

PUMPS FOR INDUSTRY

NEW

Watson-Marlow Bredel: Value for life

Industrial
strength pumps
with unrivalled
precision



Pump perfection

Watson-Marlow Bredel is the world's largest manufacturer of peristaltic pumps and tubing. We make nothing else.

We have 50 years' experience and a worldwide reputation as the leader of our industry in terms of quality as well as quantity.

We offer the widest range of pumps and tubes, capable of handling flows from 4µl/min to 4,000 litre/hour.

Peristaltic pumps are positive displacement pumps. They use the perfect pumping principle with none of the disadvantages of other pump types, and cost far less in maintenance and interrupted production.

They successfully handle the harshest fluids, stand up to the toughest industrial environment, and pump with extraordinary accuracy and flow control up to 875,000:1 in one pump.

Watson-Marlow 520, left, 620 and 720 pumps cater for the demands of industry, from food production to mining, from the water industry to printing



What is peristalsis?

Watson-Marlow Bredel pumps' low-shear peristaltic action is created by compressing the tube element between rollers.

Between roller passes, the element recovers to draw in fluid.

The pump is self-priming and dry-running, with contained flow and no cross-contamination, requiring no seals or valves. No other positive displacement pump offers this separation of pump and fluid. Watson-Marlow Bredel pumps outperform other pump types.

Value for life

Value for life is a new way of looking at the cost of ownership of Watson-Marlow Bredel pumps compared with other positive displacement pumps. We prove to customers that Watson-Marlow Bredel pumps offer the lowest-cost solution over the life of a pump in comparison to competitors.

We engineer our winning performance, we don't just turn up the speed. 60% fewer occlusions than our peristaltic competitors for the same flow means 2½ times the tube life.



- The simplest possible pumping principle: no seals or valves to clog, leak, corrode or replace
- The perfect pump for difficult fluids: caustic, abrasive, viscous, shear-sensitive, gaseous, slurries, suspended solids
- Configured for industrial integration: PLC remote control, analogue, network



Why Watson-Marlow BredeI make the right pump for you

World-leading pumps ...

With more than one million pumps in the field, our peristaltic pumps give our customers maximum reliability and minimum downtime.

...that eclipse the competition ...

Peristaltic pump usage is growing faster than any other positive displacement pump type because they are simple in essence, but capable of sophisticated control.

- Easy to install, maintain and clean
- Nothing simpler to use
- If you can drive one, you can drive them all
- Upscale from pilot to production
- One-minute maintenance
- Self-priming to 9m (30ft)
- Dry running
- Reversible to cut waste
- No metal-to-metal contact
- The duty fluid is contained within a chemically resistant tube: there is no contamination of the pump and no contamination of the fluid
- Accurate and repeatable flow rates $\pm 0.5\%$
- Designed for continuous duty 24-7
- Valve-free with no backflow or siphoning
- Superb metering: output is proportional to pump speed
- No spares inventory needed



...with the key features you need ...

Watson-Marlow BredeI cased pumps combine the toughness industry demands with the features vital to today's highly tuned, economic production techniques.

- Speed control range 3,600:1: process flexibility
- Maintenance-free brushless DC motors
 - Up to 7 bar pressure
 - IP66 washdown protection

- Pumps, pumpheads and tubing last longer
- There's less downtime, fewer failures, and less maintenance
- In the unlikely event of a problem, next-day delivery keeps your production rolling
- Our products are recognised for quality, reliability and performance, backed by a five-years warranty

So the best pump really does cost less.
Call us for the proof. It all adds up to Value for life.



Five-year warranty

Demonstrating our total confidence in reliability and our commitment to customer satisfaction,

Watson-Marlow BredeI cased pumps in this brochure carry a five-year warranty against faulty materials and workmanship. It covers everything except misuse of the pump and consumable items. Your production will not stall because of us. See www.value4life.co.uk



Investment in new plant at a yeast production facility has increased efficiency



Viscous cake batter is pumped from a hopper without degradation



Ceramic glaze has to be carefully metered to prevent air entrainment



500 series pumps replaced troublesome diaphragm pumps for coagulant dosing

Printing ink feed

Reduced downtime and spares costs meant that a heavy-duty corrugated box manufacturer paid for a new Watson-Marlow Bredel 720 series pump in less than a year.

Supplying ink to flexographic presses caused air-operated diaphragm pumps to fail when paper fibres and dried ink particles clogged filters and jammed ball valves. Every jam cost 90 minutes' production, with an entire in-line operation stalled. Production also suffered from continual minor problems.

Watson-Marlow Bredel peristaltic pumps have no valves to clog and can handle suspended solids, so they need no filters, and simple, planned maintenance. A one-minute tube change at extended intervals avoids production line stoppages.



Where are our 1 million pumps keeping industry productive?

Watson-Marlow Bredel pumps save time and money worldwide by successfully handling the toughest applications in a broad range of industries including

- **Chemical metering and transfer:** corrosive acids and bases
- **Water and waste water treatment:** sodium hypochlorite, hydrofluorosilic acid and ferric chloride
- **Paint and pigments:** dispersion mill feed, pigment and latex transfer
- **Pulp and paper:** dyes, brighteners, sizing agents, retention aids and titanium dioxide
- **Mining and mineral separation:** reagents, polymers and flocculants
- **Construction:** cement, brick and roof tiles; metering and spraying of colorants, coatings and additives
- **Brewing:** metering and transfer of yeast, flocculants, stabilisers, finings
- **Printing and packaging:** varnishes, inks, coatings and adhesives, with no colour cross-contamination or aeration
- **Food and beverage:** Clean-in-place applications, dairy, bakery, flavourings and additives
- **Textiles:** fibre coatings, dyes and acids
- **Fine chemicals production:** metering of process chemicals
- **Engineering:** spray coating and waste recovery
- **OEM:** versions available for system suppliers



At a remote water treatment works, chemicals are metered to balance pH levels



In a difficult lacquer handling application, close coupled pumps saved time and money



Sodium hypochlorite causes gas locking problems in many other pump types



In an aggressive chemical recovery application, the pump paid for itself in less than 12 months

Value for life

Putting diaphragms into the shade

Accurate and repeatable metering of process fluids into dispersion mills is critical in achieving uniformity from one batch of paint pigments to another.

Because of their ability to provide consistent, reproducible flows at low volumes, Watson-Marlow Bredel peristaltic pumps were chosen to replace double diaphragm pumps at BASF's Michigan paint mixing plant.

The pumps require minimal set-up time and maintenance. The sealless design eliminates the

need to clean the pumps, thereby avoiding the costs, health risks, and environmental issues associated with cleaning solvents.

"It is essential for colour consistency that flow rates to the mills be stable and reproducible," says the production manager. "The double diaphragm pumps we had been using were apt to stall at low flow rates. We no longer have that problem since we installed the Watson-Marlow Bredel peristaltic pumps."



How to pick a

Watson-Marlow Bredel's tough industrial cased pumps are a team, and they're on your side. 520, 620 and 720, using continuous tubing or elements, cover flows from 4 μ /min to 4,000 litres/hour, with high accuracy and industrial compatibility.

The 720 is a powerful pump which can be fitted with one or two pumpheads: twin channels double the flow for high-flow metering or transfer

The versatile, medium-flow 620 is available with two rollers, for maximum throughput, or four rollers, for minimum pulsation. Other pumpheads are available

With its eight tubing sizes, the 520 range has a flow ratio of 875,000:1, giving superb control. As well as standard metering duties, the 520 offers specialist pumping such as multi-channel and minimal pulsation

No simpler maintenance

Maintenance costs, in cash and downtime, are unavoidable for all pumps – except peristaltic pumps. Stators and rotors wear, valves jam, gas causes breakdowns – every one cutting production. Peristaltic pumps need new tubes at long, predictable intervals. Changing them takes moments – truly, one-minute maintenance.

The same principle applies to 520, 620 and 720 pumpheads:

- 1: Open the tool-unlockable safety guard** (or track); remove the old tube or element, helped by ergonomic features such as the 520's clutched rotor and the 620's retractable rollers
- 2: Fit another tube or element**
- 3: Close the guard;** and (if you have an element model) connect up to your system

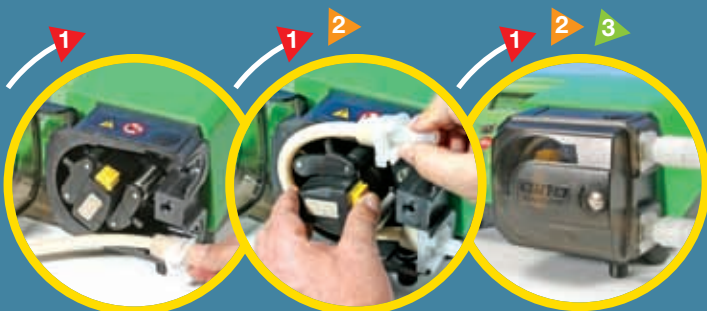
winner

All share the same technology, the same human-machine interface, and the same space-saving design concept. The controls are the same, allowing process scale-up and easy operator training: if you know one pump, you know them all.

- Flow rates to 4,000 litre /hour
 - Pressures up to 2 bar (30 psi)
 - LoadSure® elements in three materials and four sizes
 - Tubing in five materials and five sizes
- Flow rates to 18 litre/minute
 - Pressures up to 4 bar (60 psi)
 - LoadSure® elements in three materials and two sizes
 - Tubing in seven materials and four sizes
- Flow rates to 3.5 litre/minute
 - Three element configurations offer pressure capabilities up to 2 bar, 4 bar and 7 bar (30 psi, 60 psi, 100 psi)
 - LoadSure® elements in five materials and three sizes
 - Tubing in seven materials and eight sizes

Changing a LoadSure® element

As easy as...

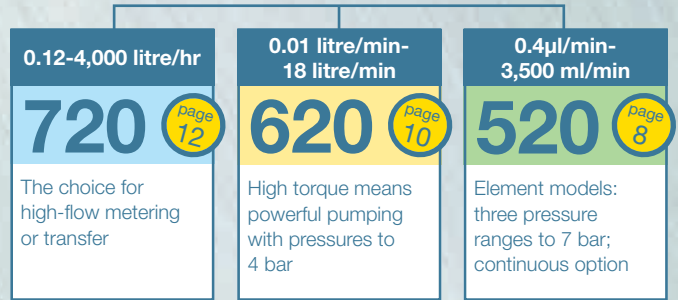


Pick the pump you need

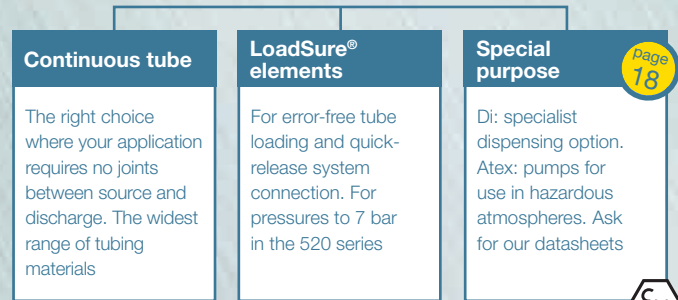
Choosing the perfect pump from our many options is easy. Just answer four questions:

- ① How much fluid?
- ② What pumphead characteristics?
- ③ Which control option?
- ④ Which tubing or element?

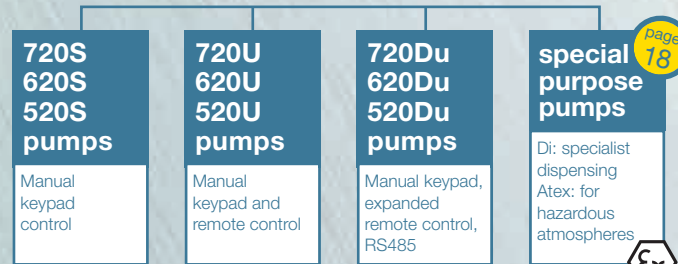
① HOW MUCH FLUID?



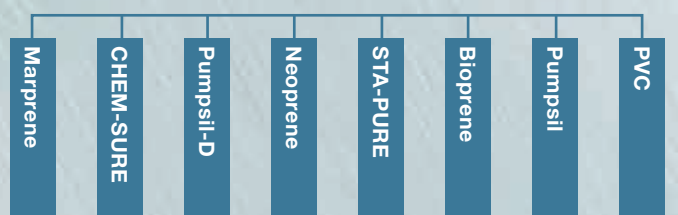
② WHAT PUMPHEAD CHARACTERISTICS?



③ WHICH CONTROL OPTION?



④ WHICH TUBING OR ELEMENT?



Whatever your needs, Watson-Marlow Bredel manufacture the industrial pumps of first choice.

PICK YOUR PUMPHEAD

Low-flow pumpheads for a wide range of metering applications. Up to 2 bar pumping with continuous tubing or LoadSure® elements and up to 7 bar chemical injection with the 520REH

LoadSure® pumpheads guarantee correct tube loading



7 bar pressures
(100 psi) with
the 520REH

Flow rates up to 450 ml/min. LoadSure® elements are available in Marprene TH and STA-PURE



4 bar pressures
(60 psi) with the
520REM

Flow rates up to 1500 ml/min. LoadSure® elements are available in Marprene TM and CHEM-SURE



2 bar pressures
(30 psi) with
the 520REL

Flow rates up to 3500 ml/min. LoadSure® elements are available in Marprene TL, Pumpsil, Neoprene and CHEM-SURE

Continuous tubing for clear flow from source to discharge

Choose 520R for 1.6mm thin wall tubing or 520R2 for 2.4mm thick wall tubing



No tube joins,
and the widest tube
material choice with
the 520R and 520R2

Flow rates up to 3500 ml/min Pressures up to 2 bar. Continuous tubing in Marprene, Bioprene, Neoprene, Pumpsil, PVC, Fluorel, CHEM-SURE and STA-PURE

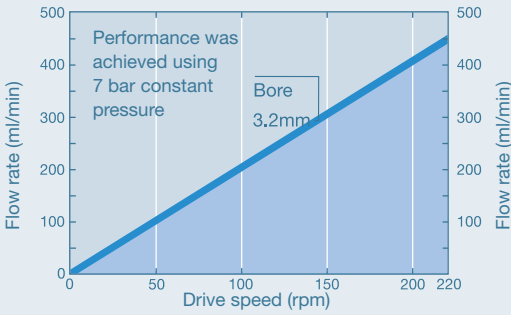
Pumphead benefits

- Large track diameter and two rollers give long tube life: 2½ times the competition
- Sprung rollers give low-shear pumping
- Tough, chemically resistant construction

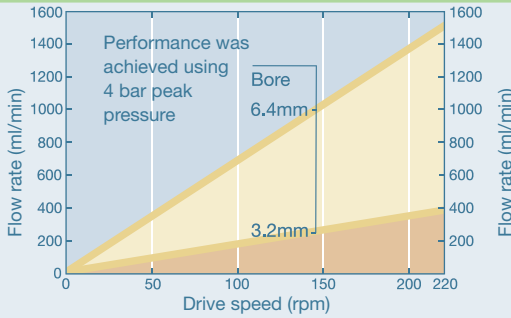


3,500 ml/min, or pressures to 7 bar (100 psi)

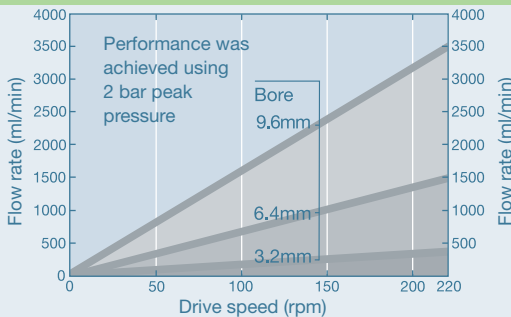
520REH performance (4-7 bar, 100 psi)



520REM performance (2-4 bar, 60 psi)



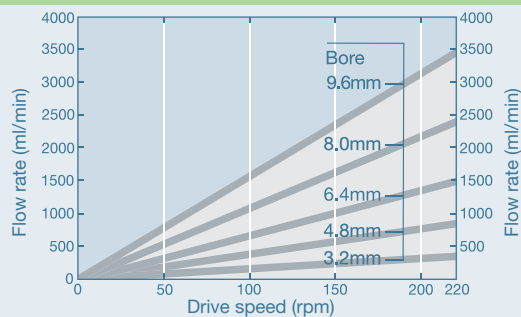
520REL performance (0-2 bar, 30 psi)



520 pumpheads: flow ranges, 0.1-220 rpm, ml/min

Tube bore (mm, in, #)		0.5 1/50	0.8 1/32	1.6 1/16	3.2 1/8	4.8 3/16	6.4 1/4	8.0 5/16	9.6 3/8
520R and 520R2 (continuous tubing)	Neoprene STA-PURE CHEM-SURE PVC, Pumpsil	0.0040 -9.5	0.01 -24	0.04 -97	0.18 -390	0.40 -870	0.70 -1500	1.1 -2400	1.6 -3500
	Marprene / 64 shore tubing	0.0040 -9.0	0.01 -23	0.04 -92	0.17 -370	0.38 -830	0.67 -1500	1.1 -2300	1.5 -3300
	Fluorel			0.03 -70	0.13 -280	0.29 -630	0.51 -1100	0.80 -1800	
520REL (elements to 2 bar)	Neoprene CHEM-SURE Pumpsil				0.18 -390		0.70 -1500		1.6 -3500
	Marprene TL				0.17 -370		0.67 -1500		1.5 -3300
520REM (elements to 4 bar)	CHEM-SURE				0.18 -390		0.70 -1500		
	Marprene TM				0.17 -370		0.67 -1500		
520REH (elements to 7 bar)	Marprene TH STA-PURE				0.20 -450				

520R2 performance (0-2 bar, 30 psi)



Flow rate varies with tube material, discharge pressure, suction and viscosity

Construction materials: High-spec engineering plastics and stainless steel defeat chemical attack. There is no known solvent that will attack polyphenylene sulphide (PPS) below 200C (392F). Robust enough for the most arduous environment. No paint or surface treatments. Pumphead track: PPS; guard, inner/outer: polycarbonate; guard seal: Neoprene; rotor hub: stainless steel 316; roller arms, rotor cover: PPS; rollers, main/guide: stainless steel 316; main roller bearings: stainless steel with PTFE seals; drain port and nut: polypropylene; drain plug: Hytrel

NOW SELECT YOUR DRIVE

Water treatment

A water company in Washington State, US, has replaced a diaphragm pump with a 520DuN/REH to inject sodium hypochlorite into a mains supply at 4.5 bar (65 psi), via an 18m (60ft) carrier water line at 4.8 bar (70 psi).

The flow rate varies between 1.1 litre/hr and 7.6 litre/hr. The pump is in the open air, under a shelter. It endures ambient temperatures of -7C-32C. Initially set up to operate manually, it is now analogue-controlled.

During testing after installation, water company engineers confirmed that the pump would hold its pressure at up to 6.6 bar (95 psi), well above the pressure actually required. They found the pump easy to install, and were delighted with the quick-connect element connectors.



Mid-flow pumpheads for metering or transfer. The 620 is available with continuous tubing for pumping up to 2 bar (30psi). For guaranteed loading and pumping to 4 bar (60psi), LoadSure® pumpheads are available in two or four-roller versions.

LoadSure® pumpheads guarantee correct tube loading



Maximum throughput and longer tube life with the 620RE's two rollers

Flow rates up to 18 litre/min. Pressures up to 4 bar (60 psi). LoadSure® elements are available in Pumpsil and Neoprene. Industrial Cam-and-Groove connectors allow universal drop-in fitting



Highest accuracy and minimal pulsation with the 620RE4's four rollers

Flow rates up to 13 litre/min. Pressures up to 4 bar (60 psi). LoadSure® elements are available in Marprene™, Marprene™ TL, Pumpsil and Neoprene. Industrial Cam-and-Groove connectors allow universal drop-in fitting

Pumphead benefits

- Tough, chemically resistant construction
- Large track diameter and two rollers for long tube life: up to 2½ times the competition
- Sprung rollers give low-shear pumping

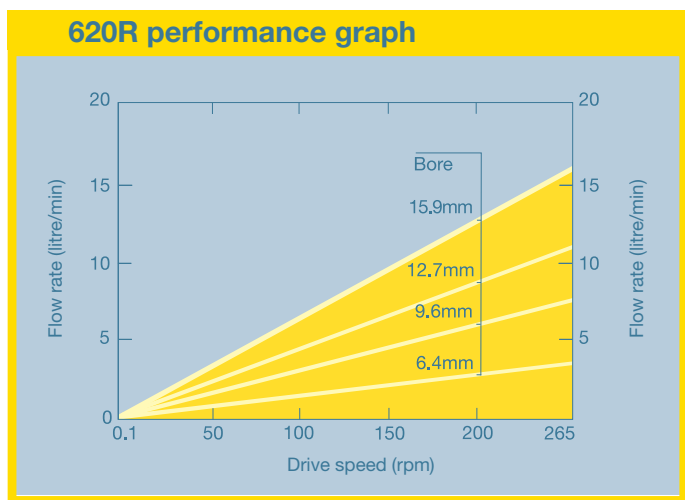
Continuous tubing for joint-free flow from source to discharge

No tube joins, and the widest tube material choice with the 620RE

Flow rates to 13 litre/min. Pressures to 2 bar (30 psi). Employs tube clamps to secure the tubing. Continuous tubing in Marprene™ TL, Bioprene, Neoprene, Pumpsil, PVC, CHEM-SURE and STA-PURE

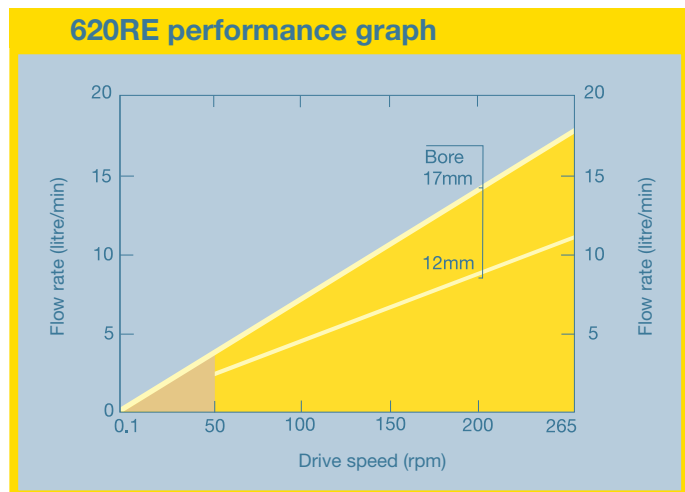
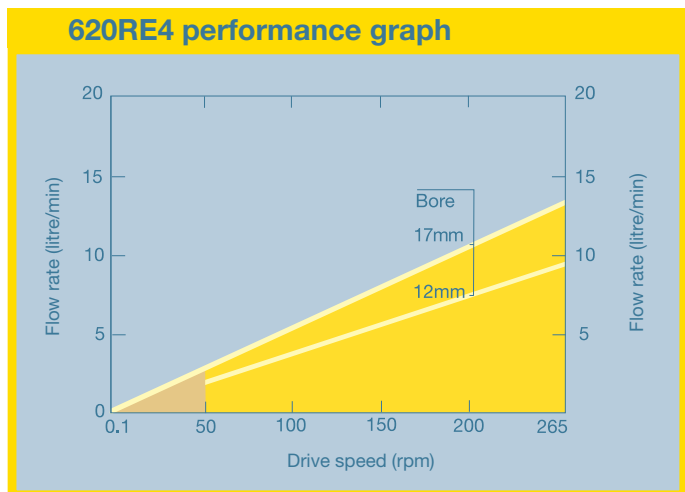


True versatility: switch from continuous tubing to elements in moments



620 pumpheads: flow ranges, 0.1-265 rpm, litre/min

Tube or element bore (mm, in, #)	620R (continuous tubing, two rollers)				620RE (elements, two rollers)		620RE4 (elements, four rollers)	
	6.4 1/4 17	9.6 3/8 193	12.7 1/2 88	15.9 5/8 189	12.0	17.0	12.0	17.0
Marpene and Bioprene TM					0.004 -9.8	0.01 -16	0.003 -8.3	0.004 -11
Marpene and Bioprene TL	0.001 -3.4	0.003 -6.6	0.004 -11	0.01 -12	0.004 -9.8	0.01 -18	0.003 -8.3	0.005 -12
Pumpsil	0.001 -3.2	0.003 -7.2	0.004 -11	0.01 -15	0.004 -10	0.01 -16	0.003 -8.7	0.004 -11
STA-PURE and Neoprene	0.001 -3.2	0.003 -6.6	0.004 -11	0.01 -16	0.004 -11	0.01 -18	0.003 -9.0	0.01 -13



■ Limited to 2 bar below 50 rpm Flow rate varies with tube material, discharge pressure, suction and viscosity

Construction materials: 620 pumpheads are designed for ultimate impact and corrosion resistance. Pumphead track: powder-coated aluminium LM24; guard, inner/outer: Grlamid TR55/polyurethane PBA; rotor hub, roller arms: Fortron 1140L4 (PPS); rotor cover: Dupont Hytrel G5544; rollers, main/guide: stainless steel 303/Nylatron; main roller bearings: carbon steel; tube clamp sets: polypropylene

NOW SELECT YOUR DRIVE

Chemical process

A major British aluminium supplier uses a 620 pump to scavenge excess lacquer from a sheet aluminium colouring process.

The Watson-Marlow pump has solved a host of problems associated with the diaphragm pump which was in use previously. The lacquer to be pumped varies in quantity. When the diaphragm pump was required to run dry, it clogged, and the corrosive lacquer spilled from its holding reservoir, coating the production machinery and becoming soiled and unusable.

When a colour change was required, the pump had to be stripped down for complete cleaning.

The self-priming 620 can run dry; it is not affected by corrosive duty fluids; and when a colour change is required, its tube can be changed in less than a minute.



High-flow pumpheads for metering or transfer applications. The 720 delivers a lot for its size.

Five sizes of continuous tubing and elements in four sizes give optimum performance over a wide flow range.

Extension pumpheads double the available flow to 4,000 l/hr.

LoadSure® pumpheads ensure correct tube loading



2 bar pressures (30 psi) with the 720RE

Flow rates up to 4,000 litre/hr. Pressures up to 2 bar (30 psi). LoadSure® elements are available in Marprene TL, Pumpsil and Neoprene. Industrial Cam-and-Groove connectors allow universal drop-in fitting

Continuous tubing for joint-free flow from source to discharge



No tube joins, and the widest tube material choice with the 720R

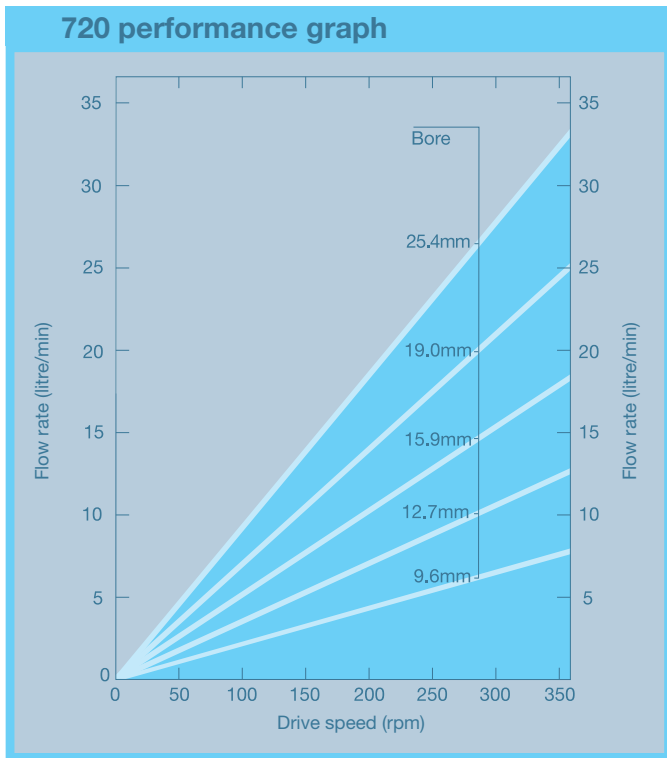
Flow rates to 4,000 litre/hr. Pressures to 2 bar (30 psi). Employs tube clamps to secure the tubing. Continuous tubing in Marprene TL, Bioprene TL, Neoprene, Pumpsil and STA-PURE

Pumphead benefits

- Four driven rollers and sprung track for long tube life and low pulsation
- Tough, chemically resistant powder coating inside and out



litre/hour, with pressures to 2 bar (30 psi)



720 pumpheads: flow ranges, litre/hr

	701R (continuous tubing)					720RE (LoadSure elements)			
	9.6	12.7	15.9	19	25.4	12.7	15.9	19	25.4
Tube or element bore (mm, in, #)	3/8	1/2	5/8	3/4	1	1/2	1/2	1/2	1
	193	88	189	191	92	88	189	191	92
0.1-360 rpm	0.12-420	0.22-780	0.30-1100	0.42-1500	0.56-2000	0.22-780	0.30-1100	0.42-1500	0.56-2000

An optional second pumphead doubles pump flow or provides two separate flows.

Flow rate varies with tube material, discharge pressure, suction and viscosity

Construction materials: All 720 pumpheads are designed for strength and durability. Pumphead track: aluminium; drive shaft: stainless steel 440C; rotor end plates: aluminium; cradle assembly, track: aluminium; central shaft: EN24 steel; rollers: MOS2 filled Nylon 6 (Nylatron); springs, spindles: stainless steel; coating: Alocrom pre-treatment with polyester powder coating.

NOW SELECT YOUR DRIVE

Abrasive slurry

With 50% solids, the oxide-water mix that a major roof tile manufacturer uses to colour his products is highly abrasive.

He tried piston pumps, but abandoned them when he found that the slurry was effectively being de-watered: the pumps pumped the water, but left the solids to clog the cylinders. He tried centrifugal pumps, but poor flow control led to inconsistent colouring.

Then he bought a Watson-Marlow 720 series pump. The slurry remained uniform and could be applied in precise quantities. Since the fluid is contained within the tube, the pump cannot clog. In addition, the pump is small enough to be conveniently set up in various parts of the factory, and its impervious casing protects the pump in a very messy environment.



A family of pumps that perfectly fit all production line needs

The new generation of Watson-Marlow Bredel peristaltic pumps offers a complete range to suit industrial and process application needs

- Efficient and reliable through a clean and brushless DC motor consuming up to 36% less power with minimal maintenance
- Tough, powder-coated housing and IP66 water-tight enclosure: perfect for industrial environments and wash-down
- Speed controls up to 3600:1 and eight tubing sizes give metering capability of 875,000:1. Comprehensive calibration and precise speed adjustment ensure metering accuracy

- Comprehensive functionality and control. Manual control for plug-and-go; auto control for straightforward set-up of analogue remote control; digital control using RS485
- Pump scaling has never been easier. The 520, 620 and 720 pumps have the same footprint: they are interchangeable on the line. Similar keypad layout and menu options. No further operator training is required; use one pump, use them all
- Value for life: the tube is the only consumable; unbeatable tube life; no installation; minimal maintenance; and a five-years warranty



Drop-in diaphragm pump replacement

- Tubing is the only consumable. No crystallisation and no gassing problems; no dismantling; no headaches
- Simple and easy installation
- Software-calibrated remote analogue speed control plus a second analogue control for flow scaling. A facility which renders redundant the stroke control adjustment
- included in some diaphragm or piston pumps
- Minimal maintenance means less downtime, less downtime means more profit. A cost effective solution for production
- Efficient motors means less power consumption



DuN: the ultimate pump for production process

520DuN, 620DuN and 720DuN offer full industrial connectivity and process control through PC, PLC or other plant controller. 16-key numeric keypad makes manual control truly simple, too: just type in the flow rate or speed you need

- Digital network control with RS485
- Comprehensive calibration with a choice of flow units
- PIN-secure process protection with two PIN levels
- Twin analogue inputs for scaled flow adjustment
- Full remote control
- Analogue speed feedback



UN with analogue and remote control

520UN, 620UN and 720UN offer keypad and remote control with analogue speed inputs and status outputs. The drives are configurable in software, and password-protected

- Analogue speed control
- Industrial logic remote control
- Analogue speed feedback



SN with manual control

520SN, 620SN and 720SN are plug-and-play pumps: Just plug in and switch on. They offer low cost of ownership, simple, accurate metering and one-key keypad access to all major controls



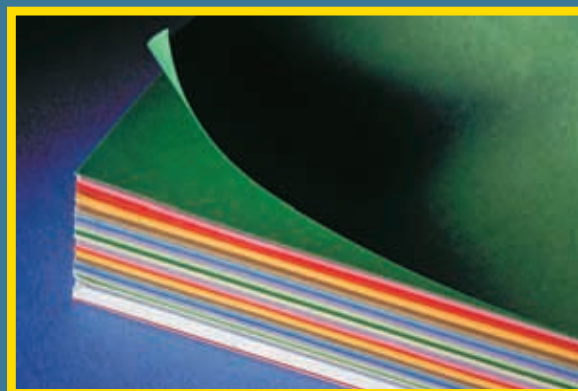
- Manual control: 9-key display pad
- Calibration to display flow rate
- MemoDose for easy one-shot dispensing

Coping with chemicals

Watson-Marlow Bredel peristaltic pumps are helping leading fine paper manufacturer, Arjo Wiggins, to improve product quality and overall production efficiency at Europe's leading business stationery plant.

Arjo Wiggins operates 14 Watson-Marlow Bredel peristaltic pumps as replacements for lobe and progressive cavity pumps. Twelve 500 and 600 series pumps add sizing agents, retention aids and optical brightening agents. Two larger 700 series pumps transfer bleach.

Commented the process engineer, "Accurate pumping is very important to minimise waste. When we went to Watson-Marlow Bredel pumps I had concerns about tube life, which has not been an issue. The pumps have proven extremely durable, despite the harsh chemicals used in paper making."



Feature	520DuN 620DuN 720DuN	520UN 620UN 720UN	520SN 620SN 720SN
Manual control			
Run/stop; speed adjustment; forward/reverse; max key for rapid priming and purging; auto-restart	●	●	●
Choice of flow rate display; metric and imperial units	●		
Numeric keypad for entry of speed, flow or PIN	●		
Cumulative flow display	720		
Remote control			
Run/stop direction change; auto/manual mode; leak detector input (via contact closure or 5V TTL to 24V industrial logic)	●	●	
Remote switch operation of MemoDose	●	●	
Analog speed control			
Software programmable inputs; 0-10V, 1-5V or 4-20mA	●	●	
Second analogue or keypad scaling of primary input	●		
Digital network control			
Full RS485 network connectivity for process control through PC or PLC	●		
Process security			
Keypad lock	●	●	●
Basic security code to protect set-up		●	
PIN-secure process protection: two-level PIN access	●		
Pump status outputs			
Analogue frequency (and 0-10V analogue) output of pump speed	●	●	
Four 24V change-over relay pump status outputs, software-configurable	●	●	
4-20mA analogue output of pump speed	●		
MemoDose			
Easy single-shot dispensing	●	●	●
Calibration			
Simple calibration to display the flow rate as well as the rotation speed		●	●
Comprehensive calibration for precise metering. Choice of flow units	●		

Sophisticated, but simplicity itself to set-up



Specifications

	Width	Depth	Height	Weight
520, drive only	276mm 10 ⁷ / ₁₆ in	322mm 12 ³ / ₁₆ in	158mm 6 ¹ / ₄ in	10.7kg 23lb 10oz
520 with 520R pumphead	276mm 10 ⁷ / ₁₆ in	407mm 16in	158mm 6 ¹ / ₄ in	11.5kg 25lb 5oz
620, drive only	280mm 11in	328mm 12 ⁷ / ₁₆ in	305mm 12in	17.4kg 38lb 6oz
620 with 620R pumphead	280mm 11in	448mm 17 ⁵ / ₁₆ in	305mm 12in	20.5kg 45lb 3oz
720, drive only	280mm 11in	328mm 12 ⁷ / ₁₆ in	305mm 12in	18.5kg 40lb 13oz
720 with 720R pumphead	280mm 11in	508mm 20in	305mm 12in	25.0kg 55lb 2oz

Robust and resilient

Advanced technology and good design underlie Watson-Marlow Bredel industrial pumps' long life of quality service.

Our admirable reliability record is maintained by features such as brushless DC motors, a toughened LCD screen and a tough membrane keypad. The chemical resistance of the whole range outlasts our competition; the powder-coated casings outperform stainless steel when exposed to aggressive fluids such as ferric chloride or sodium hypochlorite.

Speed scaling

Programmable twin analogue inputs to allow flow pacing to be coupled with downstream quality feedback. The second input over-rides the main speed control, making stroke adjustment on a diaphragm pump redundant. Drop-in diaphragm pump replacement could not be simpler.

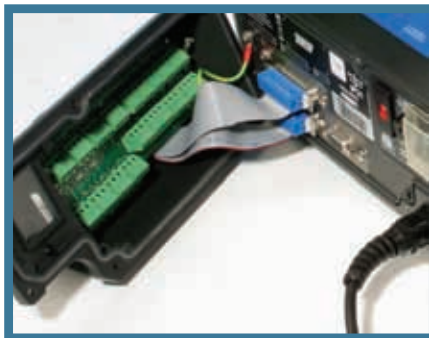
Accuracy

Class-leading flow control up to 3,600:1 and simple, accurate configuration mean that your flow will match your needs precisely. Couple that with tube bores from 0.8mm to 25.4mm, and you have a range of unbeaten versatility.



Easy wiring

Wiring-up all the cased pumps in this brochure is standard and easy. The watertight module at the rear of the pump has four watertight glands providing ample access for whatever control system connections you require. Inside: no soldering, no D-connectors, no fiddling - just large, clearly marked screw terminals. With clear instructions in product documentation, you will be up and running in minutes.



RS485

Full industrial-standard connectivity with RS485 permanent connection to control systems including PC and PLC.

IP66 protection

All industrial pumps meet the criteria for IP66 and NEMA 4X classification: they are secure against high-pressure washdown. IP31 models are also available in the 520 and 620 series.



Status outputs

Four configurable 24V relay outputs. Monitor Run/Stop; Rotation direction; auto/manual operation; general fault alarm; automatic shut-down if the guard is opened; leak-detected shutdown.

Operator safety

Operator safety comes first, with sturdy metal or impact-resistant guards and drain ports for safe disposal of spillages. Tool-lockable or electronic guard switches are standard on all pumps. Optional leak detection for all models.



NOW SELECT YOUR TUBE

Control range	520: 0.1-220 rpm; 620: 0.1-265 rpm; 720: 0.1-360rpm
Voltage/frequency	Filtered 100-120V/200-240V 50/60Hz 1ph
Maximum voltage fluctuation	±10% of nominal voltage. A well regulated electrical mains supply is required along with cable connections conforming to the best practice of noise immunity
Installation category (over voltage)	II
Power consumption	520: 135VA; 620N: 250VA; 720N: 350VA
Full load current	520: <0.6A at 230V; <1.25A at 115V; 620: <1.1A at 230V; <2.2A at 115V; 720: <1.5A at 230V; <3.0A at 115V
Eprom version	Accessible through pump software

Enclosure rating	IP66 to BS EN 60529; Equivalent to NEMA 4X to NEMA 250* (indoor use). Suitable for heavy industrial, process and harsh environments. The drive uses a Gore membrane vent to equalise the pressure inside the enclosure and to prevent ingress of water and corrosive vapours.
Operating temperature	5C to 40C, 41F to 104F
Storage temperature	520: -40C to 70C, -40F to 158F; 620, 720: -25C to 65C, -13F to 149F
Maximum altitude	2,000m, 6,560ft
Humidity (condensing)	10% - 100% RH
Noise	520, 620: <70dB(A) at 1m; 720: <85dB(A) at 1m



Directive 94/9/EC, commonly known as the ATEX directive, carries obligations to the person who places equipment on the market in EU territory for use in potentially explosive environments. All of Watson-Marlow Bredel's ATEX pumps in close-coupled or baseplate formats have been rated as Group II, Category 2 equipment, intended for use in gas-based environments only. ATEX pumps are available in 520, 620 and 720 ranges.

501DF/RLA

- Fixed speed: 62 rpm, 223 rpm or 281 rpm
- ATEX II 2G (Zone 1) 0.18kW 3-phase 50Hz industrial drive
- 501RLCA pumphead: pressures to 2 bar, 1.6mm wall continuous tubing in seven bore sizes
- Flow rates from 2.6 ml/min to 2810 ml/min
- IP55 protection, 24-hour-duty rated
- Two-years warranty

501DF/RL2A

- As 501DF/RLA
- 501RL2CA pumphead: for higher pressures using STA-PURE or CHEM-SURE, 2.4mm wall continuous tubing in seven bore sizes

501DV/RL2A

- Variable speed ball drive variator: 7 rpm – 250 rpm
- ATEX II 2G (Zone 1) 0.25kW 6-pole 230/400V 3-phase 50Hz TEFC electric motor
- 501RLCA pumphead: pressures to 2 bar, 1.6mm wall continuous tubing in seven bore sizes (to 1 bar in 6.4mm and 8.0mm bores)
- Flow rates from 0.29 ml/min to 2500 ml/min
- IP55 protection, 24-hour-duty rated
- Two-years warranty

621DF/RA and 621DF/REA

- Fixed speed: 77 rpm or 251 rpm
- ATEX II 2G 0.37kW 3-phase 50Hz industrial motor/gearbox
- Flow rates from 0.92 litre/min to 18 litre/min
- Pressures to 2 bar
- 621DF/RA twin-roller pumps for continuous tubing
- 621DF/REA twin-roller pumps for LoadSure elements
- For pressures to 4 bar, use a 621REA pumphead with a Marprene, Bioprene or STA-PURE element, or a 620RA pumphead with STA-PURE tubing
- IP55 protection, 24-hour duty-rated
- Two-years warranty

621DV/RA and 621DV/REA

- Variable speed ball drive variator: 7 rpm – 250 rpm
- ATEX II 2G (Zone 1) 0.25kW 6-pole 230/400V 3-phase 50Hz TEFC electric motor
- Pressures to 2 bar, 3.2mm wall continuous tubing in four bore sizes
- Flow rates from 0.09 litre/min to 18 litre/min
- IP55 protection, 24-hour-duty rated
- Two-years warranty
- 620DV/REA: Pressures to 2 bar, LoadSure tubing elements in two bore sizes

701DFB/RA

- Fixed speed: 112 rpm or 360 rpm
- Three-phase ATEX II 2G (Zone 1) motor
- Continuous tubing in five sizes and seven materials
- Flow rates to 4,000 litre/hour with two pumpheads
- 24-hour-duty rated
- Two-years warranty

701DFB/REA

- As 701DFB/RA
- Tubing elements in four sizes and three materials

701DFB/RXA and REXA

- As 701DFB/RA
- Extension pumpheads for 701DFB drive

501 pumpheads: flow ranges, ATEX pumps, ml/min

Tube bore (mm, in, #)	0.5 1/50	0.8 1/32	1.6 1/16	3.2 1/8	4.8 3/16	6.4 1/4	8.0 3/8
62 rpm	2.6	7.6	26	120	250	390	620
223 rpm	9.3	27	95	410	900	1400	2230
281 rpm	12	34	120	520	1100	1800	2810
7-250 rpm	0.29-10	0.86-31	3.0-110	13-470	28-1000	45-1600	70-2500

620 pumpheads: flow ranges, ATEX pumps, ml/min

		620R (continuous tubing, two rollers)				620RE (elements, 2 rollers)		620RE4 (elements, 4 rollers)	
Tube or element bore (mm, in, #)	rpm	6.4 1/4	9.6 3/8	12.7 1/2	15.9 5/8	12.0	17.0	12.0	17.0
Marprene TL	77	1.0	1.9	3.1	4.2	2.8	5.2	2.4	3.6
Bioprene TL	251	3.3	6.3	10	11	9.3	17	7.9	12
Marprene TM									
Bioprene TM	77					2.8	4.5	2.4	3.2
LoadSure elements	251					9.3	15	7.9	10
Pumpsil	77	0.92	2.1	3.2	4.7	3.0	4.7	2.5	3.3
	251	3.0	6.8	11	14	9.7	15	8.3	11
STA-PURE	77	0.92	1.9	3.1	4.7	3.1	5.6	2.6	3.9
CHEM-SURE						10	18	8.5	13
Neoprene	251	3.0	6.3	10	15				

720 pumpheads: flow ranges, ATEX pumps, litre/hr

		701R continuous tubing					701RE elements			
Tube or element bore (mm, in, #)	rpm	9.6 3/8	12.7 1/2	15.9 5/8	19 3/4	25.4 1	12.7 1/2	15.9 5/8	19 3/4	25.4 1
112 rpm	130	240	340	470	620	240	340	470	620	
360 rpm	420	780	1100	1500	2000	780	1000	1500	2000	



Close-coupled pumps Available in ATEX and non-ATEX configurations to satisfy a host of industrial pumping requirements

NOW SELECT YOUR TUBE

520DiN and 620DiN for dosing

- Accurate dosing to ±0.5%
- Dosing triggered by keypad, remote signal or additional footswitch, handswitch or proximity switch
- Output batch records for cGMP requirements
- Calibration while dispensing

Store up to 50 dispensing programs for immediate use, complete with all parameters: batch size, dose size, flow speed and dosing interval. You can even save the ramp and drip settings. Need a variation? Instant changes are easy.



At the heart of all Watson-Marlow Bredel pumps is a range of abrasion-resistant tubes and elements available in chemically stable materials including Marprene, Neoprene and STA-PURE

	Marprene	Bioprene	Pumpsil	Neoprene	STA-PURE	CHEM-SURE	PVC	Pumpsil-D	Fluorel
Up to 10,000 hours pumping life	•	•			•	•			
Wide chemical resistance	•	•				•			•
High pressure capability (0-7 bar)	•	•			•	•			
Additional abrasion resistance				•					
High dispensing accuracy					•	•		•	
Lowest levels of leachables			•		•	•		•	
Low gas permeability	•	•					•		
High clarity							•		
LaserTraceability™			•					•	
Meets or exceeds USP Class VI requirements		•	•		•	•		•	
Lot traceable from raw material to finished product		•	•		•	•		•	
FDA regulations CFR 177.2600 for contact with food	•	•	•		•	•		•	
European Pharmacopoeia 3.1.9		•	•		•	•		•	
ISO 10993		•	•		•	•		•	

Choosing the right tubing: where to start

The best way to select a tube is to decide which materials are chemically suitable. Choose the one meeting 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, Pumpsil is most often chosen for sizes up to 9.6mm (3/8in), and Neoprene for larger sizes.

- 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 high 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 use the smallest practicable bore size of tubing and run the pump at the slowest speed.

Validation packs

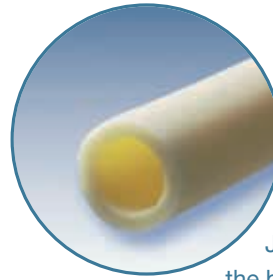
Validation packs are available for Pumpsil, Bioprene and STA-PURE. Contact your Watson-Marlow Bredel tubing representative.



Watson-Marlow Pumpsil and Bioprene are manufactured in an ISO 14644 -1 Class 7 (Class J/10,000) clean room to guarantee no impurities

Choosing the PERFECT tube for all of your applications

Watson-Marlow Bredel is the only peristaltic pump manufacturer in the world to manufacture its own tubing, optimising our tubing tolerances and formulation to deliver the best process pump performance. In a peristaltic pump, the tubing largely dictates pump and system performance: Its restitution creates suction, its strength resists pressure, its flex resistance determines pumping life, its bore defines the flow rate, its wall thickness controls pumping efficiency and its purity protects your product from contamination. Watson-Marlow Bredel offers tubing in eight materials and over 40 sizes, giving an extraordinary range of chemical and application capability.



Bioprene is Watson-Marlow Bredel's exclusive thermoplastic elastomer. Manufactured to high standards in its own thermoplastic-dedicated ISO1644-1 class 7 (class J/10,000) cleanroom, Bioprene® offers the best combination of purity, chemical compatibility and long pumping life. Bioprene is USP Class VI certified and meets FDA requirements 21CFR 177.2600 and USDA standards for food handling. High, medium and low pressure grades are available. Working temperature range 5C to 80C. Autoclavable. Can be sterilised by ethylene oxide.

Marprene is our high-performance general-purpose tube. This thermoplastic elastomer parallels Bioprene's chemical compatibility, long pumping life and pressure handling. Marprene® is ideal for general-purpose pumping or food handling and is highly resistant to oxidising agents such as ozone, peroxides and sodium hypochlorite. Meets FDA requirements 21 CFR 177.2600 and USDA standards for food handling. Working temperature range 5C to 80C. Autoclavable.



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



Secure linking up

Watson-Marlow Bredel tubing elements for 520, 620 and 720 pumps link to the rest of your system using secure instant connectors: industrial-standard Cam-and-Groove connectors for 620 and 720, left; and quick-release push-fit connectors for 520 pumps, above. Both guarantee a secure seal and immediate release when required.

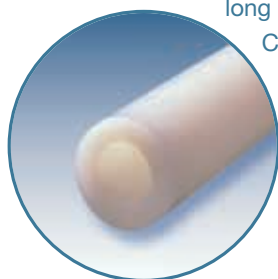
STA-PURE has a unique composite construction of silicone in a PTFE lattice giving it superior burst resistance up to 7 bar (100psi) and 18 times longer life than silicone tubing. It produces virtually no spalling, is USP Class VI approved and is classified as non-toxic. Working temperature range 0C to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



peroxide-cured silicone and is post-cured to remove linear and cyclic siloxanes, cytotoxic materials which can leach out of other manufacturers' non-post-cured platinum-cured tubing. Pumpsil® has an ultra-smooth bore to control protein binding and bacterial growth, making it ideal for production applications where there is long-term contact with the process fluid. Our LaserTraceability™ provides an ink-free, indelibly etched record of part number, lot number and use-by date right on the tubing. This means that lot traceability is carried through from box to bag to the tube itself. Working temperature range: 20C to 80C. Translucent. Autoclavable.

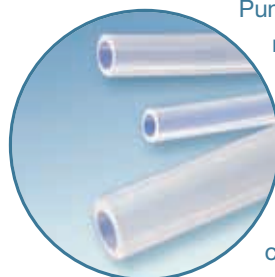
CHEM-SURE is effectively pumpable PTFE – a high performance composite of PTFE and a high-grade fluoroelastomer – offering extraordinary chemical resistance, long life and very high burst pressures.

Chem-Sure is USP Class VI and food grade approved, making it suitable for foods and pharmaceuticals as well as aggressive chemicals.



Pumpsil-D platinum-cured silicone tubing manufactured by Watson-Marlow Bredel adds ultimate dispensing performance to the high-purity attributes of Pumpsil.

Pumpsil-D is formulated with a superior flex memory that doubles the accuracy of dispensed volumes compared to standard platinum-cured silicone tubing. Fewer pump calibrations are needed, so maximising process efficiency. USP Class VI certified and complies with FDA 21CFR177.2600 for food contact. Working temperature range – 20C to 80C. Translucent. Autoclavable.

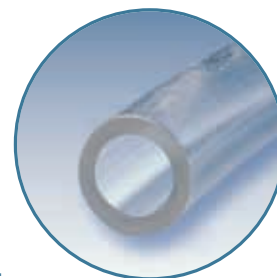


Pumpsil platinum-cured silicone

tubing is manufactured by Watson-Marlow Bredel in our own silicone-dedicated ISO1644-1 class 7 (class J/10,000) cleanroom. Developed specifically for biopharmaceutical application, Pumpsil carries full biopharmaceutical certification USP Class VI and ISO10993 and complies with FDA 21CFR177.2600 for food contact. Pumpsil is entirely free of 2,4 DCBA and other leachables associated with



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.

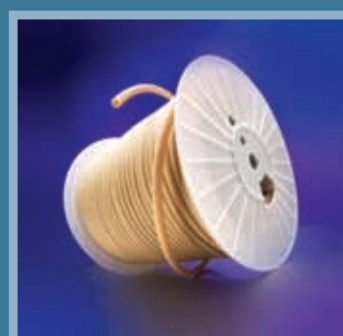


Checking your choice with an immersion test

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 Bredel 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.

Make reel savings

Many of our tubes are available in bulk, as well as in the standard shorter lengths - up to 152m at a time, depending on the bore size. Bulk buying gives important benefits in convenience, and huge cost savings: 36% less per metre than the metre price for 3m and 5m cut lengths. Further discounts are available on orders for multiple reels. Ask for our reel leaflet for the tube material of your choice.



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

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



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



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



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



500

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 0.4µl/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



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



620S/R



620U/R



700

NEW 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 0.12 litre/min to 4,000 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



720Du/R, 720U/R and 720S/R



720Du/R, 720U/R and 720S/R



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 and 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 metre/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



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



Tubing Hoses

Extensive range of tubing ensures chemical compatibility. USP Class VI and FDA approvals. Precision machined, re-reinforced 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



- Easy to install, operate and maintain
- Virtually maintenance-free – no expensive seals, valves, diaphragms or rotors to leak, clog or corrode
- 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

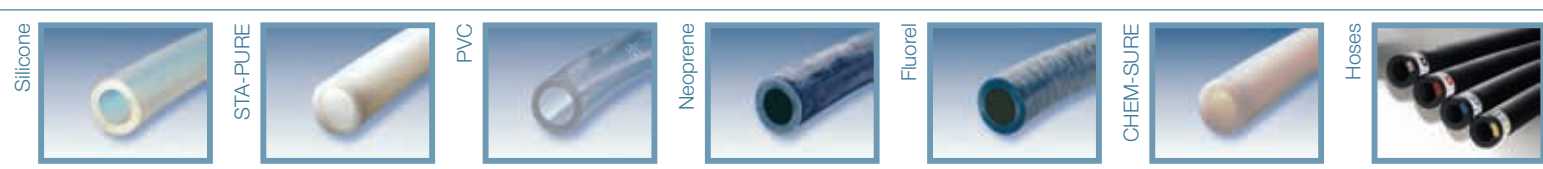
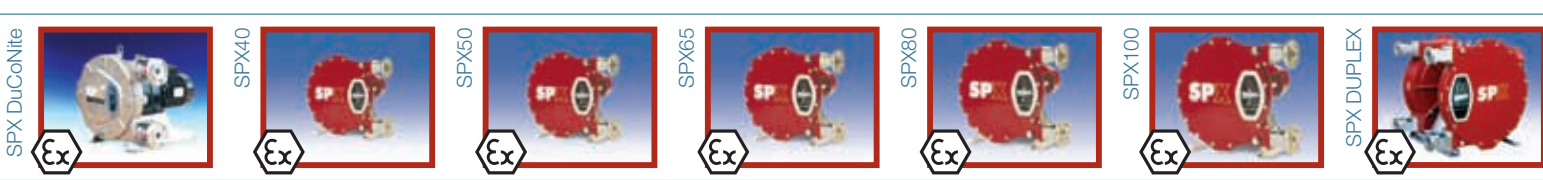
Code descriptions eg: 101U/R = Manual/auto control variable speed with single channel pumphead

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 Exd 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



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www.watson-marlow.co.uk

Members of the Spirax-Sarco Engineering Group



HB0240

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/D/1
500	Superb range of IP31 and IP66 pumps for science and industry as well as fixed and variable speed close-coupled pumps.	0.4µl/min – 4.4 litre/min up to 7bar	520S/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	NEW IP66 high flow pumps for use with continuous tubing or LoadSure elements. Three phase motors, ATEX rated drives or pneumatic.	0.22 litre/min – 4,000 litre/hr	720U/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. <ul style="list-style-type: none"> • Twelve tubing materials in bore sizes 0.13mm to 25.4mm • Autoclavable Marprene, Bioprene, STA-PURE, CHEM-SURE and Pumpsil Silicone (platinum-cured) with LaserTraceability • Five hose materials including Natural Rubber, Nitrile NBR, Bioprene Hypalon and EPDM from 10mm to 100mm 		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.



NEMA 4X

IP66



Hoses

AUKETT BROCKLISS GUY