

NEW

Every peristaltic pump for science

sciQ

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 µl/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

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 |

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.

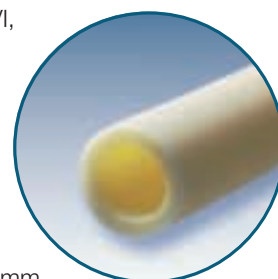
The tubing largely dictates pump performance: Its restitution creates suction, its strength resists pressure, its flex resistance determines pumping life, its bore defines the flow rate, and its wall thickness controls pumping efficiency.



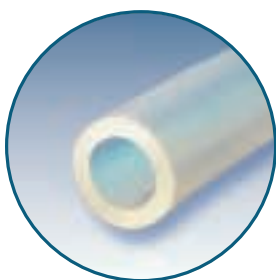
Marprene is Watson-Marlow's exclusive thermoplastic elastomer.

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.



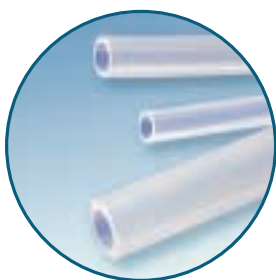
Silicone is the standard laboratory tubing used for small bore sizes up to 9.6mm. Food and medical quality, meets USP and NSF Class VI standards and autoclavable.



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.



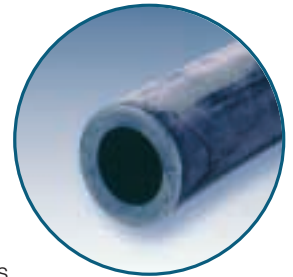
STA-PURE has a unique composite construction of silicone in a PTFE lattice giving it superior burst resistance up to 7 bar (100psi) and 18 times longer life than silicone tubing. It produces virtually no spalling, is USP Class VI approved and is classified as non toxic. Working temperature range 0C to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



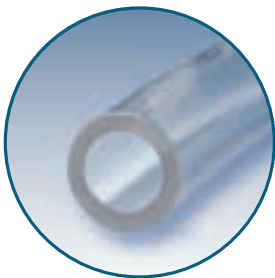
CHEM-SURE is effectively pumpable PTFE – a high performance composite of PTFE and a high-grade fluoroelastomer – offering extraordinary chemical resistance, long life and very high burst pressures. Chem-Sure is USP Class VI and food grade approved making it suitable for foods and pharmaceuticals as well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

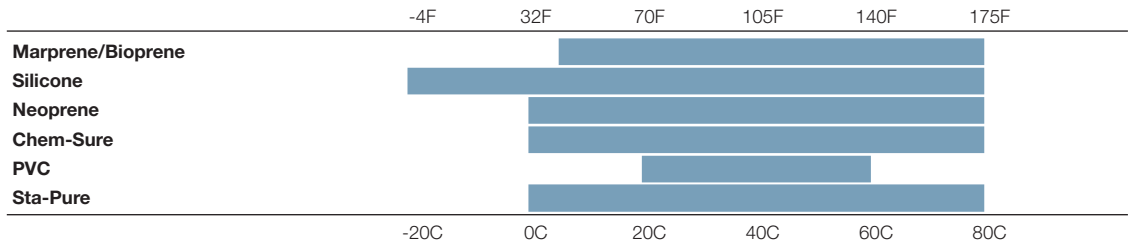
Checking your choice with an immersion test

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

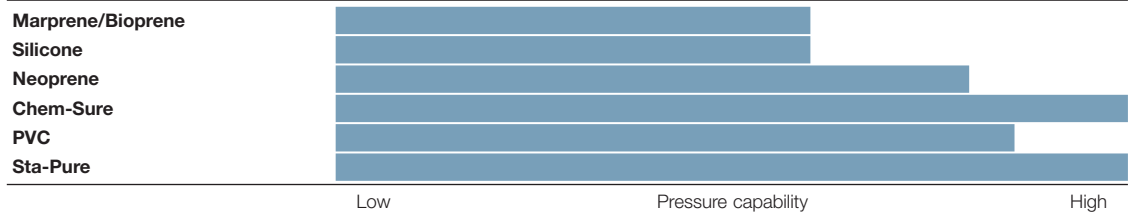
Temperature

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.



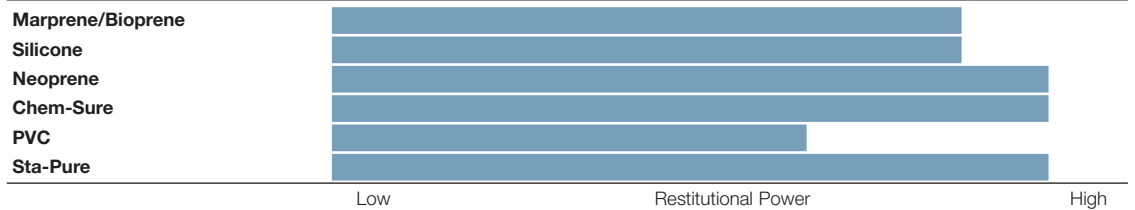
Pressure

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



Suction

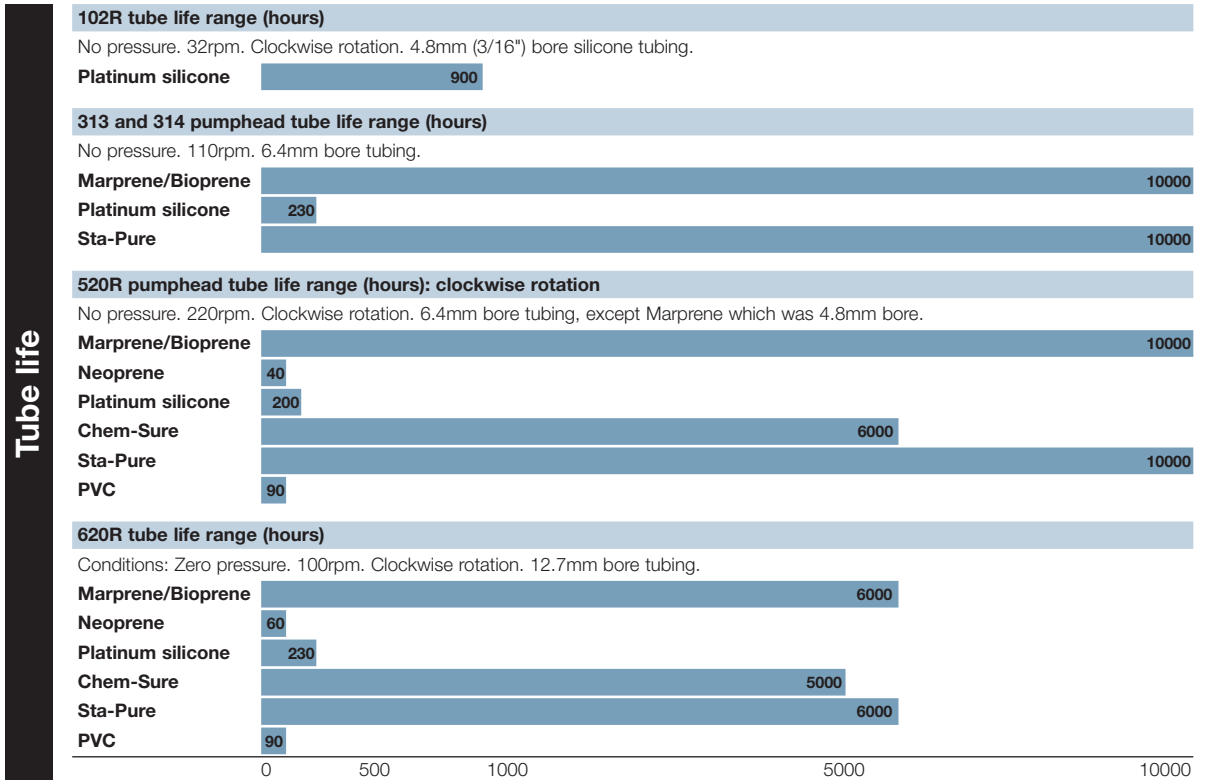
As with pressure, choose the smallest bore of tube which will produce the required flow rate. Equally important, however, is the restititional power of the tubing material:



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
- 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/L2 | | 405U/R1 | | 405U/L | | 403U/VM2 | | 403U/VM4 | | 403U/R | |
| 520Du/R | | 520SN/R2 | | 520UN/R2 | | 520DuN/R2 | | 521F/R2 | | 521V/R2 | | 520Di/L | |
| 620DuN/RE | | 620D/L | | 621F/R | | 621V/RE | | 621F/RE | | 621DV/RE | | 621P/RE | |
| 701F/R | | 701PB/R | | 701F/RE | | 701PB/RE | | 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 | |

United Kingdom
 Telephone +44 (0) 1326 370370
 Fax: +44 (0) 1326 376009
 Email info@watson-marlow.co.uk
www.watson-marlow.co.uk

Belgium
 Telephone +32 9 225 94 57
 Fax: +32 9 233 06 49
 Email info@watson-marlow.be
www.watson-marlow.be

Brazil
 Telephone +55 11 4616 0404
 Fax: +55 11 4616 0403
 Email info4brazil@watson-marlow.com
www.watson-marlow.com.br

China
 Telephone +86 21 6485 4898
 Fax: +86 21 6485 4899
 Email info@watson-marlow.cn
www.watson-marlow.cn

France
 Telephone +33 (0) 2 37 38 92 03
 Fax: +33 (0) 2 37 38 92 04
 Email info@watson-marlow.fr
www.watson-marlow.fr

Germany
 Telephone +49 (0) 2183 42040
 Fax: +49 (0) 2183 82592
 Email info@watson-marlow.de
www.watson-marlow.de

Italy
 Telephone +39 030 6871184
 Fax: +39 030 6871352
 Email info@watson-marlow.it
www.watson-marlow.it

Korea
 Telephone +82 (0) 2 525 5755
 Fax: +82 (0) 2 525 5764
 Email support4k@watson-marlow.co.kr
www.watson-marlow.co.kr

Malaysia
 Telephone +60 (3) 5635 3323
 Fax: +60 (3) 5635 7717
 Email sales@my.SpiraxSarco.com

Netherlands
 Telephone +31 (0) 10 462 1688
 Fax: +31 (0) 10 462 3486
 Email info@watson-marlow.nl
www.watson-marlow.nl

South Africa
 Telephone +27 11 796 2960
 Fax: +27 11 794 1250
 Email info@wmbpumps.co.za

Sweden
 Telephone +46 8 556 556 00
 Fax: +46 8 556 556 19
 Email info@watson-marlow.se
www.watson-marlow.se

United States of America
 Telephone 800 282 8823
 Fax: 978 658 0041
 Email support@wmbpumps.com
www.watson-marlow.com

The information contained in this document is believed to be correct, but Watson-Marlow Bredel accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

Watson-Marlow, Pumpsil, LaserTraceability, Bioprene and Marprene are registered trademarks of Watson-Marlow Limited

STA-PURE and CHEM-SURE are trademarks of WL Gore & Associates inc. Fluorel is a trademark of 3M.

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.

