WATSON MARLOW Bredel PUMPS

NEW

Every peristaltic pump for science

sciQ

400 series from Watson-Marlow Bredel

sciQ from Watson-Marlow Bredel

The new standard in scientific pumping

With over one million pumps sold, Watson-Marlow Bredel is the world's leading peristaltic pump manufacturer, entrusted with the handling of valuable, difficult and sensitive fluids in research, pilot and production processes everywhere that science is building our future.

science

Sci-Q pumps have been created for **science**, by science, exploiting every latest technique from 3D solid design, finite element analysis, rapid prototyping, intensive tooling and cellular build. The results are as near perfection as the state of the art can provide.

intelligence

At the heart of a Sci-Q pump is microprocessor **intelligence**, but what really marks it out is the intelligence of its design, born from a passion for engineering fluid-handling solutions. Watson-Marlow Bredel creates intelligent designs for intelligent users.

quality

The highest **quality** peristaltic pump available today, every Watson-Marlow Bredel product is engineered for quality. Zero-maintenance motors, whisper-quiet gearboxes and the most sophisticated control electronics designed and manufactured to ISO9001:2000 are backed by expert local support.

Inside the Sci-Q 323

- Four modular pumphead types for single or multi-channel flows from µl/minute to 2 liters per minute
- Precision brushless DC motor: servo-quality for precise speed control; zero maintenance
- Easy-use interface: high-visibility display and contoured membrane keypad designed for intuitive operation
- Durable chemical-resistant case, crevice-free for hygiene; distinctive, contemporary and functional

PRECISION PUMPS FOR SCIENCE

401U/D1

401U/D1, 401U/DM2 and 401U/DM3 manual/auto control ultra compact pumps

- 401U/D1 provides single channel flows up to 120ml/min
- 401U/DM2 and 401U/DM3 provide two and three channel flows up to 36ml/min
- Highly-compact with single control potentiometer for direction, speed and start/stop
- Analog speed control and remote switching via a 15D connector
- Reversible for easy fluid recovery

The 401U/D1 accepts standard 1/16" (1.6mm) wall tubing up to 5/32" (4mm) bore in seven different tube materials.

401U/DM2 and 401U/DM3 multi-channel pumps with precision machined aluminum rotor accept three-bridge manifold tubing and provide flow rates from 0.001-36ml/min per channel.

All are supplied with a 100-120V:15VAC transformer. Order remote switching cables separately. Accepts 4-20mA or 0-10V analog signals and remote TTL (PLC compatible) start/stop and direction switching. Quick release sprung tube clamps on D1 model. A precision machined four-roller aluminum rotor gives smooth, precise flows.

401U/DM2

401U/DM3

401U/D1 flow rates per channel (ml/min)

Tube bore	1/50"	1/32"	1/16"	3/32"	1/8"	5/32"
	0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm
1.2 to 12rpm	0.01-0.1	0.03-0.3	0.14-1.4	0.29-2.9	0.49-4.9	0.70-7.0
4.0 to 40rpm	0.05-0.5	0.12-1.2	0.45-4.5	0.97-9.7	1.6-16	2.3-23
20 to 200rpm	0.23-2.3	0.58-5.8	2.3-23	4.9-49	8.1-81	12-120

401U/DM2 and 401U/DM3 flow rates (ml/min)

Color	Orange/Black	Orange/Red	Orange/Blue	Orange/Green	Orange/Yellow
Tube bore	**0.005"**	**0.007"**	**0.010"**	**0.015"**	**0.020"**
	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm
1.2 to 12rpm	0.001-0.01	0.002-0.02	0.004-0.04	0.01-0.1	0.02-0.2
4.0 to 40rpm	0.004-0.04	0.008-0.08	0.014-0.14	0.03-0.3	0.06-0.6
10 to 100rpm	0.009-0.09	0.020-0.20	0.035-0.35	0.08-0.8	0.14-1.4

Color	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Tube bore	**0.025"**	**0.030"**	**0.035"**	**0.040"**	**0.045"**
	0.63mm	0.76mm	0.88mm	1.02mm	1.14mm
1.2 to 12rpm	0.03-0.3	0.04-0.4	0.05-0.5	0.07-0.7	0.08-0.8
4.0 to 40rpm	0.09-0.9	0.12-1.2	0.17-1.7	0.22-2.2	0.28-2.8
10 to 100rpm	0.22-2.2	0.31-3.1	0.43-4.3	0.55-5.5	0.70-7.0

Color	Gray/Gray	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Tube bore	**0.050"**	**0.055"**	**0.060"**	**0.065"**	**0.070"**
	1.29mm	1.42mm	1.52mm	1.65mm	1.85mm
1.2 to 12rpm	0.11-1.1	0.13-1.3	0.15-1.5	0.17-1.7	0.21-2.1
4.0 to 40rpm	0.35-3.5	0.43-4.3	0.49-4.9	0.56-5.6	0.70-7.0
10 to 100rpm	0.89-8.9	1.1-11	1.2-12	1.4-14	1.8-18

Color		Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Tube bore		**0.080"**	**0.095"**	**0.100"**	**0.110"**
		2.05mm	2.38mm	2.54mm	2.79mm
1.2 to 12rpm		0.26-2.6	0.31-3.1	0.37-3.7	0.44-4.4
4.0 to 40rpm		0.85-8.5	1.0-10	1.2-12	1.5-15
10 to 100rpm		2.1-21	2.6-26	3.1-31	3.6-36

Ordering information for 401

401U/D1 single channel 1.6mm wall tubing pump		**Product code**
1.2 to 12rpm	15VAC single channel standard tubing pump	040.181D.01A
4.0 to 40rpm		040.1H1D.01A
20 to 200rpm		040.1S1D.01A

401U/DM2 one or two channel manifold tube pump		
1.2 to 12rpm	15VAC two channel manifold tubing pump	040.181D.M2A
4.0 to 40rpm		040.1H1D.M2A
10 to 100rpm		040.1P1D.M2A

401U/DM3 three channel manifold tube pump		
1.2 to 12rpm	15VAC three channel manifold tubing pump	040.181D.M3A
4.0 to 40rpm		040.1H1D.M3A
10 to 100rpm		040.1P1D.M3A

Remote switching cables for 401U		
400AC1	0-10V CW/Stop/CCW 3.45 feet (1.5m) remote cable	049.0011.00A
400AC2	4-20mA CW/Stop/CCW 3.45 feet (1.5m) remote cable	049.0031.00A
400AC3	CW/Stop/CCW 3.45 feet (1.5m)remote cable	049.0051.00A
400AC4	Start/Stop 10 feet (3m) remote cable fitted with foot switch	049.0071.00A

Tubing for 401U/D1

Tube bore	**#**	**Bioprene**	**Marprene**	**Platinum Silicone**	**Neoprene**
$^{1}/_{50}$" (0.5mm)	112	903.0005.016	902.0005.016	913.A005.016	
$^{1}/_{32}$" (0.8mm)	13	903.0008.016	902.0008.016	913.A008.016	920.0008.016
$^{1}/_{16}$" (1.6mm)	14	903.0016.016	902.0016.016	913.A016.016	920.0016.016
$^{3}/_{32}$" (2.4mm)			902.0024.016	913.A024.016	
$^{1}/_{8}$" (3.2mm)	16	903.0032.016	902.0032.016	913.A032.016	920.0032.016
$^{5}/_{32}$" (4.0mm)			902.0040.016	913.A040.016	

Tube bore		**Sta-Pure**	**Chem-Sure**	**PVC**
$^{1}/_{16}$" (1.6mm)	14	960.0016.016	965.0016.016	950.0016.016
$^{1}/_{8}$" (3.2mm)	16	960.0032.016	965.0032.016	950.0032.016

Double segment manifold pump tubing for 401U/DM2 and 401U/DM3

Color code	**Bore**	**Marprene**	**Autoclavable Marprene**	**PVC**	**Silicone**
Orange/black	0.005" (0.13mm)			981.0013.000	
Orange/red	0.007" (0.19mm)			981.0019.000	
Orange/blue	0.010" (0.25mm)	979.0025.000	979.0025.00+	981.0025.000	
Orange/green	0.015" (0.38mm)	979.0038.000	979.0038.00+	981.0038.000	
Orange/yellow	0.020" (0.50mm)	979.0050.000	979.0050.00+	981.0050.000	
Orange/white	0.025" (0.63mm)	979.0063.000	979.0063.00+	981.0063.000	983.0063.000
Black/black	0.030" (0.76mm)	979.0076.000	979.0076.00+	981.0076.000	983.0076.000
Orange/orange	0.035" (0.88mm)	979.0088.000	979.0088.00+	981.0088.000	983.0088.000
White/white	0.040" (1.02mm)	979.0102.000	979.0102.00+	981.0102.000	983.0102.000
Red/red	0.045" (1.14mm)	979.0114.000	979.0114.00+	981.0114.000	983.0114.000
Gray/gray	0.050" (1.29mm)	979.0129.000	979.0129.00+	981.0129.000	983.0129.000
Yellow/yellow	0.055" (1.42mm)	979.0142.000	979.0142.00+	981.0142.000	983.0142.000
Yellow/blue	0.060" (1.52mm)	979.0152.000	979.0152.00+	981.0152.000	983.0152.000
Blue/blue	0.065" (1.65mm)	979.0165.000	979.0165.00+	981.0165.000	983.0165.000
Green/green	0.070" (1.85mm)	979.0185.000	979.0185.00+	981.0185.000	983.0185.000
Purple/purple	0.080" (2.05mm)	979.0205.000	979.0205.00+	981.0205.000	983.0205.000
Purple/black	0.095" (2.29mm)	979.0229.000	979.0229.00+	981.0229.000	983.0229.000
Purple/orange	0.100" (2.54mm)	979.0254.000	979.0254.00+	981.0254.000	983.0254.000
Purple/white	0.110" (2.79mm)	979.0279.000	979.0279.00+	981.0279.000	983.0279.000

401U specifications

Weight	**Operating temperature**	**Control ratio**	**Noise**	**Standards**
2.2lbs	5-40C	10:1	<70dBA at 1m	CE, BS0800, IEC335-1, EN60529 IP21
Supply through a mains transformer		15VAC		

403U/R1, 403U/L and 403U/L2 auto/manual control compact pumps

403U/R1

- The 403U/R1 produces single channel flows from 0.06 to 150ml/min
- The 403U/L produces low-pulsing, single channel flows from 0.11 to 180ml/min
- The 403U/L2 produces dual channel flows up to 92ml/min per channel
- Digital speed control via top panel mounted keypad
- Reversible motor for easy fluid recovery
- “Max” high speed priming function

The 403U/R1, 403U/L and 403U/L2 are precision manual/auto-control pumps which use 1/16" (1.6mm) wall tubing. All have spring-loaded tracks to maximize tube life and flow precision against pressures up to 30 psi (2 bar).

403 low-flow models provide speeds up to 50rpm, 405 high-flow models up to 200rpm. All pumpheads have transparent polyester resin (PET) guards.

20:1 speed control. R1 single channel four-roller pumphead accepts up to 1/4" (6.4mm) bore tubing. L2 dual channel or "L" low pulsing Y element option up to 3/16" (4.8mm) bore with twin, precision offset aluminum rotors with four stainless steel rollers. All pumps accept 4-20mA or 0-10V analog signals and remote TTL (PLC compatible) start/stop and CCW/CW switching. Two year comprehensive warranty.

403U/L

405U/R1, 405U/L and 405U/L2 manual/auto control high-flow pumps

405U/R1

- The 405U/R1 produces single channel flows from 0.44 to 610ml/min
- The 405U/L produces low-pulsing, single channel flows from 0.86 to 730ml/min
- The 405U/L2 produces dual channel flows up to 370ml/min per channel
- Digital speed control via front panel mounted keypad
- Reversible motor for easy fluid recovery
- "Max" high speed priming function

The 405U/R1, 405U/L and 405U/L2 pumps are precision manual/auto-control pumps which use 1/16" (1.6mm) wall tubing. All have spring-loaded tracks to maximize tube life and flow precision against pressures up to 30 psi (2 bar).

10:1 speed control. R1 single channel four-roller pumphead accepts up to 1/4" (6.4mm) bore tubing. L2 dual channel or "L" low pulsing Y element option up to 3/16" (4.8mm) bore with twin, precision offset aluminum rotors with four stainless steel rollers. All pumps accept 4-20mA or 0-10V analog signals and remote TTL (PLC compatible) start/stop and CCW/CW switching. Two year comprehensive warranty.

405U/L

403U/L2

403U and 405U flow rates per channel (ml/min)									
Pump	**Speed range**	**1/50"**	**1/32"**	**1/16"**	**3/32"**	**1/8"**	**5/32"**	**3/16"**	**1/4"**
		0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm	4.8mm	6.4mm
403U/R1	2.5 to 50rpm	0.06-1.1	0.14-2.8	0.55-11	1.2-24	2.1-43	3.3-65	4.6-92	7.6-150
403U/L	2.5 to 50rpm	0.11-2.2	0.28-5.6	1.1-22	2.4-49	4.3-86	6.5-130	9.2-180	
403U/L2	2.5 to 50rpm	0.06-1.1	0.14-2.8	0.55-11	1.2-24	2.1-43	3.3-65	4.6-92	
405U/R1	20 to 200rpm	0.44-4.4	1.1 -11	4.4-44	9.8-98	17-170	26-260	18-370	61-610
405U/L	20 to 200rpm	0.86-8.6	2.2-22	8.8-88	20 -200	37-340	52-520	37-730	
405U/L2	20 to 200rpm	0.44-4.4	1.1 -11	4.4-44	9.8-98	17-170	26-260	37-370	

Ordering information				
Pump	**Speed range**	**Description**	**Supply**	**Product code**
403U/R1	2.5 to 50rpm	Single channel low flow pump	100-120V 50/60Hz 1ph	040.3K1R.01A
403U/L	2.5 to 50rpm	Y-element low flow pump		040.3K1L.01A
403U/L2	2.5 to 50rpm	Dual channel low flow pump		040.3K1L.02A
405U/R1	20 to 200rpm	Single channel high flow pump		040.5S1R.01A
405U/L	20 to 200rpm	Y-element high flow pump		040.5S1L.01A
405U/L2	20 to 200rpm	Dual channel high flow pump		040.5S1L.02A

Remote switching cables for 403U and 405U		Product code
400AC1	0-10V CW/Stop/CCW 3.45 feet (1.5m) remote cable	049.0011.00A
400AC2	4-20mA CW/Stop/CCW 3.45 feet (1.5m) remote cable	049.0031.00A
400AC3	CW/Stop/CCW 3.45 feet (1.5m) remote cable	049.0051.00A
400AC4	Start/Stop 10 feet (3m) remote cable with foot switch fitted	049.0071.00A

405U/L2

Tubing for R1 and L2 pumpheads				
Bore	**#**	**Bioprene**	**Marprene**	**Platinum silicone**
1/50" (0.5mm)	112	903.0005.016	902.0005.016	913.A005.016
1/32" (0.8mm)	13	903.0008.016	902.0008.016	913.A008.016
1/16" (1.6mm)	14	903.0016.016	902.0016.016	913.A016.016
3/32" (2.4mm)			902.0024.016	913.A024.016
1/16" (3.2mm)	16	903.0032.016	902.0032.016	913.A032.016
5/32" (4.0mm)			902.0040.016	913.A040.016
3/16" (4.8mm)	25	903.0048.016	902.0048.016	913.A040.016
1/4" (6.4mm)	17	903.0064.016	902.0064.016	913.A064.016

Bore	**#**	**Neoprene**	**Sta-Pure**	**Chem-Sure**	**PVC**
1/32" (0.8mm)	13	920.0008.016			
1/16" (1.6mm)	14	920.0016.016	960.0016.016	965.0016.016	950.0016.016
1/16" (3.2mm)	16	920.0032.016	960.0032.016	965.0032.016	950.0032.016
3/16" (4.8mm)	25	920.0048.016	960.0048.016	965.0048.016	950.0048.016
1/4" (6.4mm)	17	920.0064.016	960.0064.016	965.0064.016	950.0064.016

Y-elements for L pumphead		
Bore	**Marprene**	**Platinum Silicone**
1/16" (1.6mm)	902.E016.016	913.AE16.016
3/32" (2.4mm)	902.E024.016	913.AE24.016
1/16" (3.2mm)	902.E032.016	913.AE32.016
3/16" (4.8mm)	902.E048.016	913.AE48.016

403U and 405U specifications	403U	405U
Weights	5.5lbs	7.7lbs
Power	13VA	30VA
Supply	100-120V 50/60Hz 1ph	
Operating temperature	5-40C	
Control ratio	10:1	
Noise	<70dBA at 1m	
Standards	BS0800, IEC335-1, EN60529 (IP21), CE	

403U/VM2

403U/VM2, 403U/VM3 and 403U/VM4 auto/manual control compact pumps

- VM2 pumphead provides two channels, VM3 three channels and VM4 four channels
- Flow rates from 0.001 to 17ml/min per channel
- Ten stainless-steel rollers with low-friction bearings
- Digital speed control via top panel mounted keypad
- Reversible with Max priming function

403U/VM pumps provide extremely accurate multi-channel pumping, having spring-loaded tracks with individual occlusion adjustment. The VM rotor has stainless-steel low-friction rollers for low pulsation and repeatable flow rates. The fixed position clamping block provides easy tube loading and removal. Pumpheads accept standard two-bridge manifold tubing.

With 20:1 speed control, the 0.5 to 10rpm drive provides low flow accuracy and the 2.5 to 50rpm drive provides higher flows. All pumps accept 4-20mA or 0-10V analog signals and remote low voltage or TTL (PLC compatible) start/stop and direction switching. Two year comprehensive warranty.

401U/VM3

401U/VM4

Flow rates per channel for 403U/VM2, 403U/VM3 and 403U/VM4 pumpheads (ml/min)

Color	Orange/Black	Orange/Red	Orange/Blue	Orange/Green	Orange/Yellow
Bore	**0.005"**	**0.007"**	**0.010"**	**0.015"**	**0.020"**
	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm
0.5 to 10rpm	0.001-0.01	0.001-0.03	0.002-0.04	0.005-0.1	0.01-0.2
2.5 to 50rpm	0.003-0.06	0.006-0.13	0.011-0.2	0.025-0.5	0.04-0.9

Color	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Bore	**0.025"**	**0.030"**	**0.035"**	**0.040"**	**0.045"**
	0.63mm	0.76mm	0.88mm	1.02mm	1.14mm
0.5 to 10rpm	0.01-0.3	0.02-0.4	0.03-0.5	0.03-0.7	0.04-0.9
2.5 to 50rpm	0.07-1.4	0.10-2.0	0.13-2.6	0.17-3.5	0.21-4.3

Color	Gray/Gray	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Bore	**0.050"**	**0.055"**	**0.060"**	**0.065"**	**0.070"**
	1.29mm	1.42mm	1.52mm	1.65mm	1.85mm
0.5 to 10rpm	0.05-1.1	0.06-1.3	0.07-1.4	0.08-1.7	0.10-2.0
2.5 to 50rpm	0.27-5.4	0.32-6.4	0.36-7.2	0.41-8.3	0.50-10.0

Color		Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Bore		**0.080"**	**0.095"**	**0.100"**	**0.110"**
		2.05mm	2.38mm	2.54mm	2.79mm
0.5 to 10rpm		0.12-2.3	0.14-2.7	0.16-3.1	0.17-3.4
2.5 to 50rpm		0.59-12	0.69-14	0.78-16	0.85-17

Ordering information				
Pump	**Speed range**	**Description**	**Supply**	**Product code**
403U/VM2	0.5-10rpm	Dual channel manifold tube pump	100-120V 50/60Hz 1ph	040.371V.M2A
403U/VM2	2.5-50rpm			040.3K1V.M2A
403U/VM3	0.5-10rpm	Three channel manifold tube pump	100-120V 50/60Hz 1ph	040.371V.M3A
403U/VM3	2.5-50rpm			040.3K1V.M3A
403U/VM4	0.5-10rpm	Four channel manifold tube pump	100-120V 50/60Hz 1ph	040.371V.M4A
403U/VM4	2.5-50rpm			040.3K1V.M4A

Remote switching cables for 403U		**Product code**
400AC1	0-10V CW/Stop/CCW 3.45 feet (1.5m) remote cable	049.0011.00A
400AC2	4-20mA CW/Stop/CCW 3.45 feet (1.5m) remote cable	049.0031.00A
400AC3	CW/Stop/CCW 3.45 feet (1.5m) remote cable	049.0051.00A
400AC4	Start/Stop 10 feet (3m) remote cable with foot switch fitted	049.0071.00A

Manifold pump tubing for 403U/VM2, 403U/VM3 and 403U/VM4						
Color code	**Tube bore**	**Marprene**	**PVC**	**Silicone**	**Solvent resistant**	**Acid resistant**
Orange/black	0.005" (0.13mm)		980.0013.000		984.0013.000	
Orange/red	0.007" (0.19mm)		980.0019.000		984.0019.000	
Orange/blue	0.010" (0.25mm)	978.0025.000	980.0025.000		984.0025.000	
Orange/green	0.015" (0.38mm)	978.0038.000	980.0038.000		984.0038.000	
Orange/yellow	0.020" (0.50mm)	978.0050.000	980.0050.000		984.0050.000	986.0050.000
Orange/white	0.025" (0.63mm)	978.0063.000	980.0063.000	982.0063.000	984.0063.000	986.0063.000
Black/black	0.030" (0.76mm)	978.0076.000	980.0076.000	982.0076.000	984.0076.000	986.0076.000
Orange/orange	0.035" (0.88mm)	978.0088.000	980.0088.000	982.0088.000	984.0088.000	986.0088.000
White/white	0.040" (1.02mm)	978.0102.000	980.0102.000	982.0102.000	984.0102.000	986.0102.000
Red/red	0.045" (1.14mm)	978.0114.000	980.0114.000	982.0114.000	984.0114.000	986.0114.000
Gray/gray	0.050" (1.29mm)	978.0129.000	980.0129.000	982.0129.000	984.0129.000	986.0129.000
Yellow/yellow	0.055" (1.42mm)	978.0142.000	980.0142.000	982.0142.000	984.0142.000	986.0142.000
Yellow/blue	0.055" (1.52mm)	978.0152.000	980.0152.000	982.0152.000	984.0152.000	986.0152.000
Blue/blue	0.065" (1.65mm)	978.0165.000	980.0165.000	982.0165.000	984.0165.000	986.0165.000
Green/green	0.070" (1.85mm)	978.0185.000	980.0185.000	982.0185.000	984.0185.000	986.0185.000
Purple/purple	0.080" (2.05mm)	978.0205.000	980.0205.000	982.0205.000	984.0205.000	986.0205.000
Purple/black	0.090" (2.29mm)	978.0229.000	980.0229.000	982.0229.000	984.0229.000	986.0229.000
Purple/orange	0.100" (2.54mm)	978.0254.000	980.0254.000	982.0254.000	984.0254.000	986.0254.000
Purple/white	0.110" (2.79mm)	978.0279.000	980.0279.000	982.0279.000	984.0279.000	986.0279.000

* For autoclavable Marprene tubing, please replace last “0” with “+” - for example 978.0238.00+

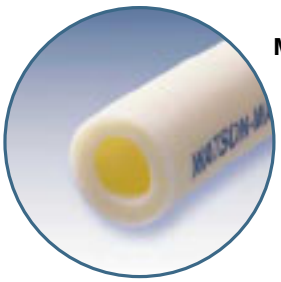
403U specifications	
Weight	5.5lbs
Power	13VA
Supply	100-120V 50/60Hz 1ph
Operating temperature	5-40C
Control ratio	20:1
Noise	<70dBA at 1m
Standards	BS0800, IEC335-1, EN60529 (IP21), CE

Tube selection guide

CHOOSING THE BEST TUBE

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

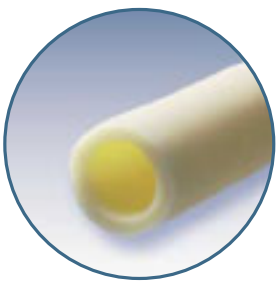
The tubing largely dictates pump performance: Its restitution creates suction, its strength resists pressure, its flex resistance determines pumping life, its bore defines the flow rate, and its wall thickness controls pumping efficiency.

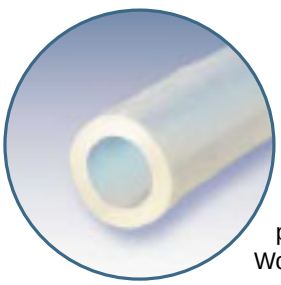


Marprene is Watson-Marlow Bredel's exclusive thermoplastic elastomer.

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 40F to 175F. 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 40F to 175F. Beige. Available in 15 meter packs only.



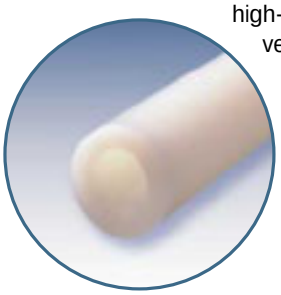


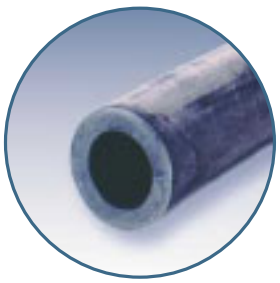
Silicone is the standard laboratory tubing used for small bore sizes up to 3/8" (9.6mm). Food and medical quality, meets USP and NSF Class VI standards and autoclavable .

Watson-Marlow offers 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 -4F to 175F. High permeability to oxygen. Translucent. Autoclavable.

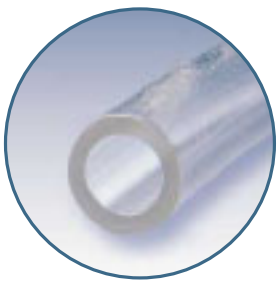
Sta-Pure has a unique composite construction of silicone in a PTFE lattice giving it superior burst resistance up to 100 psi (7bar) and 18 times longer life than silicone tubing. It produces virtually no spalling, is USP Class VI approved and is classified as non toxic. Working temperature range 32F to 175F. 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 tubing



PVC tubing

Neoprene offers excellent performance with abrasive slurries and sustained pressure applications. Good suction and pressure capabilities. Food quality. Most often used in bore sizes greater then 1/2" (12.7mm). Working temperature range 32F - 175F. 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 70F - 140F. Glass clear

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 3/8" (9.6mm), and Neoprene tubing for bore sizes of 1/2" (12.7mm) or more.

For maximum tube life, use a large bore tube at low speed. For maximum flow rate use the largest tube at maximum speed. For maximum accuracy, use a small bore tube at maximum speed.

Suction lift depends on the tube restituting fully before the advance of the next roller. If it does not, the flow rate will be reduced. For maximum suction lift or pressure, use the smallest practicable bore size of tubing and run the pump at the slowest possible speed.

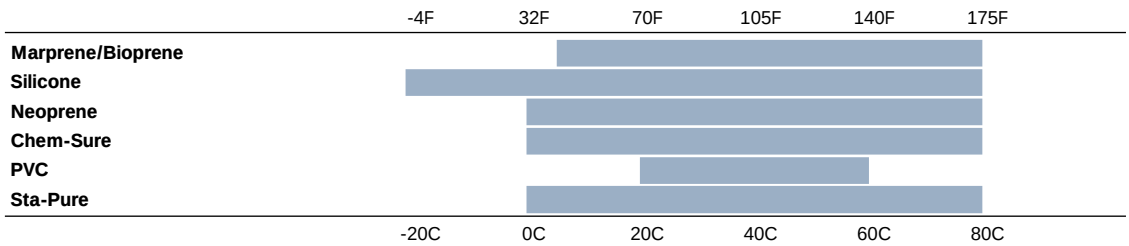
CHECKING YOUR CHOICE WITH AN IMMERSION TEST

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 Bredel 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.

PHYSICAL COMPATIBILITY

Temperature

The chart shows the temperature range of each tubing type when suction and delivery pressures are negligible. Operating temperatures of Bioprene, Marprene, Chem-Sure, Sta-Pure and silicone tubing are limited to 175F, but all may be autoclaved up to 275F.



TUBE LIFE

TUBE LIFE

313 and 314 pumphead tube life range (hours)

No pressure. 110rpm. 1/4" (6.4mm) bore tubing.

VISCOSITY

The flow rates given in this brochure are valid for fluids with viscosities in the range 1 to 100 centipoise. Increased fluid viscosity will result in decreased flow rate. Choose a tubing with as large a wall thickness as possible, which could, for instance, mean using a 300 series pump which user greater wall thickness tubing, rather than a 200 series pump.

Contact Watson-Marlow Bredel or its local distributor for advice on specific applications.

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HBO161

WATSON MARLOW Bredel PUMPS

sciQ

Pump Series — Flow Rates

200 — Near pulseless, multi-channel pumps with up to 32 channels. — 0.6µl/min - 22ml/min

300 — Single or multi-channel pumps with manual, remote or dispensing control. — 2µl/min - 2 liters/min

400 — Instrument-quality, ultra-precise, single and multi-channel pumps with manual or process control. — 1µl/min - 730ml/min

500 — Microprocessor controlled dispensing pumps and systems. — 0.02ml/min - 3.0 liters/min max

205U

313U

405U

505DZ

Put a peristaltic pump in your lab — 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 stabilize. 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 brochure were obtained pumping water at 68F (20C) with zero suction and delivery heads. PVC tubing was used to obtain the 200 series flow rates. All other flow rates were obtained using silicone tubing.

OPERATING AND STORAGE TEMPERATURES

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

IEC 335-1 is the International Electrotechnical Commission standard dealing with the "Safety of household and similar appliances, general requirements". Equivalents are BS3456: Part 101 and DIN VDE 0700: Part 1).

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 Bredel'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 Bredel's control and cannot be guaranteed, but every effort will be made to honor this policy.

Watson-Marlow Bredel Pumps

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