

Installation and operating instructions

*501RL, 205, 505BA
and 505L pumpheads*



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Declarations

Declaration of incorporation

When the 501RL, 205BA, 505BA, and 505L pumpheads are to be used with any Watson-Marlow drive unit or any customer's drive unit, or are to be installed into machines or assembled with other machines for installations, they must not be put into service until the relevant machinery has been declared in conformity with the provisions of the Machinery Directive 2006/42/EC.

Responsible person: David Cole, Managing Director,
Watson-Marlow Limited, Falmouth, Cornwall TR11 4RU, England.

Telephone 01326 370370 Fax 01326 376009

Two year warranty

Watson-Marlow Limited warrants, subject to the conditions below, through either Watson-Marlow Limited, its subsidiaries, 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:

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

Warranties purporting to be on behalf of Watson-Marlow Limited made by any person, including representatives of Watson-Marlow Limited, its subsidiaries, 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.

Information for returning pumps

Any equipment which has been contaminated with, or exposed to, body fluids, toxic chemicals or any other substance hazardous to health must be decontaminated before it is returned to Watson-Marlow or its distributor.

A certificate (a suitable blank form is included at the rear of these operating instructions), or signed statement, must be attached to the outside of the shipping carton.

This certificate is required even if the pump is unused. If the pump has been used, the fluids that have been in contact with the pump and the cleaning procedure must be specified along with a statement that the equipment has been decontaminated.

Safety

In the interests of safety, these pumpheads and the tubing selected should only be used by competent, suitably trained personnel after they have read and understood this manual, and considered any hazard involved.

Any person who is involved in the installation or maintenance of this equipment should be fully competent to carry out the work. In the UK this person should also be familiar with the Health and Safety at Work Act 1974.



Recommended operating procedures

Do keep delivery and suction lines as short as possible.

Do use the minimum number of bends in rigid pipe runs. If there must be a bend, use a swept bend and not a tight elbow.

Do use suction and delivery pipelines with a bore equal to or larger than the bore of the tube fitted in the pumphead. When pumping **viscous** fluids, the losses caused by increased friction can be overcome by using pipe runs with a cross sectional area several times greater than the pumping element.

Do run at a slow speed when pumping viscous fluids. When using the 501RL pumphead, a 4.8 or 6.4mm bore tube with a 1.6mm wall will give best results. Tube smaller than this will generate a high friction pressure loss, so reducing the flow. Tube with a larger bore will not have sufficient strength to re-stitute. Flooded suction will enhance pumping performance in all cases, particularly for materials of a viscous nature. Silicone and Marprene tubing is available with a 2.4mm wall thickness for speeds up to 220rpm. (The rotor will require re-setting to a roller/track gap of 3.8mm.)

Do use the largest possible bore tube running at slow speed for the longest tube life.

Do fit an extra length of pump tube in the system so that you can move the tube through the pumphead occasionally, without needing to break the pumping circuit. This is particularly useful for extending tube life in long running sterile applications.

Do keep the track and rollers clean, and ensure that the rollers are free.

Do not fit valves in the suction or delivery lines without considering that peristaltic pumps are self priming and will hold their prime up to several metres, so there may be no need for non-return or foot valves, nor for the loading valves required on many other kinds of pumps.

Any valves fitted must cause no restriction. If electrically actuated valves are fitted, they should be interlocked so that the pump will only run when the valves are open. Fit an automatic by-pass if manual valves are installed.

When using Marprene or Bioprene tubing, after about 30 minutes of running, re-tension the tube in the pumphead by releasing the tube clamp on the delivery side a little and pulling the tube tight. This is to counteract the normal stretching that occurs with Marprene or Bioprene, which can go unnoticed, and result in poor tube life.

Tube selection The chemical compatibility list published in the Watson-Marlow catalogue is only a guide. If in doubt request a tube sample card for immersion trials. Remember the sample will be fully immersed, but the fluid when in use will only be in contact with the inside of the tube. If the material swells but does not lose its strength it could be worth considering.

Viscous dispensing To overcome the common problems, of reduced accuracy and dripping delivery pipes, the suction and delivery lines should be kept as short as possible. Use larger bore transmission tubes than in the pumphead to keep the friction losses to a minimum. Improvement will be noticed if rigid or semi-rigid pipe is used on the delivery side. The rigid tube is effective in reducing over-run because it does not expand during pumping.

Part 1 : 501RL pumphead

Description

The 501RL pumphead has two spring-loaded rollers, which automatically compensate for minor variations in tubing wall thickness, giving extended tube life.

The 501RL is set during manufacture to accept tubing with wall thicknesses of between 1.6mm and 2.0mm, and internal diameters of up to 8.0mm. The 501RL pumphead is equipped with a "tool lockable" guard for increased safety, this should be locked shut whilst the pump is in use.

A major feature of the 501RL pumphead is the ability to run the pumphead clockwise for extended tube life, or anti-clockwise to operate against higher pressures.

The tube clamps of the 501RL are adjustable to four positions to allow varying tube diameters to be securely held without occluding the tube.

Installation

Any one of three tubing input/output positions can be selected on cased drives. Select the required position then fit the track over the drive shaft and locating boss. Tighten the track retaining screw.

After checking that the shaft is clean and degreased slide the rotor on to it. Fit the track in any one of three orientations, over the drive and locating boss. Secure the track with the locating screw. Ensure the drive shaft is degreased before locating the rotor onto the shaft via the split collet. **Rotate rotor until its guide rollers are aligned flush to the front edge of the track.** Tighten the rotor screw to a torque of 3Nm to prevent the collet slipping during operation.

To reposition the track, remove any tubing from the pumphead, and swing out the crank handle to expose the rotor retaining screw. Turn the screw anticlockwise one turn to release the collet, and withdraw the rotor from the shaft. Loosen the track locating screw, and pull the track clear. Rotate the track to its new position and tighten the track locating screw.

Roller adjustment

The 501RL has a factory set gap of 2.6mm between the rollers and the track and is suitable for tubing having wall thicknesses of between 1.6 and 2.0mm. Adjustment of the gap will be required if tubing having a wall thickness of less than 1.6mm is required. There is an adjusting screw on each of the two roller arms, and each of these screws will require adjustment. The correct gap is twice the wall thickness less twenty percent. Correct adjustment is important: over occlusion will reduce tube life; under occlusion will reduce pumping efficiency.

To change the gap setting, turn each adjusting screw clockwise to increase the gap, or anticlockwise to decrease the gap. A full turn changes the gap by 0.8mm.

To restore the original settings of 2.6mm, turn the adjusting screws until both rollers are just touching the track, then tighten each screw by three and a quarter turns.

Tube loading

Switch off the pump before loading the tube. Unlock and open the hinged guard and swing out the rotor crank handle until it locks into position.

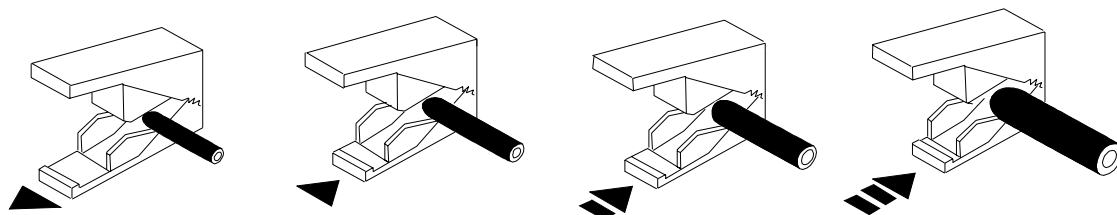
Select the length of tubing required, noting that approximately 240mm is required for the track system (measured from the outside faces of the tube clamps).



Fit one end of the tubing into one of the spring loaded clamps, and then, whilst rotating the rotor with the crank handle, feed the tubing between the rollers and the track, aligning it within the rotor tube guides. The tubing must lie naturally against the track and must not be twisted or stretched.

Fit the other end of the tubing into the second spring loaded clamp, ensuring that the tubing is not slack in the pumphead, since this can reduce tube life. Close the crank handle and shut and lock the guard. After the pump has been started, open the downstream clamp for a short time, so that the tube can find its natural length.

The 501RL pumphead is fitted with four-position tube clamps, to accommodate various tube diameters, which can be adjusted by pushing in or pulling out the bars at the top of the upper clamp and the bottom of the lower clamp. Set the clamps so that the minimum necessary pressure is applied to the tubing.

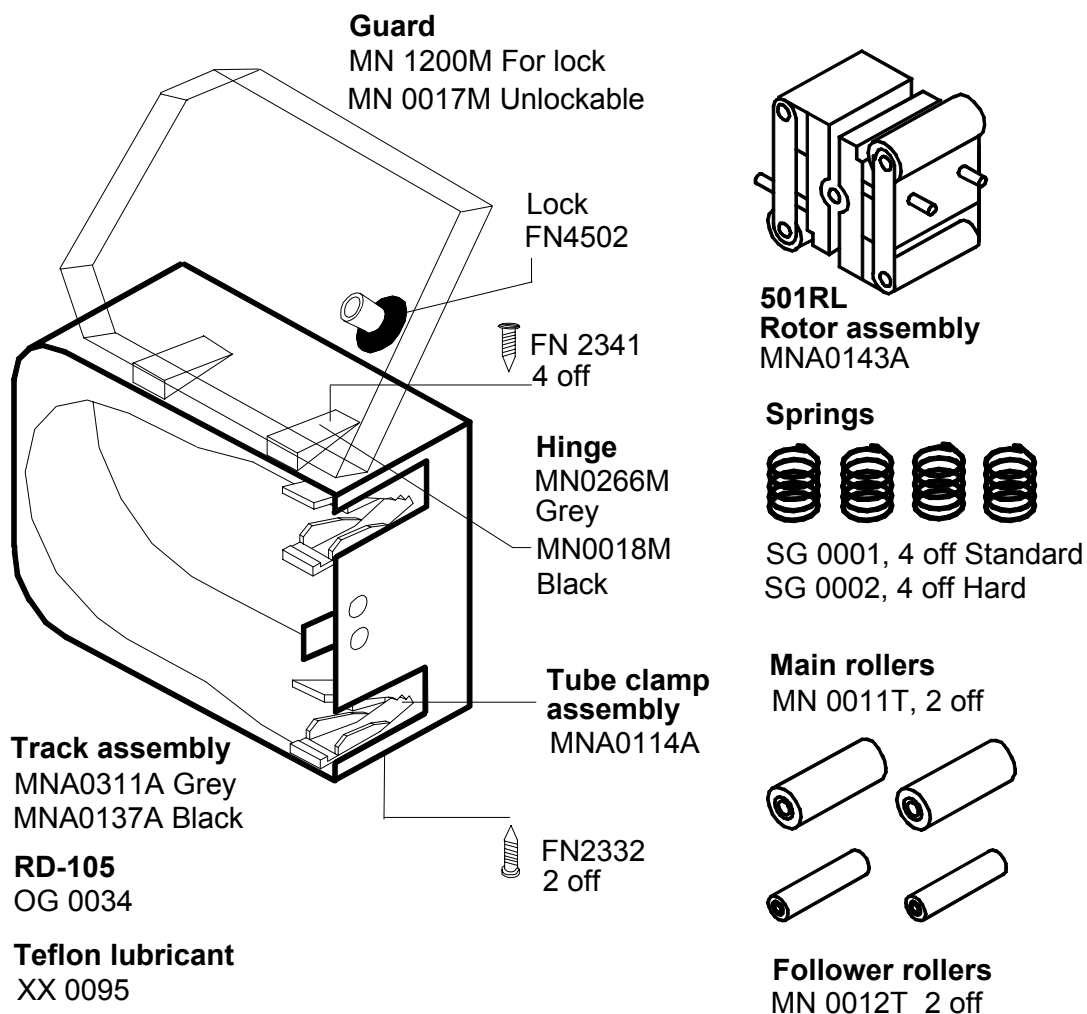


Care and maintenance

If aggressive liquids are spilled on to the pumphead, the head should be removed and cleaned using a mild solution of detergent and water. Remove any tubing from the pumphead, and swing out the crank handle to expose the rotor retaining screw. Turn the screw anticlockwise one turn to release the collet, and withdraw the rotor from the shaft. Unscrew the track retaining screw and detach the track from its spigot.

Check moving parts of the rotor regularly for freedom of movement. Lubricate pivot points and rollers with Teflon lubricating oil. To obtain effective lubrication of the roller spindle, remove from the pumphead and clean thoroughly prior to applying RD-105 grease.

Spares



If in doubt when considering spares for order, do not hesitate to contact Watson-Marlow Technical Support for further information.

Flow rates

The flow rates given overleaf were obtained using silicone tubing, with the pumphead rotating clockwise, pumping water at 20C with zero suction and delivery pressures (unless otherwise stated). Where an application is critical, the flow rate should be determined under operating conditions. The important factors affecting flow rates are delivery pressures, temperature, and fluid viscosity. Tube life will be reduced when pumping against pressure.

501RL flow rates (ml/min)								
Tube #		112	13	14	16	25	17	18
Tube bore		0.5mm 1/50"	0.8mm 1/32"	1.6mm 1/16"	3.2mm 1/8"	4.8mm 3/16"	6.4mm 1/4"	8.0mm 5/16"
504S/U	55rpm	2.3	6.7	24	101	220	347	550
505S/U/Du	220rpm	9.2	27	94	410	892	1400	2200
505Di	220rpm	9.2	27	94	410	892	1400	2200
	300*rpm	12.5	37	128	560	1210	1900	3000
503P	30rpm	1.3	3.7	13	55	120	190	300
	160rpm	6.7	20	70	293	640	1010	1600

* Pumphead restricted to a maximum running speed of 300rpm.

Tubing range

Flow precision depends upon the accuracy and consistency of the tubing. All Watson-Marlow tubing is formulated, manufactured and quality controlled to rigorous specifications. Peristaltic pumping performance and tube life will be affected unless tubing specifically designed for the task is used.

Ordering Information

Tubing 501RL pumphead						
Bore mm "	Tube #	Marprene	Bioprene	Silicone	Neoprene	
0.5 1/50	112	902.0005.016	903.0005.016	910.0005.016		
0.8 1/32	13	902.0008.016	903.0008.016	910.0008.016	920.0008.016	
1.6 1/16	14	902.0016.016	903.0016.016	910.0016.016	920.0016.016	
3.2 1/8	16	902.0032.016	903.0032.016	910.0032.016	920.0032.016	
4.8 3/16	25	902.0048.016	903.0048.016	910.0048.016	920.0048.016	
6.4 1/4	17	902.0064.016	903.0064.016	910.0064.016	920.0064.016	
8.0 5/16	18	902.0080.016	903.0080.016	910.0080.016	920.0080.016	
Bore mm "	Tube #	Butyl	Tygon	Viton		
1.6 1/16	14	930.0016.016	950.0016.016	970.0016.016		
3.2 1/8	16	930.0032.016	950.0032.016	970.0032.016		
4.8 3/16	25	930.0048.016	950.0048.016	970.0048.016		
6.4 1/4	17	930.0064.016	950.0064.016	970.0064.016		
8.0 5/16	18	930.0080.016	950.0080.016	970.0080.016		

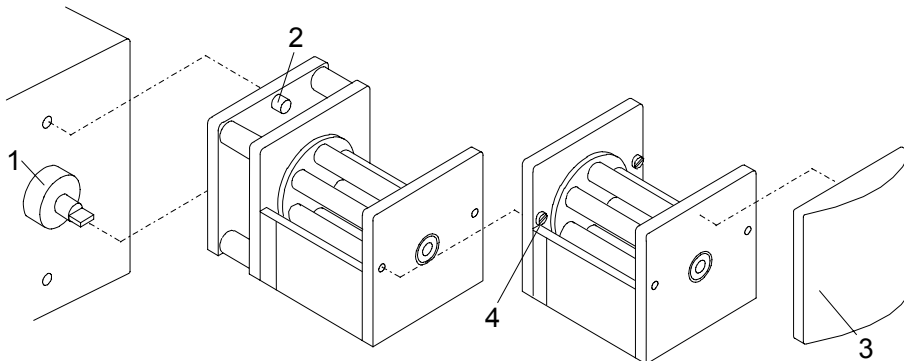
Part 3: 205BA & 505BA pumpheads

Description

The 205BA/505BA pumpheads have eight rollers driven by planetary gearing providing virtually pulse free flow. They are easy loading cassette pumpheads available in 4, 8, 12 or 16 channel versions. If more channels are required, 12 or 16 channel 205BAX/505BAX extension pumpheads can be added.

Installation

Remove the drive-shaft cover from the 205BA/505BA and fit the pumphead over the drive "nose" (1), ensuring that the tongue on the drive shaft locates on the slot in the pumphead centre shaft. Tighten the retaining screws (2) at the top and bottom of the mounting plate.



Fitting an extension pumphead

To fit an extension pumphead, remove the end cover plate (3) on the first pumphead, exposing the two locating pins and the drive shaft slot. Spring off the planetary gear system cover plate from the 205BAX/505BAX extension pumphead.

Locate the 205BAX/505BAX extension pumphead on to the two locating pins, ensuring that the tongue of its drive shaft engages in the slot in the shaft of the 205BAX/505BAX. Tighten the two retaining screws (4) on the right and left of the 205BAX/505BAX to be added. Fit the end plate to the last pumphead.

Flow rates

These flow rates were obtained using PVC tubing pumping water at 20C with zero suction and delivery pressures. Critical flow rates should be measured under operating conditions where the important factors are suction and delivery, temperature and viscosity. Flow rates are given in ml/minute.

205BA flow rates (ml/min)		Tubing internal diameter (mm)							Maximum Channels
Drive	rpm	0.13	0.19	0.25	0.38	0.50	0.63	0.76	
205S & 205U	0.5	0.0003	0.0011	0.001	0.002	0.004	0.007	0.011	32
	90	0.045	0.116	0.265	0.439	0.720	1.30	1.89	32
		0.88	1.02	1.14	1.29	1.42	1.47	1.52	32
Drive	rpm	0.035"	0.04"	0.045"	0.05"	0.055"	0.058"	0.06"	32
205S & 205U	0.5	0.014	0.019	0.023	0.029	0.035	0.038	0.040	32
	90	2.52	3.33	4.10	5.27	6.25	6.78	7.15	32
		1.65	1.85	2.05	2.38	2.54	2.79		32
Drive	rpm	0.065"	0.07"	0.08"	0.09"	0.1"	0.11"		32
205S & 205U	0.5	0.046	0.057	0.069	0.089	0.10	0.117		32
	90	8.26	10.3	12.4	16.1	18.0	21.0		32

The 205BA pumphead is dedicated to the 205S and 205U drives.

505BA flow rates (ml/min)									
		Tubing internal diameter (mm)							Maximum Channels
Drive	rpm	0.13	0.19	0.25	0.38	0.50	0.63	0.76	
504U	0.5	0.0002	0.0006	0.0014	0.0024	0.004	0.008	0.010	48
504S	2.0	0.0008	0.0024	0.0056	0.0096	0.016	0.032	0.04	48
505U	55	0.03	0.07	0.16	0.27	0.44	0.79	1.16	48
505S	170	0.068	0.204	0.476	0.816	1.36	2.72	3.4	48
505Du	0.25	0.0001	0.0003	0.0007	0.0012	0.002	0.004	0.005	48
	1.0	0.0004	0.0012	0.0028	0.0048	0.008	0.016	0.02	48
	55	0.03	0.07	0.16	0.27	0.44	0.79	1.16	48
	170	0.068	0.204	0.476	0.816	1.36	2.72	3.4	48
505Di	1.0	0.0004	0.0012	0.0028	0.0048	0.008	0.016	0.02	48
	2.0	0.0008	0.0024	0.0056	0.0096	0.016	0.032	0.04	48
	170	0.068	0.204	0.476	0.816	1.36	2.72	3.4	48
503P	6	0.0024	0.0072	0.0168	0.0288	0.048	0.096	0.12	48
	30	0.012	0.036	0.084	0.144	0.24	0.48	0.6	48
	32	0.0128	0.0384	0.0896	0.1536	0.256	0.512	0.64	48
	160	0.064	0.192	0.448	0.768	1.28	2.56	3.2	48
		Tubing internal diameter (mm)							Maximum Channels
Drive	rpm	0.88	1.02	1.14	1.29	1.42	1.47	1.52	
504U	0.5	0.014	0.02	0.022	0.030	0.034	0.038	0.040	48
504S	2.0	0.056	0.08	0.088	0.12	0.136	0.152	0.16	48
505S	55	1.54	2.04	2.51	3.22	3.82	4.14	4.37	48
504U	170	4.76	6.8	7.48	10.2	11.56	12.92	13.6	48
505Du	0.25	0.007	0.009	0.011	0.015	0.017	0.019	0.020	48
	1.0	0.028	0.04	0.044	0.060	0.068	0.076	0.080	48
	55	1.54	2.04	2.51	3.22	3.82	4.14	4.37	48
	170	4.76	6.8	7.48	10.2	11.56	12.92	13.6	48
505Di	1.0	0.028	0.04	0.044	0.060	0.068	0.076	0.080	48
	2.0	0.056	0.08	0.088	0.12	0.136	0.152	0.16	48
	170	4.76	6.8	7.48	10.2	11.56	12.92	13.6	48
503P	6	0.168	0.24	0.264	0.36	0.408	0.456	0.48	48
	30	0.84	1.2	1.32	1.8	2.04	2.28	2.4	48
	32	0.896	1.28	1.408	1.92	2.176	2.432	2.56	48
	160	4.48	6.4	7.04	9.6	10.88	12.16	12.8	48
		Tubing internal diameter (mm)							Maximum Channels
Drive	rpm	1.65	1.85	2.05	2.38	2.54	2.79		
504U	0.5	0.046	0.060	0.070	0.090	0.11	0.12	48	
504S	2.0	0.184	0.24	0.28	0.36	0.44	0.48	48	
505U	55	5.05	6.31	7.60	9.84	11.0	12.8	48	
505S	170	15.64	20.4	23.8	30.6	37.4	40.8	48	
505Du	0.25	0.023	0.029	0.035	0.045	0.50	0.60	48	
	1.0	0.092	0.12	0.14	0.18	0.22	0.24	48	
	55	5.05	6.31	7.60	9.84	11.0	12.8	48	
	170	15.64	20.4	23.8	30.6	37.4	40.8	48	
505Di	1.0	0.092	0.12	0.14	0.18	0.22	0.24	48	
	2.0	0.184	0.24	0.28	0.36	0.44	0.48	48	
	170	15.64	20.4	23.8	30.6	37.4	40.8	48	
503P	6	0.552	0.72	0.84	1.08	1.32	1.44	48	
	30	2.76	3.6	4.2	5.4	6.6	7.2	48	
	32	2.944	3.84	4.48	5.76	7.04	7.68	48	
	160	14.72	19.2	22.4	28.8	35.2	38.4	48	

505BA pumpheads must not be run at rotor drive speeds greater than 170rpm

Tubing range

Single segment manifold tubing for 205BA and 505BA cassette pumpheads

Colour code	Bore mm	Bore "	Marprene	PVC	Silicone
Orange/black	0.13	0.005		980.0013.000	
Orange/red	0.19	0.007		980.0019.000	
Orange/blue	0.25	0.010	978.0025.000	980.0025.000	
Orange/green	0.38	0.015	978.0038.000	980.0038.000	
Orange/yellow	0.50	0.020	978.0050.000	980.0050.000	
Orange/white	0.63	0.025	978.0063.000	980.0063.000	982.0063.000
Black/black	0.76	0.030	978.0076.000	980.0076.000	982.0076.000
Orange/orange	0.88	0.035	978.0088.000	980.0088.000	982.0088.000
White/white	1.02	0.040	978.0102.000	980.0102.000	982.0102.000
Red/red	1.14	0.045	978.0114.000	980.0114.000	982.0114.000
Grey/grey	1.29	0.050	978.0129.000	980.0129.000	982.0129.000
Yellow/yellow	1.42	0.055	978.0142.000	980.0142.000	982.0142.000
Translucent	1.47	0.058			982.0147.000
Yellow/blue	1.52	0.060	978.0152.000	980.0152.000	982.0152.000
Blue/blue	1.65	0.065	978.0165.000	980.0165.000	982.0165.000
Green/green	1.85	0.070	978.0185.000	980.0185.000	982.0185.000
Purple/purple	2.05	0.080	978.0205.000	980.0205.000	982.0205.000
Purple/black	2.38	0.095	978.0238.000	980.0238.000	982.0238.000
Purple/orange	2.54	0.100	978.0254.000	980.0254.000	982.0254.000
Purple/white	2.79	0.110	978.0279.000	980.0279.000	982.0279.000

Single segment manifold tubing for 205BA and 505BAcassette pumpheads

Colour code	Bore mm	Bore "	Solvent resistant	Acid resistant	
Orange/black	0.13	0.005	984.0013.000		
Orange/red	0.19	0.007	984.0019.000		
Orange/blue	0.25	0.010	984.0025.000		
Orange/green	0.38	0.015	984.0038.000		
Orange/yellow	0.50	0.020	984.0050.000	986.0050.000	
Orange/white	0.63	0.025	984.0063.000	986.0063.000	
Black/black	0.76	0.030	984.0076.000	986.0063.000	
Orange/orange	0.88	0.035	984.0088.000	986.0088.000	
White/white	1.02	0.040	984.0102.000	986.0102.000	
Red/red	1.14	0.045	984.0114.000	986.0114.000	
Grey/grey	1.29	0.050	984.0129.000	986.0129.000	
Yellow/yellow	1.42	0.055	984.0142.000	986.0142.000	
Yellow/blue	1.52	0.060	984.0152.000	986.0152.000	
Blue/blue	1.65	0.065	984.0165.000	986.0165.000	
Green/green	1.85	0.070	984.0185.000	986.0185.000	
Purple/purple	2.05	0.080	984.0205.000	986.0205.000	
Purple/black	2.38	0.095	984.0238.000	986.0238.000	
Purple/orange	2.54	0.100	984.0254.000	986.0254.000	
Purple/white	2.79	0.110	984.0279.000	986.0279.000	

Cassette loading

The cassettes are designed only for use with manifold pump tubing. Place the tube, without twisting or stretching it, into the tube retaining slots. Depress the cam adjustment lever which will move the cassette leg inwards. Load the cassettes into the pumphead starting at the drive end.

Ensure that both retaining lips are properly engaged, then raise the cam adjustment lever to its vertical position to give the normal tube occlusion. The final delivery pressure can be varied slightly by adjusting the cam lever position.

Cassette removal

Depress the cam adjustment lever fully and lift out the cassette. There is no need to switch off the drive to remove a cassette for tube changing.

The removal of a cassette will not disturb the pumping action of any other but the pump must not be run for long periods of time without all the cassettes in place.

For safety reasons, all cassettes should be in position in the pumphead during normal running, even if some do not contain tubing.

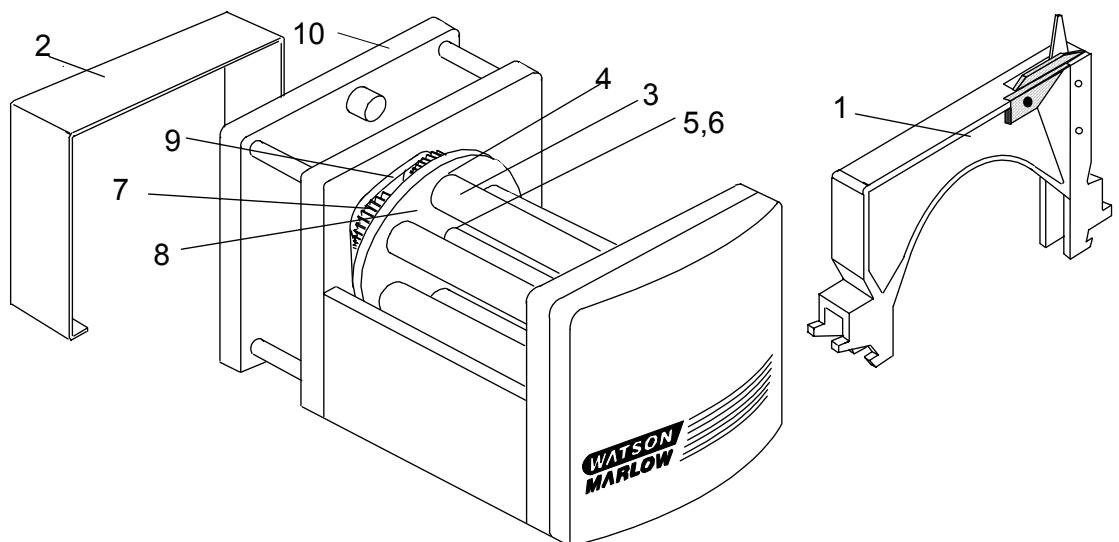


Care and maintenance

When the pumphead needs cleaning, switch the drive off and isolate it from the mains. Withdraw the cassettes from the pumphead and remove the tubing. Wash the cassettes in water and mild detergent.

If fluid has been spilled into the pumphead, removal of the pumphead from the drive will make cleaning easier. Periodically, inspect all moving parts for wear and ensure all bearings and rollers are free to rotate.

Spares 205BA & 505BA



#	Description	Part number	Quantity
1	Cassette assembly	DEA0069A	1
2	Gearbox cover	DE 0293S	1
3	Roller 4 way	DE 0981T	1
3	Roller 8 way	DE 0982T	1
3	Roller 12 way	DE 0983T	1
3	Roller 16 way	DE 0984T	1
4	Roller bearing	BB 0034	16
5	Centre shaft bearing	BB 0038	2
6	Centre spacer bearing	BB 0014	2
7	Roller gear, 35 teeth	MN 0983M	6
8	Centre gear, 45 teeth	MN 0982M	1
9	Friction O ring	OS 0013	1
10	Head/drive adaptor 505BA	053.5021.000	1

Part 5 : 505L pumphead

Description

This design of peristaltic pumphead is Watson-Marlow's most accurate dosing and dispensing pumphead. To overcome the pulsatile effect many peristaltic pumps exhibit, Watson-Marlow have developed the principle of twin offset tracks. This puts the two tubes out of phase, merging a pulse from one channel with a trough from the other.

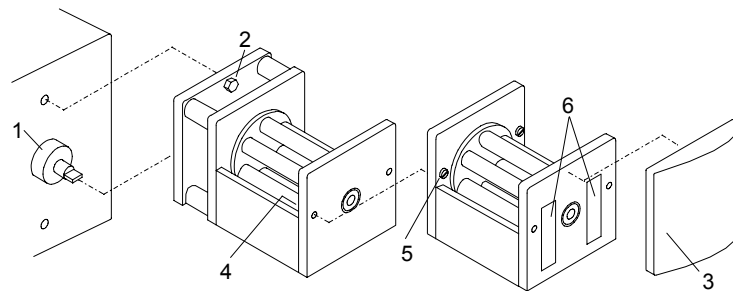
The 505L is fitted with six stainless steel rollers and uses either silicone or Marprene tubing up to 9.6mm bore, to further increase accuracy, 2.4mm wall thickness is used. With a 50% greater wall thickness than standard tubing, 505L tube elements are more stable under changing conditions of pressure, suction and viscosity. The increase of bore size compared to standard 500 series pumpheads gives increased flow rates to over 2.4 litres per minute at 220rpm.

Silicone tubing will give the highest accuracy, but Marprene or Bioprene may be a better choice where chemical compatibility is a problem, or extra long tube life is required. For most dispensing and low pulse applications, we would strongly advise the use of Watson-Marlow double-Y tubing elements, which are pre-formed to the correct length to ensure accurate merging of flows to give the smoothest flow possible. If you do not wish to use the special double-tube elements you will need to order a set of six tube clamps which will enable the pumphead to be used with either twin inlet (suction) tubes or as a two channel (totally separate) precision pumphead.

One 505LX extension pumphead can be fitted to 503P, 504S, 504U, 505Di, 505S, 505U and 505Du drives to increase flow rates still further or to provide another individual pumping channel.

Installation

Remove the drive-shaft cover from the 205/505LA and fit the pumphead over the drive "nose" (1), ensuring that the tongue on the drive shaft locates on the slot in the pumphead centre shaft. Tighten the two retaining screws (2) at the top and bottom of the mounting plate.



Fitting an extension pumphead

To remove the end cover plate (3) on the first pumphead, take one of the extension pumphead fixing bolts supplied and screw into the tapped holes (4), from the rear of the front plate, breaking the adhesion and pushing off the cover plate. Grease the shaft tongue on the extension pumphead with the grease supplied. Locate the tongue of the extension head drive shaft into the slot in the centre shaft of the first pumphead and tighten the two extension head fixing screws (5), at each side of the extension pumphead. The extension head is supplied with two strips of industrial adhesive tape (6). Peel off the cover strips and relocate the cover plate on the extension pumphead.

Flow rates

The flow rates given below were obtained using silicone tubing, with the pumphead rotating clockwise, pumping water at 20C with zero suction and delivery pressures (unless otherwise stated).

Where an application is critical, the flow rate should be determined under operating conditions. The important factors are suction and delivery pressures, temperature, and fluid viscosity.

Tube life will be reduced when pumping against pressure.

The flow rates shown are the combined flow using the Watson-Marlow Double-Y tubing elements. Flows for two separate channels are each approximately half that given.

505L flow rates (ml/min)							
Tube #	119	16	25	17	18	122	
Tube bore	1.6mm	3.2mm	4.8mm	6.4mm	8.0mm	9.6mm*	
Drive	rpm	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"
504S/U 505Di	55	40	125	230	385	495	685
505S/U 505Du	220	155	500	925	1540	1980	2750
505Di	300*	245	800	1500	2450	3150	4375
ml/revolution		0.7	2.3	4.2	7.0	9.0	12.5

* 9.6mm bore through pumphead and to delivery; 12.7mm bore to source

Tubing range

Double-Y tubing elements for 505L		Product codes	
Tube bore mm	"	Silicone	Marprene
1.6	1/16	910.E016.024	902.E016.024
3.2	1/8	910.E032.024	902.E032.024
4.8	3/16	910.E048.024	902.E048.024
6.4	1/4	910.E064.024	902.E064.024
8.0	5/16	910.E080.024	902.E080.024
9.6*	3/8	910.E096.024	902.E096.024

* 9.6mm bore through pumphead and to delivery; 12.7mm bore to source. An MNA 0345A twin tube clamp assembly, available from Watson-Marlow or its distributors, must be purchased to enable the 9.6mm high-flow Double-Y tubing element to be used.

2.4mm wall transfer tubing			Product codes	
Tube Bore mm	"	Tube #	Silicone	Marprene
1.6	1/16	119	910.0016.024	902.0016.024
3.2	1/8	120	910.0032.024	902.0032.024
4.8	3/16	15	910.0048.024	902.0048.024
6.4	1/4	24	910.0064.024	902.0064.024
8.0	5/16	121	910.0080.024	902.0080.024
9.6	3/8	122	910.0096.024	902.0096.024

Y connectors	Product codes
For 1.6mm bore	999.3016.000
For 3.2mm bore	999.3032.000
For 4.8 and 6.4mm bore	999.3064.000
For 8.0mm bore	999.3080.000
For 9.6mm bore	999.3096.000

Tube loading

Tube loading instructions are given for the three possible methods of using a 505L pumphead.

For most dispensing, and any application where there must be minimal pulsing, the use of Watson-Marlow Double-Y silicone tubing elements is recommended.

These are pre-formed to the correct length and merge two out of phase flows into a single smooth output. These elements fit on the retaining pegs supplied with the pumphead.

Under certain circumstances it may be useful to run two separate inlet tubes from your source to the pumphead. It is advisable to do this if the fluid is particularly viscous and the single inlet tube is found to restrict the flow rate, or if the pump is situated a long distance from the source reservoir and is running at high speed.

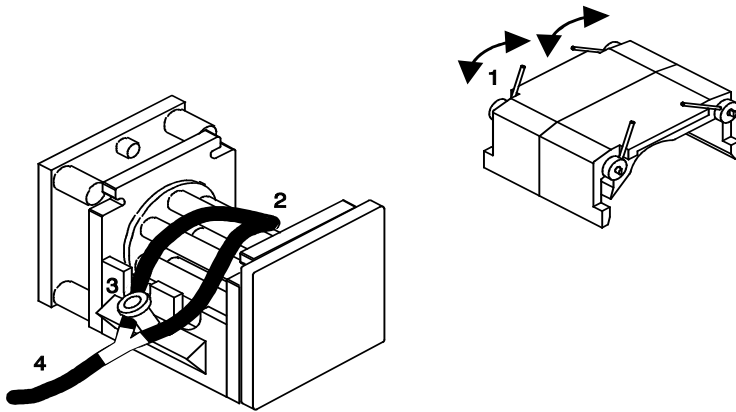
A tube clamp set is available from Watson-Marlow (refer to the spares section) to securely fix twin inlet tubes.

The 505L may also be used as a two channel, six roller, precision pumphead, with two entirely separate tubes. The tube clamp set contains two clamps for each size of tubing to enable both the inlet and the delivery side to be securely fixed.

It should be noted that, when used in this way, the flow does not benefit from the smoothing created by combining two out of phase flows, and slight channel-to-channel variation may be found in the flow rates. Keeping suction and discharge tubing lengths the same and will minimise this variation.

Lift the two levers (1) at either side of the pumphead and remove the track. Stretching the tubing element slightly (2), locate it over the "pegs" at either side of the pumphead (3).

Fitting Watson-Marlow Double-Y tubing elements

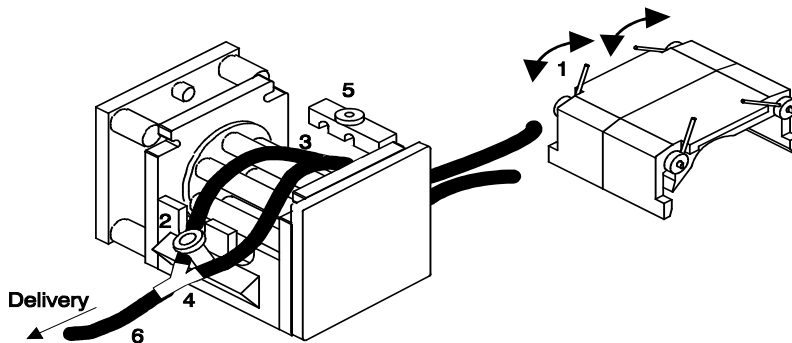


Replace the track and pull down the securing levers.

Transfer tubing (4) may now be attached to the connectors and is available from Watson-Marlow. It is advised to use 2.4mm wall tubing for transfer tubing (to match the double tube elements) as this will give the best performance under suction.

Lift the two levers (1) at each side of the pumphead and remove the track, as above. Remove the "peg" on the inlet side. Do not remove the delivery side peg (2).

Using twin inlet tubes

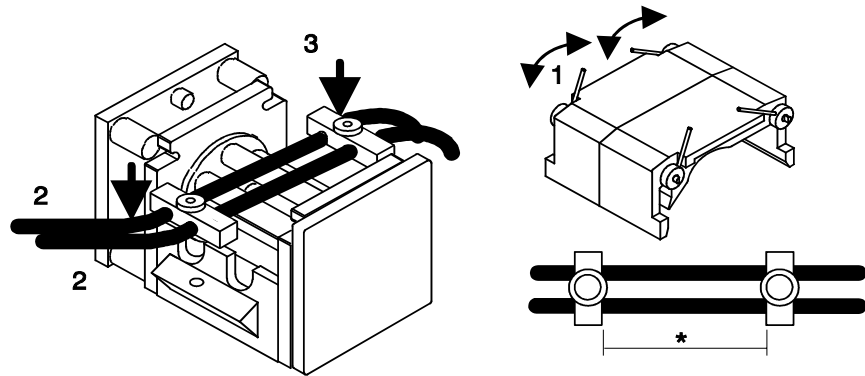


Take the two lengths (3) of tubing to be used and insert the appropriate "Y" connector (4). Lay this assembly across the rotor, with the "Y" connector over the end peg on the delivery side (2). Whilst pulling the tubing taut from the inlet side, take the correct tube clamp (5) (all tube clamps are marked with the nominal bore for their intended tubing) and firmly secure using the same fixing as the end peg. It is found to be easier to insert the two tubes into the "arches" of the clamp before securing the clamp itself.

Replace the track and pull down the securing levers and connect the delivery tube (6) to the output of the "Y" connector.

Using two independent tubes

Lift the two levers (1) at either side of the pumphead and remove the track, as above. Remove both locating "pegs". Take the two tube lengths (2) and insert into the "arches" of the tube clamps (3) ensuring that the nominal distance between the clamps * is 145mm for bore sizes up to 8.0mm and 150mm for 9.6mm bore. All tube clamps are marked with the nominal bore for their intended tubing and only the correct size should be used.



Take the tube assembly and secure one tube clamp. Whilst stretching the tubing slightly, fit the second tube clamp locking it down securely.

Replace the track and pull down the securing levers.

When fitting new lengths of Marprene tubing, run for about half an hour and then re-tension the tubing, making sure that the nominal lengths above are restored. If tubing lengths greater than those given are used, the tubing may move about within the pumphead and damage will occur.

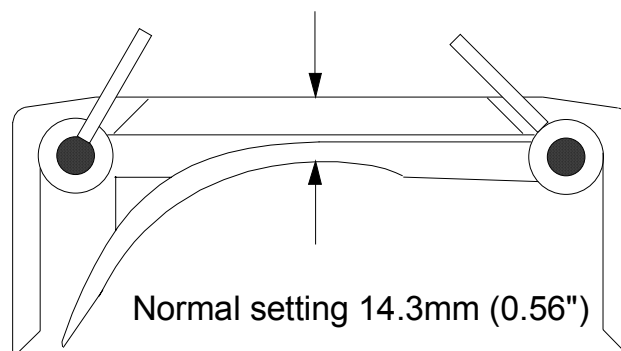
Care and maintenance

The 505L pumphead is "maintenance free" although you should check moving parts of the rotor from time to time for freedom of movement.

If aggressive liquids are spilled on to the pumphead, the head should be removed and cleaned. Do not use strong solvents.

Adjustment of the track

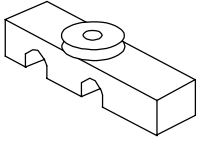
The track is set for use with 2.4mm wall tubing with bore sizes from 1.6mm to 9.6mm. If other tubing is used, it may require the adjustment of the track/rotor gap setting. This setting may also be used to "fine tune" each channel to achieve identical flow rates.



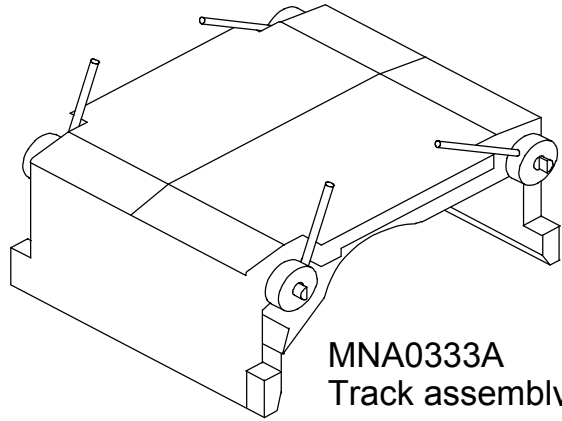
To restore the original setting, a dimension of 14.3mm (0.56") should be set from the track to the top from the pumphead. The adjustment screw is made with the screw between the two guide pins on the top of the track.

Spares and accessories

Accessories



505LTC Tube clamp set
059.4001.000
Comprises of 2 clamps for
each of the six tube sizes



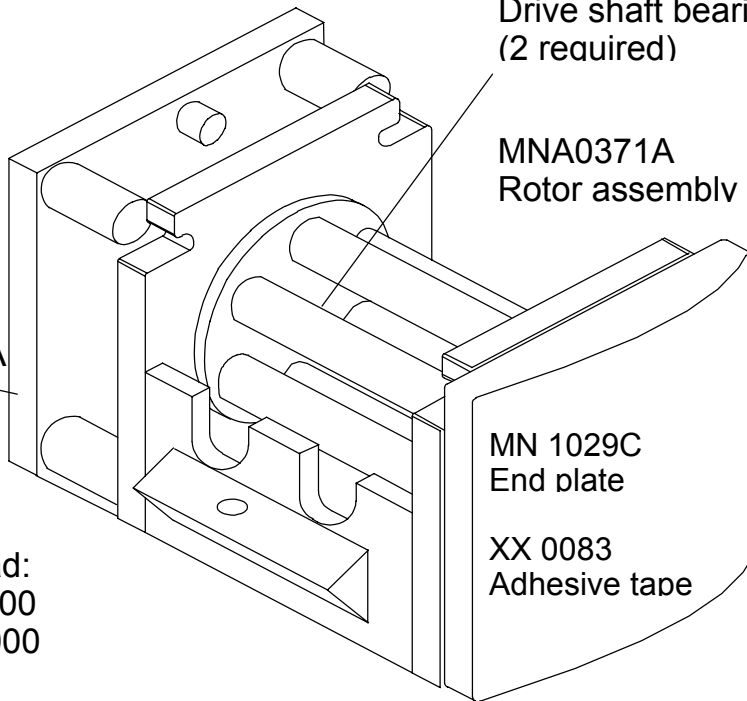
MNA0333A
Track assembly



MNA0339A
Tube locating peg
(2 required)

BB 0014
Drive shaft bearing
(2 required)

MNA0338A
Adaptor



MNA0371A
Rotor assembly

MN 1029C
End plate

XX 0083
Adhesive tape

Complete pumphead:
505L 053.4001.000
505LX 053.4011.000

