WATSON-MARLOW

601S/R

Variable speed high-flow pump

Installation and operating instructions

Quick start-up guide

Ensure local mains electricity supply matches that marked on rear panel.

Couple controller module to motor module.

With controller module power switch and motor module rear panel isolating switch in off positions, load tubing into pumphead. Use only tubing with 3.2mm wall thickness.

4 Set isolating switch to on position.

5 Turn pump on at controller module. We recommend clockwise rotation for normal duties. Set running speed on single-turn potentiometer.

Never turn pump rapidly from one direction of rotation to the other.

Two-year warranty

Watson-Marlow warrants, subject to the conditions below, through either Watson-Marlow 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 occured 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 and specific exceptions which apply to the above warranty are:

Consumable components such as fuses, rollers and tubing are excluded.

Products must be returned by pre-arrangement carriage paid to Watson-Marlow or its authorised distributor.

All repairs or modifications must have been made by Watson-Marlow or its authorised distributors or with the express permission of Watson-Marlow or its authorised distributors.

4 Products which have been abused, misused, or subjected to malicious damage or electrical surge are excluded.

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

Introduction

Thank you for choosing this 601S/R which is one of the quietest high-flow peristaltic pumps ever produced, combining benchtop size and ease of use, with a performance only previously found in industrial pumps. The 601S/R is made up of a motor module fitted with the 601R pumphead, and a controller module which can be situated with the motor module or up to 50 metres distant.

This new version of the 601S/R now incorporates current limiting circuitry which provides considerable protection to the motor if the pump is overloaded or stalled.

Contents

Section 1: Installation

Ensure that the supply voltage and frequency correspond with that marked on the rear of the unit. The mains supply to the controller module must be in the range 90-250V 50/60Hz.

The mains supply cable to the controller module is colour coded in accordance with the following code:

Brown	Live
Blue	Neutral
Green/Yellow	Earth

Couple the motor module plug to the socket on the rear of the controller module. This supplies power to the motor module. If the controller module is to be sited distant to the motor module, the connecting cable supplied may be replaced by one up to 50 metres long.

The 601S/R can be operated at ambient air temperatures from 0C to 35C. Storage temperatures from -40C to 70C are permissible, but allow time for acclimatisation before operating. An operating unit should be positioned to allow a free passage of air around it. When 600 Series modules are stacked the normal foot mountings will provide the necessary ventilation between units.

Should the pump fail to operate, check the following:

That mains electricity is available at the controller module.

That the motor module is properly connected to the controller module.

That the motor module local isolating switch is in the on position.

That all fuses are intact.

That the pumphead module is properly located and securely attached to the pump.

That the rotor is not stalled by incorrect fitting of tubing.

Section 2: Operation

A local on/off switch is situated on the back of the motor module to isolate this module. It is recommended that this switch be set to the off position before loading tubing into the pumphead or removing the pumphead. This is safer and also makes the loading of the tubing easier. This facility is provided particularly for situations where the motor module is some distance from the controller module. Where possible, mains power should be switched off at the controller module.

CAUTION The local on/off switch must not be used as a power switch.

Before operating the pump, ensure that the motor module is properly connected to the controller module and that the local isolating switch is in the on position.

The pump can now be operated from the controller module. The power switch allows clockwise or anti-clockwise rotation to be selected. The normal direction of rotation for extended tube life is clockwise. Using anti-clockwise rotation, pressures up to double those obtained with clockwise rotation can be obtained but at the cost of tube life.

WARNING Never move the switch rapidly from one direction of rotation to the other because this could damage the control circuitry or the motor before the power fusing ruptures. Make a two second pause in the off position before selecting the other direction of rotation.

Pumphead speed is set on the front panel potentiometer between 10 and 100, and corresponds with rpm.

A current limiting circuit is incorporated in the design to prevent the maximum current rising above an acceptable level. The circuit activates at a pre-determined level to reduce power to the motor, so reducing its speed.

Section 3: Specification

Nominal maximum rotor speed	100 rpm
Speed control ratio	10:1
Operating voltage/frequency	90-250V 50/60Hz
Maximum power consumption	200VA
Operating temperature	0C to 35C
Storage temperature	-40C to 70C
Relevant standards	CEE10, IP44
Motor module dimensions	195 x 200 x 325mm
Control module dimensions	85 x 200 x 325mm
Motor module weight	8.1kg
Control module weight	2.5kg
Pumphead module weight	2.9kg

Section 4: 601R Pumphead

The 601R is a spring-loaded twin roller pumphead pre-set in manufacture to accept tubing with a nominal wall thickness of 3.2mm. Tubing with bore sizes of between 4.8 and 15.9mm can be used. This setting will meet most requirements, but adjustment of the setting for other wall thicknesses is a simple task.

The pumphead can be oriented to any of four positions to suit individual requirements. Only two screws are used to secure the track to the front panel. Re-positioning is carried out by removing the screws, rotating the track to the required position and replacing the screws.

4:1 Tube loading

WARNING Switch off the pump, both at the controller module and the motor module local isolating switch, before loading the pump-head.

Fully open the hinged guard

Select a length of tubing appropriate to the requirement, noting that a length of 410mm is need for the track system.

3 Offer up that part of the tubing to be housed in the pumphead. First ease the tubing into one of the adjustable clamps and then, whilst rotating the rotor clockwise (a tool is provided for this purpose), feed the tube between the rollers and the track. Ensure that the tube lies naturally against the track and is not twisted or stretched. This is particularly important for the larger tube sizes.

4 Locate the other end of the loaded section of the tube into the second adjustable clamp, ensuring that the tube is not slack or twisted in the pumphead.

5 Clamp the tube firmly by turning the serrated adjustment wheel. Both clamps will grip the tube simultaneously. Ensure that the tool is removed and close the guard.

4:2 Adjustment of the rollers

The spring-loaded twin rollers compensate for tolerance variations in the tubing, eliminating the manual adjustment normally required by peristaltic pumps.

The rotor is set in manufacture for 3.2mm wall thickness tubing of most bore sizes. This setting can advantageously be adjusted, however, in certain cases. For instance, where large bore tubing is used and the delivery head is low, tubing life can be further extended by increasing the normal pre-set gap of 5.2mm. Re-adjustment will also be required when tubing is used having a wall thickness other than 3.2mm.

There is an adjustment screw on each of the two roller arms. Correct and equal adjustment is important. Over-occlusion will reduce tube life. Under occlusion will reduce pumping efficiency.

As a general rule, the gap setting for a given tube should be 20% less than twice the wall thickness of the tube.

To adjust the gap setting, turn the adjustment screws: Clockwise for an increase in gap setting or anti-clockwise for a decrease in gap setting. One complete turn of the screw changes the gap setting by approximately 1.0mm.

Should it appear that the roller arms are not equally adjusted, and you want to restore the original factory setting, turn the adjusting screws until both rollers are just in contact with the track, then tighten each screw by five turns

Section 5: Flow rates

The flow rates given below were obtained pumping water at 20C with nominal suction and delivery pressures. Where flow rate is critical it should be measured under operating conditions. The major factors affecting flow rate are suction and delivery heads, fluid viscosity, temperature, and tubing material used.

601S/R Flow rates (litre/min) Minimimum flows 10% of rates given

	Tubing internal diameter (mm)					
rpm	4.8	6.4	8.0	9.6	12.7	15.9
100	0.90	1.24	1.80	2.40	4.60	6.60

Section 6: Tubing range

Please remember that flow precision depends upon the accuracy and consistency of the tubing. All Watson-Marlow tubing is formulated, manufactured and quality controlled to our own specifications.

Bore mm	Viton	Neoprene	Butyl	Silicone	PVC
3.2 mm wall thickness					
4.8				TU155	
6.4	TU055	TU028	TU076	TU097	TU187
9.6	TU057	TU029	TU077	TU098	TU189
12.7	TU056	TU030	TU078	TU099	TU190
15.9	TU031	TU079	TU156	TU113	TU191

Section 7: Care and maintenance

Scheduled maintenance of the 601S/R pump is not required. Brushes should be replaced when necessary.

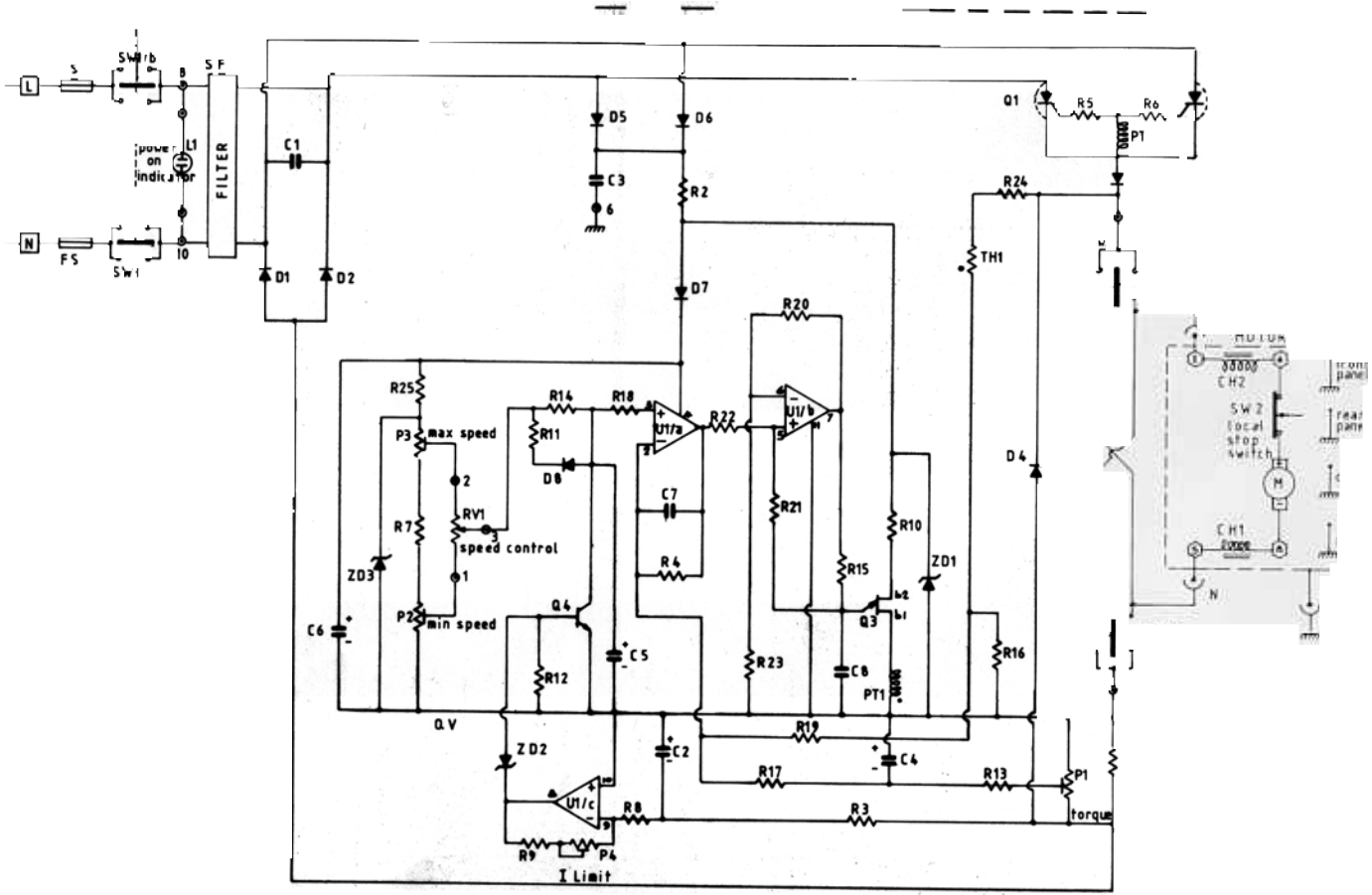
Should spillage of harmful liquids occur during use, it is recommended that the pumphead be removed and cleaned. This can be carried out quickly and easily after first ensuring that the pump is switched off and isolated from the mains. Remove any tubing in the pumphead. Remove the rotor by unscrewing the retaining bolt one turn to release the collet, and withdrawing the rotor from the shaft. Remove the track by unscrewing the two retaining screws and detaching the track from its spigot.

All moving parts of the rotor should be checked from time to time for freedom of movement. Occasional lubrication of pivot points and rollers with light lubricating oil will aid trouble free operation.

From time to time the unit may need cleaning. It is recommended that a cloth dampened with a solution of water and mild detergent is used for this purpose. On no account should strong solvents be used.

Section 8: Spares list

601R Pumphead	
MRA 10	Rotor assembly
MRA 14	Track assembly
MR 601	Collet
MR 571	Main tube roller (2 required per pumphead)
MR 572	Follower roller (2 required per pumphead)
MR 573	Spindle for main tube roller or follower roller
MR 574	Guide roller spindle
MR 575	Guide roller (white plastic)
SG 003	Springs (4 required per pumphead)
601S Controller and Motor Modules	
MG 123	Motor and gearbox
SW 001	Local isolating switch
MRA 15	Printed circuit board assembly
	On/off reversing switch comprising
SW041	Actuator (1)
SW042	Contact block (2)
SW043	Contact block (2)
FH 007	Fuseholder
	Fuse, type T, 3.15A, 20mm
MD 865	Single turn speed control potentiometer
MD 861	Locking knob and dial for potentiometer
MD 860	Screw for locking knob
LS 009	Neon lamp
BM 007	Brushes for motor (pair)


L
N
S
FS
SW1b
SW1
power on indicator
L1
FILTER
C1
D1
D2
D5
D6
C3
R2
D7
Q1
R5
R6
P1
R24
TH1
R20
R25
P3
max speed
R14
R18
R11
D8
U1/a
R22
U1/b
C7
R4
R21
R10
R15
ZD1
Q3
D4
RV1
speed control
R7
ZD3
P2
min speed
C6
Q4
C5
R12
R23
C8
PT1
R16
0 V
ZD2
C2
R19
C4
R17
R13
P1
torque
U1/c
R8
R3
R9
P4
I Limit
CH2
SW2
local stop switch
CH1
Power
M
N