tube bore 1,6	*FTLL210-6*
Tube bore 2,4	*FTLL220-6*
Tube bore 3,2	*FTLL230-6*
Tube bore 4,0	*FTLL240-6*
Tube bore 4,8	*FTLL250-6*

WATSON MARLOW Bredel PUMPS

Pump Series		Flow Rates	
100	Single channel, low flow pumps. Fixed or variable speed.	1µl/min - 53ml/min	101U
200	Near pulseless, multi-channel pumps with up to 32 channels.	0.6µl/min - 22ml/min	205U
300	NEW Compact, single or multi-channel laboratory pumps with manual, remote, analogue, RS232 or dispensing control.	2µl/min - 2.2 litre/min	323U
400	Instrument-quality, ultra-precise, single and multi-channel pumps with manual or process control.	1µl/min - 730ml/min	405U
500	Microprocessor controlled and IP55 industrial pumps with manual, auto and digital control.	10µl/min - 4.4 litre/min	505S
600	IP55 mid-flow industrial pumps. Fixed or variable speed.	50ml/min - 18.3 litre/min	624U
700	IP55 industrial pumps with manual or auto control, single or twin channel.	1.6 litre/min - 66 litre/min	704U
800	High flow hygienic pumps with full CIP and SIP capability.	2 litre/min - 133 litre/min	840
SPX	Bredel: High flow industrial pumps operating at pressures up to 16 bar (230 psi).	0.3 litre/min 80m³/hr	SPX40
Tubing Hoses	Extensive range of tubing ensures chemical compatibility. USP Class VI and FDA approvals. Precision machined, reinforced hoses provide flow stability and excellent suction performance. • Twelve tubing materials in bore sizes 0.13mm to 25.4mm • Autoclavable Marprene, Bioprene, STA-PURE, Chem-Sure and Pumpsil (platinum-cured Silicone)		Tubing

Put a peristaltic in your process Improve your performance










PROFILE OF FLOW RATE AGAINST TIME

The flow rate of all peristaltic pump tubing will reduce over time, with the majority of the change occurring in the first hours and days of use, after which the flow rate will stabilise. Maximum accuracy of metering and dosing will be obtained during this period of stability. Where precise flow rates are required, it is recommended that the flow rate is calibrated after at least a one hour running-in period.

FLOW RATES

All flow rates given in this catalogue were obtained pumping water at 20C (68F) with zero suction and delivery heads. PVC tubing was used to obtain the 200 series flow rates, Marprene or Bioprene tubing to obtain the 600 series flow rates. All other flow rates were obtained using silicone tubing.

OPERATING AND STORAGE TEMPERATURES

Unless otherwise stated, all pumps listed in this catalogue may be operated at ambient temperatures between 5C and 40C (41F and 104F). They may be stored at temperatures between -40C and 70C (-40F and 158F), but allow time for acclimatisation before operating.

STANDARDS

CE Meets all relevant directives

EN601010 is the European Norm standard dealing with "Safety requirements for electrical equipment for measurement, control and laboratory use".

EN60529 is the European Norm standard dealing with the "Classification of degrees of protection provided by enclosures for rotating machines. Equivalents are BS 4999: Part 105, IEN 60 034: Part 5, and DIN VDE 0530: Part 5. IP numbers (such as IP34, IP42, IP55) indicate the degree of ingress protection of the product, with the first digit indicating protection against the ingress of objects, and the second digit indicating the degree of protection against the ingress of water.

SPARE PARTS AVAILABILITY

Watson-Marlow's policy is to provide spare parts for all products for a minimum of seven years from discontinuation. The ability to implement this policy is not entirely within Watson-Marlow's control and cannot be guaranteed, but every effort will be made to honour this policy.

LLOYD'S REGISTER QUALITY ASSURANCE ISO 14001 — UKAS ENVIRONMENTAL MANAGEMENT 001

LLOYD'S REGISTER QUALITY ASSURANCE ISO9001 — UKAS QUALITY MANAGEMENT 001