120F, 120S and 120U pumps with 102R, 114DV, 400D1, 400DM2 and 400DM3 pumpheads

100 series
Watson-Marlow Pumps

FEATURES AND BENEFITS

- Flow rates suitable for laboratory applications
- Flows from 0.001ml/min (0.0 USGPH) to 190ml/min (3.04 USGPH) at 2 Bar (30psi)
- Compact and stackable pumps, saving valuable benchtop space
- Superior speed control up to 10,000:1, ±1% set speed accuracy
- IP31/NEMA 2 ingress protection for wipedown environments
- Maintenance-free brushless DC motor
- Three interface options: Fixed speed, manual and remote control
- A selection of pumphead options for high accuracy and smooth precise flow

24 hour duty

3 warranty

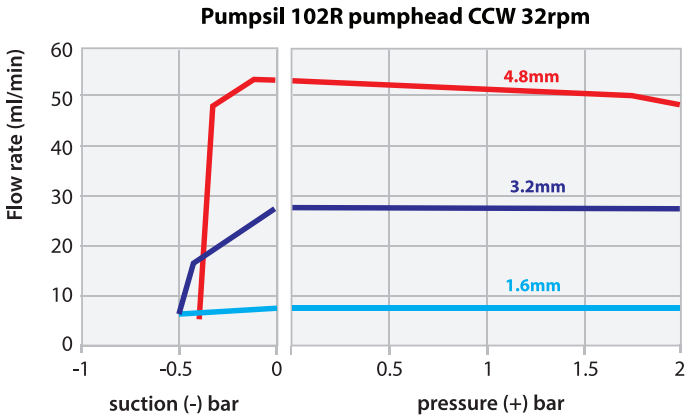
Watson-Marlow...Innovation in Full Flow

PERFORMANCE: 102R PUMPHEAD
Single channel two roller pumphead

- Flows from 0.003ml/min (0.0USGPH) to 54ml/min (0.86 USGPH)
- Suitable for continuous silicone tubing
- Sprung rotor to maximise tube life

Tube bore and flow rates 120F/R (ml/min)						
	Speed rpm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm
Pumpsil (Silicone)	10rpm	0.3	0.5	2.1	8.5	17
	17rpm	0.5	0.9	3.6	14	29
	31rpm	0.9	1.6	6.5	26	52

Tube bore and flow rates 120S/R and 120U/R (ml/min)						
	Speed rpm	0.5mm	0.8mm	1.6mm	3.2mm	4.8mm
Pumpsil (Silicone)	1 – 32rpm	0.03-0.9	0.05-1.6	0.21-6.7	0.85-27	1.6-54
	0.1 – 32rpm	0.003-0.9	0.005-1.6	0.021-6.7	0.085-27	0.16-54



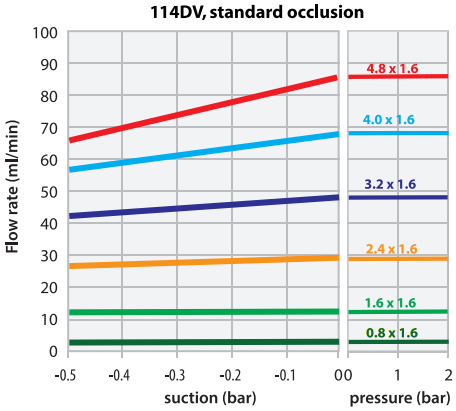
Flows obtained pumping water at 100rpm CCW-rotation
Typically 25% less pressure capacity in the CW direction

PERFORMANCE: 114DV PUMPHEAD
Flip top single channel pumphead

- **Flows from 0.002ml/min (0.0 USGPH) to 190ml/min (3.04 USGPH)**
- **Four rollers for smooth flow**
- **Assures trouble free continuous tube loading in seconds**
- **High accuracy and repeatable flow**

Tube bore and flow rates 120F/DV (ml/min)							
Speed rpm	**0.5mm**	**0.8mm**	**1.6mm**	**2.4mm**	**3.2mm**	**4.0mm**	**4.8mm**
10rpm	0.2	0.4	1.4	2.9	4.7	6.7	8.5
17rpm	0.3	0.7	2.4	4.9	8.0	11	14
31rpm	0.6	1.2	4.3	9.0	15	21	26
52rpm	1.0	2.1	7.3	15	24	35	44
220rpm	4.4	8.8	31	64	100	150	190

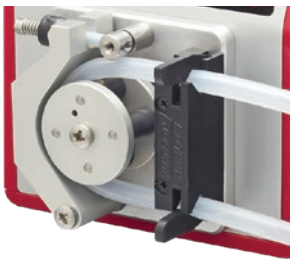
Tube bore and flow rates 120S/DV and 120U/DV (ml/min)							
Speed rpm	**0.5mm**	**0.8mm**	**1.6mm**	**2.4mm**	**3.2mm**	**4.0mm**	**4.8mm**
1 - 200rpm	0.02 - 4.0	0.04 - 8.0	0.14 - 28	0.29 - 58	0.47 - 94	0.67 - 130	0.85 - 170
0.1 - 200rpm	0.002 - 4.0	0.004 - 8.0	0.014 - 28	0.029 - 58	0.047 - 94	0.07 - 130	0.085 - 170



Flows obtained pumping water at 100rpm CCW-rotation
Typically 25% less pressure capacity in the CW direction

PERFORMANCE: 400D1 PUMPHEAD
Single channel 400D1 pumphead

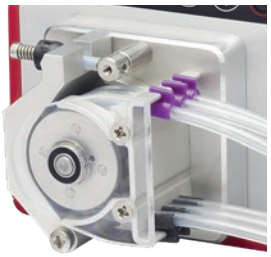
- **Flow rates from 0.001ml/min (0.0 USGPH) to 120 ml/min (1.92 USGPH)**
- **Precision machined four roller aluminium rotor**
- **Quick release sprung tube clamps**
- **Smooth precise flow**



Tube bore and flow rates 102S/D1 and 120U/D1 (ml/min)							
	Speed rpm	**0.5mm**	**0.8mm**	**1.6mm**	**2.4mm**	**3.2mm**	**4.0mm**
120S/D1	1 - 200rpm	0.01 – 2.2	0.03 – 5.8	0.11 – 23	0.24 – 49	0.41 – 81	0.59 – 120
120U/D1	0.1 - 200rpm	0.001 – 2.2	0.003 – 5.8	0.011 – 23	0.024 – 49	0.041 – 81	0.059 - 120

PERFORMANCE: 400DM2 / 400DM3 PUMPHEADS
DM2—Twin channel / DM3—Three channel pumpheads

- **Compatible with two and three bridge manifold tubing**
- **0.001ml/min (0.0 USGPH) to 36ml/min (0.58 USGPH) per channel**
- **Precision machined four roller aluminium rollers**
- **Ideal for ultra low flow metering**
- **Smooth precise flow**

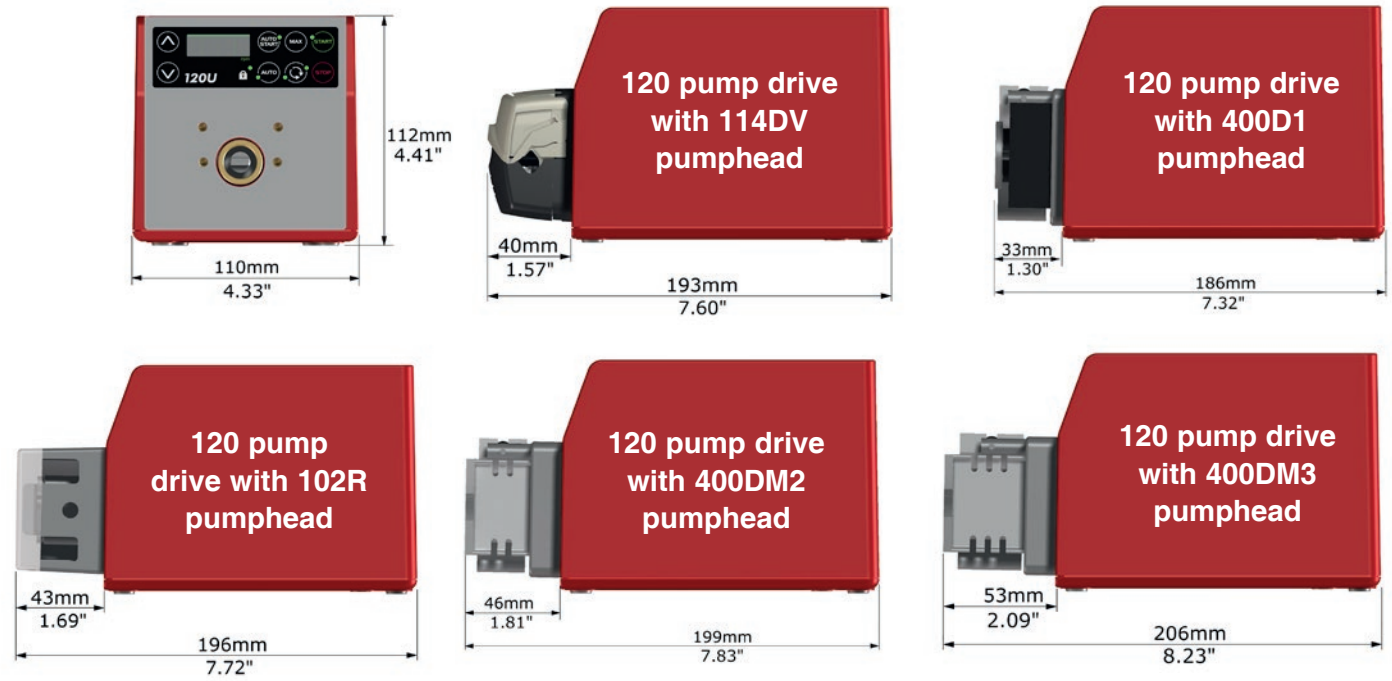


Tube bore and flow rates 400DM2, 400DM3 (ml/min)—per channel						
	Speed rpm	**0.13mm**	**0.19mm**	**0.25mm**	**0.38mm**	**0.50mm**
120S	1 – 100rpm	0.001-0.1	0.002-0.2	0.004-0.4	0.008-0.8	0.014-1.4
120U	0.1 – 100rpm	0.0001-0.1	0.0002-0.2	0.0004-0.4	0.0008-0.8	0.001-1.4
	Speed rpm	**0.64mm**	**0.76mm**	**0.89mm**	**1.02mm**	**1.14mm**
120S	1 – 100rpm	0.022-2.2	0.031-3.1	0.043-4.3	0.055-5.5	0.070-7.0
120U	0.1 – 100rpm	0.002-2.2	0.003-3.1	0.004-4.3	0.006-5.5	0.007-7.0
	Speed rpm	**1.30mm**	**1.42mm**	**1.52mm**	**1.65mm**	**1.85mm**
120S	1 – 100rpm	0.089-8.9	0.110-11	0.120-12	0.140-14	0.180-18
120U	0.1 – 100rpm	0.009-8.9	0.011-11	0.012-12	0.014-14	0.018-18
	Speed rpm	**2.06mm**	**2.29mm**	**2.54mm**	**2.79mm**	
120S	1 – 100rpm	0.210-21	0.250-25	0.310-31	0.360-36	
120U	0.1 – 100rpm	0.021-21	0.025-25	0.031-31	0.036-36	

TECHNICAL DATA

Functionality	**120F**	**120S**	**120U**
Manual control			
Fixed speed (CW direction)	•		
Variable speed 1rpm increments		•	
Variable speed 0.1rpm increments			•
Numerical speed display		•	•
Direction change		•	•
Max (prime)		•	•
Auto start		•	•
Remote control and feedback			
Run/stop, direction change, auto/man toggle, alarm			•
Analogue control			
Variable speed 0.1rpm increments			•
Analogue speed input; 4-20mA, 0-10V			•
Tacho speed output; 0-5V			•
Security			
Keypad lock to protect set-up		•	•

DIMENSIONS



TECHNICAL SPECIFICATION

120F, 120S, 120U						
Ingress rating	IP31 / NEMA 2					
Enclosure	Wipedown					
Suitability	Dry light-industrial environments					
Humidity	Non-condensing 80% up to 31C, 88F, decreasing linearly to 50% at 40C (104F)					
Temperature	5C to 40C (40F to 104F)					
Pump weight	**Drive only**	**114DV**	**102R**	**400D1**	**400DM2**	**400DM3**
	1.40kg (3lbs 1oz)	1.50kg (3lbs 5oz)	1.55kg (3lbs 7oz)	1.65kg (3lbs 10oz)	1.70kg (3lbs 11oz)	1.70kg (3lbs 11oz)
Torque rating	0.4Nm continuous duty					
Noise	< 60dB(A) at 1m					
Standard	CE, cETLus					
Power supply	Supplied with 24VDC mains transformer plug (range 90-264VAC 47-63Hz) which comes with multi-country adaptors					

Control Ratio											
	120F	**120S**					**120U**				
Pumphead	**NA**	**102R**	**114DV**	**400D1**	**400DM2**	**400DM3**	**102R**	**114DV**	**400D1**	**400DM2**	**400DM3**
Manual	Fixed	1-32 rpm (32:1)	1-200 rpm (200:1)	1-200 rpm (200:1)	1-100 rpm (100:1)	1-100 rpm (100:1)	0.1-32 rpm (320:1)	0.1-200 rpm (2,000:1)	0.1-200 rpm (2,000:1)	0.1-100 rpm (1,000:1)	0.1-100 rpm (1,000:1)
Automatic	NA	NA	NA	NA	NA	NA	0.01-32 rpm (3,200:1)	0.01-200 rpm (20,000:1)	0.01-200 rpm (20,000:1)	0.01-100 rpm (10,000:1)	0.01-100 rpm (10,000:1)

MATERIALS OF CONSTRUCTION

Drive	
Component	**Material**
Keypad	Polyester
Drive casework	ABS plastic
Drive shaft	Stainless Steel

Pumphead					
Component	**102R**	**114DV**	**400D1**	**400DM2**	**400DM3**
Pumphead track	Acetal copolymer, Kematal	Stainless steel	Aluminium (anodised)		
Pumphead guard	Polycarbonate	NA	NA	Polyethylene (PETG)	
Pumphead housing	NA	IXEF PEI, Grilamid PA12	NA		
Rotor	IXEF (Polyarylamide)	IXEF PEI	Aluminium (anodised)		
Rollers	MOS2 filled Nylon 6 (nylatron)	PTFE filled PBT	Acetal		
Spindles guide pins	Stainless steel	NA	Stainless steel		
Bearings	NA	Stainless steel	NA		
Shaft					
Springs					

ORDER CONFIGURATOR
120F: Fixed speed pump

0 1 0 . 6 1 1 • . • • 0

Speed (rpm)

1: 10
2: 17
3: 31
4: 52
5: 220

Pumphead

R0: 102R*
DA: 114DV

*Not available for 52rpm or 220rpm

Note: All models are IP31 / NEMA 2

ORDER CONFIGURATOR
120S and 120U

0 1 0 . 6 1 • 1 . • • 0

Model

3: S (Manual variable speed)
4: U (Auto variable speed)

Pumphead

DA: 114DV
R0: 102R
01: 400D1
M2: 400DM2
M3: 400DM3

ORDER INFORMATION
Pumpheads and Tubing

Pumphead product codes		
Model	**Description**	**Product code**
114DV	114DV pumphead	013.5000.00A
102R	102R single channel pumphead (8mm shaft)	013.7101.000
400D1	400D1 pumphead kit, 1 channel	043.001D.D1C
400DM2	400DM2 pumphead kit, 2 channel	043.001D.D2C
400DM3	400DM3 pumphead kit, 3 channel	043.001D.D3C
120 PSU	120V PSU kit 1A	MN2634B

Notes:
The pumpheads can only be sold as 120 replacement heads
The pumpheads are not interchangable between drive models as they use different shaft designs

Tubing 1.6mm wall thickness for 102R					
	0.5mm	**0.8mm**	**1.6mm**	**3.2mm**	**4.8mm**
Pumpsil	913.A005.016	913.A008.016	913.A016.016	913.A032.016	913.A048.016

Tubing 1.6mm wall thickness for 114DV							
	0.5mm	**0.8mm**	**1.6mm**	**2.4mm**	**3.2mm**	**4.0mm**	**4.8mm**
Bioprene	903.0005.016	903.0008.016	903.0016.016	903.0024.016	903.0032.016	903.0040.016	903.0048.016
Pumpsil (Silicone)	913.A005.016	913.A008.016	913.A016.016	913.A024.016	913.A032.016		913.A048.016
STA-PURE® Series PCS			961.0016.016		961.0032.016		961.0048.016
Marprene	902.0005.016	902.0008.016	902.0016.016	902.0024.016	902.0032.016	902.0040.016	902.0048.016
STA-PURE® Series PFL			966.0016.016		966.0032.016		966.0048.016

Tubing 1.6mm wall thickness for 400D1						
	0.5mm	**0.8mm**	**1.6mm**	**2.4mm**	**3.2mm**	**4.0mm**
Bioprene	903.0005.016	903.0008.016	903.0016.016	903.0024.016	903.0032.016	
Pumpsil (Silicone)	913.A005.016	913.A008.016	913.A016.016	913.A024.016	913.A032.016	
STA-PURE® Series PCS			961.0016.016		961.0032.016	
Marprene	902.0005.016	902.0008.016	902.0016.016	902.0024.016	902.0032.016	902.0040.016
STA-PURE® Series PFL			966.0016.016		966.0032.016	
PVC			950.0016.016		950.0032.016	
Neoprene		920.0008.016	920.0016.016		920.0032.016	

Tubing for 400DM2 and 400DM3 pumpheads				
colour code	**Bore (mm)**	**Pharmed® BPT**	**Tygon® E3603**	**Tygon® E-LFL**
orange/black	0.13		981.A013.072	
orange/blue	0.25	979.A025.072	981.A025.072	988.A025.072
orange/green	0.38	979.A038.072	981.A038.072	988.A038.072
green/yellow	0.44		981.A044.072	
orange/yellow	0.51	979.A051.072	981.A051.072	988.A051.072
white/yellow	0.57		981.A057.072	
orange/white	0.64	979.A064.072	981.A064.072	988.A064.072
black/black	0.76	979.A076.072	981.A076.072	988.A076.072
orange/orange	0.89	979.A089.072	981.A089.072	988.A089.072
white/black	0.95		981.A095.072	
white/white	1.02	979.A102.072	981.A102.072	988.A102.072
white/red	1.09		981.A109.072	
red/red	1.14	979.A114.072	981.A114.072	988.A114.072
red/grey	1.22		981.A122.072	
grey/grey	1.30		981.A130.072	988.A130.072
yellow/yellow	1.42	979.A142.072	981.A142.072	988.A142.072
yellow/blue	1.52	979.A152.072	981.A152.072	988.A152.072
blue/blue	1.65	979.A165.072	981.A165.072	988.A165.072
blue/green	1.75		981.A175.072	
green/green	1.85	979.A185.072	981.A185.072	988.A185.072
purple/purple	2.06	979.A206.072	981.A206.072	988.A206.072
purple/black	2.29	979.A229.072	981.A229.072	988.A229.072
purple/orange	2.54	979.A254.072	981.A254.072	988.A254.072
purple/white	2.79	979.A279.072	981.A279.072	988.A279.072

All flow rates shown were obtained pumping water at 20C (68F) with zero suction and delivery heads. Disclaimer:
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