

# 400 SERIES

**NEW**

Precision pumps for Science



Watson-Marlow leads the world in providing fluid handling solutions for the scientific community with peristaltic pumping technology. The company is accredited for design and manufacture to ISO9001, and strives to provide its customers with nothing less than the best products, service and knowledge.

## Watson-Marlow peristaltic pumps bring you...

- Continuous duty 24 hours a day, 7 days a week
- Extensive range of tube materials, medical and food grade
- Two year international warranty
- Digital and analogue process control capabilities
- Virtually zero-pulse pumpheads for critical applications

The 400 series is Watson-Marlow's latest addition to its science range, offering new high quality compact pumps with up to four channel flow, covering every need from analytical research to pilot production processes.

### 401U/D1, 401U/DM2 and 401U/DM3 manual/auto control ultra compact pumps



401U/D1

- 401U/D1 provides single channel flows up to 120ml/min
- 401U/DM2 and 401U/DM3 provide two and three channel flows up to 36ml/min
- Highly-compact with single control potentiometer for direction, speed and start/stop
- Analogue speed control and remote switching via a 15D connector
- Reversible for easy fluid recovery

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

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

All are supplied with a 220-240V:15VAC transformer. Order remote switching cables separately. Accepts 4-20mA or 0-10V analogue signals and remote TTL (PLC compatible) start/stop and direction switching. Quick release sprung tube clamps on D1 model. A precision machined four-roller aluminium rotor gives smooth, precise flows.



401U/DM2

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

Tube bore	0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm
1.2 to 12rpm	0.01-0.1	0.03-0.3	0.14-1.4	0.29-2.9	0.49-4.9	0.70-7.0
4.0 to 40rpm	0.05-0.5	0.12-1.2	0.45-4.5	0.97-9.7	1.6-16	2.3-23
20 to 200rpm	0.23-2.3	0.58-5.8	2.3-23	4.9-49	8.1-81	12-120

#### 401U/DM2 and 401U/DM3 flow rates (ml/min)

Colour code	Orange/black	Orange/Red	Orange/Blue	Orange/Green	Orange/yellow
Tube bore	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm
1.2 to 12rpm	0.001-0.01	0.002-0.02	0.004-0.04	0.01-0.1	0.02-0.2
4.0 to 40rpm	0.004-0.04	0.008-0.08	0.014-0.14	0.03-0.3	0.06-0.6
10 to 100rpm	0.009-0.09	0.020-0.20	0.035-0.35	0.08-0.8	0.14-1.4



401U/DM3

Colour code	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Tube bore	0.63mm	0.76mm	0.88mm	1.02mm	1.14mm
1.2 to 12rpm	0.03-0.3	0.04-0.4	0.05-0.5	0.07-0.7	0.08-0.8
4.0 to 40rpm	0.09-0.9	0.12-1.2	0.17-1.7	0.22-2.2	0.28-2.8
10 to 100rpm	0.22-2.2	0.31-3.1	0.43-4.3	0.55-5.5	0.70-7.0

Colour code	Grey/Grey	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Tube bore	1.29mm	1.42mm	1.52mm	1.65mm	1.85mm
1.2 to 12rpm	0.11-1.1	0.13-1.3	0.15-1.5	0.17-1.7	0.21-2.1
4.0 to 40rpm	0.35-3.5	0.43-4.3	0.49-4.9	0.56-5.6	0.70-7.0
10 to 100rpm	0.89-8.9	1.1-11	1.2-12	1.4-14	1.8-18

Colour code	Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Tube bore	2.05mm	2.29mm	2.54mm	2.79mm
1.2 to 12rpm	0.26-2.6	0.31-3.1	0.37-3.7	0.44-4.4
4.0 to 40rpm	0.85-8.5	1.0-10	1.2-12	1.5-15
10 to 100rpm	2.1-21	2.6-26	3.1-31	3.6-36

<b>401U/D1 single channel 1.6mm wall tubing pump</b>		<b>Product code</b>
1.2 to 12rpm	15VAC single channel standard tubing pump	040.181D.010*
4.0 to 40rpm		040.1H1D.010*
20 to 200rpm		040.1S1D.010*

<b>401U/DM2 one or two channel manifold tube pump</b>		
1.2 to 12rpm	15VAC two channel manifold tubing pump	040.181D.M20*
4.0 to 40rpm		040.1H1D.M20*
10 to 100rpm		040.1P1D.M20*

<b>401U/DM3 three channel manifold tube pump</b>		
1.2 to 12rpm	15VAC three channel manifold tubing pump	040.181D.M30*
4.0 to 40rpm		040.1H1D.M30*
10 to 100rpm		040.1P1D.M30*

<b>Remote switching cables for 401U</b>		
400AC1	0-10V CW/STOP/CCW 1.5m remote cable	049.0011.000
400AC2	4-20mA CW/STOP/CCW 1.5m remote cable	049.0031.000
400AC3	CW/STOP/CCW 1.5m remote cable	049.0051.000
400AC4	START/STOP 3m remote cable fitted with foot switch	049.0071.000

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

<b>Tubing for 401U/D1</b>						
<b>Tube bore</b>	<b>#</b>	<b>Bioprene</b>	<b>Marprene</b>	<b>Peroxide Silicone</b>	<b>Platinum Silicone</b>	<b>Neoprene</b>
0.5mm	112	903.0005.016	902.0005.016	910.0005.016	913.A005.016	
0.8mm	13	903.0008.016	902.0008.016	910.0008.016	913.A008.016	920.0008.016
1.6mm	14	903.0016.016	902.0016.016	910.0016.016	913.A016.016	920.0016.016
2.4mm						
3.2mm	16	903.0032.016	902.0032.016	910.0032.016	913.A032.016	920.0032.016
<b>Tube bore</b>				<b>Sta-Pure</b>	<b>Chem-Sure</b>	<b>PVC</b>
1.6mm	14			960.0016.016	965.0016.016	950.0016.016
3.2mm	16			960.0032.016	965.0032.016	950.0032.016

<b>Double segment manifold pump tubing for 401U/DM2 and 401U/DM3</b>						
<b>Colour code</b>	<b>Bore</b>	<b>Bore</b>	<b>Autoclavable Marprene</b>	<b>Marprene</b>	<b>PVC</b>	<b>Silicone</b>
<b>Orange/black</b>	0.13mm	0.005"			981.0013.000	
<b>Orange/red</b>	0.19mm	0.007"			981.0019.000	
<b>Orange/blue</b>	0.25mm	0.010"	979.0025.00+	979.0025.000	981.0025.000	
<b>Orange/green</b>	0.38mm	0.015"	979.0038.00+	979.0038.000	981.0038.000	
<b>Orange/yellow</b>	0.50mm	0.020"	979.0050.00+	979.0050.000	981.0050.000	
<b>Orange/white</b>	0.63mm	0.025"	979.0063.00+	979.0063.000	981.0063.000	983.0063.000
<b>Black/black</b>	0.76mm	0.030"	979.0076.00+	979.0076.000	981.0076.000	983.0076.000
<b>Orange/orange</b>	0.88mm	0.035"	979.0088.00+	979.0088.000	981.0088.000	983.0088.000
<b>White/white</b>	1.02mm	0.040"	979.0102.00+	979.0102.000	981.0102.000	983.0102.000
<b>Red/red</b>	1.14mm	0.045"	979.0114.00+	979.0114.000	981.0114.000	983.0114.000
<b>Grey/grey</b>	1.29mm	0.050"	979.0129.00+	979.0129.000	981.0129.000	983.0129.000
<b>Yellow/yellow</b>	1.42mm	0.055"	979.0142.00+	979.0142.000	981.0142.000	983.0142.000
<b>Yellow/blue</b>	1.52mm	0.060"	979.0152.00+	979.0152.000	981.0152.000	983.0152.000
<b>Blue/blue</b>	1.65mm	0.065"	979.0165.00+	979.0165.000	981.0165.000	983.0165.000
<b>Green/green</b>	1.85mm	0.070"	979.0185.00+	979.0185.000	981.0185.000	983.0185.000
<b>Purple/purple</b>	2.05mm	0.080"	979.0205.00+	979.0205.000	981.0205.000	983.0205.000
<b>Purple/black</b>	2.29mm	0.095"	979.0229.00+	979.0229.000	981.0229.000	983.0229.000
<b>Purple/orange</b>	2.54mm	0.100"	979.0254.00+	979.0254.000	981.0254.000	983.0254.000
<b>Purple/white</b>	2.79mm	0.110"	979.0279.00+	979.0279.000	981.0279.000	983.0279.000

<b>401U specifications</b>	
Weight	1.0kg
Operating temperature	5-40C
Control ratio	10:1
Noise	<70dBA at 1m
Standards	CE, BS0800, IEC335-1, EN60529 IP21
Supply through a mains transformer	15VAC



403U/R1

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

- The 403U/R1 produces single channel flows from 0.1 to 150ml/min
- The 403U/L produces low-pulsing, single channel flows from 0.11 to 180ml/min
- The 403U/L2 produces dual channel flows up to 92ml/min per channel
- Digital speed control via top panel mounted keypad
- Reversible motor for easy fluid recovery
- "Max" high speed priming function



The 403U/R1, 403U/L and 403U/L2 are precision manual/auto-control pumps which use 1.6mm wall tubing. All have spring-loaded tracks to maximise tube life and flow precision against pressures up to 2 bar.

403 low-flow models provide speeds up to 50rpm, 405 high-flow models up to 200rpm. All pumpheads have transparent polyester resin (PET) guards.

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



403U/L

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

- The 405U/R1 produces single channel flows from 0.44 to 610ml/min
- The 405U/L produces low-pulsing, single channel flows from 0.86 to 730ml/min
- The 405U/L2 produces dual channel flows up to 370ml/min per channel



405U/L2

### 403U and 405U flow rates per channel (ml/min)

Pump	Speed range	0.5mm	0.8mm	1.6mm	2.4mm	3.2mm	4.0mm	4.8mm	6.4mm
403U/R1	2.5 to 50rpm	0.06-1.1	0.14-2.8	0.55-11	1.2-24	2.1-43	3.3-65	4.6-92	7.6-150
403U/L	2.5 to 50rpm	0.11-2.2	0.28-5.6	1.1-22	2.4-49	4.3-86	6.5-130	9.2-180	
403U/L2	2.5 to 50rpm	0.06-1.1	0.14-2.8	0.55-11	1.2-24	2.1-43	3.3-65	4.6-92	
405U/R1	20 to 200rpm	0.44-4.4	1.1-11	4.4-44	9.8-98	8.6-170	13-260	37-370	61-610
405U/L	20 to 200rpm	0.86-8.6	2.2-22	8.8-88	20-200	17-340	26-520	73-730	
405U/L2	20 to 200rpm	0.44-4.4	1.1-11	4.4-44	4.9-98	9.8-170	13-260	37-370	



405U/R1

### Ordering information

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



405U/L2

### Remote switching cables for 403U and 405U

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

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



405U/L

### Tubing for R1 and L2 pumpheads

Bore	#	Bioprene	Marprene	Peroxide silicone	Platinum silicone
0.5mm	112	903.0005.016	902.0005.016	910.0005.016	913.A005.016
0.8mm	13	903.0008.016	902.0008.016	910.0008.016	913.A008.016
1.6mm	14	903.0016.016	902.0016.016	910.0016.016	913.A016.016
2.4mm					
3.2mm	16	903.0032.016	902.0032.016	910.0032.016	913.A032.016
4.0mm					
4.8mm	25	903.0048.016	902.0048.016	910.0048.016	913.A048.016
6.4mm	17	903.0064.016	902.0064.016	910.0064.016	913.A064.016

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Tubing for R1 and L2 pumpheads continued					
Tube bore	#	Neoprene	Sta-Pure	Chem-Sure	PVC
0.8mm	13	920.0008.016			
1.6mm	14	920.0016.016	960.0016.016	965.0016.016	950.0016.016
3.2mm	16	920.0032.016	960.0032.016	965.0032.016	950.0032.016
4.8mm	25	920.0048.016	960.0048.016	965.0048.016	950.0048.016
6.4mm	17	920.0064.016	960.0064.016	965.0064.016	950.0064.016

Y-elements for L pumphead		
Tube bore	Marprene	Peroxide Silicone
1.6mm	902.E016.016	910.E016.016
2.4mm	902.E024.016	910.E024.016
3.2mm	902.E032.016	910.E032.016
4.8mm	902.E048.016	910.E048.016

403U and 405U specifications		403U	405U
Weights		2.5kg	3.5kg
Power		13VA	30VA
Supply		220-240V 50/60Hz 1ph	
Operating temperature		5 to 40C	
Control ratio		20:1	
Noise		<70dBA at 1m	
Standards		BS0800, IEC335-1, EN60529 (IP21), CE	



403U/VM2



403U/VM3



403U/VM4

## 403U/VM2, 403U/VM3 and 403U/VM4 auto/manual control compact pumps

- VM2 pumphead provides two channels, VM3 three channels and VM4 four channels
- Flow rates from 0.001 to 17ml/min per channel
- Ten stainless-steel rollers with low-friction bearings
- Digital speed control via top panel mounted keypad
- Reversible with Max priming function

403U/VM pumps provide extremely accurate multi-channel pumping, having spring-loaded tracks with individual occlusion adjustment. The VM rotor has stainless-steel low-friction rollers for low pulsation and repeatable flow rates. The fixed position clamping block provides easy tube loading and removal. Pumpheads accept standard two-bridge manifold tubing.

With 20:1 speed control, the 0.5 to 10rpm drive provides low flow accuracy and the 2.5 to 50rpm drive provides higher flows. All pumps accept 4-20mA or 0-10V analogue signals and remote low voltage or TTL (PLC compatible) start/stop and direction switching.

Flow rates per channel for 403U/VM2, 403U/VM3 and 403U/VM4 pumpheads (ml/min)					
Colour code	Orange/black	Orange/Red	Orange/Blue	Orange/Green	Orange/yellow
Tube bore	0.13mm	0.19mm	0.25mm	0.38mm	0.50mm
0.5 to 10rpm	0.001-0.01	0.001-0.03	0.002-0.04	0.005-0.1	0.01-0.2
2.5 to 50rpm	0.003-0.06	0.006-0.13	0.011-0.2	0.025-0.5	0.04-0.9

Colour code	Orange/White	Black/Black	Orange/Orange	White/White	Red/Red
Tube bore	0.63mm	0.76mm	0.88mm	1.02mm	1.14mm
0.5 to 10rpm	0.01-0.3	0.02-0.4	0.03-0.5	0.03-0.7	0.04-0.9
2.5 to 50rpm	0.07-1.4	0.10-2.0	0.13-2.6	0.17-3.5	0.21-4.3

Colour code	Grey/Grey	Yellow/Yellow	Yellow/Blue	Blue/Blue	Green/Green
Tube bore	1.29mm	1.42mm	1.52mm	1.65mm	1.85mm
0.5 to 10rpm	0.05-1.1	0.06-1.3	0.07-1.4	0.08-1.7	0.10-2.0
2.5 to 50rpm	0.27-5.4	0.32-6.4	0.36-7.2	0.41-8.3	0.50-10.0

Colour code	Purple/Purple	Purple/Black	Purple/Orange	Purple/White
Tube bore	2.05mm	2.29mm	2.54mm	2.79mm
0.5 to 10rpm	0.12-2.3	0.14-2.7	0.16-3.1	0.17-3.4
2.5 to 50rpm	0.59-12	0.69-14	0.78-16	0.85-17



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

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**Ordering information for 403**

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

**Remote switching cables for 403U**

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

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**Manifold pump tubing for 403U/DM2, 403U/DM3 and 403U/VM4**

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

**403U specifications**

Weight	2.5kg
Power	13VA
Supply	220-240V 50/60Hz 1ph
Operating temperature	5 to 40C
Control ratio	20:1
Noise	<70dBA at 1m
Standards	BS0800, IEC335-1, EN60529 (IP21), CE

