

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 wherever 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 analysis, rapid prototyping, intensive tooling and cellular build.

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 creates intelligent designs for intelligent users.

quality

The highest quality peristaltic pump available today, every Watson-Marlow Bredel product is engineered for quality; brushless DC drives, precision gearboxes and the most sophisticated control electronics designed and manufactured to ISO9001:2000, are backed by expert local support.



Inside the Sci-Q 323

Five modular pumphead types for single or multi-channel flows from $\mu\text{l}/\text{minute}$ 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

SERIES



101U/R

101U/R auto/manual control variable speed pump

- The world's leading low-flow single channel pump
- Flow rates from 0.001 to 53ml/min
- Digital speed setting for accurate process control
- Reversible flow with Max priming switch
- Accepts auto-control signals up to 30V or 32mA and TTL remote control



Precision DC motor with pulse-width-modulated speed control and instant auto/manual changeover. Selectable dual-voltage operation. Fitted with rapid tube loading 102R pumphead which accepts silicone tubing only.



101F/R

101F/R fixed speed pump

101F/R fixed speed pumps provide flow rates up to 32.6ml/min, accept silicone tubing only, and operate in the clockwise (long tube life) direction only.

101U/R flow rate ranges (ml/min)

Pump	Speed range	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm
101U/R	0.06 to 2rpm	0.001-0.04	0.003-0.10	0.013-0.44	0.049-1.62	0.098-3.25
	1.0 to 32rpm	0.021-0.69	0.048-1.61	0.210-7.00	0.780-26.0	1.590-53.0

101F/R flow rates (ml/min)

Pump	Speed range	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm
101F/R	4rpm	0.087	0.20	0.87	3.17	6.35
	20rpm	0.420	0.98	4.36	16.0	32.6

101U/R and 101F/R ordering information

Pump	Speed range	Supply	Product code
101U/R	0.06 to 2rpm	100-120V/220-240V 50/60Hz 1ph 15VA	010.4002.000*
	1.0 to 32rpm	100-120V/220-240V 50/60Hz 1ph 15VA	010.4202.000*
101F/R	4rpm	220-240V 50Hz 1ph 25VA	010.0211.000*
	20rpm	220-240V 50Hz 1ph 25VA	010.0521.000*

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

Tubing for 101U/R and 101F/R pumps

Bore	Platinum silicone
0.5mm	913.A005.016
0.8mm	913.A008.016
1.6mm	913.A016.016
3.2mm	913.A032.016
4.8mm	913.A048.016

101U/R and 101F/R specifications

Weight	2.4kg
Dimensions	H100 x W160 x L210mm
Standards	EN60529 (IP21) CE



205U/CA

205U/CA low-flow multi-channel pumps

- High precision, near-pulseless flow through 4 to 32 channels
- Flow rates from 0.6 microlitres to 22ml/min per channel
- Eight planetary-driven stainless-steel rollers give extended tube life
- 180:1 speed control range and 19 tube sizes give 36,000:1 control range
- Manual control or analogue auto-control (up to 30V or 32mA)
- Change cassettes without stopping the pump or disturbing other channels



The 200 series provides high-precision pulsation-free pumping. Flow control for each individual channel is provided by multi-turn “click-stop” pressure adjustment on each cassette. Manual and analogue auto-control options.



Snap-fit cassettes

The 205CA pumphead with its snap-fit cassettes and sprung track is factory-set for standard applications, but lockable occlusion adjustment allows settings to be optimised when necessary and, uniquely, remain undisturbed during tube changes. 205CA pumpheads accept manifold pump tubing in five different materials and nineteen sizes.

Keypad lock prevents tampering or accidental changes. Max high speed priming function. All functionality controlled from wipe-clean membrane keypad. 0-5V DC tachometer output for speed monitoring, 5V auxiliary output for motor run indication. Remote low voltage, or TTL (PLC compatible) control of start/stop and direction. Selectable dual voltage 100-120V or 220-240V 50/60Hz operation.

205S/CA low-flow multi-channel pumps

If you require only manual control, please order the 205S/CA.



205S/CA

205U/CA and 205S/CA flow rate ranges ml/min (maximum 32 channels)

Colour code	Orange/Black	Orange/Red	Orange/Blue	Orange/Green	Orange/yellow
Tube bore	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm
0.5-90rpm	0.0006-0.10	0.0009-0.16	0.0013-0.23	0.0036-0.65	0.0056-1.01
Colour code	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Tube bore	0.63mm	0.76mm	0.88mm	1.02mm	1.14mm
0.5-90rpm	0.0083-1.49	0.011-2.02	0.016-2.92	0.021-3.76	0.026-4.68
Colour code	Grey/Grey	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Tube bore	1.29mm	1.42mm	1.52mm	1.65mm	1.85mm
0.5-90rpm	0.033-5.95	0.04-7.20	0.043-7.69	0.051-9.12	0.063-11.3
Colour code		Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Tube bore		2.05mm	2.29mm	2.54mm	2.79mm
0.5-90rpm		0.076-13.8	0.092-16.5	0.11-19.3	0.12-22.0

205U/CA and 205S/CA ordering information

Supply	100-120/220-240V 50/60Hz 1ph 60VA				
Channels	205U/CA	205S/CA	Channels	205U/CA	205S/CA
4	020.5704.000*	020.3704.000*	20	020.5720.000*	020.3720.000*
8	020.5708.000*	020.3708.000*	24	020.5724.000*	020.3724.000*
12	020.5712.000*	020.3712.000*	28	020.5728.000*	020.3728.000*
16	020.5716.000*	020.3716.000*	32	020.5732.000*	020.3732.000*

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



Colour code	Bore	Autoclavable		PVC	Silicone	Solvent resistant	Acid resistant
		Marprene	Marprene				
Orange/black	0.13mm			980.0013.000		984.0013.000	
Orange/red	0.19mm			980.0019.000		984.0019.000	
Orange/blue	0.25mm	978.0025.00+	978.0025.000	980.0025.000		984.0025.000	
Orange/green	0.38mm	978.0038.00+	978.0038.000	980.0038.000		984.0038.000	
Orange/yellow	0.50mm	978.0050.00+	978.0050.000	980.0050.000		984.0050.000	986.0050.000
Orange/white	0.63mm	978.0063.00+	978.0063.000	980.0063.000	982.0063.000	984.0063.000	986.0063.000
Black/black	0.76mm	978.0076.00+	978.0076.000	980.0076.000	982.0076.000	984.0076.000	986.0076.000
Orange/orange	0.88mm	978.0088.00+	978.0088.000	980.0088.000	982.0088.000	984.0088.000	986.0088.000
White/white	1.02mm	978.0102.00+	978.0102.000	980.0102.000	982.0102.000	984.0102.000	986.0102.000
Red/red	1.14mm	978.0114.00+	978.0114.000	980.0114.000	982.0114.000	984.0114.000	986.0114.000
Grey/grey	1.29mm	978.0129.00+	978.0129.000	980.0129.000	982.0129.000	984.0129.000	986.0129.000
Yellow/yellow	1.42mm	978.0142.00+	978.0142.000	980.0142.000	982.0142.000	984.0142.000	986.0142.000
Yellow/blue	1.52mm	978.0152.00+	978.0152.000	980.0152.000	982.0152.000	984.0152.000	986.0152.000
Blue/blue	1.65mm	978.0165.00+	978.0165.000	980.0165.000	982.0165.000	984.0165.000	986.0165.000
Green/green	1.85mm	978.0185.00+	978.0185.000	980.0185.000	982.0185.000	984.0185.000	986.0185.000
Purple/purple	2.05mm	978.0205.00+	978.0205.000	980.0205.000	982.0205.000	984.0205.000	986.0205.000
Purple/black	2.29mm	978.0229.00+	978.0229.000	980.0229.000	982.0229.000	984.0229.000	986.0229.000
Purple/orange	2.54mm	978.0254.00+	978.0254.000	980.0254.000	982.0254.000	984.0254.000	986.0254.000
Purple/white	2.79mm	978.0279.00+	978.0279.000	980.0279.000	982.0279.000	984.0279.000	986.0279.000

205U/CA and 205S/CA specifications

Channels	Dimensions	Weight
4	H155mm x W147mm x L290mm	6.5kg
8	H155mm x W147mm x L330mm	7.6kg
12	H155mm x W147mm x L380mm	8.8kg
16	H155mm x W147mm x L430mm	10.0kg
20	H155mm x W147mm x L530mm	12.4kg
24	H155mm x W147mm x L580mm	13.5kg
28	H155mm x W147mm x L630mm	14.7kg
32	H155mm x W147mm x L680mm	15.9kg
Standards		EN60529 (IP31), CE
Operating temperature range		5 to 40C

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	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/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/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

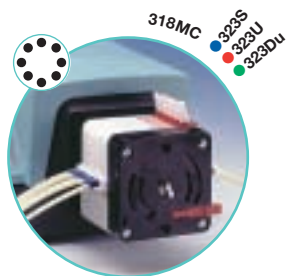
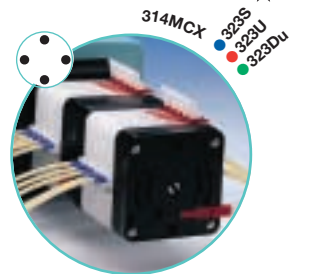
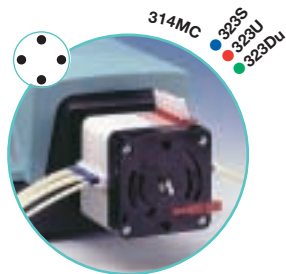
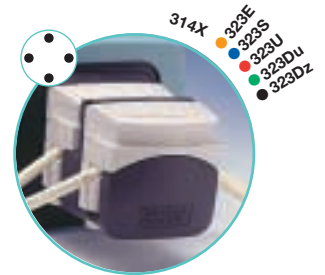
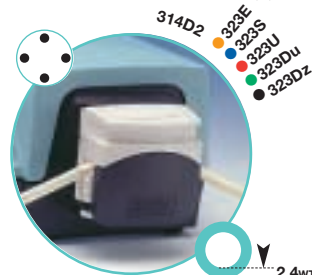
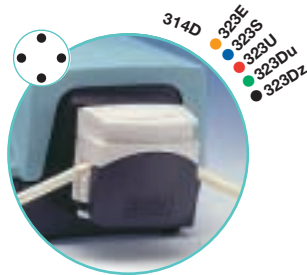
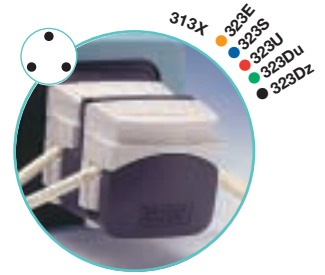
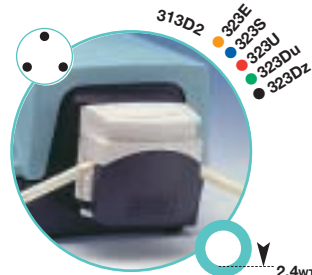
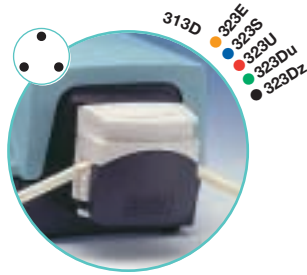
The modular design means that many more combinations of drives and pumpheads than those shown on the previous page are possible. Five drives couple to four pumphead types, options to meet every need: Up to five 313 or 314 pumpheads can be fitted to one drive, and up to two 314MC or 318MC (which can also 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	14	16	25	17	18
		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		

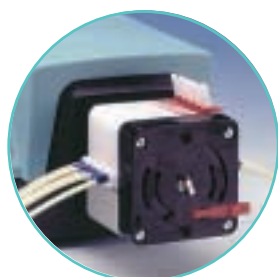
*Replace last 0 with **A, E** or **U** for **American, European** or **UK** mains lead

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
Marpene	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
Pumpsil-D	913.D016.016	913.D032.016	913.D048.016	913.D064.016	913.D080.016
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	Marpene	Autoclavable Marpene	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

Precision pumps for science

SERIES



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 turn control potentiometer for direction, speed and start/stop
- Analogue speed control and remote switching via a 15D connector
- Reversible for easy fluid recovery

The 401U/D1 accepts standard 1.6mm wall tubing up to 4mm bore in seven different tube materials.

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

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



401U/DM2



401U/DM3

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

Tube bore	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)

Colour	Orange/Black	Orange/Red	Orange/Blue	Orange/Green	Orange/Yellow
Tube bore	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

Colour	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Tube bore	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

Colour	Grey/Grey	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Tube bore	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

Colour	Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Tube bore	2.05mm	2.29mm	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	Single channel standard tubing pump	040.181D.010*
4.0 to 40rpm		040.1H1D.010*
20 to 200rpm		040.1S1D.010*

401U/DM2 one or two channel manifold tube pump

1.2 to 12rpm	Two channel manifold tubing pump	040.181D.M20*
4.0 to 40rpm		040.1H1D.M20*
10 to 100rpm		040.1P1D.M20*

401U/DM3 three channel manifold tube pump

1.2 to 12rpm	Three channel manifold tubing pump	040.181D.M30*
4.0 to 40rpm		040.1H1D.M30*
10 to 100rpm		040.1P1D.M30*

Remote switching cables for 401U

400AC1	0-10V CW/Stop/CCW 1.5m remote cable	049.0011.000
400AC2	4-20mA CW/Stop/CCW 1.5m remote cable	049.0031.000
400AC3	CW/Stop/CCW 1.5m remote cable	049.0051.000
400AC4	Start/Stop 3m remote cable fitted with foot switch	049.0071.000

*Replace last **0** with **A** for **American**, mains transformer (**110V 1ph 60Hz**)

Tubing for 401U/D1

Tube bore	#	Bioprene	Marpene	Platinum Silicone	Neoprene
0.5mm	112	903.0005.016	902.0005.016	913.A005.016	
0.8mm	13	903.0008.016	902.0008.016	913.A008.016	920.0008.016
1.6mm	14	903.0016.016	902.0016.016	913.A016.016	920.0016.016
2.4mm			902.0024.016	913.A024.016	
3.2mm	16	903.0032.016	902.0032.016	913.A032.016	920.0032.016
4.0mm			902.0040.016	913.A040.016	
Tube bore		Sta-Pure	Chem-Sure	PVC	
1.6mm	14	960.0016.016	965.0016.016	950.0016.016	
3.2mm	16	960.0032.016	965.0032.016	950.0032.016	

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

Colour code	Bore	Marpene	Autoclavable Marpene	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

401U specifications

Weight	Operating temperature	Control ratio	Noise	Standards
1.0kg	5-40C	10:1	<70dBA at 1m	CE, EN60529 IP21
Supply through a mains transformer		18U0C		



403U/R

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

- The 403U/R produces single channel flows from 0.05 to 83ml/min
- 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/R, 403U/R1, 403U/L and 403U/L2 are precision manual/auto-control pumps which use 1.6mm wall tubing. All have spring-loaded tracks to maximise tube life and flow precision against pressures up to 2 bar. The 403U/R accepts Marprene and Bioprene tubing in addition to platinum-cured silicone.

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 6.4mm bore tubing. L2 dual channel or “L” low pulsing Y element option up to 4.8mm bore with twin, precision offset aluminium rotors with four stainless steel rollers. All pumps accept 4-20mA or 0-10V analogue signals and remote TTL (PLC compatible) start/stop and CCW/CW switching. Two year comprehensive warranty.



403U/R1



403U/L

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

- 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 1.6mm wall tubing. All have spring-loaded tracks to maximise tube life and flow precision against pressures up to 2 bar.

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



405U/R1



405U/L



400

SERIES



403U/L2

403U and 405U flow rates per channel (ml/min)								
Pump	Speed range	0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.8mm	6.4mm
403U/R	2.5 to 50rpm	0.05-1.1	0.1-2.5	0.5-11		2-41	4-83	
403U/R1	2.5 to 50rpm	0.06-1.1	0.14-2.8	0.55-11	1.2-24	2.1-43	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	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	4.6-92	
405U/R1	20 to 200rpm	0.44-4.4	1.1-11	4.4-44	9.8-98	17-170	37-370	61-610
405U/L	20 to 200rpm	0.86-8.6	2.2-22	8.8-88	20-200	34-340	73-730	
405U/L2	20 to 200rpm	0.44-4.4	1.1-11	4.4-44	9.8-98	17-170	37-370	

Ordering information

Pump	Speed range	Description	Supply	Product code
403U/R	2.5 to 50rpm	Single channel low flow pump	220-240V 50/60Hz 1ph	040.3K11.010*
403U/R1	2.5 to 50rpm	Single channel low flow pump		040.3K1R.010*
403U/L	2.5 to 50rpm	Y-element low flow pump		040.3K1L.010*
403U/L2	2.5 to 50rpm	Dual channel low flow pump		040.3K1L.020*
405U/R1	20 to 200rpm	Single channel high flow pump		040.5S1R.010*
405U/L	20 to 200rpm	Y-element high flow pump		040.5S1L.010*
405U/L2	20 to 200rpm	Dual channel high flow pump		040.5S1L.020*

Remote switching cables for 403U and 405U

	Product code	
400AC1	0-10V CW/Stop/CCW 1.5m remote cable	049.0011.000
400AC2	4-20mA CW/Stop/CCW 1.5m remote cable	049.0031.000
400AC3	CW/Stop/CCW 1.5m remote cable	049.0051.000
400AC4	Start/Stop 3m remote cable with foot switch fitted	049.0071.000

*Replace last 0 with **A, E** or **U** for **American, European** or **UK** mains supply (**American 110V 1ph 60Hz**)

tubing for R, R1 and L2 pumpheads

Bore	#	Bioprene	Marprene	Platinum silicone
0.5mm	112	903.0005.016	902.0005.016	913.A005.016
0.8mm	13	903.0008.016	902.0008.016	913.A008.016
1.6mm	14	903.0016.016	902.0016.016	913.A016.016
2.4mm			902.0024.016	913.A024.016
3.2mm	16	903.0032.016	902.0032.016	913.A032.016
4.8mm	25	903.0048.016	902.0048.016	913.A048.016
6.4mm	17	903.0064.016	902.0064.016	913.A064.016

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

Y-elements for L pumphead

Bore	Marprene	Platinum Silicone
1.6mm	902.E016.016	910.E016.016
2.4mm	902.E024.016	910.E024.016
3.2mm	902.E032.016	910.E032.016
4.8mm	902.E048.016	910.E048.016

403U and 405U specifications		403U	405U
Weights		2.5kg	3.5kg
Power		13VA	30VA
Supply		220-240V 50/60Hz 1ph	
Operating temperature		5-40C	
Control ratio		10:1	
Noise		<70dBA at 1m	
Standards		EN60529 (IP21), CE	



405U/L2



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 analogue signals and remote low voltage or TTL (PLC compatible) start/stop and direction switching. Two year comprehensive warranty.



403U/VM3

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

Colour	Orange/Black	Orange/Red	Orange/Blue	Orange/Green	Orange/Yellow
Bore	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

Colour	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Bore	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

Colour	Grey/Grey	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Bore	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

Colour	Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Bore	2.05mm	2.29mm	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



403U/VM4

Ordering information for 403				
Pump	Speed range	Description	Supply	Product code
403U/VM2	0.5-10rpm	Dual channel manifold tube pump	220-240V 50/60Hz 1ph	040.371V.M20*
403U/VM2	2.5-50rpm			040.3K1V.M20*
403U/VM3	0.5-10rpm	Three channel manifold tube pump	220-240V 50/60Hz 1ph	040.371V.M30*
403U/VM3	2.5-50rpm			040.3K1V.M30*
403U/VM4	0.5-10rpm	Four channel manifold tube pump	220-240V 50/60Hz 1ph	040.371V.M40*
403U/VM4	2.5-50rpm			040.3K1V.M40*

Remote switching cables for 403U				Product code
400AC1	401U, 403U, 405U	0-10V CW/Stop/CCW 1.5m remote cable		049.0011.000
400AC2	401U, 403U, 405U	4-20mA CW/Stop/CCW 1.5m remote cable		049.0031.000
400AC3	401U, 403U, 405U	CW/Stop/CCW 1.5m remote cable		049.0051.000
400AC4	401U, 403U, 405U	Start/Stop 3m remote cable with foot switch fitted		049.0071.000

*Replace last 0 with **A, E** or **U** for **American, European** or **UK** mains supply (**American 110V 1ph 60Hz**)

Manifold pump tubing for 403U/VM2, 403U/VM3 and 403U/VM4							
Colour code	Tube Bore	Autoclavable Marprene	Marprene	PVC	Silicone	Solvent resistant	Acid resistant
Orange/black	0.13mm			980.0013.000		984.0013.000	
Orange/red	0.19mm			980.0019.000		984.0019.000	
Orange/blue	0.25mm	978.0025.00+	978.0025.000	980.0025.000		984.0025.000	
Orange/green	0.38mm	978.0038.00+	978.0038.000	980.0038.000		984.0038.000	
Orange/yellow	0.50mm	978.0050.00+	978.0050.000	980.0050.000		984.0050.000	986.0050.000
Orange/white	0.63mm	978.0063.00+	978.0063.000	980.0063.000	982.0063.000	984.0063.000	986.0063.000
Black/black	0.76mm	978.0076.00+	978.0076.000	980.0076.000	982.0076.000	984.0076.000	986.0076.000
Orange/orange	0.88mm	978.0088.00+	978.0088.000	980.0088.000	982.0088.000	984.0088.000	986.0088.000
White/white	1.02mm	978.0102.00+	978.0102.000	980.0102.000	982.0102.000	984.0102.000	986.0102.000
Red/red	1.14mm	978.0114.00+	978.0114.000	980.0114.000	982.0114.000	984.0114.000	986.0114.000
Grey/grey	1.29mm	978.0129.00+	978.0129.000	980.0129.000	982.0129.000	984.0129.000	986.0129.000
Yellow/yellow	1.42mm	978.0142.00+	978.0142.000	980.0142.000	982.0142.000	984.0142.000	986.0142.000
Yellow/blue	1.52mm	978.0152.00+	978.0152.000	980.0152.000	982.0152.000	984.0152.000	986.0152.000
Blue/blue	1.65mm	978.0165.00+	978.0165.000	980.0165.000	982.0165.000	984.0165.000	986.0165.000
Green/green	1.85mm	978.0185.00+	978.0185.000	980.0185.000	982.0185.000	984.0185.000	986.0185.000
Purple/purple	2.05mm	978.0205.00+	978.0205.000	980.0205.000	982.0205.000	984.0205.000	986.0205.000
Purple/black	2.29mm	978.0229.00+	978.0229.000	980.0229.000	982.0229.000	984.0229.000	986.0229.000
Purple/orange	2.54mm	978.0254.00+	978.0254.000	980.0254.000	982.0254.000	984.0254.000	986.0254.000
Purple/white	2.79mm	978.0279.00+	978.0279.000	980.0279.000	982.0279.000	984.0279.000	986.0279.000

403U specifications

Weight	2.5kg
Power	13VA
Supply	220-240V 50/60Hz 1ph
Operating temperature	5-40C
Control ratio	20:1
Noise	<70dBA at 1m
Standards	EN60529 (IP21), CE

New 520 series

The 520 pumps have raised the standard for scientific, biotech and pharmaceutical pumping. Pump options include the manual control 520S, the 520U with remote auto and analogue control and the 520Du which includes remote digital or RS232 control with full feedback on performance. All 520 pumps have a large digital display and easy-to-use tactile membrane keypad with a keypad lock for process security.

520U/R auto/analogue, manual control variable speed pump

- Flow rates from 4 microlitres/min up to 2.4 litre/min
- Manual control with flow calibration and MemoDose for accurate single shot dispensing
- Analogue input, 0-10V / 4-20mA software configurable and calibrated, 0-10V analogue or 0-1258Hz speed indication output
- Inputs: run/stop, direction, leak detected, auto/manual toggle, MemoDose remote footswitch, all accepting 5V TTL or 24V industrial logic
- Outputs: four status outputs, 5V TTL or 24V industrial logic, user set-up for run/stop, direction, auto/manual status and choice of alarm conditions

520S/R manual control variable speed pump

If you require only manual control, please order a 520S/R pump.

520Du/R digital/analogue/manual control variable speed pump

- RS232 network control for connectivity by PC or PLC
- Manual control with flow calibration and MemoDose for accurate single shot dispensing
- Analogue input, 0-10V / 4-20mA software configurable and calibrated, 0-10V analogue or 0-1258Hz speed indication output. Plus speed scaling from keypad or a second input
- Inputs: run/stop, direction, leak detected, auto/manual toggle, MemoDose remote foot switch, all accepting 5V TTL or 24V industrial logic
- Outputs: four status outputs, 5V TTL or 24V industrial logic, user set-up for run/stop, direction, auto/manual status and choice of alarm conditions

The 520S/R, 520U/R and 520Du/R are fitted as standard with the 520R pumphead which uses 1.6mm wall thickness tubing and features a large swept volume and sprung rollers for high accuracy, gentle pumping of shear sensitive fluids. A brushless DC motor provides a massive speed control ratio of 2,200:1 and set speed accuracy to 0.1%. Pumps combine extraordinary levels of functionality with on-screen menus, large high visibility displays and easy-to-use tactile membrane keypads.

520 drives also accept 313/314 flip-top pumpheads which can be extended for up to six channels of flow, as well as the 505L low-pulse and 505CA microlitre flow, multi-channel pumpheads. For high pressure applications or for pumping viscous materials, tubing with a 2.4mm wall thickness can be used. The 520R2 pumphead or 313D2 and 314D2 pumpheads should be chosen for 2.4mm wall thickness tubing.

The 520R2 pumphead can also be fitted to achieve a higher maximum flow rate of 3.5 litre/min using the largest 9.6mm bore tubing which has 2.4mm wall thickness. Ordering codes for pumps fitted with the 520R2 are given on page 18. 2.4mm wall thickness tubing ordering information is also shown.



520U/R



520S/R



505Du/R



520S/R, 520U/R and 520Du/R flow rates (ml/min)							
Tube bore	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm
0.1 to 220rpm	0.004-9.5	0.0-24	0.04-97	0.18-390	0.40-870	0.70-1500	1.1-2400

Tubing for 520S/R, 520U/R and 520Du/R pumps							
Bore	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	960.0005.016	960.0008.016	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

2.4mm wall tubing for 520S/R2, 520U/R2 and 520Du/R2 pumps							
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	

520S/R, 520U/R and 520Du/R specifications							
Maximum speed	220rpm	Weight	9.6kg	Standards	EN60529, (IP31) CE C ETL US		
Control ratio	2,200:1	Dimensions	H158 x W276 x L385mm				

Ordering information	Supply	Product code	Product code
Speed range		520S/R	520S/R2
0.1 to 220rpm	100-120V/220-240V 50/60Hz 1ph 100VA	050.7131.100	050.7131.2L0
		520U/R	520U/R2
0.1 to 220rpm	100-120V/220-240V 50/60Hz 1ph 100VA	050.7141.100	050.7141.2L0
		520Du/R	520Du/R2
0.1 to 220rpm	100-120V/220-240V 50/60Hz 1ph 100VA	050.7151.100	050.7151.2L0

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

A range of IP66 pumps are also available for high pressure washdown areas.



620S/R

620S/R compact manual control pump

- Flow rates up to 16 litre/minute, pressures up to 2 bar (30psi)
- 2650:1 speed control ratio
- Twin roller high-flow pumphead with wireless guard switching for safety
- MemoDose for accurate single shot dispensing
- Two pumphead positions as standard



Rapid and simple tube loading. 620R continuous tubing pumpheads accepts four tube bore sizes in seven different materials. Rollers snap away for easy tube loading. Smooth, easy-to-clean enclosure. Mains voltage switchable between 100-120V 50/60Hz and 200-240V 50/60Hz.

620S/R flow rate ranges (litre/min)

Tubing material	Speed range	6.4mm	9.6mm	12.7mm	15.9mm
Bioprene	0.1 to 265rpm	0.001-3.4	0.003-6.6	0.004-11	0.01-12
Marprene	0.1 to 265rpm	0.001-3.4	0.003-6.6	0.004-11	0.01-12
Silicone	0.1 to 265rpm	0.001-3.3	0.003-7.2	0.004-11	0.01-15
Neoprene, Sta-Pure	0.1 to 265rpm	0.001-13.2	0.003-6.6	0.004-11	0.01-16

620S/R ordering information

Speed range	Supply	Product code
0.1 to 265rpm	100-120V/220-240V 50/60Hz 1ph 250VA	060.4131.020*

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

Tubing for 620S/R

Tube bore	6.4mm	9.6mm	12.7mm	15.9mm
Bioprene	903.0064.032	903.0096.032	903.0127.032	903.0159.032
Marprene	902.0064.032	902.0096.032	902.0127.032	902.0159.032
Sta-Pure	960.0064.032	960.0096.032	960.0127.032	960.0159.032
Platinum silicone	913.A064.032	913.A096.032	913.A127.032	913.A159.032
Neoprene	920.0064.032	920.0096.032	920.0127.032	920.0159.032
Chem-Sure	965.0064.032	965.0096.032	965.0127.032	965.0159.032
PVC	950.0064.032	950.0096.032	950.0127.032	950.0159.032

620S/R specifications

Weight	19.6kg
Dimensions	H290 x W280 x L362 mm
Standards	EN60529 (IP31) CE

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 five 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.

Pumpsil-D platinum-cured silicone tubing provides higher accuracy and high purity to pharmaceuticals and biotechnology precision dispensing applications.

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	7.2-1400	10.0-2000
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

Tubing for 323Dz/D can be found on page 10

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

- Dial-up flow rates from 43 microlitres/min to 4.4 litre/min*
- Calibration by weight or by volume, ± 0.5 accuracy
- “Suck-back” facility eliminates drips at dose end
- Two models for IP31 or IP66 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



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. 520Di/L IP31 pump has full RS232 control via serial communications and the 520DiN/L 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.

Pumpsil-D platinum-cured silicone tubing provides higher accuracy and high purity to pharmaceutical and biotechnology precision dispensing applications.

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 IP31	050.7171.5LO*
0.1 to 350rpm	100-120V/220-240V 50/60Hz 1ph 100VA IP66	050.717N.5LO*

*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
Pumpsil-D	913.DE16.K24	913.DE32.K24	913.DE48.K24	913.DE64.K24	913.DE80.K24	913.DE96.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
Pumpsil-D	913.D016.024	913.D032.024	913.D048.024	913.D064.024	913.D080.024	913.D096.024

520Di/L specifications			
Weight	15kg	Standards	EN60529 (IP31) CE
Dimensions	H158 x W276 X L395mm		





620Di/L

620Di/L high-accuracy high-flow dispenser

- Dispenses 500ml in 2.4 seconds with $\pm 0.5\%$ accuracy
- Timed or remote dosing (footswitch or logic input)
- Dial-up flow rates up to 12.5 litre/min, 2650:1 control ratio
- Calibration by weight or volume
- Store up to 50 dispensing programs
- PIN protection of all pump settings



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 in six different materials. Pumpsil silicone tubing and Sta-Pure tubing will provide highest accuracy and Marprene and Bioprene will all give extremely long tube life. For two-channel dosing, two separate tubes can be fitted into the 605L pumphead, each producing half the listed flow rate.

Export batch records to PC or printer for cGMP requirements. Wide range of industrial logic I/O control options and serial communication. Wireless guard switching and tool lockable track for safety. Adjustable speed ramp reduces splashes or frothing, suck back facility eliminates drips at dose end. Selectable dual voltage operation. Three year comprehensive warranty.

Pumpsil-D platinum-cured silicone tubing provides higher accuracy and high purity to pharmaceuticals and biotechnology precision dispensing applications.

IP66 washdown model available for wet or humid environments.

620Di/L recommended dose sizes (ml) in 10 seconds

Maximum speed	Tube bore	8.0mm	12.0mm	16.0mm
265rpm	Minimum dose	8ml	16ml	22ml
	Maximum dose	738ml	1420ml	1920ml

620Di/L flow rates (litre/min)

Speed range	Tube bore	8.0mm	12.0mm	16.0mm
0.1 to 265rpm		0.002-4.6	0.003-8.5	0.005-12.4

620Di/L ordering information

Speed range	Supply	Product code
0.1 to 265rpm	100-120V/220-240V 50/60Hz 1ph 300VA	060.417.5L0

Double-Y tubing elements for 620Di/L dispenser

Tube bore	8.0mm	12.0mm	16.0mm
Marprene	902.E080.K40	902.E120.K40	902.E160.040
Platinum silicone	913.E080.K40	913.E120.K40	913.E160.040
Pumpsil-D	913.DE80.K40	913.D12E.K40	913.D16E.K40
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 620Di/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
Pumpsil-D	913.D080.040	913.D120.040	913.D160.040

620Di/L specifications

Weight	24.3kg
Dimensions	H305 x W280 x L414mm
Standards	CE, cETL-US (IP31)



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 620Di/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 620Di/L dispensers		
624AF	Footswitch for 620Di/L	069.5231.000
624AN	Network kit for 620Di/L (including software & cables)	059.3121.000
624AL	Dispensing lance	069.5251.000
624AV	Proximity switch for 620Di/L	059.5072.000
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.

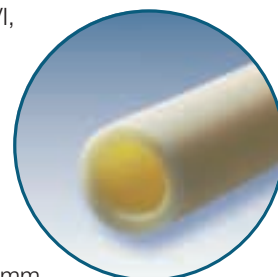
The tubing largely dictates pump performance: Its restitution creates suction, its strength resists pressure, its flex resistance determines pumping life, its bore defines the flow rate, and its wall thickness controls pumping efficiency.



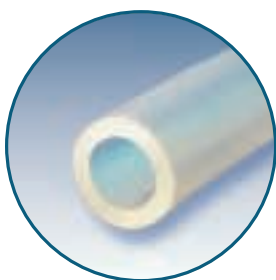
Marprene is Watson-Marlow's exclusive thermoplastic elastomer.

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.



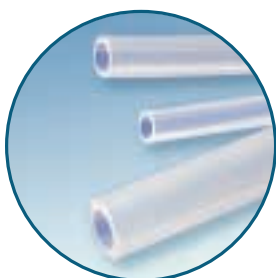
Silicone is the standard laboratory tubing used for small bore sizes up to 9.6mm. Food and medical quality, meets USP and NSF Class VI standards and autoclavable.



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.

Pumpsil-D tubing provides higher accuracy and high purity to pharmaceutical and biotechnology precision dispensing applications. Pumpsil-D is platinum-cured silicone tubing with a superior flex memory which doubles the accuracy of dispensed volumes compared to standard platinum-cured silicone tubing. Fewer pump calibrations are needed so maximising process efficiency.



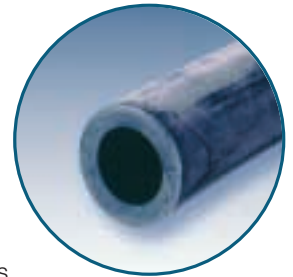
STA-PURE has a unique composite construction of silicone in a PTFE lattice giving it superior burst resistance up to 7 bar (100psi) and 18 times longer life than silicone tubing. It produces virtually no spalling, is USP Class VI approved and is classified as non toxic. Working temperature range 0C to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



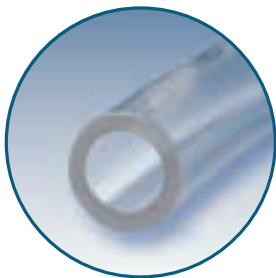
CHEM-SURE is effectively pumpable PTFE – a high performance composite of PTFE and a high-grade fluoroelastomer – offering extraordinary chemical resistance, long life and very high burst pressures. Chem-Sure is USP Class VI and food grade approved making it suitable for foods and pharmaceuticals as well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



Neoprene offers excellent performance with abrasive slurries and sustained pressure applications. Good suction and pressure capabilities. 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.

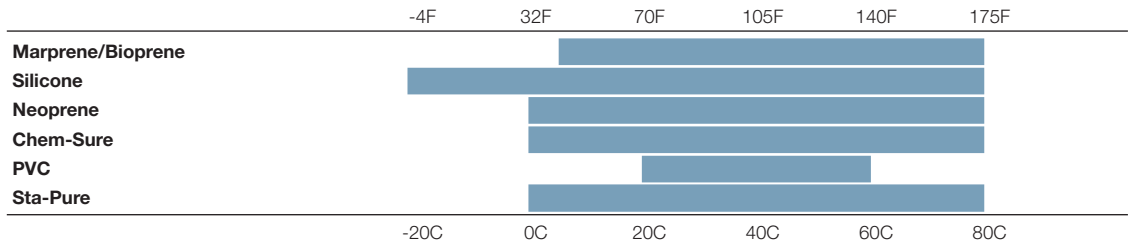
Checking your choice with an immersion test

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

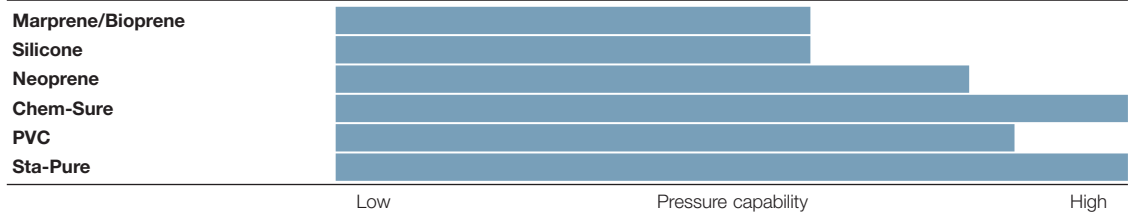
Temperature

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.



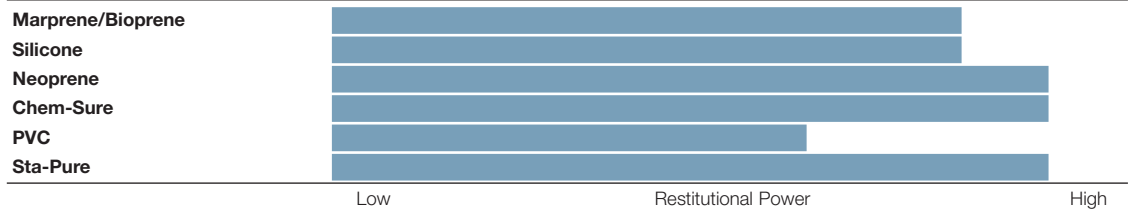
Pressure

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

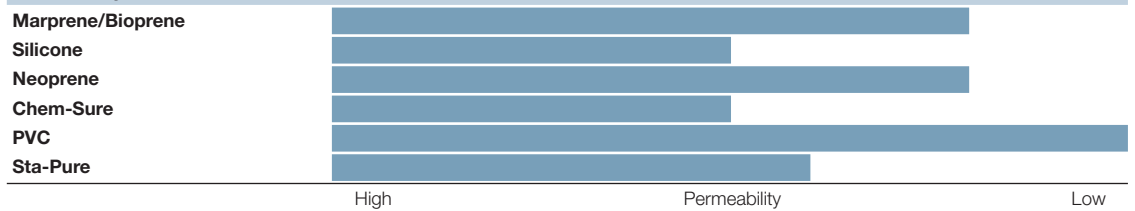


Suction

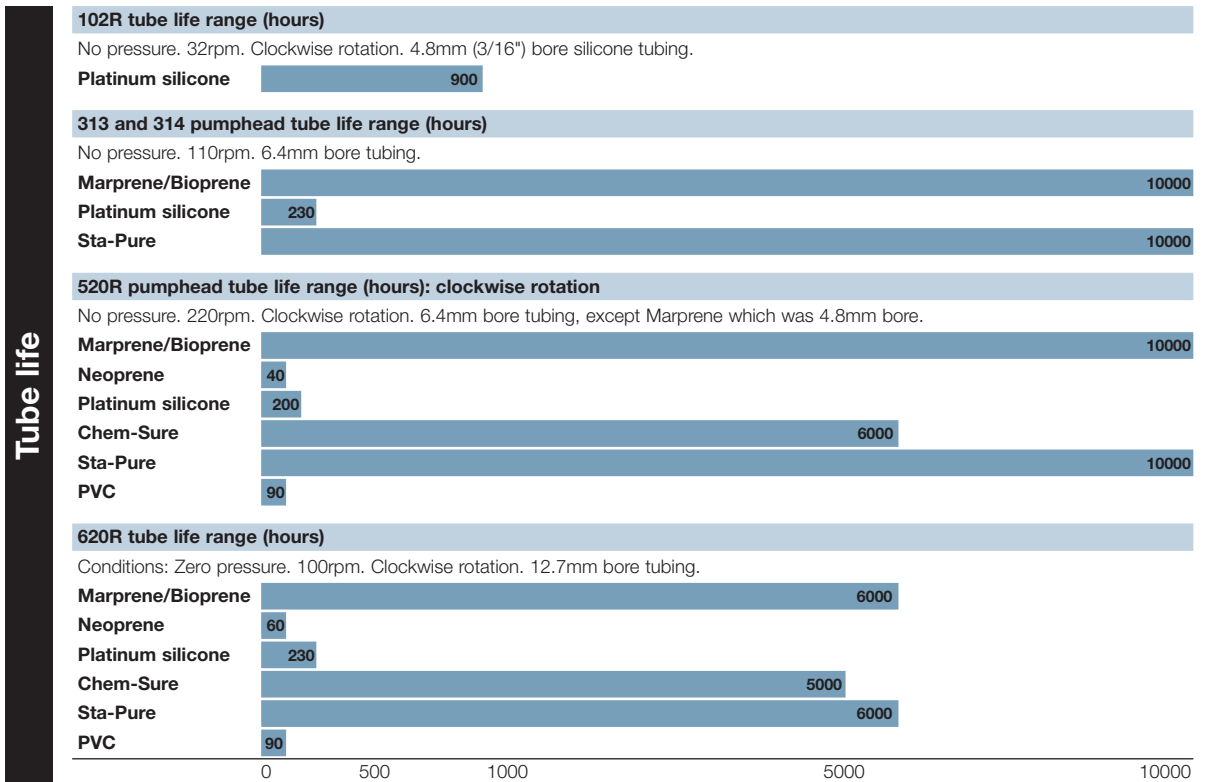
As with pressure, choose the smallest bore of tube which will produce the required flow rate. Equally important, however, is the restititional power of the tubing material:



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

100

Low flow single channel pumps. Fixed and manual/auto control variable speed.

- Flow rates from 1µl/min to 53ml/min
- Rapid and simple tube loading
- Manual, auto and digital TTL control



101F/R



101U/R



2 bar

200

Near pulseless, multi-channel cassette pumps with up to 32 channels.

- Flow rates from 0.6µl/min to 22ml/min per channel
- Precise flow control for each individual channel
- Manual, auto and digital TTL control



205S/CA



205U/CA



2 bar

300

Single or multi-channel benchtop pumps with manual, remote, analogue, RS232 control and accurate dispensing.

- 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



323E/D



323S/D



2 bar

400

Ultra-compact scientific pumps for low flow single or multi-channel applications.

- 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



401U/D1



401U/DM3



2 bar

500

NEW

Superb range of IP31 and IP66 rated pumps for science and industry as well as fixed and variable speed close-coupled pumps.

- 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 and including low-pulse high accuracy 505L element pumphead
- Dosing and dispensing pump for ±0.5% accuracy



520S/R



520U/R



7 bar

600

NEW

IP66 mid-flow process pumps with full clean-in-place and steam-in-place capability.

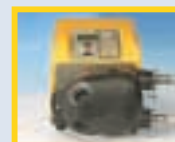
- Flow rates from 0.001ml/min to 18.3 litre/min
- Manual, auto and digital control
- Close coupled pumps for the three phase operation including pneumatic and ATEX options
- One minute maintenance LoadSure elements



620SN/RE



620UN/RE



4 bar

700

Industrial cased and baseplate mounted pumps for use with continuous tubing or new LoadSure elements. Three phase motors, ATEX rated drives or pneumatic.

- 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



704U/R and 704S/R



704U/RE and 704S/RE



2 bar

800

High-flow hygienic pumping using USP Class VI Bioprene tubing or STA-PURE tubing.

- Flow rates 2 litre/min to 8,000 litre/hour
- Full Clean-In-Place and Steam-In-Place capability
- Extensive motor/gearbox control options



825



840



3.5 bar



SPX

High flow high-pressure industrial pumps with unique patented direct coupled design. Duplex and CIP models available.

- 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



SPX10 and 15



SPX25 and 32



16 bar



OEM

A wide range of instrument quality and industrial OEM pumpheads for fitting to users own drives, or with faceplate-mounted motor options.

- 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



100



300



2 bar

Tubing Hoses

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.

- 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

Marprene



Bioprene



- Designed for continuous duty – 24 hours/7 days
- Pumps act as their own check-valves
- Self-priming up to 9 metres (30 feet) and dry running
- 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/L2		405U/R1		405U/L		403U/VM2		403U/VM4		403U/R			
520Du/R		520SN/R2		520UN/R2		520Du/R2		521F/R2		521V/R2		520Di/L			
620Du/R		620D/L		621F/R		621V/R		621F/R		621FX/R		621DV/R		621P/R	
701F/R		701PB/R		701F/R		701PB/R		700 Element Kit							
SPX DuCoNite		SPX40		SPX50		SPX65		SPX80		SPX100		SPX DUPLEX			
400		500		520R		600		700							
Silicone		STA-PURE		PVC		Neoprene		Fluorel		CHEM-SURE		Hoses			

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www.watson-marlow.co.uk

Members of the Spirax-Sarco Engineering Group



Value for life


Pump Series

Flow Rates





Put a peristaltic in your process Improve your performance

100	Low flow single channel pumps. Fixed and manual/auto control variable speed.	1µl/min - 53ml/min	101F/R
200	Near pulseless, multi-channel pumps with up to 32 channels.	0.6µl/min - 22ml/min	205S/CA
300	Single or multi-channel benchtop pumps with manual, remote, analogue, RS232 control and accurate dispensing.	2µl/min - 3 litre/min	323E/D
400	Ultra-compact scientific pumps for low flow single or multi-channel applications.	1µl/min - 610ml/min	401U/D1
500	NEW Superb range of IP31 and IP66 rated pumps for science and industry as well as fixed and variable speed close-coupled pumps.	10µl/min - 4.4 litre/min	505S/R
600	NEW IP66 mid-flow process pumps with full clean-in-place and steam-in-place capability	50ml/min - 18.3 litre/min	620S/R
700	Industrial cased and baseplate mounted pumps for use with continuous tubing or new LoadSure elements. Three phase motors, ATEX rated drives or pneumatic.	1.6 litre/min - 2,000 litre/hr	704U/R and 704S/R
800	High-flow hygienic pumping using USP Class VI Bioprene tubing or STA-PURE tubing.	2 litre/min - 8,000 litre/hr	825
SPX	High-flow high-pressure industrial pumps with unique patented direct coupled design. Duplex and CIP models available.	0.3 litre/min - 80m ³ /hr	SPX40
OEM	A wide range of instrument quality and industrial OEM pumpheads for fitting to users own drives, or with faceplate-mounted motor options.	0.01µl/min - 33 litre/min	100
Tubing Hoses	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.		Tubing







Profile of flow rate against time

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

Flow rates

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

Operating and storage temperatures

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

Standards

CE Meets all relevant directives

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

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

Spare parts availability

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

