

**NEW**

Every peristaltic pump for science



200 series from  
Watson-Marlow



# sci-Q from Watson-Marlow Bredel

## The new standard in scientific pumping

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

### science

Sci-Q pumps have been created for **science**, by science, exploiting every latest technique from 3D solid design, finite element analysis, rapid prototyping, intensive tooling and cellular build. The results are as near perfection as the state of the art can provide.

### intelligence

At the heart of a Sci-Q pump is microprocessor **intelligence**, but what really marks it out is the intelligence of its design, born from a passion for engineering fluid-handling solutions. Watson-Marlow Bredel creates intelligent designs for intelligent users.

### quality

The highest **quality** peristaltic pump available today, every Watson-Marlow Bredel product is engineered for quality. Zero-maintenance motors, whisper-quiet gearboxes and the most sophisticated control electronics designed and manufactured to ISO9001:2000 are backed by expert local support.



#### Inside the Sci-Q 323

Five modular pumphead types for single or multi-channel flows from  $\mu\text{l}/\text{minute}$  to 2.2 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



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)

|                    |                     |                      |                      |                      |                      |
|--------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| <b>Colour code</b> | <b>Orange/Black</b> | <b>Orange/Red</b>    | <b>Orange/Blue</b>   | <b>Orange/Green</b>  | <b>Orange/yellow</b> |
| <b>Tube bore</b>   | <b>0.13mm</b>       | <b>0.19mm</b>        | <b>0.25mm</b>        | <b>0.38mm</b>        | <b>0.50mm</b>        |
| 0.5-90rpm          | 0.0006-0.10         | 0.0009-0.16          | 0.0013-0.23          | 0.0036-0.65          | 0.0056-1.01          |
| <b>Colour code</b> | <b>Orange/White</b> | <b>Black/Black</b>   | <b>Orange/Orange</b> | <b>White/White</b>   | <b>Red/Red</b>       |
| <b>Tube bore</b>   | <b>0.63mm</b>       | <b>0.76mm</b>        | <b>0.88mm</b>        | <b>1.02mm</b>        | <b>1.14mm</b>        |
| 0.5-90rpm          | 0.0083-1.49         | 0.011-2.02           | 0.016-2.92           | 0.021-3.76           | 0.026-4.68           |
| <b>Colour code</b> | <b>Grey/Grey</b>    | <b>Yellow/Yellow</b> | <b>Yellow/Blue</b>   | <b>Blue/Blue</b>     | <b>Green/Green</b>   |
| <b>Tube bore</b>   | <b>1.29mm</b>       | <b>1.42mm</b>        | <b>1.52mm</b>        | <b>1.65mm</b>        | <b>1.85mm</b>        |
| 0.5-90rpm          | 0.033-5.95          | 0.04-7.20            | 0.043-7.69           | 0.051-9.12           | 0.063-11.3           |
| <b>Colour code</b> |                     | <b>Purple/Purple</b> | <b>Purple/Black</b>  | <b>Purple/Orange</b> | <b>Purple/White</b>  |
| <b>Tube bore</b>   |                     | <b>2.05mm</b>        | <b>2.29mm</b>        | <b>2.54mm</b>        | <b>2.79mm</b>        |
| 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 |                |                 |                |                |
| <b>Channels</b> | <b>205U/CA</b>                    | <b>205S/CA</b> | <b>Channels</b> | <b>205U/CA</b> | <b>205S/CA</b> |
| 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                   |                          | BS800, IEC 335-1, EN60529 (IP31), CE |
| Operating temperature range |                          | 5 to 40C                             |

## 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.

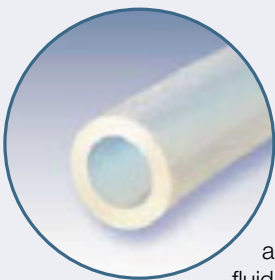
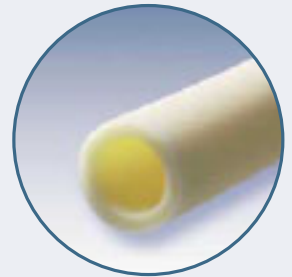
The tubing largely dictates pump performance: its restitution creates suction, its strength resists pressure, its flex resistance determines pumping life, its bore defines the flow rate, and its wall thickness controls pumping efficiency.



**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.



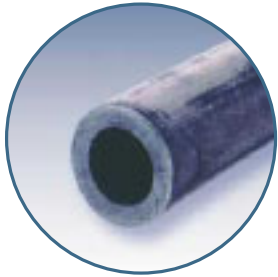
**Silicone** is the standard laboratory tubing used for small bore sizes up to 9.6mm. Food and medical quality, meets USP and NSF Class VI standards and autoclavable .

**Watson-Marlow** manufactures a specially developed **platinum-cured silicone tubing** 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.

**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 tubing

**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.

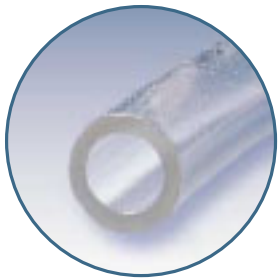
**PVC** has a high Shore hardness giving excellent pressure and suction performance and low gas permeability. FDA approved for use with food and is NFS listed. Working temperature range 20C to 60C. Glass clear

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.



PVC tubing

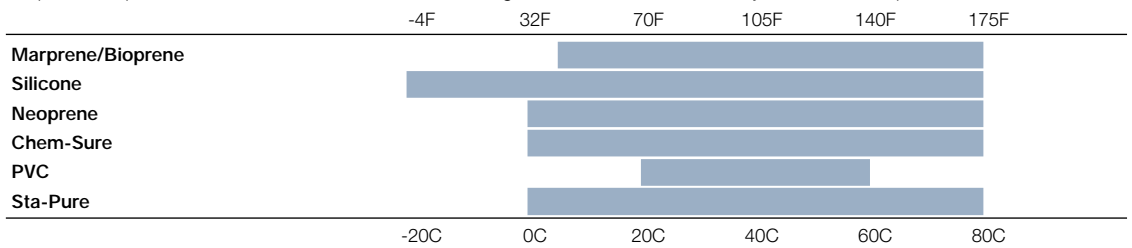
### CHECKING YOUR CHOICE WITH AN IMMERSION TEST

Always conduct an immersion test before choosing a tube material for critical applications. Immerse a short length of the tubing or a disk of rubber sample (always available from Watson-Marlow 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

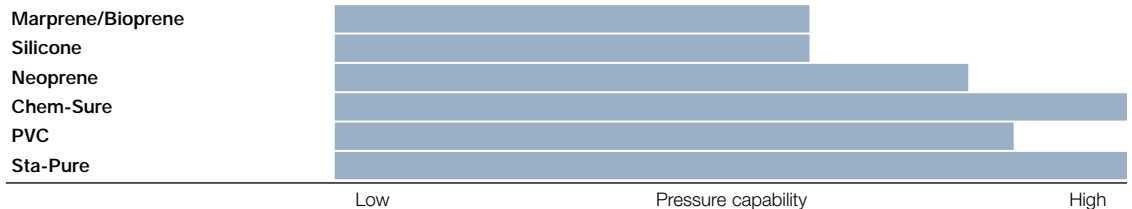
#### Temperature

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.



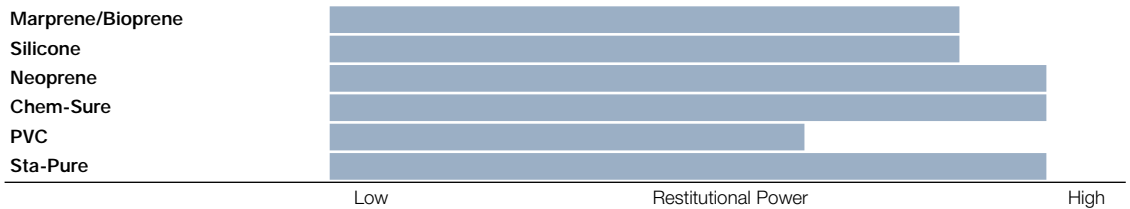
#### Pressure

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

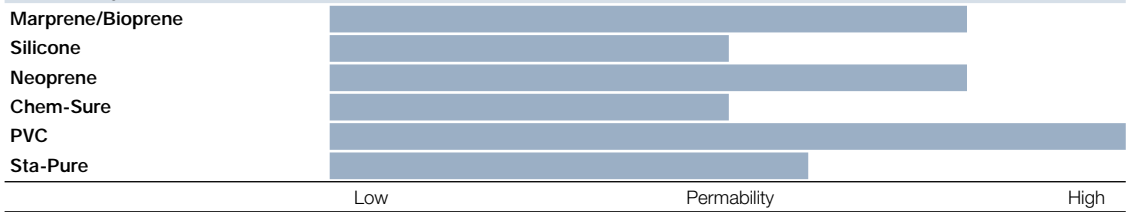


### Suction

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

TUBE LIFE

### 102R tube life range (hours)

No pressure. 32rpm. Clockwise rotation. 4.8mm (3/16") bore silicone tubing.



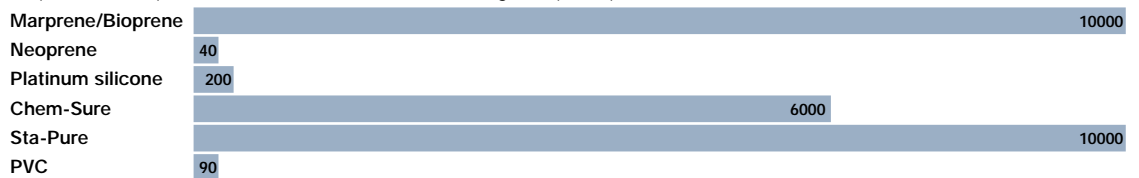
### 313 and 314 pumphead tube life range (hours)

No pressure. 110rpm. 6.4mm bore tubing.



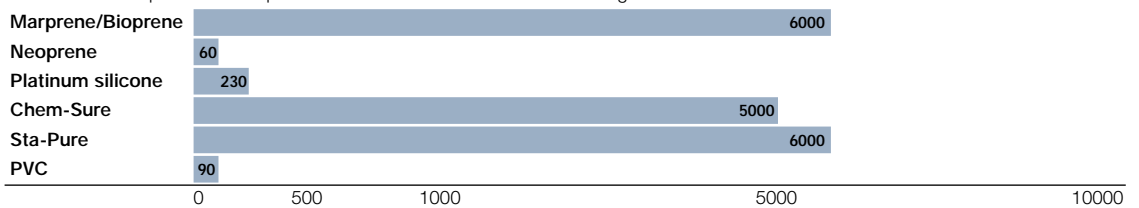
### 501RL pumphead tube life range (hours): clockwise rotation

No pressure. 220rpm. Clockwise rotation. 6.4mm bore tubing, except Marprene which was 4.8mm bore.



### 620R tube life range (hours)

Conditions: Zero pressure. 100rpm. Clockwise rotation. 12.7mm bore tubing.



## 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.

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

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

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## Pump Series

## Flow Rates

Put a peristaltic in your process Improve your performance

|            |   |                                      |      |
|------------|---|--------------------------------------|------|
| <b>100</b> | Single channel, low flow pumps. Fixed or variable speed.  | 1µl/min - 53ml/min                   | 101U |
| <b>200</b> | Near pulseless, multi-channel pumps with up to 32 channels.   | 0.6µl/min - 22ml/min                 | 205U |
| <b>300</b> | NEW Compact, single or multi-channel laboratory pumps with manual, remote, analogue, RS232 or dispensing control. | 2µl/min - 2.2 litre/min              | 323U |
| <b>400</b> | Instrument-quality, ultra-precise, single and multi-channel pumps with manual or process control.                 | 1µl/min - 730ml/min                  | 405U |
| <b>500</b> | Microprocessor controlled and IP55 process pumps with manual, auto and digital control.                           | 0.02ml/min - 4.4 litre/min           | 505S |
| <b>600</b> | IP55 mid-flow process pumps with full CIP and SIP capability. Fixed or variable speed.                            | 70ml/min - 10.4 litre/min            | 624U |
| <b>700</b> | IP55 industrial pumps with manual or auto control, single or twin channel.  | 1.6 litre/min - 66 litre/min         | 704U |
| <b>800</b> | High flow hygienic pumps with full CIP and SIP capability.  | 2 litre/min - 133 litre/min          | 840  |
| <b>SPX</b> | Bredel: High flow industrial pumps operating at pressures up to 16 bar (230 psi).                                 | 0.3 litre/min - 80m <sup>3</sup> /hr | SPX  |



### 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".

**IEC 335-1** is the International Electrotechnical Commission standard dealing with the "Safety of household and similar appliances, general requirements". Equivalent standards are BS3456: Part 101 and DIN VDE 0700: Part 1).

**EN60529** is the European Norm standard dealing with the "Classification of degrees of protection provided by enclosures for rotating machines. Equivalent standards 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.



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