Watson-Marlow Pumps Group

WATSON-MARLOW BREDEL E-MANUALS

PB0275GB03

Watson-Marlow 704U, 704S

Clickable index

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1 Declaration of conformity

CE When this pump unit is used as a stand alone pump it complies with: Machinery Directive 98/37/EC EN60204-1, Low Voltage Directive 73/23/EEC EN61010-1, EMC Directive 89/336/EEC, EN50081-1/EN50082-1.

2 Declaration of incorporation

When this pump unit is to be installed into a machine or is to be assembled with other machines for installations, it must not be put into service until the relevant machinery has been declared in conformity with the Machinery Directive 98/37/EC EN60204-1.

Responsible person: Christopher Gadsden, Managing Director, Watson-Marlow Limited, Falmouth, Cornwall TR11 4RU, England. Telephone +44 (0) 1326 370370 Fax +44 (0) 1326 376009.

3 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 tubing and rollers 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 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, 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.

4 Information for returning pumps

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 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.

5 Safety

In the interests of safety, this pump 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.

There are dangerous voltages (at mains potential) inside the pump. If access is required, isolate the pump from the mains before removing the cover. All Molex connections should be checked before the case top is replaced.

6 Recommended operating procedures

On variable speed models please note that the mechanical speed variator must not be adjusted when the motor is not running.

Do site the fluid reservoir above the pump wherever possible.

Do keep delivery and suction lines as short and direct as possible.

Do use gradual sweeping bends in installation pipe work with minimum radius equal to five times the tubing diameter. Avoid tight pipeline bends, pipe reducers and excessive lengths of smaller bore tubing than that in the pumphead, particularly in pipelines on the suction side.

Do ensure that there is always a minimum of one metre of smooth bore flexible tubing connected to the discharge port of the pumphead. This will help minimise any impulse losses and pulsation in the pipeline. This is especially important with viscous fluids and

rigid pipework.

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 fit an over-length pump tube in the system to allow its position to be varied relative to the rotor. This will extend tube life and minimise the downtime of the pumping circuit.

Do ensure that connecting pipe work and fittings are suitably rated to handle the predicted pipeline pressure.

If rigid pipe work comes in close proximity to the pumphead, a drop out section of pipe work will simplify tube replacement.

Do keep the pumphead rollers and track clean.

If unsure of an installation please contact your local Watson-Marlow Technical Support Office for further assistance.

The self-priming nature of peristaltic pumps means valves are not required. Any valves fitted must cause no restriction to flow in the pumping circuit.

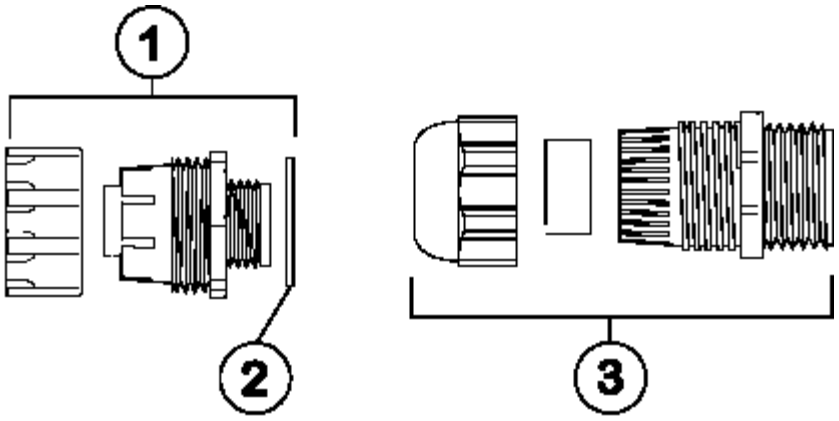
Tube selection. The chemical compatibility list published in the Watson-Marlow catalogue is only a guide. If in doubt about the compatibility of a tube material and the duty fluid, request a tube sample card for immersion trials.

7 Installation

The 704S and 704U are suitable for single-phase mains electricity supplies only.

The pump should be positioned to allow a free flow of air around it.

- Remove the small transparent plate on the rear panel to gain access to the voltage selector and terminal block.
- Set the voltage selector to either 120V for 100-120V 50/60Hz single-phase AC supplies, or 240V for 220-240V 50/60Hz single-phase AC supplies.
- Route the mains supply cable through the entry point to the right of the recess, and couple the cable to the terminal block. Check rear panel for this information.
- The 704S and 704U accept three-core 1.0 square millimetre PVC-sheathed mains cable (via the screwed adapter supplied) so that a flying lead can be used. The 704S and 704U both accept 20mm rigid or flexible conduit.
- Ensure that the mains lead is securely retained in the strain relief gland so that IP55 ingress protection is maintained.
- Securely replace the transparent plate and the gasket over the recess.



1. Conduit adaptor gland GR0018
2. Washer GR0019
3. Cable strain relief gland GR0031

Ingress protection standard will be compromised if the transparent plate is not replaced.

8 Troubleshooting

Should the pump fail to operate, make the following checks to determine whether or not servicing is required.

- Check that the power switch is on.
- Check the mains supply is available at the pump.
- Check the voltage selector switch is in the correct position.
- Check the fuse in the mains socket.
- Check that the pump is not stalled by incorrect fitting of tubing.

9 704S and 704U Manual operation

- Switch on mains power by turning the rotary switch on top of the drive to "**I**".
- Change the set speed by pressing the ⌃ or ⌄ key. The 704S and 704U speed control ratio is better than 50:1. This will give a minimum rotor speed of 7rpm on the 360rpm drive.
- Change direction by pressing the **CW / CCW** key.
- Select the maximum speed: press the ⌃ key and the **Max** key together.
- Select the minimum speed: press the ⌄ key and the **Max** key together.
- The keypad has a locking facility to avoid resetting or tampering. If the pump is stopped, press **Stop** until the padlock symbol illuminates. If the pump is running, press **Start** until the padlock symbol illuminates. All keys will be disabled except for **Start** and **Stop**. Press either of these keys until the padlock symbol extinguishes to unlock the keypad.
- The pump can be set to automatically restart in its operating state set prior to power interruption, or set so that after power is reconnected the pump will remain stopped. To invoke the auto-restart facility switch off power to the pump at the mains supply. Press the **Start** key while the mains supply is switched back on until the **!** symbol illuminates. Now press **Start** to start the pump. This facility can be cancelled by turning the mains supply off and then pressing the **Stop** key while turning the mains supply back on. The **!** symbol will not be illuminated.
- Press **Start** to start the pump. Press **Stop** to stop the pump.

10 704U Automatic operation

Ensure the **Man / Aut** keypad switch on the front panel is switched to the auto position so that the **Aut** symbol illuminates.

The pump will accept external control signals through the 25 pin cage clamp connector on the back panel. The auto control cable glands mounting thread size is PG7, accepting 3.0-5.0mm cable. Remove the cover plate ensuring that the gasket is not damaged.

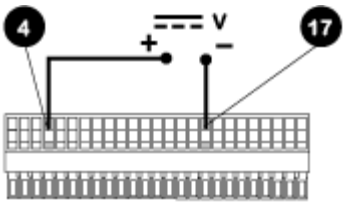
The pump is controllable by an analogue process signal of up to 30V or 32mA. The pump will provide an increasing flow rate for rising control signal *(non-inverted response)* or an increasing flow rate for falling control signal *(inverted response)*.

- **Signal offset** is the process signal level which has to be reached in order for the pump rotor to start rotating.
- **Signal range** is the change in process signal level necessary to produce the required change in pump rotor speed.

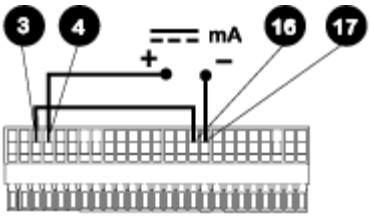
For example, when using a 4mA to 20mA process signal:

Pump response	Signal offset	Signal range
Non-inverted	4mA	16mA
Inverted	20mA	16mA

For voltage modes a stable, variable DC voltage source can



be used in conjunction with a DC voltmeter, (max 30V DC). (Refer to the 25 pin terminal strip wiring detail as an example of control circuitry.) Circuit impedance 100kOhms. Polarity set for non-inverted response. Reverse polarity for inverted response.



For current modes the same DC source can be used in conjunction with a DC milliampere meter, (maximum 32mA). (See 25 pin terminal strip detail.) Circuit impedance 250Ohms. Polarity set for non-inverted response. Reverse polarity for inverted response.

Never apply mains voltage across any pins on the 25-pin cage clamp connector. Up to 30V may be applied across pins 4 and 17, and 5V TTL on pins 7 and 5, but no voltage should be applied across other pins. Permanent damage not covered by warranty may result. Do not use the mains power switch to control the 704U pump for a high repetition of stop/starts. The auto-control facility should be used.

11 704U Calibration procedure

- Turn the signal offset potentiometer (20 turn potentiometer) clockwise until the slider traverse limit is reached and is signified by a clicking noise. Now turn the potentiometer 10 turns counter-clockwise. Repeat for the signal range potentiometer. This ensures correct potentiometer set-up for calibration.
- Set the process signal offset.
- Turn the signal offset potentiometer clockwise to set the pump shaft speed to the desired minimum.
- Set the process signal at its upper range limit (not exceeding 30V or 32mA).
- Turn the signal range potentiometer (marked "Range" on back panel) clockwise to set the drive shaft speed to the desired maximum.

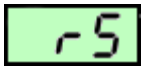
If the process signal or pump speed are set above their designated maximums the pump will be overloaded which is signified by the signal overload indicator illuminating. The **Aut** symbol will flash on the keypad. This is an indication of the limiting control and speed levels of the drive. Reset to operate within these levels.

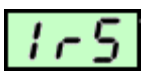
- Repeat the procedure until pump response coincides exactly with the process signal.

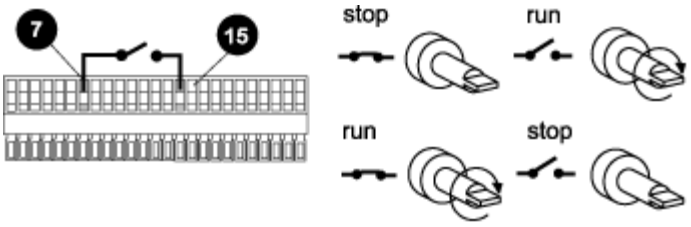
12 Remote auto-manual switch and TTL option

Stop/Start

Connect remote switch between pins 7 and 15 of the 25-pin cage clamp connector. Alternatively a TTL compatible logic input (Low 0V, High 5V) may be applied to pin 7. Low input stops the pump, high input runs the pump. With no connection, the pump will default to running. To invoke either remote stop or inverted remote stop, when switching power to the pump using the pump on/off switch, press **Stop** and **CW/CCW** keys simultaneously. The pump will indicate its current mode of switching for 2 seconds. rS indicates standard remoted switching, IrS indicates inverted remote switching.

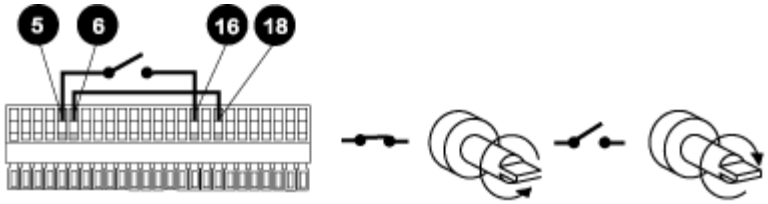






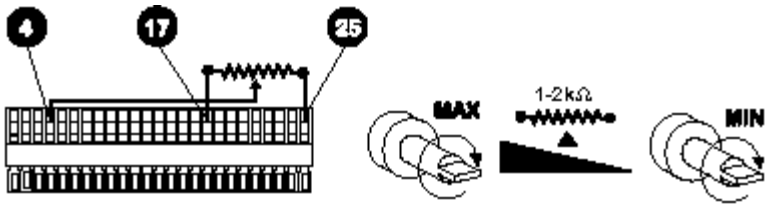
Direction

Connect remote switch between pins 5 and 16 and disable the front panel reversing control by linking pins 6 and 18 of the 25-pin cage clamp connector. Open switch for clockwise rotation, close for counter-clockwise. Alternatively a TTL compatible logic input (Low 0V, High 5V) may be applied to pin 5. Low input will run the pump in a counter-clockwise direction, high input in a clockwise rotation. No connection: the pump will default to clockwise rotation.



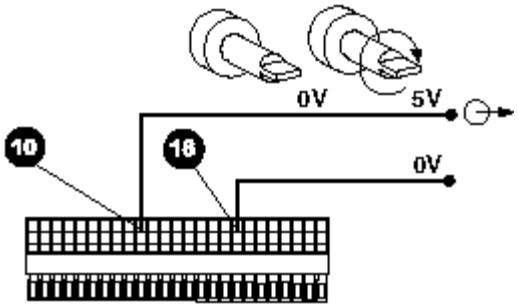
Speed

A remote potentiometer with a nominal value of between 1kW and 2kW with a minimum power of 0.25W should be wired as shown. When using a remote potentiometer, do not apply a voltage/current control input signal at the same time. The speed control signal will require calibration relative to the minimum and maximum settings of the potentiometer. Use the offset and range potentiometers as described under *Calibration*, above.



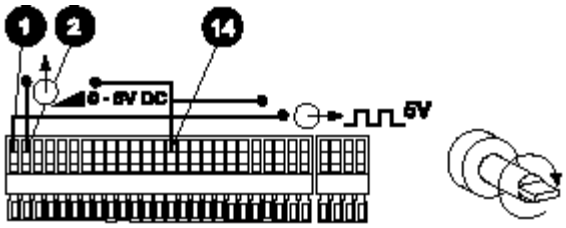
Strobe

The start / stop state of the pump may be monitored by utilising a 5V Hi Lo strobe line available at the 25-pin cage clamp connector on the pump rear panel. The strobe line will change state as soon as the motor starts or stops.



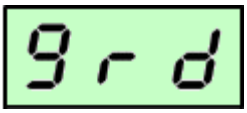
Tachometer

This facility can be used to indicate motor speed or total the number of motor revolutions. When using the square wave, the output is: 360rpm = 4603Hz.



13 Guard safety warnings

If the track is lifted while running in each operating mode the pump will stop and this warning will be displayed:



When the track has been correctly re-positioned on the pumphead, press any key on the keypad, then press **Start** on the keypad and the pump will continue to operate.

14 Error messages

Er1	Tachometer fault
Er2	Over temperature error
Er3	EEPROM error
Er4	EEPROM read error
Er5	EEPROM write error
Er6	EEPROM exhausted error. There is a maximum number of times the EEPROM can be written to. If Er6 is displayed, the EEPROM must be replaced.
Er9	RAM corruption error

15 Care and maintenance

The only scheduled maintenance required for the 704S/R and the 704U/R is inspection of the motor brushes and their replacement before their length is less than 10mm. The life of the brushes will depend on the duty of the pump, but is expected to be a minimum of 2,000 hours at maximum speed.

If the pump requires cleaning, use a mild solution of detergent in water after removing the pumphead. Do not use strong solvents. The sun gear of the gearbox in the 701R, 701RE, 701RX and 701REX pumpheads should be lightly greased with a quality gear grease every one thousand hours and after cleaning. If harmful liquids are spilled on to the pump, the case and pumphead should be thoroughly cleaned with detergent and water. Strong solvents should not be used. The sun gear of the gearbox in the pumphead should be lightly greased with a good gear grease after the pumphead has been cleaned.

16 Specification

Maximum rotor speed	360rpm
Voltage/frequency	100-120/220-240V 50/60Hz
Control range	50:1
Power consumption 704S, 704U	515VA
Fuse rating	Type T (anti-surge) 8A
Operating temperature range	5°C to 40°C
Storage temperature range	-40°C to 70°C

Weight	31kg
Noise	85dBA at 1m
Standards	EN60529 (IP55) Machinery Directive: 98/37/EC EN60204-1 Low Voltage Directive: 73/23/EEC EN61010-1 EMC Directive: 89/336/EEC EN50081-1/EN50082-1

Specific drive performance details such as loaded drive speed variation against mains supply voltage fluctuation and drive stability from a cold start to normal operating temperature are available on request. For further information please contact Watson-Marlow Technical Support.

17 701R, 701RX, 701RG, 701RE, 701REX Pumphead installation

A correctly engineered installation will promote the best possible tube life, so please ensure that the following guidelines are followed:

On variable speed models please note that the mechanical speed variator must not be adjusted when the motor is not running.

Do site the fluid reservoir above the pump wherever possible.

Do keep delivery and suction lines as short and direct as possible.

Do use gradual sweeping bends in installation pipe work with minimum radius equal to five times the tubing diameter. Avoid tight pipeline bends, pipe reducers and excessive lengths of smaller bore tubing than that in the pumphead, particularly in pipelines on the suction side.

Do ensure that there is always a minimum of one metre of smooth bore flexible tubing connected to the discharge port of the pumphead. This will help minimise any impulse losses and pulsation in the pipeline. This is especially important with viscous fluids and rigid pipework.

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 fit an over-length pump tube in the system to allow its position to be varied relative to the rotor. This will extend tube life and minimise the downtime of the pumping circuit.

Do ensure that connecting pipe work and fittings are suitably rated to handle the predicted pipeline pressure.

If rigid pipe work comes in close proximity to the pumphead, a drop out section of pipe work will simplify tube replacement.

Do keep the pumphead rollers and track clean.

If unsure of an installation please contact your local Watson-Marlow Technical Support Office for further assistance.

All performance figures in this operating instruction relate to peak pipeline pressures. Peak pressure is not always accurately shown by oil-filled analogue pressure gauges as damping of the gauge needle occurs. The pressure being recorded using an analogue gauge may only be 75% of true peak pressure. For accurate peak pressure measurement a digital pressure transducer should be used.

18 Tube loading

T704U and 704S pumps can be operated with a 701R continuous tubing pumphead or with a 701RE pumphead fitted with Watson-Marlow LoadSure tube elements. For both pumphead types, extension "X" pumphead options are available.

701R, 701RX and 701RG continuous tube loading

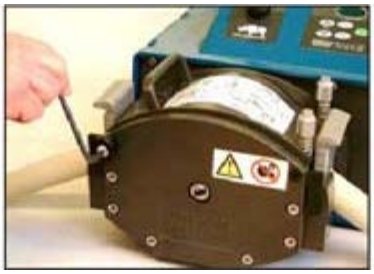
- Loosen the track compression spring knobs using a 10mm A/F spanner, turning them anticlockwise six (6) times.
- Unscrew the track securing bolt and withdraw the bolt fully. Lift the track by its handle and slide out from under the springs.
- Release the tube clamps by pulling on the release levers and lift out both clamps.



- Lay the tubing across the pumphead. Secure the suction side by sliding in the first tube clamp while pulling the release lever.
- Fit the delivery clamp loosely to allow any excess tubing to work its way through the pumphead. (See *Re-tensioning the tubing*, below).



- Slip the right hand end of the track under the springs and position the left hand end so the track securing bolt can be inserted.
- Tighten the track securing bolt with the 6mm Allen key provided.
- Tighten both the track compression spring knobs to a torque of 3Nm (2.2 lb-ft) using a 10mm A/F spanner.


Note: If two pumpheads are fitted each with 25.4mm bore tubing, the maximum allowable output pressure is 1bar (14.5 psig) per channel.

Re-tensioning the tubing

Start the pump with the guard in place, allowing any excess tubing to work through the pumphead, then press down the delivery end clamp firmly. Check the tube for movement when the pump is running. If tubing moves through the pumphead, the tube should be more firmly clamped at the suction end. The delivery end should be unclamped to release any excess tubing, pulled tight and then firmly re-clamped again. Repeat as necessary.

When using Marprene continuous tubing, after the first 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 necessary to counteract the normal stretching that occurs with Marprene which can go unnoticed and result in poor

tube life.

701RE and 701REX LoadSure tube element loading

700 series LoadSure tube elements:

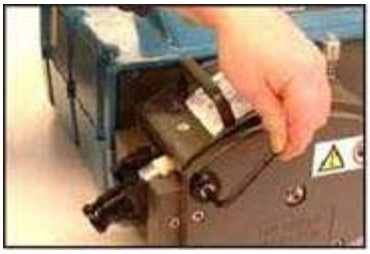
- remove the chance of premature tube failure caused by incorrect tube loading;
- avoid over-clamping of tubing;
- remove the need to re-tension the tubing;
- extend tube life;
- reduce maintenance time for tube changeover and cleaning;
- offer standard industrial tube connections.



- Loosen the track-compression spring knobs using a 10mm A/F spanner, turning them anticlockwise six (6) times.
- Unscrew the track-securing bolt and withdraw the bolt fully. Lift the track by its handle and slide it out from under the springs.
- Locate the D-shaped flange fitted to the end of the tube element into the delivery (right-hand) sliding tube clamp. (The D flange ensures that the element can only be loaded correctly.)



- Slip the right-hand end of the track under the springs.
- Locate the second D-shaped flange into the suction (left-hand) sliding tube clamp. (Lifting the sliding tube clamp will aid the tube-loading.)
- Position the left-hand end of the track so that the track-securing bolt can be inserted.



- Tighten the track-securing bolt with the 6mm Allen key provided.
- Tighten both the track-compression spring knobs to a torque of 3Nm (2.2 lb-ft) using a 10mm A/F spanner.
- Connect both ends of the element to the rest of the system using industrial-standard cam and groove connectors.

19 Fitting an extension pumphead

The procedure for fitting an extension pumphead is the same for 701R and 701RE first pumpheads. The 701R procedure is pictured below.

- From the first pumphead remove:
  the plug from the tapped hole in the top right hand corner;
  the track securing bolt and the track;
  the plug from the slot in the centre shaft;
  the M8 x 16 socket head cap screw from the bottom left of the first pumphead.
- Grease the drive shaft dog of the extension pumphead with the grease supplied.



- Apply thread locking compound to the M8 x 16 socket head cap screw in the top right hand corner of the backplate of the extension pumphead.
- Align the drive shaft dog of the extension pumphead with the slot in the drive shaft of the first pumphead.
- Fit the extension pumphead to the first pumphead. Ensure the backplate of the extension pumphead is flat against the frontplate of the first pumphead.
- Lightly tighten the socket head cap screw with the modified 6mm Allen key provided.
- Apply thread locking compound to the M8 x 170 socket head cap screw in the bottom left of the extension pumphead frontplate, and tighten it in sequence with the M8 cap screw in the backplate.

20 Pumphead spares: continuous tubing

Models 701RB, 701RBX, 701RBG

1	MRA0027A	Pivot pin assembly
1	MRA0034A	Pivot pin assembly ~701RX
2	MRA0021A	Rotor assembly
2	MRA0036A	Rotor assembly ~ 701RX
3	701RB, 701RBX: MRA0104A 701RBG: MRA0295A	Knob assembly ~ 4.8mm wall tubing
3	MRA0103A	Knob assembly ~ 3.2mm wall tubing
4	701RB, 701RBX: SG0005 701RBG: SG0019	Spring
5	701RB, 701RBX: MR0674T 701RBG: MR0977T	501RL Spring retaining washer

	6	MR0880C	Tube clamp
	7	MR0662T	Stud ~ Set to 61mm
	8	MRA0154A	Track assembly
	9	MR0882M	Eccentric bush

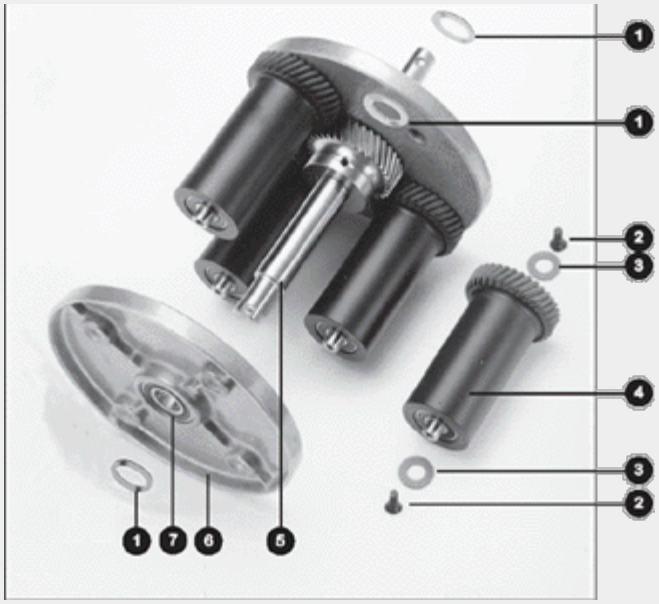
21 Pumphead spares: tubing elements

Models 701RBE, 701RBEX

	1	MRA0027A	Pivot pin assembly
	1	MRA0034A	Pivot pin assembly ~701RX
	2	MRA0021A	Rotor assembly
	2	MRA0036A	Rotor assembly ~ 701RX
	3	MRA0104A	Knob assembly ~ 4.8mm wall tubing
	3	MRA0103A	Knob assembly ~ 3.2mm wall tubing
	4	SG0005	Spring
	5	MR0674T	Spring retaining washer
	6	MR0662T	Stud ~ Set to 61mm
	7	MR1118T	Sliding clamp
	8	MRA0154A	Track assembly
	9	MR0882M	Eccentric bush

22 Pumphead spares: rotor

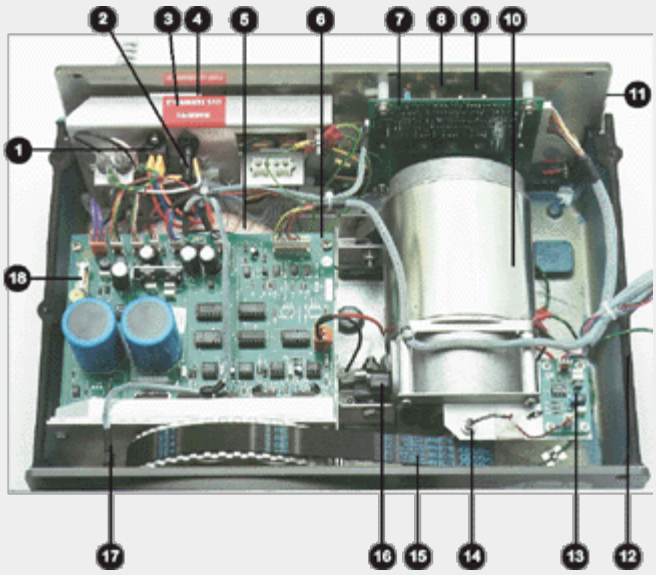
All models



	1	MR0667T	Spacer
	2	FN0420	Screw M5x16 socket countersunk
	3	FN0722	Washer
	4	MRA0020A	Roller assembly
	5	MRA0039A	Shaft with sun gear ~701R
	5	MRA0040A	Shaft with sun gear ~701RX
	6	MR0879C	Rotor flange
	7	BB0018	Bearing

23 Drive spares

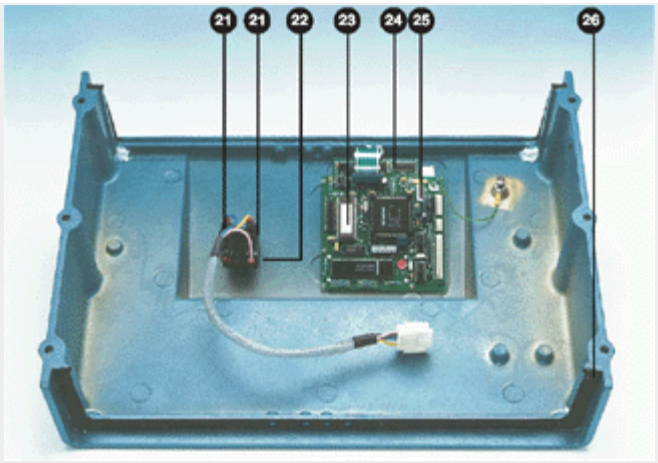
All models



1	SW0086	Voltage selector switch
2	FS0061	Mains fuse T type 8.0A
3	MR0669S	Terminal inspection window
4	MR0771S	Terminal window gasket
5	MRA0214A	Transformer
6	MRA0222A	Control PCB assembly Mk2
7	MRA0201A	Analogue PCB assembly ~704U
8	MN1086S	Remote connection inspection cover ~704U
9	MN1087S	Remote connection inspection cover gasket ~704U
10	MO0093	Motor
11	MR0690S	Vertical gasket: 4 per pump
12	MR0691S	Horizontal gasket: 2 per pump
13	MRA0203A	Tacho PCB assembly
14	MR1081H	Tacho sensor
15	OS0020	Drive belt
16	BM0008	Bush and holder: 2 per pump
17	MR1084H	Magnetic guard switch
18	FS0043	Control PCB fuse 5.0A T Type ceramic 20mm

All models

21	SW0129	Switch contact block: 2 per pump
22	SW0127	Switch mechanism
23	MRA0224A	IC ROM 704S/U
24	MR1064B	Keypad ~704S
24	MR1053B	Keypad ~704U
25	MRA0205A	CPU/display PCB assembly
26	MR0690S	Vertical gasket: 4 per pump



24 Flow rates

Flow rates were obtained using silicone tubing with the pumphead rotating clockwise, pumping water at 20°C with zero suction and delivery pressures. For critical applications determine flow rates under operating conditions.

Tube bore | Tube number - # | rpm | Pressure (+) | Suction (-)

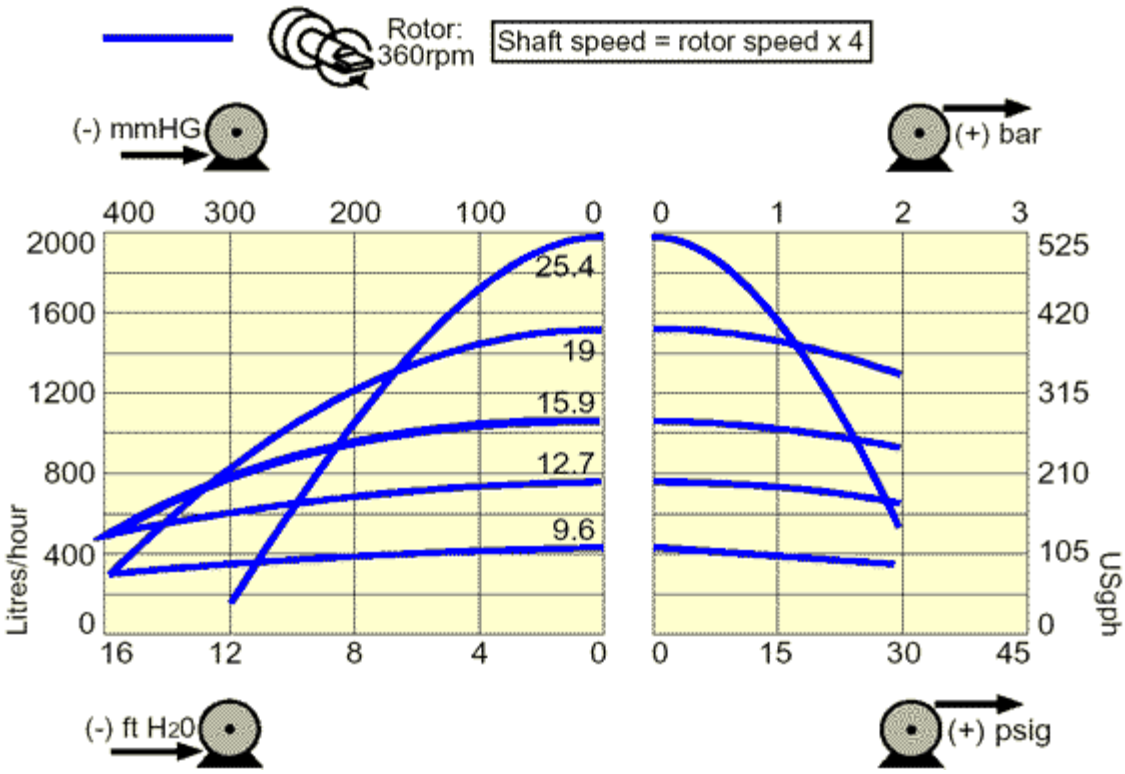
Flow rates: 701R							Flow rates: 701RE		
	mm	9.6	12.7	15.9	19.0	25.4	12.7	15.9	19.0
	inch	3/8	1/2	5/8	3/4	1	1/2	5/8	3/4
	#	193	88	189	191	92	88	189	191
	360	420	780	1080	1500	2000	780	1080	1500

25 701R product codes

mm	inch	#	Marprene	Marprene LoadSure	Bioprene	Platinum silicone
9.6	3/8	193	902.0096.048		903.0096.048	913.A096.048
12.7	1/2	88	902.0127.048	902.0127.PPC	903.0127.048	913.A127.048
15.9	5/8	189	902.0159.048	902.0159.PPC	903.0159.048	913.A159.048
19.0	3/4	191	902.0190.048	902.0190.PPC	903.0190.048	913.A190.048
25.4	1	92	902.0254.048		903.0254.048	913.A254.048
mm	inch	#	Neoprene	Neoprene LoadSure	Butyl	Fluorel
9.6	3/8	193	920.0096.048			
12.7	1/2	88	920.0127.048	920.0127.PPC		
15.9	5/8	189	920.0159.048	920.0159.PPC		
19.0	3/4	191	920.0190.048	920.0190.PPC	930.0190.048	970.A190.048
25.4	1	92	920.0254.048		930.0254.048	
mm	inch	#	STA-PURE			

9.6	**3/8**	**193**	960.0096.048
12.7	**1/2**	**88**	960.0127.048
15.9	**5/8**	**189**	960.0159.048
19.0	**3/4**	**191**	960.0190.048
25.4	**1**	**92**	960.0254.048

26 Flow, pressure and suction

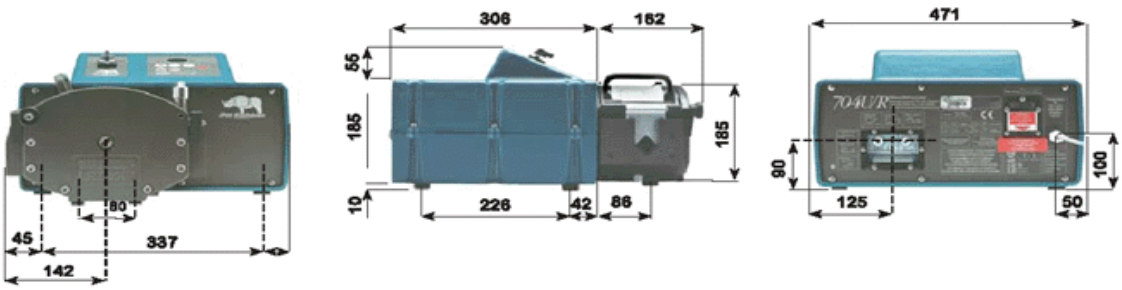


27 Maximum peak working pressure ratings

701RB	701RBX	701RBG	701RBE	701RBEX
2bar	**2bar**	**2bar**	**2bar**	**2bar**

28 Outline dimensions

Measurements are given in millimetres.



29 Trademarks and disclaimer

30 Warning not to use pumps in patient-connected applications

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

31 Publication history

Watson-Marlow 704U, 704S
14 06 02: First published in html. m-704su-gb-02.htm. PB0275GB02
19 06 02: Dimension update. m-704su-gb-03.htm. PB0275GB03

32 Decontamination certificate

In compliance with the *UK Health and Safety at Work Act* and the *Control of Substances Hazardous to Health Regulations*, you are required to declare the substances which have been in contact with product(s) you return to Watson-Marlow or its subsidiaries or distributors. Failure to do so will cause delays. Please ensure that you fax us this form and receive an RGA (Returned Goods Authorisation) before you despatch the product(s). A copy of this form must be attached to the outside of the packaging containing the product(s). Please complete a separate decontamination certificate for each product.

You are responsible for cleaning and decontaminating the product(s) before return.

Your name		**Company**	
Address			
Postcode / zip		**Country**	
Telephone		**Fax**	
Product type		**Serial number**	
To speed the repair, please describe all known faults			

The product has ... ○ Been used ○ Not been used

If the product has been used, please complete all the following sections. If the product has not been used, please just sign this form.

Names of chemicals handled with product(s)	
Precautions to be taken in handling these chemicals	

Action to be taken in the event of human contact	

I understand that the personal data collected will be kept confidentially in accordance with the UK Data Protection Act 1998.

Signature		**RGA number**	
		Your position	
		Date	

Please print out, sign and fax to Watson-Marlow Pumps at +44 1326 376009.