

**NEW**

Every peristaltic pump for science



From  
**Watson-Marlow**



# sci from Watson-Marlow Bredel

## The new standard in scientific pumping

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

## science

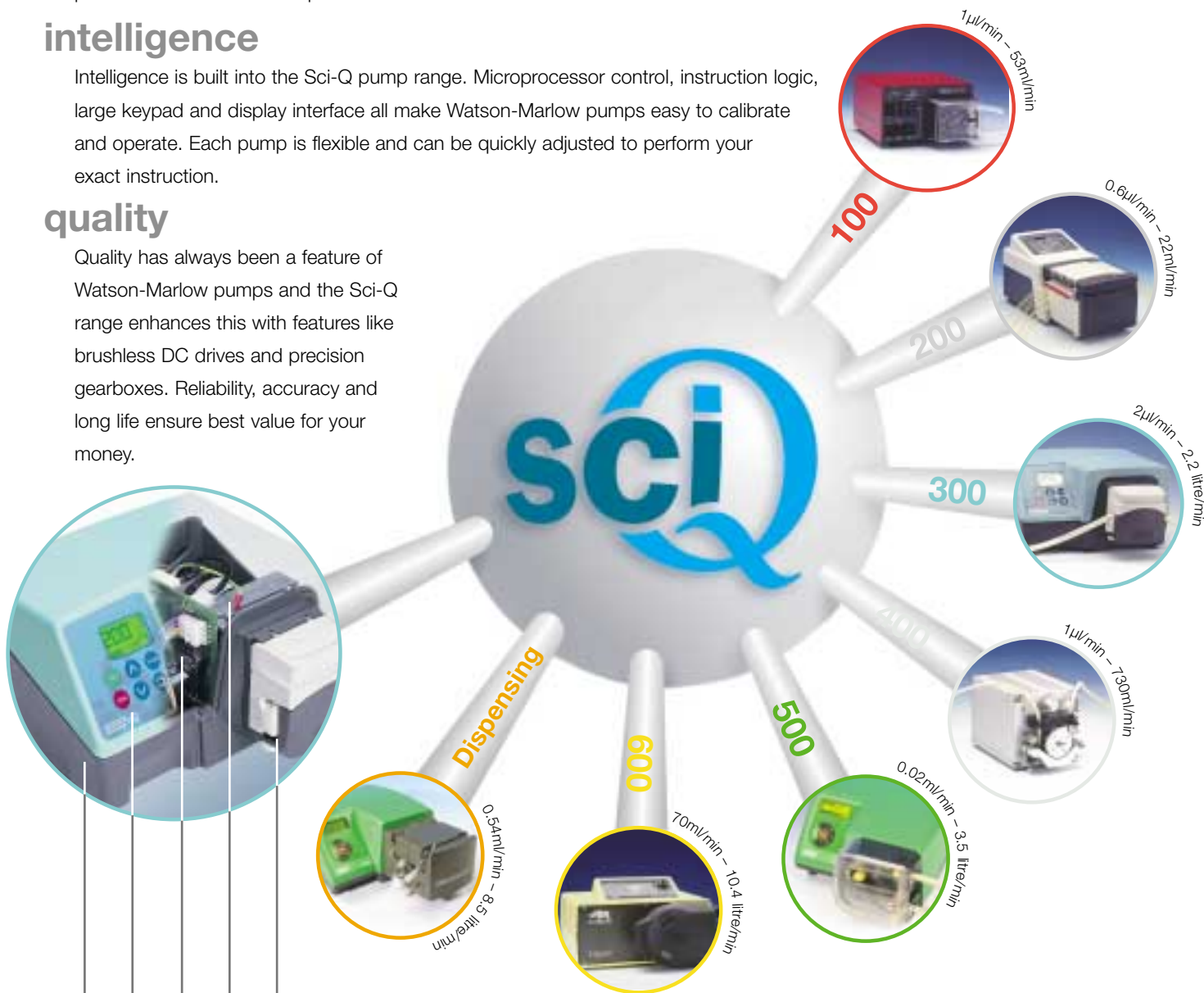
Science and Watson-Marlow pumps lead the way. Sci-Q provides the very latest peristaltic technology in response to customer research, enabling you to match pump, task and budget for precise results without compromise.

## intelligence

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

## quality

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



### Inside the Sci-Q 323

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

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

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

Easy-use interface: high-visibility display and contoured membrane keypad designed for intuitive operation

Durable chemical-resistant case, crevice-free for hygiene; distinctive, contemporary and functional

## 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

# Tube selection guide

## Choosing the best tube

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

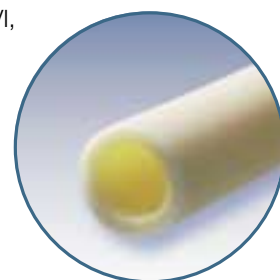
The tubing largely dictates pump performance: Its restitution creates suction, its strength resists pressure, its flex resistance determines pumping life, its bore defines the flow rate, and its wall thickness controls pumping efficiency.



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

Always our first recommendation. Marprene is the longest life tubing with a wide chemical compatibility, and is highly resistant to oxidising agents such as ozone and peroxides and sodium hypochlorite. Marprene is beige in colour, opaque to both visible and ultra-violet light with low permeability to gases such as oxygen, carbon dioxide and nitrogen, and meets USDA standards for food handling. Working temperature range 5C to 80C. Autoclavable.

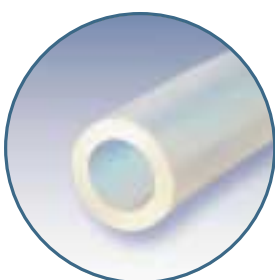
**Bioprene** has the same long life as Marprene but complies with USP Class VI, FDA requirements 21 CFR 177.2600 and NSF and USDA standards for food handling. It has a wide chemical compatibility, and can handle repeated autoclaving. Bioprene can be sterilised by ethylene oxide or gamma irradiation.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



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

**Watson-Marlow** manufactures a specially developed **platinum-cured silicone tubing, Pumpsil** for additional protection from contamination during the pumping process. Platinum-cured tubing produces a smoother surface, less protein binding offers high levels of purity. It is ideal for medical devices, chemical analysis and pharmaceutical production applications, particularly where there is long term contact with the process fluid. Working temperature range -20C to 80C. High permeability to oxygen. Translucent. Autoclavable.

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



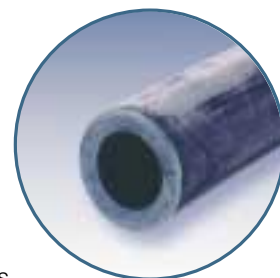
**Sta-Pure** has a unique composite construction of silicone in a PTFE lattice giving it superior burst resistance up to 7 bar (100psi) and 18 times longer life than silicone tubing. It produces virtually no spalling, is USP Class VI approved and is classified as non toxic. Working temperature range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



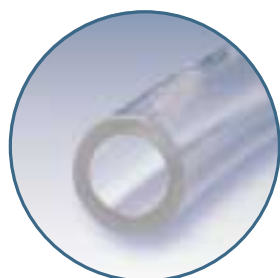
**Chem-Sure** is effectively pumpable PTFE - a high performance composite of PTFE and a high-grade fluoroelastomer - offering extraordinary chemical resistance, long life and very high burst pressures. Chem-Sure is USP Class VI and food grade approved making it suitable for foods and pharmaceuticals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



**Neoprene** offers excellent performance with abrasive slurries and sustained pressure applications. Good suction and pressure capabilities. Food quality. Working temperature range 0C to 80C. Black.



**PVC** has a high Shore hardness giving excellent pressure and suction performance and low gas permeability. FDA approved for use with food and is NSF listed. Working temperature range 20C to 60C. Glass clear.



The best way to select a tube is to first decide which materials are chemically suitable, and then choose the one which best meets the physical demands of the application.

Normally, use the longest tube life material, which will usually be Bioprene or Marprene if they are chemically and physically suitable. Otherwise, silicone tubing is most often chosen for sizes up to 9.6mm (3/8"), and Neoprene tubing for bore sizes of 12.7mm (1/2") or more.

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

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

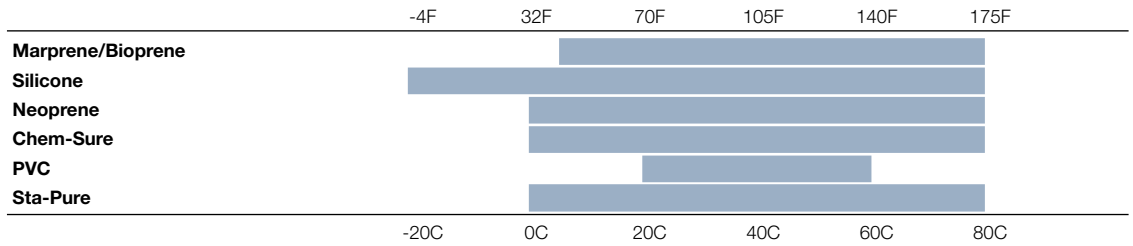
## Checking your choice with an immersion test

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

## Physical compatibility

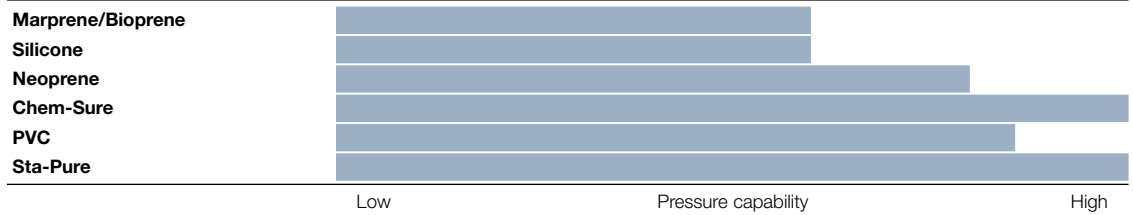
### Temperature

The chart shows the temperature range of each tubing type when suction and delivery pressures are negligible. Operating temperatures of Bioprene, Marprene, Chem-Sure, Sta-Pure and silicone tubing are limited to 80C, but all may be autoclaved up to 135C.



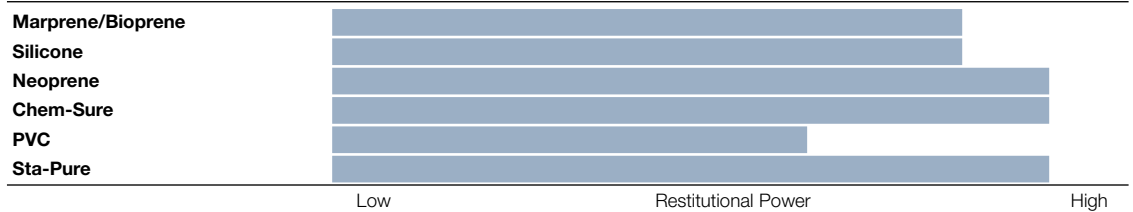
### Pressure

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

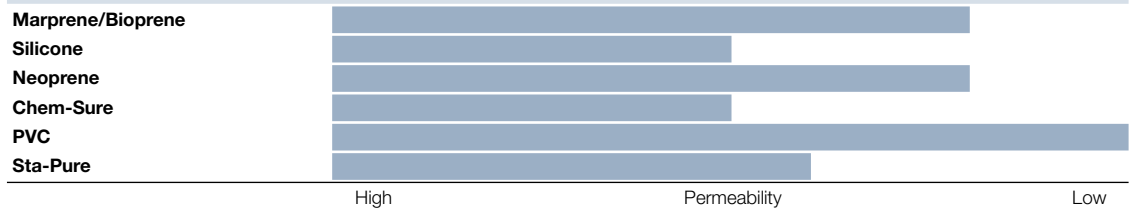


### Suction

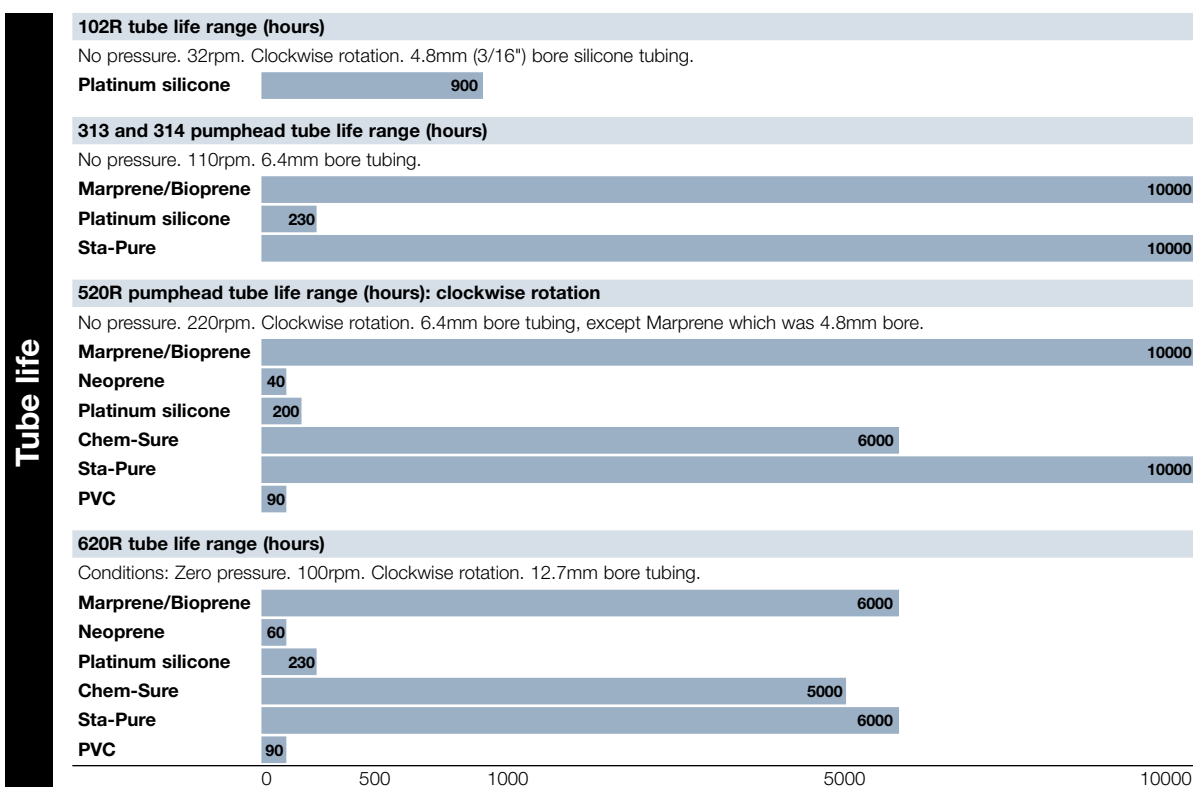
As with pressure, choose the smallest bore of tube which will produce the required flow rate. Equally important, however, is the restititional power of the tubing material:



### Permeability



## Tube life



## Viscosity

The flow rates given in this catalogue are valid for fluids with viscosities in the range 1 to 100 centipoise. Increased fluid viscosity will result in decreased flow rate. Choose a tubing with as large a wall thickness as possible, which could, for instance, mean using a 600 series pump which user greater wall thickness tubing, rather than a 500 series pump. Following this guidance will allow fluids with viscosities up to 2500 centipoise to be satisfactorily handled.

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

# Watson-Marlow Bredel pumps bring you...

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

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



2 bar

101F/R



101U/R



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



2 bar

205S/CA



205U/CA



300

**NEW**

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



2 bar

323E/D



323S/D



400

**NEW**

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



2 bar

401U/D1



401U/DM3



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 options including low-pulse high accuracy 505L
- Dosing and dispensing pump for +/- 0.5% accuracy



2 bar

520S/R



520U/R



600

IP55 mid-flow process pumps with full clean-in-place and steam-in-place capability.

- Flow rates from 50ml/min to 18.3 litre/min
- Manual, auto and digital control
- Close coupled pumps for the three phase operation including pneumatic and ATEX options
- One minute maintenance LoadSure elements



4 bar

623S/R



624S/RE



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



2 bar

704U/R and 704S/R



704U/RE and 704S/RE



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



7 bar

825



840



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



16 bar

SP10 and 15



SP25



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



2 bar

100



300



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

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 Members of the Spirax-Sarco Engineering Group



Value for life

Pump Series

Flow Rates

Put a peristaltic in your process Improve your performance

<b>100</b>	Low flow single channel pumps. Fixed and manual/auto control variable speed.	1µl/min - 53ml/min	101F/R
<b>200</b>	Near pulseless, multi-channel pumps with up to 32 channels.	0.6µl/min - 22ml/min	205S/CA
<b>300</b>	Single or multi-channel benchtop pumps with manual, remote, analogue, RS232 control and accurate dispensing.	2µl/min - 3 litre/min	323E/D
<b>400</b>	Ultra-compact scientific pumps for low flow single or multi-channel applications.	1µl/min - 610ml/min	401U/D1
<b>500</b>	<b>NEW</b> 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
<b>600</b>	<b>NEW</b> IP66 mid-flow process pumps with full clean-in-place and steam-in-place capability	50ml/min - 18.3 litre/min	620S/R
<b>700</b>	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
<b>800</b>	High-flow hygienic pumping using USP Class VI Bioprene tubing or STA-PURE tubing.	2 litre/min - 8,000 litre/hr	825
<b>SPX</b>	High-flow high-pressure industrial pumps with unique patented direct coupled design. Duplex and CIP models available.	0.3 litre/min - 80m <sup>3</sup> /hr	SPX40
<b>OEM</b>	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
<b>Tubing Hoses</b>	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.

