

# 202S/AA

Variable speed cassette pump  
Installation and operating instructions

Publication PB 0157

- 1 Ensure mains electricity supply matches that marked on rear panel.
- 2 Load tubing into pumphead cassettes.
- 3 Set running speed.
- 4 Set direction of rotation on top panel switch.
- 5 Press **power** button to set pump running.
- 6 Hold down **max** switch to prime pump.
- 7 To stop pump, press **power** switch again.
- 8 To set pump to 0.5 percent idle speed, press **min** switch.

Watson-Marlow Limited warrants, subject to the conditions below, through either Watson-Marlow Limited or its authorised distributors, to repair or replace free of charge, including labour, any part of this product which fails within two years of delivery of the product to the end user. Such failure must have occurred because of defect in material or workmanship and not as a result of operation of the product other than in accordance with the instructions given in this manual.

Conditions of and specific exceptions to the above warranty are:

- 1 Consumable items such as fuses, rollers and tubing are excluded.
- 2 Products must be returned by pre-arrangement carriage paid to Watson-Marlow Limited or its authorised distributor.
- 3 All repairs or modifications must have been made by Watson-Marlow Limited or its authorised distributors or with the express permission of Watson-Marlow Limited or its authorised distributors.
- 4 Products which have been abused, misused, or subjected to malicious or accidental damage or electrical surge are excluded.

Warranties purporting to be on behalf of Watson-Marlow Limited made by any person, including representatives of Watson-Marlow Limited or its distributors, which do not accord with the terms of this warranty shall not be binding upon Watson-Marlow Limited unless expressly approved in writing by a Director or Manager of Watson-Marlow Limited.

Thank you for purchasing this 202S/AA cassette pump. The 202S/AA incorporates a motor control system capable of precise control over a 100 to 1 range with an accuracy of better than plus or minus one percent. If the pumphead is overloaded, the power to the motor will be held to a safe level until the cause of the overload is removed. Speed on the 202S/AA is set digitally, and the pump incorporates controls for direction of flow, priming and standby.

The 202S/AA is fitted with an entirely new cassette which is even easier to load and remove, incorporates calibrated click-stop adjustment and pre-tensions the tube for more accurate performance.

When returning for servicing, in the current situation of heightened concern over the handling of hazardous materials, any equipment which has been contaminated with, or exposed to, body fluids, toxic chemicals or any other substance hazardous to health must be decontaminated. A certificate (a suitable blank form is available from Watson-Marlow), or signed statement that the equipment has been decontaminated must be attached to the shipping carton.

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**Contamination by  
materials hazardous  
to health**

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## Supplies

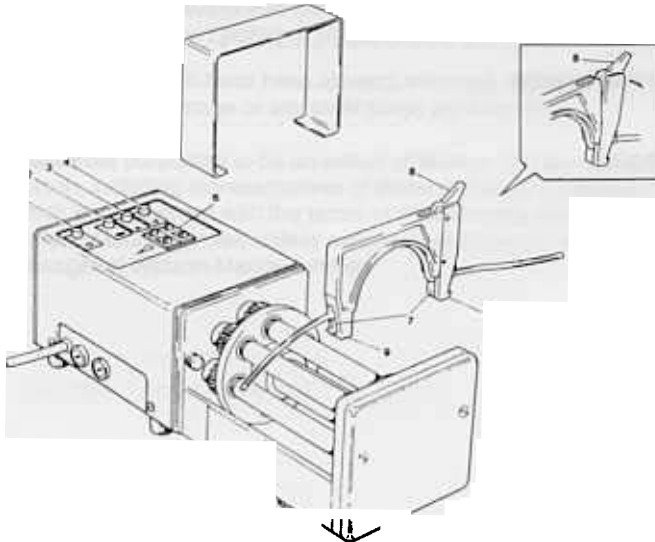
Ensure that the supply voltage and frequency corresponds with that marked on the rear of the pump. The mains supply cable is coded so that the live lead is coloured brown, the neutral lead is coloured blue, and the earth lead is coloured green and yellow.

The 202S/AA can be operated at ambient air temperatures from 0C to 37C. Storage temperatures from -20C to 70C are permissible, but allow time for acclimatisation before operating. The pump should be positioned to allow a free passage of air around it.

If the pump fails to operate, check that mains electricity is available at the unit, that all fuses are intact, that the pump is not stalled by incorrectly fitted tubing, and that the pumphead is properly located and securely attached to the drive.

There are four top panel switches, each of which is identified by a colour and shape-coded light emitting diode. Switch 1 controls power on/off, and switch 2 selects direction of rotation, either clockwise or anti-clockwise. For priming, the max switch 3 will accelerate the pump to between 150 percent and 200 percent of its normal maximum speed depending upon the local mains supply voltage. The max switch is non-latching and must be held down as long as high speed running is required. The min switch 4 sets the pump to run at approximately 0.5 percent of its rated maximum speed. This will be found useful as an idle facility since the very low rotor speed is sufficient to prevent the tube walls adhering to each other. The min switch is latching and has a press-to-set, press-to-release action. The max switch will override the min switch.

The speed control potentiometer 6 is a digital type enabling the pump speed to be varied in increments of one percent. Speed stability will be better than plus or minus one percent.



The cassettes are designed for use with manifold pump tubing. Place the tube, without twisting or stretching it into the retaining slots (7). Depress the cam adjustment lever (8) and push the cassette leg downwards and inwards. Load the cassettes into the pumphead starting at the drive end. Ensure that both retaining lips (9) are properly engaged, then raise the cam adjustment lever to its vertical position to give approximately the right tube occlusion. Raise the cam adjustment lever only far enough to obtain the pressure that you require. Over occlusion will cause unnecessary tube wear.

In most cases it will be found that the moving rollers will ease the tube through the cassette until the colour coded wishbone on the inlet side rests against the cassette. Where this does not happen, assist by pulling the tube gently through the cassette.

Depress the cam adjustment lever fully and lift out cassette. There is no need to switch off the drive to remove a cassette, and the removal of a cassette will not disturb the pumping action of any other.

These flow rates were obtained from a 202S/AA fitted with PVC tubing pumping water at room temperature. Where flow rate is critical, it should be determined under operating conditions since factors such as suction and delivery pressure, temperature and the viscosity of the fluid will all affect flow rate. The rated flow rates of the colour coded manifold tubes (for instance, one ml/min for grey/grey tubing) will be obtained at approximately forty percent. Minimum flow rates will be one percent of the figures given.

Flow precision demands accurate, consistent tubing. The formulation, manufacture and quality control of all the manifold pump tubing types listed below comply with Watson-Marlow specifications.

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**Standard operating conditions**

<b>Colour code</b>	<b>Bore mm</b>	<b>Flow ml/min</b>	<b>Marprene</b>	<b>PVC</b>	<b>Silicone</b>
Orange/black	0.13	0.02		980.0013.000	
Orange/red	0.19	0.06		980.0019.000	
Orange/blue	0.25	0.14	978.0025.000	980.0025.000	
Orange/green	0.38	0.24	978.0038.000	980.0038.000	
Orange/yellow	0.50	0.39	978.0050.000	980.0050.000	
Orange/white	0.63	0.57	978.0063.000	980.0063.000	982.0063.000
Black/black	0.76	0.77	978.0076.000	980.0076.000	982.0076.000
Orange/orange	0.88	1.09	978.0088.000	980.0088.000	982.0088.000
White/white	1.02	1.44	978.0102.000	980.0102.000	982.0102.000
Red/red	1.14	1.85	978.0114.000	980.0114.000	982.0114.000
Grey/grey	1.29	2.25	978.0129.000	980.0129.000	982.0129.000
Yellow/yellow	1.42	2.89	978.0142.000	980.0142.000	982.0142.000
Translucent	1.47	3.16			982.0147.000
Yellow/blue	1.52	3.42	978.0152.000	980.0152.000	982.0152.000
Blue/blue	1.65	3.76	978.0165.000	980.0165.000	982.0165.000
Green/green	1.85	4.88	978.0185.000	980.0185.000	982.0185.000
Purple/purple	2.05	5.87	978.0205.000	980.0205.000	982.0205.000
Purple/black	2.38	7.12	978.0238.000	980.0238.000	982.0238.000
Purple/orange	2.54	9.12	978.0254.000	980.0254.000	982.0254.000
Purple/white	2.79	10.20	978.0279.000	980.0279.000	982.0279.000

<b>Colour code</b>	<b>Bore mm</b>	<b>Flow ml/min</b>	<b>Solvent resistant</b>	<b>Acid resistant</b>
Orange/black	0.13	0.02	984.0013.000	
Orange/red	0.19	0.06	984.0019.000	
Orange/blue	0.25	0.14	984.0025.000	
Orange/green	0.38	0.24	984.0038.000	
Orange/yellow	0.50	0.39	984.0050.000	986.0050.000
Orange/white	0.63	0.57	984.0063.000	986.0063.000
Black/black	0.76	0.77	984.0076.000	986.0076.000
Orange/orange	0.88	1.09	984.0088.000	986.0088.000
White/white	1.02	1.44	984.0102.000	986.0102.000
Red/red	1.14	1.85	984.0114.000	986.0114.000
Grey/grey	1.29	2.25	984.0129.000	986.0129.000
Yellow/yellow	1.42	2.89	984.0142.000	986.0142.000
Translucent	1.47	3.16		
Yellow/blue	1.52	3.42	984.0152.000	986.0152.000
Blue/blue	1.65	3.76	984.0165.000	986.0165.000
Green/green	1.85	4.88	984.0185.000	986.0185.000
Purple/purple	2.05	5.87	984.0205.000	986.0205.000
Purple/black	2.38	7.12	984.0238.000	986.0238.000
Purple/orange	2.54	9.12	984.0254.000	986.0254.000
Purple/white	2.79	10.20	984.0279.000	984.0279.000

Motor type	Permanent magnet direct current
Nominal maximum gearbox output speed	50rpm
Nominal maximum rotor speed	10rpm
Speed control ratio	100:1
Operating voltage/frequency	200-250V 50/60Hz 90-130V 50/60Hz
Maximum power consumption	20VA
Fuse ratings	0.16A/200-250V 0.315A/90-130V
Operating temperature	0C to 37C
Storage temperature	-20C to 70C
Standards	CEE10, ESCHLE
Height	120mm (4 3/4")
Width	125mm (4 15/16")
Length 202S/AA4	262mm (10 5/16")
Weight 202S/AA4	4.8kg (10 1/2lbs)
Length 202S/AA8	312mm (12 1/4")
Weight 202S/AA8	5.6kg (12 1/2lbs)
Length 202S/AA12	362mm (14 1/4")
Weight 202S/AA12	6.4kg (14 1/2lbs)
Length 202S/AA16	412mm (16 1/4")
Weight 202S/AA16	7.2kg (16 1/2lbs)

Scheduled maintenance of the 202S/AA pump is not required. If the pump needs cleaning, use a cloth dampened with a solution of water and mild detergent. Do not use strong solvents

Colour code	Bore Flow		Marprene	PVC	Silicone
	mm	ml/min			
Orange/black	0.13	0.02		980.0013.000	
Orange/red	0.19	0.06		980.0019.000	
Orange/blue	0.25	0.14	978.0025.000	980.0025.000	
Orange/green	0.38	0.24	978.0038.000	980.0038.000	
Orange/yellow	0.50	0.39	978.0050.000	980.0050.000	
Orange/white	0.63	0.57	978.0063.000	980.0063.000	982.0063.000
Black/black	0.76	0.77	978.0076.000	980.0076.000	982.0076.000
Orange/orange	0.88	1.09	978.0088.000	980.0088.000	982.0088.000
White/white	1.02	1.44	978.0102.000	980.0102.000	982.0102.000
Red/red	1.14	1.85	978.0114.000	980.0114.000	982.0114.000
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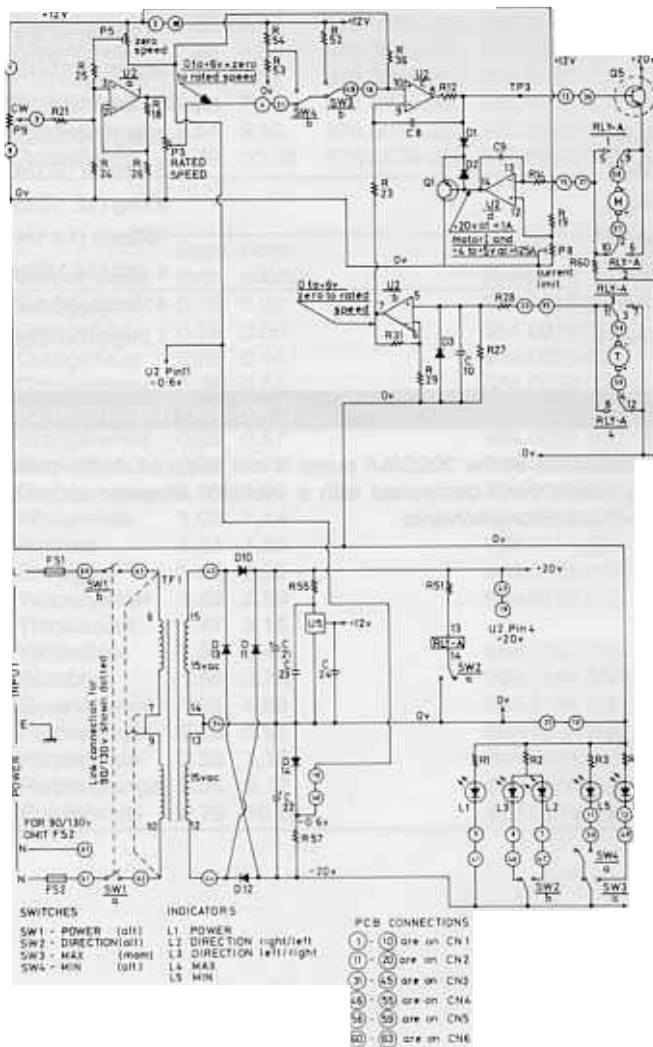
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DEA0029A	Control PCB assembly	BB 0003B	Bearing, roller
DEA0030A	Logic PCB assembly	BB 0014B	Bearing, centre shaft
FS 0019	Fuse, type T, 0.16A	DE 0264B	Gear, centre, 45 teeth
FS 0020	Fuse, type T, 0.315A	DE 0301M	Gear, 35 teeth, plastic
FH 0007	Fuseholder	DE 0293S	Gearbox cover
TF 0004	Transformer	DE 0466T	Roller, 4 channel
DEA0041A	Motor/gearbox, 12V dc	DE 0553T	Roller, 8 channel
MN 0197H	Mains cable	DE 0554T	Roller, 12 channel
RV 0027	Digital potentiometer	DE 0467T	Roller, 16 channel
OS 0013	Drive belt	DEA0012A	End plate assembly
FB 0001	Foot	DEA0014A	Cassette assembly



## Declaration of incorporation

We declare that when any pump or drive unit listed below is used with any suitable Watson-Marlow pumphead (also listed below) and intended for installation into machines or are to be assembled with other machines into machines. It must not be put into service until the machinery into which it has been incorporated has been declared to be in conformity with the provisions of the

### Machinery Directive 91/368/EEC EN60204-1

Pumps		Drive units		Pumpheads		
101U/R	701S/R	205S	505S	205AA	501RL	603R
101F/R	701U/R	205U	505U	205BA	505L	605L
	701FB/R		505Du	205LA	505LX	
501/601FB/R	701FBC/R	302S	505Di	205AAX		701RX
501/601FBC/R	701VB/R	302F	505Dz	205BAX	504MC	701REX
501/601VB/R	701DFBC/R			205LAX	508MC	
501/601DFBC/R	701DFB/R	504S	603S			MG204
501/601DFB/R	701DVBC/R	504U	604S	303D/A	505AA	MG209
501/601DVBC/R	701DVB/R	504F	604U	303X	505BA	MG213
501/601DVB/R	701IB/R		604Di	304D/A	505LA	
	EL3-N		5004U	304X		
				306D/A	505AAX	
				306X	505BAX	
					505LAX	



Responsible person: A S Balding, Managing Director.  
**Watson-Marlow Limited**, Falmouth, Cornwall, TR11 4RU, England.  
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## Declaration of conformity

We declare that when any pump or drive unit listed below is used with any suitable Watson-Marlow pumphead (also listed below) to form a stand alone pump it conforms to the requirements of the

Machinery Directive 91/386/EEC EN60204-1  
 Low Voltage Directive 73/23/EEC EN61010-1

Pumps		Drive units		Pumpheads		
101U/R	701S/R	205S	505S	205AA	501RL	603R
101F/R	701U/R	205U	505U	205BA	505L	605L
	701FB/R		505Du	205LA	505LX	
501/601FB/R	701FBC/R	302S	505Di	205AAX		701RX
501/601FBC/R	701VB/R	302F	505Dz	205BAX	504MC	701REX
501/601VB/R	701DFBC/R			205LAX	508MC	
501/601DFBC/R	701DFB/R	504S	603S			MG204
501/601DFB/R	701DVBC/R	504U	604S	303D/A	505AA	MG209
501/601DVBC/R	701DVB/R	504F	604U	303X	505BA	MG213
501/601DVB/R	701IB/R		604Di	304D/A	505LA	
	EL3-N		5004U	304X		
				306D/A	505AAX	
				306X	505BAX	
					505LAX	



Responsible person: A S Balding, Managing Director.  
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