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NEW

Every peristaltic pump for science



From
Watson-Marlow



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

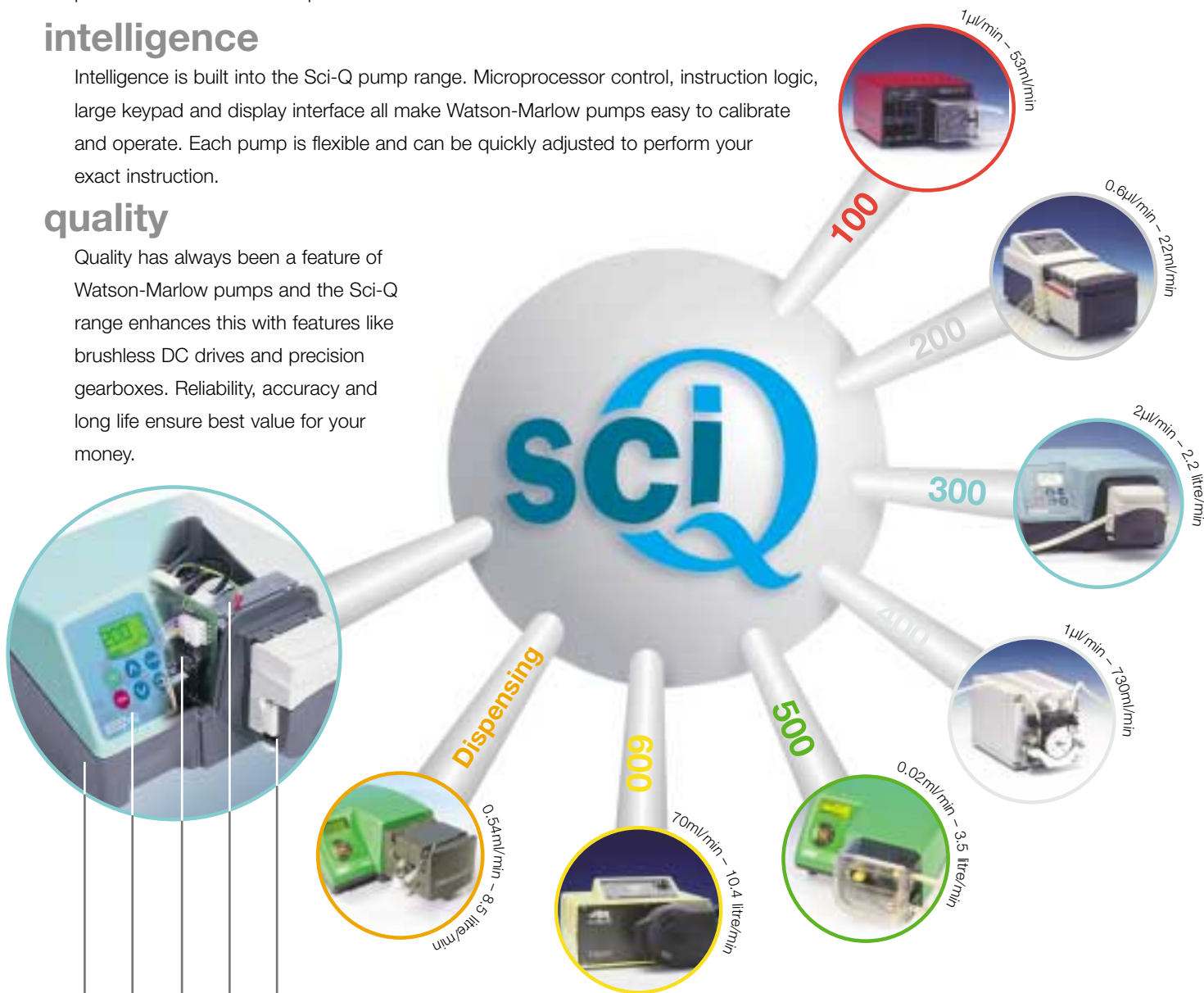
Science and Watson-Marlow pumps lead the way. Sci-Q provides the very latest peristaltic technology in response to customer research, enabling you to match pump, task and budget for precise results without compromise.

intelligence

Intelligence is built into the Sci-Q pump range. Microprocessor control, instruction logic, large keypad and display interface all make Watson-Marlow pumps easy to calibrate and operate. Each pump is flexible and can be quickly adjusted to perform your exact instruction.

quality

Quality has always been a feature of Watson-Marlow pumps and the Sci-Q range enhances this with features like brushless DC drives and precision gearboxes. Reliability, accuracy and long life ensure best value for your money.



Inside the Sci-Q 323

Five modular pumphead types for single or multi-channel flows from μ l/minute to 2.0 litres per minute

Precision brushless DC motor: servo-quality for precise speed control; zero maintenance

Full integration with PLC and other equipment; includes digital, analogue and serial RS232 communication

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

Power and performance for the benchtop



The Sci-Q 323 range is designed exclusively for scientific pumping needs, and brings a stunning level of performance and quality to the benchtop. Five drives coupled with four pumphead options meet every need. Up to five 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 pumps
- 323U/D analogue auto/manual control pumps
- 323Du/D digital/analogue auto/manual control pumps
- 323Dz/D general purpose dispensing pump



High visibility display, wipe-clean keypad



Chemical-resistant case, distinctive, contemporary and functional



Brushless DC motor means zero maintenance and precision control



Choice of control options – manual, analogue auto, digital RS232/auto and dispensing



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 five channels

Digital speed control from 15 to 400rpm in 5rpm steps. Instantly reversible, rapid-loading 313 flip-top pumphead accepts five 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 8 for details.



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

Pump	Speed range	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323E/D	15 to 400rpm	4.1-110	15-400	33-880	54-1400	75-2000



323S/D

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

- High-performance microprocessor controlled pumps
- 323S/D can be extended with 313X extension pumpheads to five channels
- Flow rates to 2000ml/min and 133:1 speed control ratio

323S/D speed adjusts in 1rpm steps from 3 to 400rpm. Instantly reversible, rapid-loading flip-top pumphead accepts five tube sizes, keypad lock prevents tampering or accidental changes, auto restart for mains 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 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 8 for details.



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

Pump	Speed range	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323S/D	3.0 to 400rpm	0.81-110	3.0-400	6.6-880	11-1400	15-2000

Ordering information for 323E/D and 323S/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	030.3124.3D0*
323S/D	313D three roller pumphead	3.0 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	030.3134.3D0*

*Replace last 0 with **A**, **E** or **U** for **American**, **European** or **UK** mains lead

Extension pumpheads

Extension pumpheads	Product code
313X three-roller extension pumphead (maximum five - see page 9)	033.3431.000

323E and 323S specifications

Weights	4.7kg	Dimensions	H132 x W230 x L225mm
Standards	EN60529 (IP31) CE		

For tubing for the 323E/D and the 323S/D, see table on page 10.



323U/D

323U/D analogue auto/manual control variable speed pumps

- Manual control or remote 4-20mA or 0-10V analogue auto-control
- Digital, remote switch or TTL inputs for run/stop and direction
- Flow rates to 2000ml/min
- 323U/D can be extended with 313X extension pumpheads to five channels



323U/D speed adjusts in 1rpm steps from 3 to 400rpm. Instantly reversible, rapid-loading flip-top pumphead accepts five tube sizes, keypad lock prevents tampering or accidental changes, auto restart for mains failure recovery, switchable between 100-120V or 220-240V, two year comprehensive warranty. Control card mounted on the rear panel accepts 4-20mA or 0-10V analogue auto-control signals, and remote switching of direction and run/stop. MemoDose facility for accurate single shot dosing.

323U 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.

For low-flow pumping through up to ten channels, 323U 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 8 for details.

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

Pump	Speed range	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323U/D	3.0 to 400rpm	0.81-110	3.0-400	6.6-880	11-1400	15-2000

Ordering information for 323U/D pumps

Pump	Pumphead fitted	Speed range	Supply	Product code
323U/D	313D three-roller pumphead	3.0 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	030.3144.3D0*

*Replace last 0 with **A**, **E** or **U** for **American**, **European** or **UK** mains lead

Extension pumpheads

Extension pumpheads	Product code
313X three-roller extension pumphead (maximum five - see page 9)	033.3431.000

323U specifications

Weights	4.7kg	Dimensions	H132 x W230 x L225mm
Control ratio	133:1	Standards	EN60529 (IP31) CE



323Du/D

323Du/D digital/analogue auto/manual control variable speed pump

- Precision digital auto-control, RS232 serial communication
- Digital, remote switched or TTL inputs for run/stop and direction
- Manual control or 4-20mA or 0-10V analogue auto-control
- 323Du/D can be extended with 313X extension pumpheads to five channels of flow up to 2000ml/min per channel



323Du/RL speed adjusts in 220 steps from 1.5 to 220rpm. 323Du/D speed adjusts in 1rpm steps from 3 to 400rpm. Instantly reversible, easy-loading flip-top pumpheads accept five tube sizes, keypad lock prevents tampering or accidental changes, auto restart for mains failure recovery, switchable between 100-120V or 220-240V. Control card mounted on the rear panel accepts RS232 signals, 4-20mA or 0-10V analogue auto-control signals and remote switching of direction and run/stop. MemoDose facility for accurate single shot dosing. Two year comprehensive warranty.

323Du 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.

For low-flow pumping through up to ten channels, 323Du 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 8 for details.

323Du/RL and 323Du/D flow rate ranges (ml/min)

Pump	Speed range	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323Du/D	3.0 to 400rpm	0.81-110	3.0-400	6.6-880	11-1400	15-2000

Ordering information for 323Du/D pumps

Pump	Pumphead fitted	Speed range	Supply	Product code
323Du/D	313D three-roller pumphead	3.0 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	030.3154.3D0**

*Replace last 0 with **A**, **E** or **U** for **American**, **European** or **UK** mains lead

Extension pumpheads

Extension pumpheads	Product code
313X three-roller extension pumphead (maximum five - see page 9)	033.3431.000

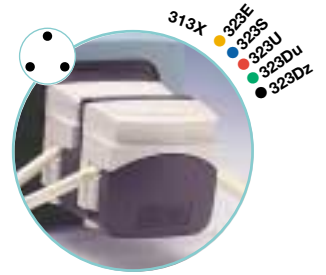
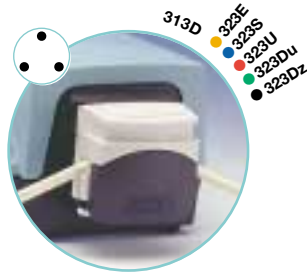
323Du specifications

Weights	4.7kg	Dimensions	H125 x W230 x L225mm
Control ratio	133:1	Standards	EN60529 (IP31) CE

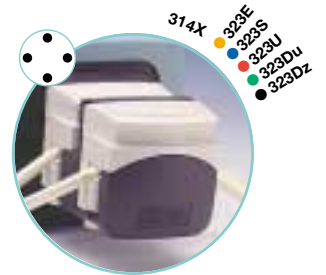
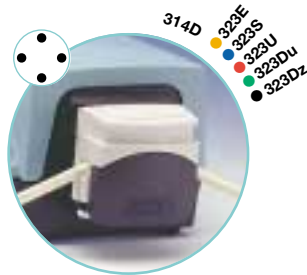
Sci-Q 300 series drives and pumpheads

The modular design means that many more combinations of drives and pumpheads than those shown on the previous page are possible. Five drives couple to four pumphead types, options to meet every need: Up to five 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.

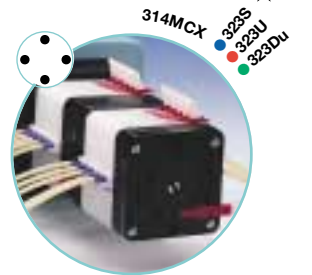
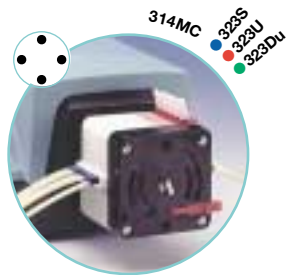
- 323E manual control
- 323S high-performance manual control
- 323U analogue-auto/manual control
- 323Du digital-auto/analogue-auto/manual control
- 323Dz general purpose dispensing



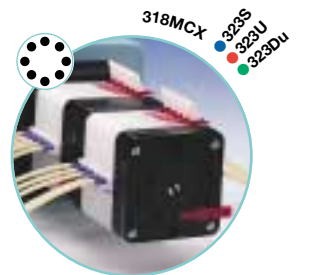
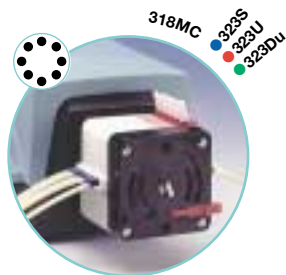
- 314D four-roller higher-accuracy, low-pulse pumphead up to 300rpm only
- 314X four-roller extension pumphead – add up to four extra channels
- 313D2 three-roller pumphead for 2.4mm wall tubing
- 314D2 four-roller pumphead for 2.4mm wall tubing



- 314MC four-roller higher-flow five channel cassette pumphead up to 110rpm only
- 314MCX four-roller extension pumphead – add one for ten channel pumping



- 318MC eight roller higher-accuracy five channel cassette pumphead up to 110rpm only
- 318MCX eight roller extension pumphead – add one for ten channel pumping





314D

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 four 314X extension pumpheads can be fitted, depending on the size of the tubing fitted and the pressure in the system. Note that 314 pumpheads can be run up to a maximum of 300rpm.

323E, 323S, 323U, 323Du and 323Dz drives may also be fitted 313D2 or 314D2 pumpheads which accept 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, 323U and 323Du 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	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323E	15 to 300rpm	3.8-75	13-260	29-570	45-900	60-1200
323S, 323U, 323Du, 323Dz	3.0 to 300rpm	0.75-75	2.6-260	5.7-570	9.0-900	12-1200

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

Drive	Pumphead	Speed range	Supply	Drive code	Pumphead code
323E	314D	15 to 300rpm	100-120/220-240V 50/60Hz 1ph 100VA	036.3124.000*	033.4451.000
323S	314D	3.0 to 300rpm		036.3134.000*	033.4451.000
323U	314D	3.0 to 300rpm		036.3144.000*	033.4451.000
323Du	314D	3.0 to 300rpm		036.3154.000*	033.4451.000
323Dz	314D	3.0 to 300rpm		036.3184.000*	033.4451.000

*Replace last 0 with A, E or U for American, European or UK mains lead

Extension pumphead

Extension pumphead	Pumphead code
314X four-roller extension pumphead	033.4431.000

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

Tubing	Tube number	Pressure				
		1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Platinum-cured silicone	0.5 bar (7 psig)	5	3	2	2	1
	2 bar (30 psig)	5	3	2	1	1
Bioprene, Marprene, PVC, Neoprene	0.5 bar (7 psig)	4	2	2	1	1
	2 bar (30 psig)	4	2	2	1	1
Chem-Sure, Sta-Pure	0.5 bar (7 psig)	1	1	1	1	1
	2 bar (30 psig)	1	1	1	1	1

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

For 0.5 and 0.8mm bore tubing pumpheads, contact Watson-Marlow

Ordering information for 323E, 323S, 323U 323Du and 323Dz drives and pumpheads

Drive	Speed range	Drive code	313D2	314D2	314MC	318MC
323E	15 to 400rpm	036.3124.000*	033.3551.000	033.4551.000	033.6453.000	033.6853.000
323S	3.0 to 400rpm	036.3134.000*	033.3551.000	033.4551.000	033.6453.000	033.6853.000
323U	3.0 to 400rpm	036.3144.000*	033.3551.000	033.4551.000	033.6453.000	033.6853.000
323Du	3.0 to 400rpm	036.3154.000*	033.3551.000	033.4551.000	033.6453.000	033.6853.000
323Dz	3.0 to 400rpm	036.3184.000*	033.3511.000	033.4511.000		

*Replace last 0 with A, E or U for American, European or UK mains lead

2.4mm wall tubing for 313D2 and 314D2 pumpheads

Tube bore	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm	9.6mm
Bioprene	903.0016.024	903.0032.024	903.0048.024	903.0064.024	903.0080.024	903.0096.024
Marprene	902.0016.024	902.0032.024	902.0048.024	902.0064.024	902.0080.024	902.0096.024
Platinum silicone	913.A016.024	913.A032.024	913.A048.024	913.A064.024	913.A080.024	913.A096.024

Ordering information for 314MC and 318MC extension pumpheads

Extension pumphead	Pumphead code
314MCX four-roller extension pumphead (maximum one extension pumphead)	033.6454.000
318MCX eight-roller extension pumphead (maximum one extension pumphead)	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, 323U, 323Du	3.0-110rpm	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, 323U, 323Du	3.0-110rpm	0.08-3.1	0.13-4.6	0.17-6.4	0.22-8.1	0.27-9.9
Drive	Speed range	Grey/Grey 1.29mm	Yellow/Yellow 1.42mm	Yellow/Blue 1.52mm	Blue/Blue 1.65mm	Green/Green 1.85mm
323S, 323U, 323Du	3.0-110rpm	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, 323U, 323Du	3.0-110rpm		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, 323U, 323Du	3.0-110rpm	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, 323U, 323Du	3.0-110rpm	0.07-2.6	0.11-3.9	0.14-5.3	0.18-6.6	0.24-8.8
Drive	Speed range	Grey/Grey 1.29mm	Yellow/Yellow 1.42mm	Yellow/Blue 1.52mm	Blue/Blue 1.65mm	Green/Green 1.85mm
323S, 323U, 323Du	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, 323U, 323Du	3.0-110rpm		0.65-24	0.79-29	0.90-33	0.98-36

Tubing for 323E/D, 323S/D, 323U/D, 323Du/D and 323Dz/D					
Tube number	14	16	25	17	18
Tube bore	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Bioprene	903.0016.016	903.0032.016	903.0048.016	903.0064.016	903.0080.016
Marprene	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.A016.016	913.A032.016	913.A048.016	913.A064.016	913.A080.016
Neoprene	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					
Colour code	Bore	Marprene	Autoclavable Marprene	PVC	Silicone
Orange/black	0.13mm			981.0013.000	
Orange/red	0.19mm			981.0019.000	
Orange/blue	0.25mm	979.0025.000	979.0025.00+	981.0025.000	
Orange/green	0.38mm	979.0038.000	979.0038.00+	981.0038.000	
Orange/yellow	0.50mm	979.0050.000	979.0050.00+	981.0050.000	
Orange/white	0.63mm	979.0063.000	979.0063.00+	981.0063.000	983.0063.000
Black/black	0.76mm	979.0076.000	979.0076.00+	981.0076.000	983.0076.000
Orange/orange	0.88mm	979.0088.000	979.0088.00+	981.0088.000	983.0088.000
White/white	1.02mm	979.0102.000	979.0102.00+	981.0102.000	983.0102.000
Red/red	1.14mm	979.0114.000	979.0114.00+	981.0114.000	983.0114.000
Grey/grey	1.29mm	979.0129.000	979.0129.00+	981.0129.000	983.0129.000
Yellow/yellow	1.42mm	979.0142.000	979.0142.00+	981.0142.000	983.0142.000
Yellow/blue	1.52mm	979.0152.000	979.0152.00+	981.0152.000	983.0152.000
Blue/blue	1.65mm	979.0165.000	979.0165.00+	981.0165.000	983.0165.000
Green/green	1.85mm	979.0185.000	979.0185.00+	981.0185.000	983.0185.000
Purple/purple	2.05mm	979.0205.000	979.0205.00+	981.0205.000	983.0205.000
Purple/black	2.29mm	979.0229.000	979.0229.00+	981.0229.000	983.0229.000
Purple/orange	2.54mm	979.0254.000	979.0254.00+	981.0254.000	983.0254.000
Purple/white	2.79mm	979.0279.000	979.0279.00+	981.0279.000	983.0279.000

Dispensing



323Dz/D

323Dz/D general purpose benchtop dispenser

- Dispenses 100ml in 3 seconds
- Accurate to within $\pm 1\%$
- Menu driven calibration procedure with mid-batch re-calibration
- Dispensing by key press or an additional footswitch/handswitch
- Fitted with 313D three roller pumphead with flip-top design, ensuring easy cleaning and ultra-fast set up
- Also accepts 314D four roller pumphead for greater accuracy and low pulsation
- Extension pumpheads can be fitted for up to six channels of flow



323Dz/D extends the laboratory range with a unique dispensing unit that combines accuracy and versatility. Designed for precise dispensing up to 2.0 litre/minute without the need for stored programs or printed records. The new 323Dz/D general purpose dispensing pump incorporates zero-maintenance brushless DC motors that are dust and contaminant-free. It is simple to use and benefits from a microprocessor control that delivers a dosing accuracy of $\pm 1.0\%$. Additional features include soft-start "ramp", which reduces splashes and frothing, and a "suck-back" facility eliminates drips at the end of each dose.

Digital speed control from 3rpm to 400rpm and instantly reversible. Switchable between 100-120V and 220-240V. 313D and 314D pumpheads accept five bore sizes of tubing. For use with 2.4mm wall thickness tubing, use 313D2 and 314D2 pumpheads (these cannot be extended). The maximum speed a 314D pumphead can be run is 300rpm.

323Dz/D flow rate and dose ranges (ml/min)						
Pump	Speed range	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
323Dz/D	2.0 - 400rpm	0.54-110	2.0-400	4.4-880	54-1400	75-2000
Minimum recommended dose (ml)						
		1.4	5.0	11.0	18.0	25.0

Dose size and approximate dose time - using 323Dz/D at 400rpm					
	10ml	25ml	50ml	100ml	250ml
Recommended tube bore					
High accuracy $\pm 1\%$	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
Seconds	5.6	3.8	3.4	3.0	7.5
Recommended tube bore					
Normal	3.2mm	4.8mm	8.0mm	6.4mm	8.0mm
Seconds	1.5	1.7	1.5	3.0	7.5

Ordering information for 323Dz/D dispenser				
Pump	Pumphead fitted	Speed range	Supply	Product code
323Dz/D	313D three-roller pumphead	3.0 to 400rpm	100-120/220-240V 50/60Hz 1ph 100VA	030.3184.3D0*

*Replace last 0 with **A**, **E** or **U** for **American**, **European** or **UK** mains lead

323Dz/D specifications	
Weight	4.7kg
Dimensions	H125 x W230 x L225mm
Control ratio	133:1
Standards	EN60529(IP31) CE



520Di/L

NEW 520Di/L high accuracy dispenser

- Accurately dispenses to +/- 0.5 percent using 505L pumphead for minimal pulsation
- Dial-up flow rates from 43 microlitres/min to 4.4 litre/min*
- Calibration by weight or by volume
- "Suck-back" facility eliminates drips at dose end
- Two models for IP31 or IP66 NEMA 4X protection
- Dosing triggered by keypad or additional footswitch, handswitch or proximity switch
- Data logging via printer or PC terminal
- On-the-fly calibration without disturbing batch dispensing



The new 520Di/L pump combines extraordinary levels of functionality with an on-screen menu, easy-to-use tactile membrane keypad and an alphanumeric display in English, German, French, Spanish and Italian. Up to 50 individual dispensing programs including all dose parameters and calibration, can be stored in the memory with full file name. Brushless DC motor with 3,500:1 speed control. IP31 pump has full RS232 control via serial communications and the IP66 model has full RS485 control.

A simple security protection code protects set functions and a comprehensive security protection can be incorporated to protect dispensing parameters and calibration values.

The 505L pumphead has low inertia stainless steel rollers and twin offset tracks to provide smooth flows using double tube elements, or two individual tubes up to 9.6mm bore with 2.4mm wall thickness. A 505LX extension pumphead can be fitted to provide one additional channel of flow through a double tube element, or four separate channels of flow via individual tubes.

520Di/L recommended dose sizes (ml)

Maximum speed	Tube bore	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm	9.6mm
350rpm	Minimum dose	4ml	13ml	25ml	40ml	50ml	70ml
	Maximum dose	20ml	65ml	125ml	200ml	250ml	360ml

520Di/L flow rates (ml/min)

Tube bore	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm	9.6mm	9.6mm*
0.1 to 350rpm	0.04-150	0.23-800	0.42-1500	0.70-2500	0.90-3200	1.3-3800	1.3-4400

*To obtain the highest flow rate of 4.4 litres/min you should use a high-flow Double-Y tube element, product code 913.AH96.K24 together with the 505L tube clamp MN0857T

520Di/L ordering information

Speed range	Supply	Product code
0.1 to 350rpm	100-120V/220-240V 50/60Hz 1ph 100VA	050.7171.5L0*

*Replace last 0 with A, E or U for American, European or UK mains lead

"Double-Y" tubing elements for 520Di/L dispenser

Tube bore	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm	9.6mm
Bioprene	903.E016.K24	903.E032.K24	903.E048.K24	903.E064.K24	903.E080.K24	903.E096.K24
Marprene	902.E016.K24	902.E032.K24	902.E048.K24	902.E064.K24	902.E080.K24	902.E096.K24
Platinum silicone	913.E016.K24	913.E032.K24	913.E048.K24	913.E064.K24	913.E080.K24	913.E096.K24
Sta-Pure	960.E016.K24	960.E032.K24	960.E048.K24	960.E064.K24	960.E080.K24	913.AH96.K24

2.4mm wall transfer tubing for 520Di/L dispenser

Tube bore	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm	9.6mm
Bioprene	903.0016.024	903.0032.024	903.0048.024	903.0064.024	903.0080.024	903.0096.024
Marprene	902.0016.024	902.0032.024	902.0048.024	902.0064.024	902.0080.024	902.0096.024
Platinum silicone	913.A016.024	913.A032.024	913.A048.024	913.A064.024	913.A080.024	913.A096.024

520Di/L specifications

Weight	15kg
Dimensions	H158 x W276 X L395mm
Standards	EN60529 (IP31) CE



624Di/L

624Di/L high-accuracy high-flow dispenser

- Fitted with high-accuracy twin-channel 605L pumphead
- Dial-up flow rates, menu driven for simple operation
- Calibration by weight or volume
- Store up to 26 dispensing programs
- Manual and RS232, TTL or analogue auto control
- Maximum flow rate 8.5 litre/min



Twin tubes on the 605L pumphead split and recombine the flow out of phase to virtually eliminate pulsation and more than double dosing accuracy. Accepts three sizes of double-Y tube elements. Sta-Pure tubing will give the highest accuracy, followed by silicone. Sta-Pure, Marprene and Bioprene will all give extremely long life. For two-channel dosing, two separate tubes can be fitted into the 605L pumphead, each producing half the listed flow rate.

Network any combination of up to sixteen 624Di/L pumps for computer control of all functions. Analogue control up to 30V or 32mA through rear panel, of speed, and switched or TTL control of direction and stop/start. Keypad lock prevents tampering or accidental changes, auto restart for mains failure recovery, adjustable speed ramp reduces splashes or frothing, suck back facility eliminates drips at dose end. Dose triggered by front panel or remote switch. Selectable dual voltage operation. Two-year comprehensive warranty. IP55 washdown protection.

624Di/L recommended dose sizes (ml)				
Maximum speed	Tube bore	8.0mm	12.0mm	16.0mm
200rpm	Minimum dose	60ml	100ml	150ml
	Maximum dose	300ml	500ml	750ml
624Di/L flow rates (litre/min)				
Speed range	Tube bore	8.0mm	12.0mm	16.0mm
4.0 to 200rpm		0.07-3.5	0.13-6.5	0.17-8.5

624Di/L ordering information		
Speed range	Supply	Product code
4.0 to 200rpm	100-120V/220-240V 50/60Hz 1ph 300VA	060.2204.5L0

* Replace last 0 with **A**, **E** or **U** for **American**, **European** or **UK** mains lead

Double-Y tubing elements for 624Di/L dispenser			
Tube bore	8.0mm	12.0mm	16.0mm
Marprene	902.E080.K40	902.E120.K40	902.E160.040
Platinum silicone	913.AE80.K40	913.A12E.K40	913.A16E.040
Sta-Pure	960.E080.K40	960.E120.K40	960.E160.040
Chem-Sure	965.E080.K40	965.E120.K40	965.E160.040

Transfer tubing for 624Di/L dispenser			
Tube bore	8.0mm	12.0mm	16.0mm
Bioprene	903.0080.040	903.0120.040	903.0160.040
Marprene	902.0080.040	902.0120.040	902.0160.040
Platinum silicone	913.A080.040	913.A120.040	913.A160.040

624Di/L specifications	
Weight	40kg
Dimensions	H260 x W420 x L510mm
Menu languages	English, French
Standards	EN60529 (IP55) CE



Filling needles

Dispensing accessories

Watson-Marlow dispensing accessories can tailor-make a complete dispensing system for any individual application.

Two sets of stainless steel filling needles are available with two alternative stainless steel filling stands which accept a variety of bottle sizes and come complete with a holder for the filling needles. Pumping can be activated by a proximity sensor available for either of the filling stands and automatically triggers a fill when a bottle is in place.

Footswitches and handswitches for the 323Dz/D, 520Di/L and 624Di/L are also available.

If you are not using a filling stand, you may choose to use one of the hand held lances specifically designed for our dispensing system filling needles. Each lance has a built-in switch.



Filling stand

Accessory	Description	Product code
Accessories for 520Di/L dispensers		
520AF	Footswitch for 323Dz and 520Di	059.3002.000
520AH	Handswitch for 323Dz and 520Di	059.3022.000
520AL	Dispensing lance	059.5052.000
520AV	Proximity switch	059.5072.000
505AS	Filling stand	059.5001.000
505AFN	Filling needle set	059.5101.000
	Filling needle 1.6mm bore	059.5100.016
	Filling needle 3.2mm bore	059.5100.032
	Filling needle 4.8mm bore	059.5100.048
	Filling needle 6.4mm bore	059.5100.064
	Filling needle 8.0mm bore	059.5100.080

Accessories for 520Di/L dispensers		
520AN	Network kit for 520Di (including software & cables)	059.3102.000
505LTC	Tube clamps set for 505L pumphead	059.4001.000

Accessories for 624Di/L dispensers		
624AF	Footswitch for 624Di Mk3	069.5231.000
624AN	Network kit for 624Di Mk3 (including software & cables)	069.3311.000
624AP	Printer and cable for 624Di Mk3, UK plug	069.3301.000
624AL	Dispensing lance Mk3	069.5251.000
624AV	Proximity switch for 624Di Mk3	069.5271.000
625LTC	Tube clamp set for 625L pumphead	069.4001.000
624AS	Filling stand	069.5001.000
624AFN	Filling needle set	069.5101.000
	Filling needle 8.0mm bore	069.5100.080
	Filling needle 12.0mm bore	069.5100.120
	Filling needle 16.0mm bore	069.5100.160



Footswitch



Handswitch

Tube selection guide

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.

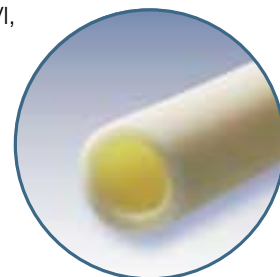
The tubing largely dictates pump performance: Its restitution creates suction, its strength resists pressure, its flex resistance determines pumping life, its bore defines the flow rate, and its wall thickness controls pumping efficiency.



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 oxidising agents such as ozone and peroxides and sodium hypochlorite. Marprene is beige in colour, 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.

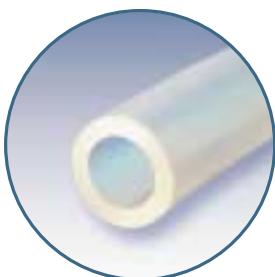
Bioprene has the same long life as Marprene but complies with USP Class VI, FDA requirements 21 CFR 177.2600 and NSF and USDA standards for food handling. It has a wide chemical compatibility, and can handle repeated autoclaving. Bioprene can be sterilised by ethylene oxide or gamma irradiation. Working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

LaserTraceability coding produces an indelible print which uses no ink and has no effect on tube performance. It means that, for the first time, lot traceability is carried through from box to bag to the tube itself.



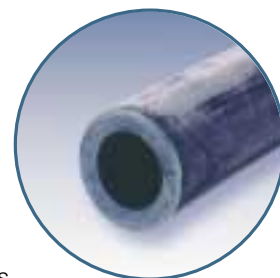
Sta-Pure has a unique composite construction of silicone in a PTFE lattice giving it superior burst resistance up to 7 bar (100psi) and 18 times longer life than silicone tubing. It produces virtually no spalling, is USP Class VI approved and is classified as non toxic. Working temperature range 0C to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



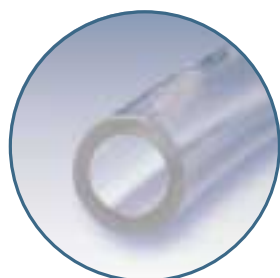
Chem-Sure is effectively pumpable PTFE - a high performance composite of PTFE and a high-grade fluoroelastomer - offering extraordinary chemical resistance, long life and very high burst pressures. Chem-Sure is USP Class VI and food grade approved making it suitable for foods and pharmaceuticals as well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



Neoprene offers excellent performance with abrasive slurries and sustained pressure applications. Good suction and pressure capabilities. Food quality. Working temperature range 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 NSF listed. Working temperature range 20C to 60C. 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 9.6mm (3/8"), and Neoprene tubing for bore sizes of 12.7mm (1/2") 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.

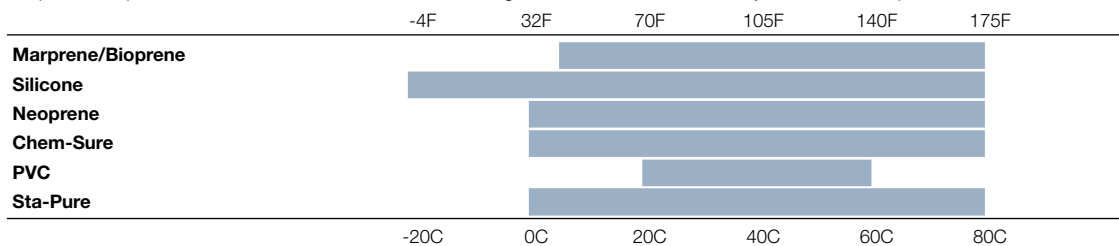
Checking your choice with an immersion test

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 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

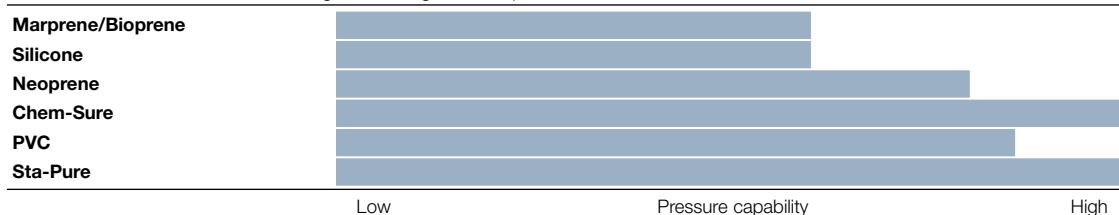
Temperature

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 80C, but all may be autoclaved up to 135C.



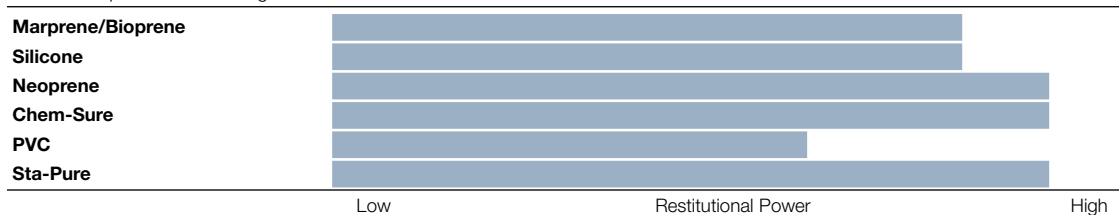
Pressure

Choose the smallest bore size of tubing which will give the required flow rate.



Suction

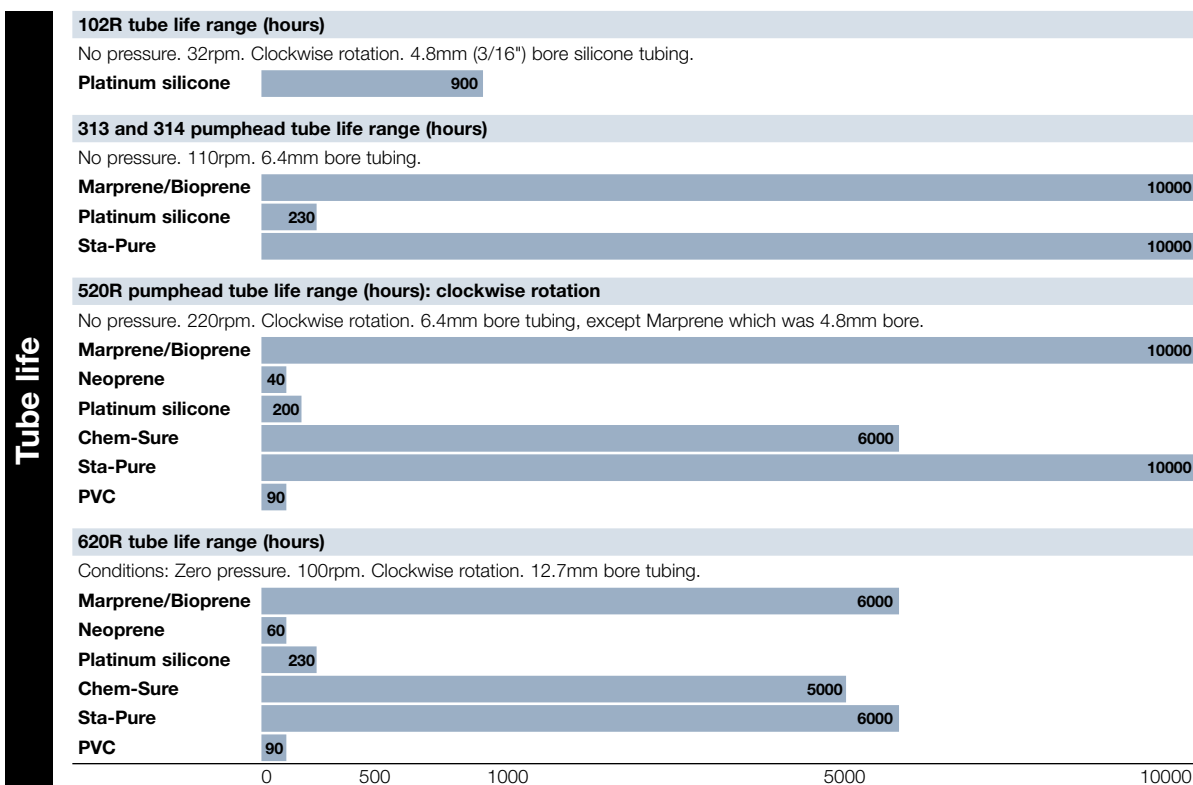
As with pressure, choose the smallest bore of tube which will produce the required flow rate. Equally important, however, is the restititional power of the tubing material:



Permeability



Tube life



Viscosity

The flow rates given in this catalogue 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 600 series pump which user greater wall thickness tubing, rather than a 500 series pump. Following this guidance will allow fluids with viscosities up to 2500 centipoise to be satisfactorily handled.

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

Watson-Marlow Bredel pumps bring you...

- Accurate and repeatable flow rates
- Contamination free pumping - ideal for shear-sensitive fluids, viscous sludges or slurries, and aggressive acids and caustics
- Easy to install, operate and maintain
- Virtually maintenance free - no expensive seals, valves, diaphragms or rotors to leak, clog or corrode

<p>100</p>	<p>Low flow single channel pumps. Fixed and manual/auto control variable speed.</p>	<ul style="list-style-type: none"> • Flow rates from 1µl/min to 53ml/min • Rapid and simple tube loading • Manual, auto and digital TTL control 	<p> 101F/R 2 bar</p>		<p>101U/R </p>
<p>200</p>	<p>Near pulseless, multi-channel cassette pumps with up to 32 channels.</p>	<ul style="list-style-type: none"> • Flow rates from 0.6µl/min to 22ml/min per channel • Precise flow control for each individual channel • Manual, auto and digital TTL control 	<p> 205S/CA 2 bar</p>		<p>205U/CA </p>
<p>300</p>	<p>NEW Single or multi-channel benchtop pumps with manual, remote, analogue, RS232 control and accurate dispensing.</p>	<ul style="list-style-type: none"> • Flow rates from 2µl/min to 3 litre/min • High visibility digital display with membrane keypad • Single channel or up to ten separate channels • Zero maintenance brushless DC motors • New 323Dz general purpose dispensing pump 	<p> 323E/D 2 bar</p>		<p>323S/D </p>
<p>400</p>	<p>NEW Ultra-compact scientific pumps for low flow single or multi-channel applications.</p>	<ul style="list-style-type: none"> • Flow rates from 1µl to 610 ml/min • Precision multi-roller pumpheads for accurate flows • Single channel 102R pumphead for use with Silicone or Marprene tubing • Digital and analogue process signal control 	<p> 401U/D1 2 bar</p>		<p>401U/DM3 </p>
<p>500</p>	<p>NEW Superb range of IP31 and IP66 rated pumps for science and industry as well as fixed and variable speed close-coupled pumps.</p>	<ul style="list-style-type: none"> • Flow rates from 10 µl/min to 4.4 litre/min • Manual, analogue and digital RS232/RS485 control • ATEX rated, three phase and pneumatic drives • Seven pumpheads options including low-pulse high accuracy 505L • Dosing and dispensing pump for +/- 0.5% accuracy 	<p> 520S/R 2 bar</p>		<p>520U/R </p>
<p>600</p>	<p>IP55 mid-flow process pumps with full clean-in-place and steam-in-place capability.</p>	<ul style="list-style-type: none"> • Flow rates from 50ml/min to 18.3 litre/min • Manual, auto and digital control • Close coupled pumps for the three phase operation including pneumatic and ATEX options • One minute maintenance LoadSure elements 	<p> 623S/R 4 bar</p>		<p>624S/RE </p>
<p>700</p>	<p>Industrial cased and baseplate mounted pumps for use with continuous tubing or new LoadSure elements. Three phase motors, ATEX rated drives or pneumatic.</p>	<ul style="list-style-type: none"> • Flow rates from 1.6 litre/min to 2,000 litre/ hour • Single or twin channel operation • Driven roller pumphead extends tube life • LoadSure elements ensure correct tube loading every time • Fixed or variable speed drives 	<p> 704U/R and 704S/R 2 bar</p>		<p>704U/RE and 704S/RE </p>
<p>800</p>	<p>High-flow hygienic pumping using USP Class VI Bioprene tubing or STA-PURE tubing.</p>	<ul style="list-style-type: none"> • Flow rates 2 litre/min to 8,000 litre/hour • Full Clean-In-Place and Steam-In-Place capability • Extensive motor/gearbox control options 	<p> 825 7 bar</p>	<p> 825 </p>	<p>840  840 </p>
<p>SPX</p>	<p>High flow high-pressure industrial pumps with unique patented direct coupled design. Duplex and CIP models available.</p>	<ul style="list-style-type: none"> • Flow rates to 0.3 litre/min 80 cubic metres/hour • Reinforced hoses enable pressures up to 16 bar • Fixed and mechanically or electronically variable speed drives including ATEX versions 	<p> SP10 and 15 16 bar</p>	<p> SP10 and 15 </p>	<p>SP25  SP25 </p>
<p>OEM</p>	<p>A wide range of instrument quality and industrial OEM pumpheads for fitting to users own drives, or with faceplate-mounted motor options.</p>	<ul style="list-style-type: none"> • Flow rates from 0.01µl/min to 33 litre/min • Single and multi-channel pumpheads • Synchronous, DC, induction, shaded-pole or stepper motors • Optional Eurocard pcb enables full controllability 	<p> 100 2 bar</p>	<p>100 </p>	<p>300 </p>
<p>Tubing Hoses</p>	<p>Extensive range of tubing ensures chemical compatibility. USP Class VI and FDA approvals. Precision machined, re-inforced hoses provide flow stability and excellent suction performance.</p>	<ul style="list-style-type: none"> • Twelve tubing materials in bore sizes 0.13mm to 25.4mm • Autoclavable Marprene, Bioprene, STA-PURE, Chem-Sure and Pumpsil Silicone (platinum-cured) with LaserTraceability • Four hose materials including Natural Rubber, Nitrile NBR, Hypalon and EPDM from 10mm to 100mm 	<p>Marprene</p>		<p>Bioprene </p>

- Designed for continuous duty - 24 hours/7 days
- Self-priming up to 9 metres (30 feet) and dry running
- Pumps act as their own check-valves
- Reversible flow direction

Code descriptions eg: 101U/R = Manual/auto control variable speed with single channel pumphead

Drive

F	Fixed speed
S	Manual control variable speed
U	Manual/auto control variable speed
Du	Digital/analogue control variable speed
Dz	Dispenser
Di	Precision dispenser, RS232 control
VI	Varmeca controlled
FX	Fixed speed duplex drive
DF	ATEX EExd T4 fixed speed
P	Pneumatic
DVB	ATEX Exd T4, mechanical variable speed
PB	Pneumatic, baseplate mounted
SN/UN/DuN (N) denotes IP66 protection	

Pumphead

R	Single channel pumphead
R2	Single channel pumphead for 2.4mm wall tubing
RE	Single channel pumphead for LoadSure elements
CA	High precision multi-channel cassette pumphead
D1	Single channel, four roller pumphead
D	Single channel, three or four roller, 'flip-top' pumphead
DM2-3	Three channel pumphead for three bridge manifold tubing
R1	Single channel, four roller pumphead
L2	Two channel, four roller pumphead
L	Precision 'low pulse' pumphead
VM2-4	Precision low flow multi-channel pumphead for two bridge manifold tubing

323U/D		323Du/D		323Dz/D		314MC							
403U/R1		403U/UL2		405U/R1		405U/L		403U/MM2		403U/MM4		403U/R	
520Du/R		520SN/R2		520UN/R2		520DuN/R2		521F/R2		521V/R2		520Di/L	
624U/RE		624Di/L		621F/R		621Vi/RE		621FX/RE		621DV/RE		621P/RE	
701F/R		701PB/R		701F/RE		701PB/RE		700 Element Kit					
SPX32		SPX40		SPX50		SPX65		SPX80		SPX100		SPX DUPLEX	
400		500		600		700							
Silicone		Sta-Pure		PVC		Neoprene		Fluorel		Chem-Sure		Hoses	