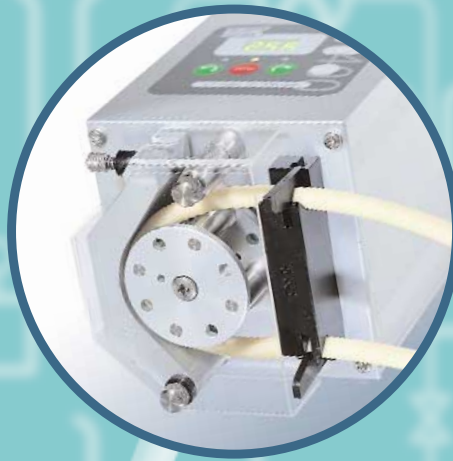


NEW

Every peristaltic pump for science



323 series from
Watson-Marlow Bredel



sci 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 $\mu\text{l}/\text{minute}$ 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

SERIES



The new Sci-Q 323 range is designed exclusively for scientific pumping needs, and brings a stunning new level of performance and quality to the benchtop. Four brand new drives coupled with five pumphead options meet every need. Up to six 313 and 314 pumpheads (they can be mixed) can be fitted to a single drive, and up to two 314MC or 318MC five-channel pumpheads (which can also be mixed) can be fitted to a single drive to provide ten channels of flow.

- 323E/D manual control pump
- 323S/D high-performance manual control pump



Hi-Viz display, wipe-clean keypad



Chemical-resistant case, distinctive, contemporary and functional



Brushless DC motor means zero maintenance and precision control



323E/D

323E/D manual control variable speed pump

- 313D pumphead produces flow rates to 2000ml/min
- 27:1 speed control ratio
- Snap-fit 313X extension pumpheads provide up to six channels
- Two year comprehensive warranty



Digital speed control from 15 to 400rpm in 5rpm steps. Instantly reversible, rapid-loading 313 flip-top pumphead accepts seven tube sizes. Switchable between 100-120V or 220-240V.

323E drives may also be fitted with 314 four roller pumpheads if lower pulsing is required, or with 313D2 or 314D2 pumpheads which accept 2.4mm wall thickness tubing for higher pressure operation or pumping more viscous fluids.

See the 300 series drive and pumpheads section on page 7 for details.

For tubing for the 323E/D, see table on page 9.

323E/D flow rate ranges (ml/min)								
Pump	Speed range	1/50"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
		0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323E/D	15 to 400rpm	0.45-12	1.1-28	4.1-110	15-400	33-880	54-1400	75-2000

Ordering information for 323E/D pumps				
Pump	Pumphead fitted	Speed range	Supply	Product code
323E/D	313D three roller pumphead	15 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	030.3124.3DA

Extension pumpheads	Product code
313X three-roller extension pumphead (maximum five)	033.3431.00A

323E/D specifications	
Weight	10.3lbs
Dimensions (inches)	H5.2 x W9.1 x L8.9
Control ratio	27:1
Standards	IEC 335-1, EN60529 (IP31) CE

300

SERIES



323S/D

323S/D high-performance manual control variable speed pump

- High-performance microprocessor controlled pumps
- 323S/D can be extended to six channels
- Flows rates to 2000ml/min per channel with 323S/D

323S/D speed adjusts in 1rpm steps from 3 to 400rpm. Instantly reversible, rapid-loading flip-top pumphead accepts seven tube sizes, keypad lock prevents tampering or accidental changes, auto restart for power failure recovery, switchable between 100-120V or 220-240V, two year comprehensive warranty. MemoDose facility for accurate single shot dosing.

323S drives may also be fitted with 314 four roller pumpheads if lower pulsing is required, or with 313D2 or 314D2 pumpheads which accept 3/32" (2.4mm) wall thickness tubing for higher pressure operation or pumping more viscous fluids. For low-flow pumping, up to ten channels, 323S drives may be fitted with 314MC (four-roller) and 318MC (eight-roller) microcassette pumpheads, which can be extended to ten channels by adding one 314MCX or 318MCX extension pumphead. See the 300 series drive and pumpheads section on page 7 for details.

For tubing for the 323S/D, see table on page 9.



323S/D flow rate ranges (ml/min)

Pump	Speed range	1/50"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
		0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323S/D	3.0 to 400rpm	0.09-12	0.21-28	0.81-110	3.0-400	6.6-880	11-1400	15-2000

Ordering information for 323S/D pumps

Pump	Pumphead fitted	Speed range	Supply	Product code
323S/D	313D three-roller pumphead	3.0 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	030.3134.3DA

Extension pumpheads

	Product code
313X three-roller extension pumphead (maximum five)	033.3431.00A

323S specifications

Weights	10.3lbs
Dimensions (inches)	H5.2 x W9.1 x L8.9
Control ratio	323S/D 400rpm 133:1
Standards	IEC 335-1, EN60529 (IP31) CE



Sci-Q 300 series drives and pumpheads

The modular design means that many more combinations of drives and pumpheads than those shown on the previous page are possible. Two drives couple to five pumphead types, options to meet every need: Up to six 313 or 314 pumpheads can be fitted to one drive, and up to two 314MC or 318MC (which can also be mixed) can be fitted to a single drive to provide ten channels of flow.

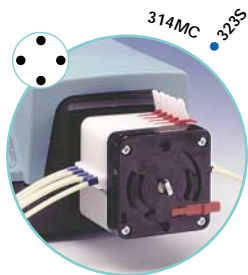
- 313D three-roller high flow pumphead
- 313D2 three-roller high flow pumphead for 3/32" (2.4mm) wall tubing
- 313X three-roller extension pumphead - add up to five extra channels



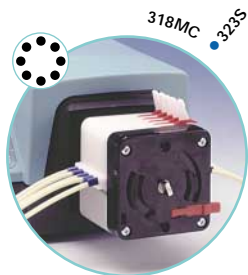
- 314D four-roller higher-accuracy, low-pulse pumphead
- 314D2 four-roller pumphead for 3/32" (2.4mm) wall tubing
- 314X four-roller extension pumphead - add up to five extra channels



- 314MC four-roller higher-flow five channel cassette pumphead
- 314MCX four-roller extension pumphead - add one for ten channel pumping



- 318MC eight roller higher-accuracy five channel cassette pumphead
- 318MCX eight roller extension pumphead - add one for ten channel pumping



300

SERIES



314D

Sci-Q 300 Series Drives and Pumpheads Continued

323 drives can be fitted with 314D four-roller pumpheads when lower pulsing is required (flow rates will be lower than with the 313 three-roller pumphead), and up to five 314X extension pumpheads can be fitted, depending on the size of the tubing fitted and the pressure in the system.

323 drives may also be fitted 313D2 or 314D2 pumpheads which accept 3/32" (2.4mm) wall thickness tubing for higher pressure operation or pumping more viscous fluids. 313D2 or 314D2 pumpheads make higher torque demands, and extension pumpheads may not be fitted.

For low-flow pumping through up to ten channels, 323S drives may be fitted with 314MC (four-roller) and 318MC (eight-roller) microcassette pumpheads, which can be extended to ten channels by adding one 314MCX or 318MCX extension pumphead.

314D and 314X pumphead flow rate ranges (ml/min)

Drive	Speed range	1/50"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
		0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323E	15 to 400rpm	0.45-12	0.90-24	3.8-100	13-340	29-760	45-1200	60-1600
323S	3.0 to 400rpm	0.09-12	0.18-24	0.75-100	2.6-340	5.7-760	9.0-1200	12-1600

Ordering information for 323E, 323S drives and 314 four-roller pumpheads

Drive	Pumphead	Speed range	Supply	Drive code	Pumphead code
323E	314D	15 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	036.3124.00A	033.4451.000
323S	314D	3.0 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	036.3134.00A	033.4451.000

Extension pumphead

314X four-roller extension pumphead	Pumphead code
	033.4431.000

Maximum number of 313 and 314 pumpheads which can be fitted to 323 drives

Tubing	Tube number	Pressure	112	13	14	16	25	17	18
			1/50"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
Platinum Silicone	7 psi (0.5 bar)	30 psi (2 bar)	6	6	5	3	2	2	1
			6	6	5	3	2	1	1
Bioprene, Marprene, PVC, Neoprene	7 psi (0.5 bar)	30 psi (2 bar)	6	6	4	2	2	1	1
			6	6	4	2	2	1	1
Chem-Sure, Sta-Pure	7 psi (0.5 bar)	30 psi (2 bar)	1	1	1	1	1	1	1
			1	1	1	1	1	1	1

Note that only one 313D2 or 314D2 may be fitted to a 323E, 323S drive

Ordering information for 323E, 323S drives and 313D2 and 314D2 pumpheads

Drive	Pumphead	Speed range	Supply	Drive code	Pumphead code
323E	313D2	15 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	036.3124.00A	033.3551.000
	314D2			036.3124.00A	033.4551.000
323S	313D2	3.0 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	036.3134.00A	033.3551.000
	314D2			036.3134.00A	033.4551.000

Note that only one 313D2 or 314D2 may be fitted to a 323E or 323S drive

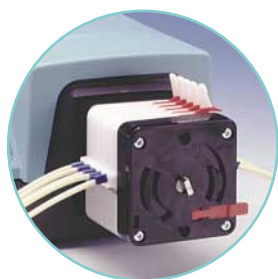
Ordering information for 323E, 323S drives and microcassette pumpheads

Drive	Speed range	Drive code	314MC	318MC
323E	15 to 400rpm	036.3124.00A	033.6453.000	033.6853.000
323S	3.0 to 400rpm	036.3134.00A	033.6453.000	033.6853.000

Tubing for 313D2 and 314D2 pumpheads, see table on page 19.

Ordering information for 314MC and 318MC extension pumpheads

314MCX four-roller extension pumphead (maximum one extension pumphead)	Pumphead code
	033.6454.000
318MCX eight-roller extension pumphead (maximum one extension pumphead)	Pumphead code
	033.6854.000



314MC

314MC pumphead flow rate ranges (ml/min) - maximum 10 channels. Note speed must not exceed 110rpm.						
Drive	Speed range	Orange/Black 0.13mm	Orange/Red 0.19mm	Orange/Blue 0.25mm	Orange/Green 0.38mm	Orange/Yellow 0.50mm
323S	3.0-110 rpm	0.002-0.09	0.01-0.3	0.01-0.5	0.03-0.9	0.05-1.7
Drive	Speed range	Orange/White 0.63mm	Black/Black 0.76mm	Orange/Orange 0.88mm	White/White 1.02mm	Red/Red 1.14mm
323S	3.0-110 rpm	0.08-3.1	0.13-4.6	0.17-6.4	0.22-8.1	0.27-9.9
Drive	Speed range	Gray/Gray 1.29mm	Yellow/Yellow 1.42mm	Yellow/Blue 1.52mm	Blue/Blue 1.65mm	Green/Green 1.85mm
323S	3.0-110 rpm	0.35-13	0.46-17	0.52-19	0.60-22	0.76-28
Drive	Speed range		Purple/Purple 2.05mm	Purple/Black 2.29mm	Purple/Orange 2.54mm	Purple/White 2.79mm
323S	3.0-110 rpm		0.90-33	1.1-40	1.3-47	1.4-53

318MC pumphead flow rate ranges (ml/min) - maximum 10 channels. Note speed must not exceed 110rpm.						
Drive	Speed range	Orange/Black 0.13mm	Orange/Red 0.19mm	Orange/Blue 0.25mm	Orange/Green 0.38mm	Orange/Yellow 0.50mm
323S	3.0-110 rpm	0.002-0.09	0.01-0.3	0.01-0.5	0.02-0.8	0.04-1.4
Drive	Speed range	Orange/White 0.63mm	Black/Black 0.76mm	Orange/Orange 0.88mm	White/White 1.02mm	Red/Red 1.14mm
323S	3.0-110 rpm	0.07-2.6	0.11-3.9	0.14-5.3	0.18-6.6	0.24-8.8
Drive	Speed range	Gray/Gray 1.29mm	Yellow/Yellow 1.42mm	Yellow/Blue 1.52mm	Blue/Blue 1.65mm	Green/Green 1.85mm
323S	3.0-110rpm	0.27-10	0.33-12	0.38-14	0.46-17	0.55-20
Drive	Speed range		Purple/Purple 2.05mm	Purple/Black 2.29mm	Purple/Orange 2.54mm	Purple/White 2.79mm
323S	3.0-110 rpm		0.65-24	0.79-29	0.90-33	0.98-36

Tubing for 323E/D and 323S/D							
Tube bore	1/50"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"
Tube number	112	13	14	16	25	17	18
	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Bioprene	903.0005.016	903.0008.016	903.0016.016	903.0032.016	903.0048.016	903.0064.016	903.0080.016
Marprene	902.0005.016	902.0008.016	902.0016.016	902.0032.016	902.0048.016	902.0064.016	902.0080.016
Sta-Pure			960.0016.016	960.0032.016	960.0048.016	960.0064.016	960.0080.016
Platinum silicone	913.A005.016	913.A008.016	913.A016.016	913.A032.016	913.A048.016	913.A064.016	913.A080.016
Neoprene		920.0008.016	920.0016.016	920.0032.016	920.0048.016	920.0064.016	920.0080.016
PVC			950.0016.016	950.0032.016	950.0048.016	950.0064.016	950.0080.016
Chem-Sure			965.0016.016	965.0032.016	965.0048.016	965.0064.016	965.0080.016

Double pump segment manifold pump tubing for 314MC and 318MC microcassette pumpheads					
Color code	Bore	Marprene	Autoclavable Marprene	PVC	Silicone
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	0.090" (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

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.

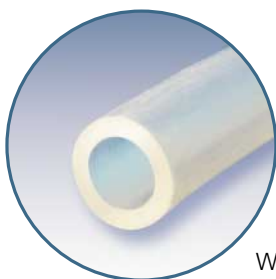
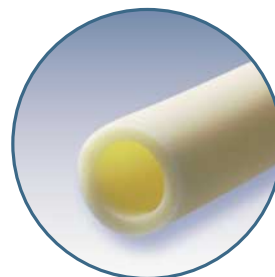
The tubing largely dictates pump performance: Its restitution creates suction, its strength resists pressure, its flex resistance determines pumping life, its bore defines the flow rate, and its wall thickness controls pumping efficiency.



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.

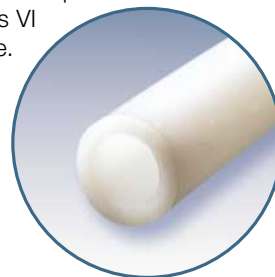
Bioprene has the same long life as Marprene but complies with USP Class VI, FDA requirements 21 CFR 177.2600 and NSF and USDA standards for food handling. It has a wide chemical compatibility, and can handle repeated autoclaving. Bioprene can be sterilized by ethylene oxide or gamma irradiation. Working temperature range 40F to 175F. Beige. Available in 15 meter packs only.



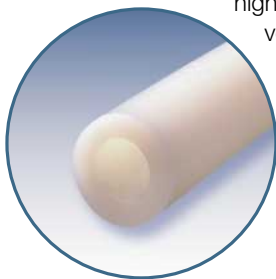
Silicone is the standard laboratory tubing used for small bore sizes up to 3/8" (9.6mm). Food and medical quality, meets USP and NSF Class VI standards and autoclavable .

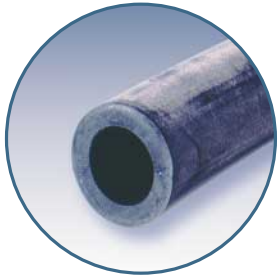
Watson-Marlow offers a specially developed **platinum-cured silicone tubing** for additional protection from contamination during the pumping process. Platinum-cured tubing produces a smoother surface, less protein binding offers high levels of purity. It is ideal for medical devices, chemical analysis 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

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 than 1/2" (12.7mm). Working temperature range 32F - 175F. Black.

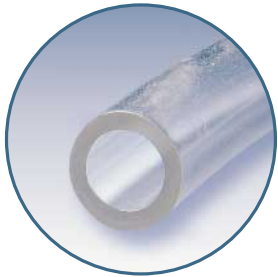
PVC has a high Shore hardness giving excellent pressure and suction performance and low gas permeability. FDA approved for use with food and is NFS listed. Working temperature range 70F - 140F. Glass clear

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.

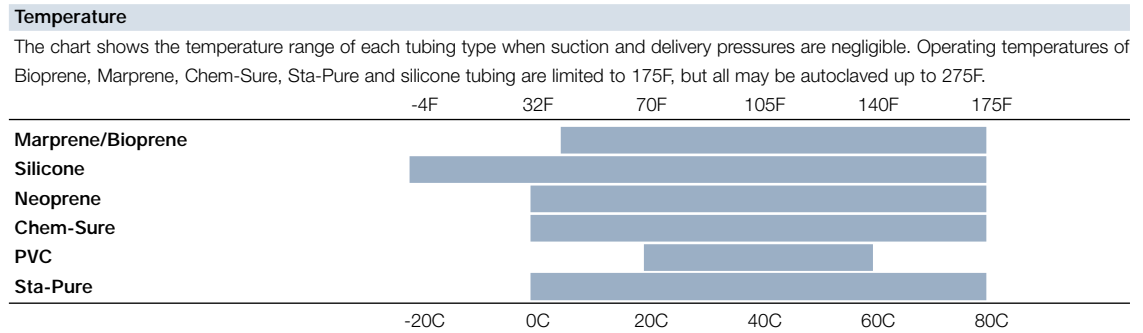


PVC tubing

CHECKING YOUR CHOICE WITH AN IMMERSION TEST

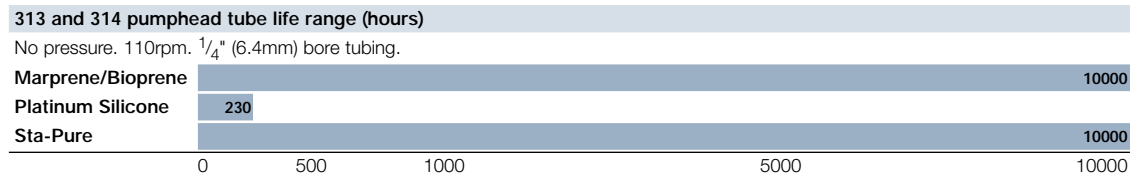
Always conduct an immersion test before choosing a tube material for critical applications. Immerse a short length of the tubing or a disk of rubber sample (always available from Watson-Marlow Bredel or its distributors) in a closed container of the fluid for 48 hours, and then examine for signs of attack,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

PHYSICAL COMPATIBILITY



TUBE LIFE

TUBE LIFE



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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 Members of the Spirax-Sarco Engineering Group

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WARNING
 These products are not designed for use in, and should not be used for, patient connected applications.

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STA-PURE and CHEM-SURE are trademarks of W.L. Gore & Associates inc.



HBO161

sci Q Pump Series Flow Rates Put a peristaltic pump in your lab Improve your performance

200	Near pulseless, multi-channel pumps with up to 32 channels.	0.6µl/min - 22ml/min	205U
300	Single or multi-channel pumps with manual, remote or dispensing control.	2µl/min - 2 liters/min	313U
400	Instrument-quality, ultra-precise, single and multi-channel pumps with manual or process control.	1µl/min - 730ml/min	405U
500	Microprocessor controlled dispensing pumps and systems.	0.02ml/min - 3.0 liters/min max	505DZ



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.

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