WATSON MARLOW Pumps

**WATSON-MARLOW BREDEL MANUALS**

m-620bpn-bp-gb-01

# Watson-Marlow 620BpN/620Bp PROFIBUS-controlled pumps

## Contents

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# 1 Declaration of conformity

This declaration was issued for Watson-Marlow 620BpN and 620Bp pumps on May 1, 2008. When this pump unit is used as a stand-alone pump it complies with: Machinery Directive 2006/42/EC, EMC Directive 2004/108/EC.

This pump is ETL listed: ETL control number 3050250. Cert to CAN/CSA std C22.2 No 61010-1. Conforms to UL std 61010A-1.

See 8 *Pump specifications*.

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# 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 2006/42/EC.

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

The information in this user guide is believed to be correct at the time of publication. However, Watson-Marlow Limited accepts no liability for errors or omissions. Watson-Marlow Bredel has a policy of continuous product improvement, and reserves the right to alter specifications without notice. This manual is intended for use only with the pump it was issued with. Earlier or later models may differ. The most up-to-date manuals appear on the Watson-Marlow website: http://www.watson-marlow.com

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# 3 Five year warranty

## 520 cased pumps, 620 cased pumps and 720 cased pumps

For any 520, 620 or 720 cased pump purchased after 1 January 2007, Watson-Marlow Limited ("Watson-Marlow") warrants, subject to the conditions and exceptions below, through either Watson-Marlow, its subsidiaries, or its authorised distributors, to repair or replace free of charge, any part of the product which fails within five years of the day of manufacture of the product. 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 normal operation as defined in this pump manual.

Watson-Marlow shall not be liable for any loss, damage, or expense directly or indirectly related to or arising out of the use of its products, including damage or injury caused to other products, machinery, buildings, or property, and Watson-Marlow shall not be liable for consequential damages, including, without limitation, lost profits, loss of time, inconvenience, loss of product being pumped, and loss of production. This warranty does not obligate Watson-Marlow to bear any costs of removal, installation, transportation, or other charges which may arise in connection with a warranty claim.

Conditions of and specific exceptions to the above warranty are:

**Conditions**

- Products must be returned by pre-arrangement, carriage-paid, to Watson-Marlow, or a Watson-Marlow approved service centre.
- All repairs or modifications must have been made by Watson-Marlow Limited, or a Watson-Marlow approved service centre or with the express permission of Watson-Marlow.
- Warranties purporting to be on behalf of Watson-Marlow made by any person, including representatives of Watson-Marlow, its subsidiaries, 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.

**Exceptions**

- The warranty shall not apply to repairs or service necessitated by normal wear and tear or for lack of reasonable and proper maintenance.
- All tubing and pumping elements as consumable items are excluded.
- Products which, in the judgment of Watson-Marlow, have been abused, misused, or subjected to malicious or accidental damage or neglect are excluded.
- Electrical surge as a cause of failure is excluded.
- Chemical attack is excluded
- All pumphead rollers are excluded.
- The 620R family of pumpheads are excluded from all warranty when pumping above 2 bar while above 165rpm.
- Pumpheads from the 313/314 and the Microcassette ranges and any 701 extension pumpheads are excluded and retain their one-year standard pumphead warranty. The drive they are attached to is subject to the five-year warranty as set out here.
- Ancillaries such as leak detectors are excluded.

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# 4 When you unpack your pump

Unpack all parts carefully, retaining the packaging until you are sure all components are present and in good order. Check against the components supplied list, below.

## Packaging disposal

Dispose of packaging materials safely, and in accordance with regulations in your area. The outer carton is made of corrugated cardboard and can be recycled.

## Inspection

Check that all components are present. Inspect components for damage in transit. If anything is missing or damaged, contact your distributor immediately.

## Components supplied

620Bp and 620BpN pumps are available in two forms, dedicated to either 620R series pumpheads or 620L series pumpheads. Pumps are supplied as:

- Dedicated 620R pump drive unit fitted with 620R, 620RE or 620RE4 pumphead (see 8 *Pump specifications*); OR: Dedicated 620L pump drive unit fitted with 620L or 620LG pumphead (see 8 *Pump specifications*)
- A 620N module providing pump ingress protection to IP66, NEMA 4X, if a 620BpN.
  **Note**: the module is attached for transit, but must be removed to allow wiring up, voltage selection and fuse inspection and then re-affixed before the pump is operated.
- The designated mains power lead for your pump
- PC-readable CDROM containing these operating instructions
- Quick Start manual

Note: Some versions of this product will include components different from those listed above. Check against your purchase order.

## Storage

This product has an extended shelf life. However, care should be taken after storage to ensure that all parts function correctly. Users should be aware that the pump contains a battery with an unused life of seven years. Long-term storage is not recommended for peristaltic pump tubing. Please observe the storage recommendations and use-by dates which apply to tubing you may wish to bring into service after storage.

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# 5 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.

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# 6 Peristaltic pumps - an overview

Peristaltic pumps are the simplest pump, with no valves, seals or glands to clog or corrode. The fluid contacts only the bore of a tube, eliminating the risk of the pump contaminating the fluid, or the fluid contaminating the pump. Peristaltic pumps can run dry.

### How they work

A compressible tube is squeezed between a roller and a track on an arc of a circle, creating a seal at the point of contact. As the roller advances along the tube, the seal also advances. After the roller has passed, the tube returns to its original shape, creating a partial vacuum which is filled by fluid drawn from the inlet port.

Before the roller reaches the end of the track, a second roller compresses the tube at the start of the track, isolating a packet of fluid between the compression points. As the first roller leaves the track, the second continues to advance, expelling the packet of fluid through the pump's discharge port. At the same time, a new partial vacuum is created behind the second roller into which more fluid is drawn from the inlet port.

Backflow and siphoning do not occur, and the pump effectively seals the tube when it is inactive. No valves are needed.

The principle may be demonstrated by squeezing a soft tube between thumb and finger and sliding it along: fluid is expelled from one end of the tube while more is drawn in at the other.

Animal digestive tracts function in a similar way.

### Suitable applications

Peristaltic pumping is ideal for most fluids, including viscous, shear-sensitive, corrosive and abrasive fluids, and those containing suspended solids. They are especially useful for pumping operations where hygiene is important.

Peristaltic pumps operate on the positive displacement principle. They are particularly suitable for metering, dosing and dispensing applications. Pumps are easy to install, simple to operate and inexpensive to maintain.

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# 7 Safety notes

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. If the pump is used in a manner not specified by Watson-Marlow Limited, the protection provided by the pump may be impaired.

**This symbol, used on the pump and in this manual, means: Caution, refer to accompanying documents.**

**This symbol, used on the pump and in this manual, means: Do not allow fingers to contact moving parts.**

**This symbol, used on the pump and in this manual, means: Recycle this product under the terms of the EU Waste Electrical and Electronic Equipment (WEEE) Directive.**

**There is a user-replaceable type T5A H 250V fuse in the fuseholder in the centre of the switchplate at the back of the pump. *The 620N module must be removed, if a 620BpN, to allow access to the switchplate.* See 22.1 *620N module removal and replacement*. There are thermal fuses within the pump which self-reset within 60 seconds; if they trip an error code is displayed. This pump contains no user-serviceable fuses or parts.**

**Fundamental work with regard to lifting, transportation, installation, starting-up, maintenance and repair should be performed by qualified personnel only. The unit must be isolated from mains power while work is being carried out.**

Any person who is involved in the installation or periodic maintenance of this equipment should be suitably skilled or instructed and supervised using a safe system of work. In the UK this person should also be familiar with the Health and Safety at Work Act 1974.

**There are moving parts inside the pumphead. Before opening the tool-unlockable fixed guard (620R) or tool-unlockable track (620L), ensure that the following safety directions are followed.**

- Ensure that the pump is isolated from the mains power.
- Ensure that there is no pressure in the pipeline.
- If a tube failure has occurred, ensure that any fluid in the pumphead has been allowed to drain to a suitable vessel, container or drain.
- Ensure that protective clothing and eye protection are worn if hazardous fluids are pumped.
- Primary operator protection from rotating parts of the pump is provided by the pumphead  fixed guard. Note that guards differ, depending on the type of pumphead. See the pumphead sections of this manual: 27 and 31.
- Secondary operator protection from rotating parts of the pump is provided by indicator-only switching of the pumphead guard. This function will stop the pump if the guard is inadvertently opened while the pump is running. For details of permissible pumphead orientations, see the pumphead sections of this manual: 27 and 31.

This pump must be used only for its intended purpose. The pump must be accessible at all times to facilitate operation and maintenance. Access points must not be obstructed or blocked. The pump's mains plug is the disconnecting device (for isolating the motor drive from the mains supply in an emergency). Do not position the pump so that it is difficult to disconnect the mains plug. Do not fit any devices to the drive unit other than those tested and approved by Watson-Marlow. Doing so could lead to injury to persons or damage to property for which no liability can be accepted.

**This product does not comply with the ATEX directive and must not be used in explosive atmospheres.**

If hazardous fluids are to be pumped, safety procedures specific to the particular fluid and application must be put in place to protect against injury to persons.

The exterior surfaces of the pump may get hot during operation. Do not take hold of the pump while it is running. Let it cool after use before handling it.

No attempt should be made to run the drive without a pumphead fitted.

The pump weighs more than 18kg (the exact weight depends on model and pumphead—see 8 *Pump specifications*). Lifting should be performed according to standard Health and Safety guidelines. Finger recesses are built into the sides of the lower shell for convenience in lifting; in addition, the pump can conveniently be lifted by grasping the pumphead and (where fitted) the 620N module at the rear of the pump.

# 8 Pump specifications

Labels fixed to the rear of the pump contain manufacturer and contact details, product reference number, serial number and model details.

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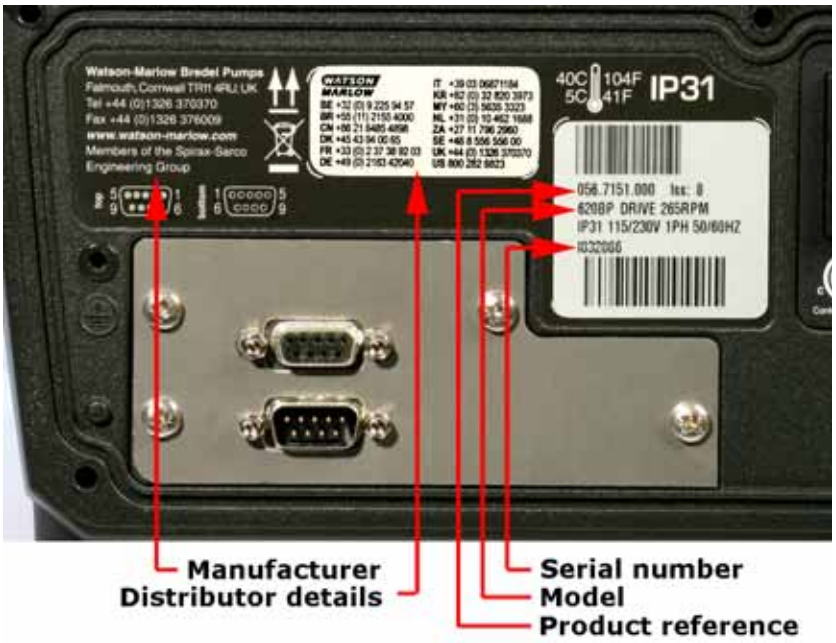
The same information is carried on the drive's backplate, accessible when the 620N module is removed. The picture below is how a 620Bp looks from the box.



### 620BpN, IP66 NEMA 4X model and 620Bp, IP31 model

This pump can be controlled from the keypad or remotely. It features:

**Manual control**
Speed adjustment; run and stop; direction control; keypad scaling; "max" key for rapid priming.

**PROFIBUS control**
Remote control via PROFIBUS DP V0. See *PROFIBUS digital communications*, below.

**MemoDose**
Allows repeat dosing. Stores in memory a pulse count from the motor. This count is repeated each time **START** is pressed to provide a single-shot dose.

**Calibration**
Full calibration with default figures for a range of pumpheads and tubes. Calibration dose facility.

**Guard switch**
Primary operator protection from rotating parts of the pump is provided by the fixed guard. Secondary operator protection from rotating parts of the pump is provided by indicator-only switching of the pumphead guard.

**PIN-secure process protection**
Two levels of control protection: main PIN code and user PIN code.

## PROFIBUS digital communications

PROFIBUS is a system of digital communications widely used in process automation. A central programmable controller—the PROFIBUS master—controls up to 125 devices such as pumps, valves and instruments—slaves. The master can send information to the pump, such as an instruction to start or stop; and interrogate the pump about its condition: whether it is running, for example, or whether it has a fault. Communication is via a dedicated, shielded, two-core cable which connects devices serially to the master.

### PROFIBUS 620BpN/620Bp capability

**Configuration**:

- Set pump address (see 18 *Setup)*
- PROFIBUS enable (see 18 *Setup)*

**Parameters:**

- Minimum speed
- Maximum speed
- Pump model
- Pumphead
- Tubing bore size

**Data flow, master to pump:**

- Set speed
- Rotation direction
- Start / stop
- Flow calibration

**Diagnostics:**

- General fault flag
- Pump software version
- PROFIBUS software version
- Leak detection device
- Upper speed limit exceeded
- Lower speed limit exceeded

**Extended diagnostics:**

- Guard open
- Over current
- Over voltage
- Under voltage
- Over temperature
- Stalled
- Tacho fault
- Out of range details

For more information on this pump and PROFIBUS, see 22.2.1 *PROFIBUS wiring* and 23 *Switching to PROFIBUS network control*. Refer to PROFIBUS International for PROFIBUS control information. This product uses a version of PROFIBUS called PROFIBUS Decentralised Periphery V0, and adheres to the International Standard and device certification by PROFIBUS International: http://www.profibus.com.

## IP (Ingress Protection) and NEMA definitions

| IP | | | | NEMA | |
|---|---|---|---|---|---|
| 1st Digit | | 2nd Digit | | | |
| **3** | Protected against ingress of solid objects with a diameter of more than 2.5mm. Tools, wires etc with a thickness of more than 2.5mm are prevented from approach | **1** | Protection against dripping water falling vertically. No harmful effect must be produced | **2** | Indoor use to provide a degree of protection against limited amounts of falling water and dirt |
| **5** | Protected against harmful dust deposits. Ingress of dust is not totally prevented but the dust must not enter in sufficient quantity to interfere with satisfactory operation of the equipment. Complete protection against contact | **5** | Protection against water projected from a nozzle against the equipment (enclosure) from any direction. There must be no harmful effect (water jet) | **12** | Indoor use to provide a degree of protection against dust, falling dirt and dripping, non-corrosive liquids |
| | | | | **13** | Indoor use to provide a degree of protection against dust and spraying of water, oil and non-corrosive coolants |
| **6** | Protection against ingress of dust (dust-tight). Complete protection against contact | **6** | Protection against heavy seas or powerful water jets. Water must not enter the equipment (enclosure) in harmful quantities (splashing over) | **4X** | Indoor or outdoor use* to provide a degree of protection against splashing water, wind-blown dust and rain, hose-directed water; undamaged by the formation of ice on the enclosure. (Resist corrosion: 200-hour salt spray) |

* 620 cased pumps are rated to NEMA 4X (indoor use) only.

## Pump specifications

| | |
|---|---|
| **Control range (turndown ratio)** | 0.1-265rpm (2650:1) |
| **Supply voltage/frequency** | Filtered 100-120V/200-240V 50/60Hz 1ph |
| **Maximum voltage fluctuation** | ±10% of nominal voltage. A well regulated electrical mains supply is required along with cable connections conforming to the best practice of noise immunity |
| **Installation category (overvoltage category)** | II |
| **Power consumption** | 250VA |
| **Full load current** | <1.1A at 230V; <2.2A at 115V |
| **Eprom version** | Accessible through pump software |
| **Enclosure rating - 620BpN** | IP66 to BS EN 60529; Equivalent to NEMA 4X to NEMA 250* (indoor use). Suitable for heavy industrial, process and filthy environments. The drive uses a Gore membrane vent to equalise the pressure inside the enclosure and to prevent ingress of water and corrosive vapours. |
| **Enclosure rating - 620Bp** | IP31 to BS EN 60529. Equivalent to NEMA 2, suitable for indoor use. Protected against dripping water and falling dirt. May be wiped with a damp cloth, but should not be immersed. |
| **Pumphead options (620R models)** | 620R, 620RE, 620RE4 |
| **Pumphead options (620L models)** | 620L, 620LG |
| **Operating temperature range** | 5C to 40C, 41F to 104F |
| **Storage temperature range** | -25C to 65C, -13F to 149F |
| **Maximum altitude** | 2,000m, 6,560ft |
| **Humidity (non-condensing) (620Bp)** | 80% up to 31C, 88F, decreasing linearly to 50% at 40C, 104F |
| **Humidity (condensing) (620BpN)** | 10% - 100% RH |
| **Weight** | See 8.2 *Dimensions* |
| **Noise** | <70dB(A) at 1m |

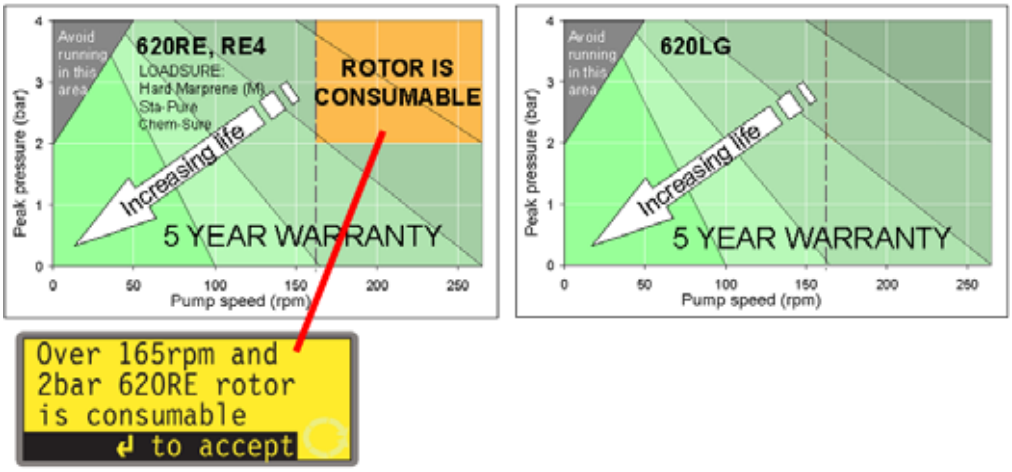
* Protect from prolonged UV exposure.

## Standards

| | |
|---|---|
| **EC harmonised standards** | Safety of machinery—electrical equipment of machines: BS EN 60204-1 |
| | Safety requirements for electrical equipment for measurement, control and laboratory use: BS EN 61010-1 incorporating A2 Category 2, Pollution degree 2 |
| | Degrees of protection provided by enclosures (IP code): BS EN 60529 amendments 1 and 2 |
| | Conducted emissions: BS EN 55011 A1 and A2, Class A, called by BS EN 61000-6-4 |
| | Radiated emissions: BS EN 55011 A1 and A2, Class A, called by BS EN 61000-6-4 |
| | Electrostatic discharge: BS EN 61000-4-2 |
| | Radiated RF immunity: BS EN 61000-4-3 A1 and A2, called by BS EN 61000-6-2 |
| | Fast transient burst: BS EN 61000-4-4 A1 and A2, Level 3 (2kV), called by BS EN 61000-6-2 |
| | Surge immunity: BS EN 61000-4-5 A1 and A2, called by BS EN 61000-6-2 |
| | Conducted RF immunity: BS EN 61000-4-6, called by BS EN 61000-6-2 |
| | Voltage dips and interruptions: BS EN 61000-4-11, called by BS EN 61000-6-2 |
| | Mains harmonics: BS EN 61000-3-2 A2 |
| | Pumps and pump units for liquids—common safety requirements: BS EN 809 |
| **Other standards** | UL 61010A-1 |
| | CAN/CSA-C22.2 No 61010-1 |
| | Conducted emissions FCC 47CFR, Part 15.107 |
| | Radiated emissions FCC 47CFR, Part 15 |
| | NEMA 4X to NEMA 250 (indoor use) for IP66 products only |

# 8.1 Pressure capability

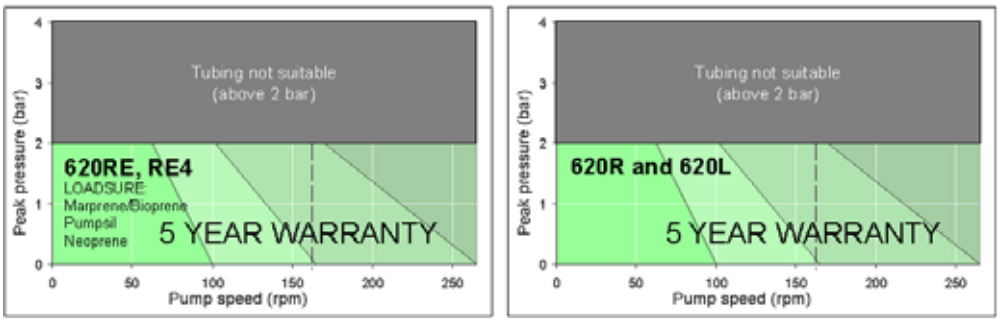
### 0-4 bar higher pressure pumping



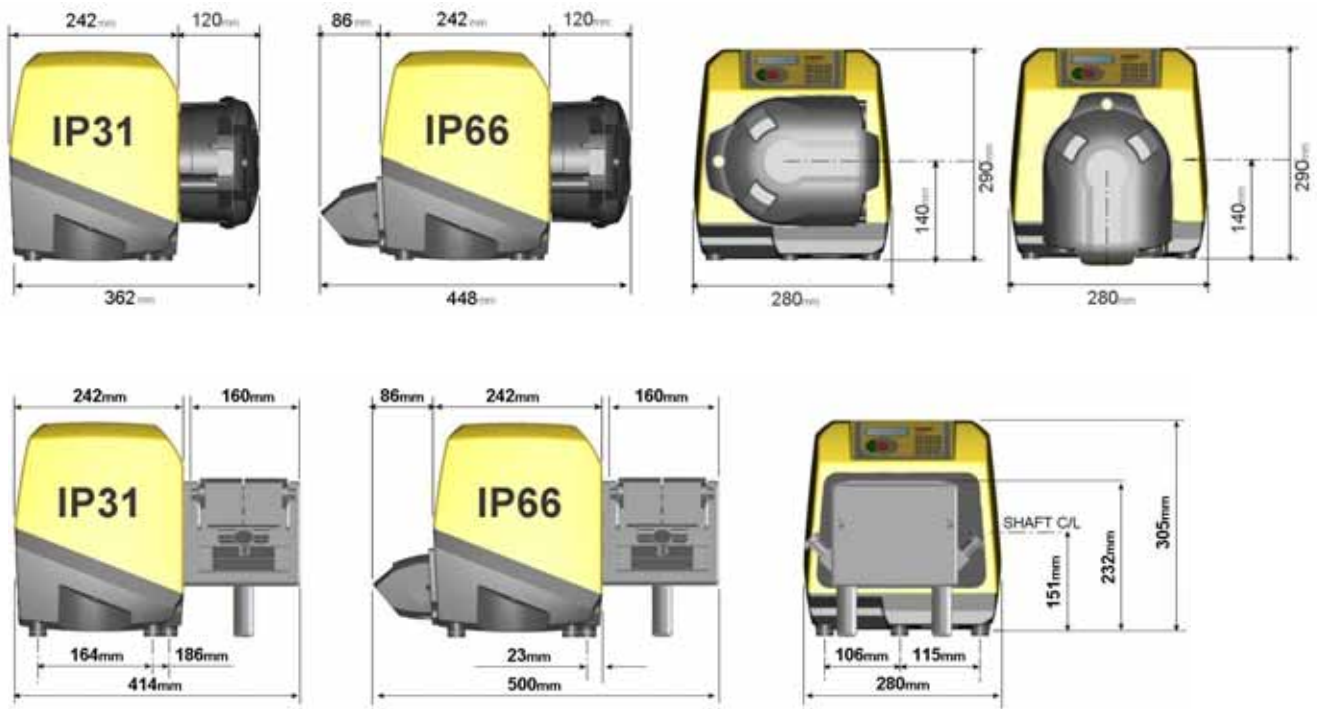

This pump's default running speed is 165rpm. It can be run at any speed up to 265rpm. Please note, however:

- **The 620RE and 620RE4 rotor warranty is limited to 2 bar from 165rpm to 265rpm**.
- A warning is displayed when the user sets the speed above 165rpm.
  **Note**: Applies to 620RE MarkII and 620RE4 MarkII pumpheads only. (The 620LG is not limited).
- The pump's software records the duration of operation above 165rpm.

### 0-2 bar pressure pumping



# 8.2 Dimensions




### Unit weights

| | Drive only | + 620R, 620RE | + 620RE4 | + 620L, 620LG |
|---|---|---|---|---|
| **IP31** | 16.5kg, 36lb 6oz | 19.6kg, 43lb 3oz | 20.1kg, 44lb 5oz | 24.3kg, 53lb 9oz |
| **IP66 NEMA 4X** | 17.4kg, 38lb 6oz | 20.5kg, 45lb 3oz | 21.0kg, 46lb 5oz | 25.2kg, 55lb 9oz |

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# 9 Good pump installation practice

## 9.1 General recommendations

### Position

A correctly engineered installation will promote long tube life. Site the pump on a flat, horizontal, rigid surface, free from excessive vibration, to ensure correct lubrication of the gearbox. Allow a flow of air around the pump to ensure that heat can be dissipated. Ensure that the temperature around the pump does not exceed 40C.

Do not stack other 620 pumps on top of this pump. It is, however, acceptable to stack other equipment on the upper surface of the 620 (as long as the ambient temperature does not exceed 40C).

### Emergency disconnection

The pump's mains plug is the disconnecting device (for isolating the motor drive from the mains supply in an emergency). Do not position the pump so that it is difficult to disconnect the mains plug. The **STOP** key on the keypad will always stop the pump. However, it is recommended that a suitable local emergency stop device is fitted into the mains supply to the pump.

### Valves

Peristaltic pumps are self-priming and self-sealing against backflow. No valves are required in inlet or discharge lines. Valves in the process flow must be opened before the pump operates. Users are advised to fit a pressure relief device between the pump and any valve on the discharge side of the pump to protect against damage caused by accidental operation with the discharge valve closed.

The pump may be set up so that the direction of rotor rotation is clockwise or counter-clockwise, whichever is convenient.

### Tubing materials: run-in advice

Sta-Pure and Marprene TM tubing are hard to compress when new. When using tubing made of these materials, the first five pumphead revolutions should be at a speed of 10rpm or greater. If the pump is run slower, the safety system built into pump drive's software may cause it to stop and display an over-current error message.

### Pressure advice

In most circumstances, rotor and tube life are maximised if the pumphead is run slowly, particularly when pumping at high pressure. However, to maintain performance at pressures above 2 bar, avoid running the pumphead below 50rpm. If low-flow, high-pressure operation is necessary, switching to a smaller tube is recommended.

## 9.2 Do’s and do not’s

**Do not** build a pump into a tight location without adequate airflow around the pump.

**Do** ensure that when the 620N watertight module is fitted the seals are intact and properly located. Ensure that the holes for cable glands are properly sealed to maintain the IP66 / NEMA 4X rating.

**Do not** strap the control and mains power cables together.

**Do** avoid tight bends in PROFIBUS signal cable.

**Do** keep delivery and suction tubes as short and direct as possible - though ideally not shorter than 1m - and follow the straightest route. Use bends of large radius: at least four times the tubing diameter. Ensure that connecting pipework and fittings are suitably rated to handle the predicted pipeline pressure. Avoid pipe reducers and lengths of smaller bore tubing than the pumphead section, particularly in pipelines on the suction side. Any valves in the pipeline (not usually needed) must not restrict the flow. Any valves in the flow line must be open when the pump is running.

**Do** use suction and delivery pipes equal to or larger than the bore of the tube in the pumphead. When pumping viscous fluids use pipe runs with a bore several times larger than the pump tube.

**Do** ensure that on longer tube runs at least 1m of smooth bore flexible tubing is connected to the inlet and discharge port of the pumphead to help to minimize impulse losses and pulsation in the pipeline. This is especially important with viscous fluids and when connecting to rigid pipework.

**Do** site the pump at or just below the level of the fluid to be pumped if possible. This will ensure flooded suction and maximum pumping efficiency.

**Do** keep the pumphead track and all moving parts clean and free from contamination and debris.

**Do** run at slow speed when pumping viscous fluids (though see Pressure advice in 9.1 *General recommendations*). Flooded suction will enhance pumping performance in all cases, particularly for materials of a viscous nature.

**Do** recalibrate after changing pump tubes, fluid, or any connecting pipework. It is also recommended that the pump is recalibrated periodically to maintain accuracy.

**IP66 / NEMA 4X** models may be hosed down, but should not be immersed. Protect from prolonged UV exposure.

**IP31** models may be wiped with a damp cloth, but should not be hosed or immersed. The front of IP31 models is further protected against light spillages onto the pump.

**When using Marprene or Bioprene** continuous tubing, do re-tension the tube after the first 30 minutes of running.

**Tube selection**: The chemical compatibility lists published in Watson-Marlow publications are guides. If in doubt about the compatibility of a tube material and the duty fluid, request a Watson-Marlow tube sample card for immersion trials.

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# 10 Connecting this product to a power supply

A well regulated electrical mains supply is required along with cable connections conforming to the best practice of noise immunity. It is not recommended to site these drives alongside "dirty" electrical mains supplies such as 3-phase contactors and inductive heaters without special attention being paid to unacceptable mains-borne noise.


The voltage selector is mounted in the switchplate at the rear of the pump, protected from water by the 620N module (620BpN). The module must be removed to allow access to the switchplate. See 22.1 *620N module removal and replacement*. Set the voltage selector to 115V for 100-120V 50/60Hz supplies or 230V for 200-240V 50/60Hz supplies. Always check the voltage selector switch before connecting the mains supply. Make suitable connection to an earthed, single-phase mains electricity supply. To comply with Safety Standards, the mains plug must be a separable plug (not a locking type).

**We recommend using commercially available supply voltage surge suppression where there is excessive electrical noise.**

**Power cable**: The pump is supplied fitted with either of two cable glands and approximately 2.8m of power cable. The European cable is to Harmonised code H05RN-F3G0.75, used with our gland part number SL0128 which is suitable for an outside cable sheath diameter of 4-7mm. The north American cable is to type SJTOW 105C 3-18AWG VW-1 used with our gland part number SL0123 which is suitable for an outside cable sheath diameter of 7-9mm.

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Power cables of NEMA 4X specification pumps are fitted with a standard US mains power plug. IP66 specification pumps are supplied with no plug. Wiring a mains plug must only be undertaken by suitably skilled, qualified personnel.

### Conductor coding

| | European | North American |
|---|---|---|
| **line** | brown | black |
| **neutral** | blue | white |
| **ground** | green/yellow | green |

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**The voltage selector switch is not visible while the 620N module is in place. Do not switch the pump on unless you have checked that it is set to suit your power supply by removing the module and inspecting the switch, and then refitting the module. See 22.1 *620N module removal and replacement*.**

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If the mains power cable is inappropriate for your installation, it can be changed. Please contact your local Watson-Marlow Bredel service centre.


**Input line fusing**: type T5A H 250V 20mm time-delayed cartridge fuse, located in a fuseholder in the centre of the switchplate at the rear of the pump.

**Power interruption**: This pump has an auto-restart feature which, when active, will restore the pump to the operating state it was in when power was lost. See 18.6 *Auto-restart*.

**Stop / start power cycles**: Do not power up/power down for more than 100 starts per hour, whether manually or by means of the auto-restart facility. A minimum interval of 3 seconds is required between power cycles. We recommend remote control where a high number of starts is required.

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# 11 Start-up check list

Note: See also 27.6, 27.7, 27.8 and 31.5 *Tube loading*.

- Ensure that proper connections are achieved between the pump tube and suction and discharge piping.
- Ensure proper connection has been made to a suitable power supply.
- Ensure that the recommendations in section 9 Good pump installation practice are followed.

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# 12 Switching the pump on for the first time

**Note**: This manual uses **bold** type to highlight the active option in menu screens: "**English**" in the first screen represented here. The active option appears on the pump display in inverse text.


- Switch on the power supply at the rear of the pump. The pump runs a power-on test to confirm proper functioning of the memory and hardware. If a fault is found, an error message is displayed. See 24.1 *Error codes*.
- The pump displays a language menu. Use the **UP** and **DOWN** keys to select your language. Press the **ENTER** key to confirm your choice.
- **The information which follows assumes that your choice was English.**
- When the language is chosen this menu will not appear again and all menus will appear in the language you chose. (Language can be reset as described later. See 18.13 *Language*.)
- The pump displays the Watson-Marlow start-up screen for four seconds, followed by the pump model identity screen for four seconds, and then the manual mode main screen.
- The rotation symbol on the display indicates clockwise rotation. The default speed setting is 165rpm, but 265rpm is available (see 18.7 *Set maximum allowed speed*). Other initial start-up operational parameters are listed in the table below.

| First-time start-up defaults | | | |
|---|---|---|---|
| **Language** | Not set | **Auto-restart** | Off |
| **Speed** | 165rpm | **Pump status** | Stopped |
| **Direction** | Clockwise | **Beeper** | On |
| **Pumphead** | 620R | **Manual screen** | rpm |
| **Tube size** | 15.9mm | **Security code** | Not set |
| **Calibration** | 620R 15.9mm tube | **Pump address** | 126 |
| **Backlight** | On | **Scrolling increment** | 0.1rpm |
| **Keypad lock** | Off | **PROFIBUS** | Enabled |

**The pump is now ready to operate according to the defaults listed above.**

All operating parameters may be changed by means of key-presses. See 14 *Manual operation*.

**BpN, Bp**

# 13 Switching the pump on in subsequent power cycles (if not in auto-restart mode)


- Switch on the power supply at the rear of the pump. The pump runs a power-on test to confirm proper functioning of the memory and hardware. If a fault is found, an error message is displayed. See 24.1 *Error codes*.
- The pump displays the Watson-Marlow start-up screen for four seconds followed by the pump model identity screen for four seconds, and then the manual mode main screen.
- **Note**: Once in the manual mode main screen, keys assume their normal functions - see 15.1 *Keypad functions in menu screens*. A subsequent press on **START** causes the pump to operate.
- Start-up defaults are those in place when the pump was switched off last. Check that the pump is set to operate as you require it.

**The pump is now ready to operate.**

All operating parameters may be changed by means of key-presses. See 14 *Manual operation*.

# 14 Manual operation

## 14.1 Keypad functions

All settings and functions of the pump in manual mode are set and controlled by means of key-presses. Immediately after the start-up display sequence detailed above, the manual mode main screen will be displayed. The currently selected rotation direction is indicated on the display by a clockwise or counter-clockwise segmented arrow. If an exclamation mark ( **!** ) shows, it indicates that Auto-restart is on. If a padlock icon ( 🔒 ) shows, it indicates that Keypad lock is on.


**Note**: A number of the controls listed below are shortcuts to commands which are also available through the Main menu. See 15 *Main menu*.

**Note**: **SHIFT** gives access to functions which appear on the upper part of numeric keys. To access the **MAX** function, for example, press **SHIFT** once *and release it*. A symbol appears in the bottom left of the display to indicate that the next keypress will be **SHIFT**ed. Press **4 (MAX)**.

A brief single press on each key triggers a beep sound (if enabled - see 14.5 *Keypad beep*) and causes the pump to function as follows:

- **START**: starts the pump at the speed and in the direction shown on the display. The rotation symbol will become animated to confirm that the pump is operating.


If the pump is running when **START** is pressed, it causes the information shown on the manual mode main screen to cycle from revolutions per minute, to flowrate in a choice of units (via a warning screen if flowrate has not been calibrated and if this is the first cycle since power-up) to rpm, flowrate and Run time. An example is shown here. The default can be altered from within the Setup menu (see 18.3 *Display*).

- **MAX (SHIFT, 4)**: while pressed, **MAX (SHIFT, 4)** operates the pump at the maximum allowed speed and in the direction shown on the display. When released, the pump returns to its previous status.
  **Note**: Priming can be achieved by pressing **MAX (SHIFT, 4)** until fluid flows through the pump and reaches the point of discharge, and then releasing **MAX (SHIFT, 4)**.
- **AUTO (SHIFT, 9)**: has no effect if the pump is running in auto mode. Stops the pump if it is running in manual mode and displays the pump's address, direction of rotation, the speed at which it will run if it receives a PROFIBUS telegram to start, and its calibrated flow rate. It is automatically switched into auto-restart mode and displays the **!** icon.


- **MAN (SHIFT, 6)**: has no effect if the pump is already running in manual mode. Returns the pump to manual control if it is running in auto mode.
- **STOP**: if the pump is running, pressing **STOP** stops the pump. The display will continue to show the previous speed and direction. The pump will return to this speed and direction when the **START** key is pressed again.

- **UP**: increases the speed shown on the display in minimum steps of 0.1rpm, or other steps as pre-selected in the Scrolling section of Setup (18.15), (unless the speed displayed is already the maximum allowed speed). If the pump is then started by pressing the **START** key, it will operate at the new speed. If the pump is running when **UP** in pressed, the change takes effect immediately.
  **Note**: If the pump's flow rate has been calibrated (see 17 *Head and tubing calibration*), after a speed change a screen showing the new rpm figure and the new flowrate is displayed for four seconds before returning the user to the previously set manual mode main screen: rpm or flowrate.
- **DOWN**: decreases the speed shown on the display in minimum steps of 0.1rpm, or other steps as pre-selected in the Scrolling section of Setup (18.15). If the pump is then started by pressing the **START** key, it operates at the new speed. The minimum speed possible is 0.1rpm. If the pump is running when **DOWN** is pressed, the change takes effect immediately.
  **Note**: If the pump's flow rate has been calibrated (see 17 *Head and tubing calibration*), after a speed change a screen showing the new rpm figure and the new flowrate is displayed for four seconds before returning the user to the previously set manual mode main screen: rpm or flowrate.
  **Note**: You can reduce the pump speed from 0.1rpm (or any other minimum displayed unit of speed as selected in the Scrolling section of Setup (18.15)) to 0rpm by a further press on the **DOWN** key. The pump is still in the running state and the rotation symbol will continue to move. Press the **UP** key to return the pump to the minimum speed.
  **Note**: If a minimum allowed speed has been set in the Set Min Speed section of the Setup menu, the above note on speed reduction to 0rpm does not apply.
- **DIRECTION (SHIFT, 1)**: toggles the direction of rotation shown on the display. If the pump is then started by pressing the **START** key, it rotates in the new direction. If the pump is running when **DIRECTION** is pressed, the change takes effect immediately.
- **ENTER**: is used to enter/confirm numeric and menu selections. Also cycles the information shown on the manual mode main screen exactly as **START** does, whether the pump is running or not. See **START**, above.
- **MENU (SHIFT, 7)**: causes the main menu to be displayed, from which all aspects of pump setup can be controlled. See 15 *Main menu*.
- **CLEAR (SHIFT, 5)**: clears numeric entries so that they can be entered again.
- **CAL (SHIFT, 8)**: takes the user to the calibrate sequence.
- **. (decimal point, period) (SHIFT, 0)**: used in numeric expressions as a decimal point. To enter 5.3, press 5, SHIFT, 0, 3. (Some languages use , (comma) to represent a decimal point. This pump uses .)

**Keypress combinations** cause the pump to function as follows:

**Note**: A number of the controls listed below are shortcuts to commands which are also available through the Main menu. See 15 *Main menu*.

- **UP** and **1 (DIRECTION)** on power-up: toggles the **keypad beep** on and off.
- **START** on power-up: switches on the **Auto-restart** facility. See 18.6 *Auto-restart*.
- **STOP** on power-up: switches off the **Auto-restart** facility. See 18.6 *Auto-restart*.
- **STOP** and **UP** while the pump is stopped: turns the **display backlight** on.
- **STOP** and **DOWN** while the pump is stopped: turns the **display backlight** off.
- **SHIFT** and **UP**: sets the pump to maximum allowed speed. **Note**: Unlike its action elsewhere, **SHIFT** must be pressed and held. **Note**: The **MAX** key has a similar function, but causes the pump to run at maximum allowed speed only while the key is pressed.
- **SHIFT** and **DOWN**: sets the pump to minimum allowed speed. **Note**: Unlike its action elsewhere, **SHIFT** must be pressed and held.
- **1 (DIRECTION)** and **DOWN,** pressed simultaneously: interrupts the display to show the pump's ROM version for four seconds.
- **START** pressed and held for four seconds: toggles the keypad lock on and off. Only the **START** and **STOP** keys are active when keypad lock is on. The pad-lock icon is displayed.
- **STOP** pressed and held for two seconds: toggles the **keypad lock** on and off. Only the **START** and **STOP** keys are active when keypad lock is on. The pad-lock icon is displayed.
- **STOP STOP** within half a second: shortcut entry to MemoDose; when in MemoDose, shortcut return to manual mode main screen. See 20 *MemoDose*.

## 14.2 Speed

To change the running speed:

- Use the **UP** and **DOWN** keys to change the pump's running speed within limits of 0.1 rpm or other minimum allowed speed and the maximum allowed speed. **Note**: You can reduce the pump speed from 0.1 rpm to 0 rpm by a further press on the **DOWN** key. The pump is still in the running state and the rotation symbol will continue to move. Press the **UP** key to return the pump to the minimum speed.

**Note**: The maximum allowed speed of the drive defaults to 165rpm. It is possible to set this limit at any speed up to 265rpm. See 18.7 *Set maximum allowed speed*, and section 3 *Five-year warranty*.

## 14.3 Direction

To toggle the pump's rotation sense:

- Press **DIRECTION (SHIFT, 1)** to toggle the pump between clockwise and counter-clockwise rotation.

**Note**: Direction control is available subject to access not being limited by security code. See 18.16 *Security code*.

## 14.4 Keypad lock

The keypad can be locked to prevent changes to pump speed or other settings, and make it possible only to start or stop the pump. The padlock symbol shows on the display.

- While the pump is running, hold down the **START** key for two seconds. The padlock symbol shows and only the **START** and **STOP** keys function.
- The keypad may also be locked while the pump is stopped. Hold down the **STOP** key for two seconds. The padlock symbol shows and only the **START** and **STOP** keys function.
- To unlock the keypad while the pump is running hold down the **START** key for two seconds. The padlock symbol is removed. If the pump is stopped hold down the **STOP** key until the padlock symbol is removed.

**Note**: Keypad lock is available subject to access not being limited by security code. See 18.16 *Security code*.

## 14.5 Keypad beep

The pump keypad can operate silently or indicate a positive key-press with a beep sound.

- To toggle the sound on and off, stop the pump. Turn off the mains power switch at the rear of the pump.
- Depress the **UP** and **1 (DIRECTION)** keys while switching on the mains power switch at the rear of the pump.

See 18.15 *Beep*.

## 14.6 Backlight

To turn the display backlight on:

- Depress the **STOP** and **UP** keys together.

To turn the display backlight off:

- Depress the **STOP** and **DOWN** keys together.

See 18.11 *Backlight*.

## 14.7 Auto-restart

This pump offers an auto-restart feature. When active on power loss, it will restore the pump when power returns to the operating state it was in when power was lost. It does not operate when powering down in the middle of a dose; when the pump is restarted, it will await a press on the **START** key to begin the interrupted dose again. Auto-restart is retained while the pump is switched off. When the pump starts running look for the **!** symbol on the display. This **!** symbol indicates that the pump is set for auto-restart.

**Do not use auto-restart for more than 100 starts per hour. We recommend remote control where a high number of starts is required.**

To turn the auto-restart facility on:

- Turn off the mains power switch at the rear of the pump.
- Depress the **START** key while switching on the mains power switch at the rear of the pump.

To turn the auto-restart facility off:

- Turn off the mains power switch at the rear of the pump.
- Depress the **STOP** key while switching on the mains power switch at the rear of the pump.

BpN, Bp

# 15 Main menu

## 15.1 Keypad functions in menu screens

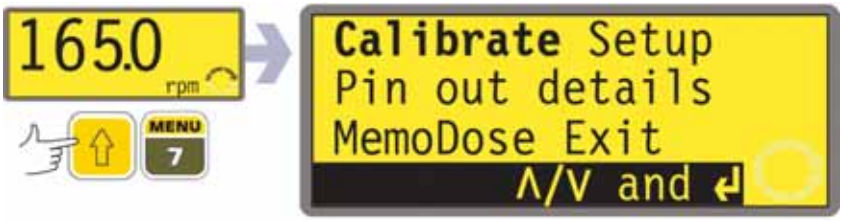

In addition to their functions in other operations, the following keys have specific actions in menu screens:

- **STOP**: In general, **STOP** functions as a "go back" key, taking the user up one menu level without making a change.
- **UP**: The **UP** key is used in menu item selection: it moves a highlight up the menu. When a numerical entry screen is displayed, pressing **UP** increases the number displayed.
- **DOWN**: The **DOWN** key is used in menu item selection: it moves a highlight down a menu. When a numerical entry screen is displayed, pressing **DOWN** decreases the number displayed.
- **ENTER**: The **ENTER** key functions in a similar way to the "enter" key of a personal computer: it confirms key-presses made immediately before. In menu item selection, it triggers the action or display selected from a menu using the **UP** and **DOWN** keys.

**Note**: Confirmation screens are displayed for 4 seconds. While they are displayed, a single press on any key removes them.

## 15.2 Main menu entry

**MENU (SHIFT, 7)** displays the main menu and stops the pump if it is running in Manual mode. It operates at any point in the pump's activity except where error screens are displayed, where **UP** and **DOWN** keys are used to enter values, or where a PIN is requested.




The main menu offers five options: **Calibrate, Setup, Pin out details, MemoDose** and **Exit.** Use the **UP** and **DOWN** keys to make a choice. Press the **ENTER** key to confirm your decision.

### Calibrate

**Calibrate** allows the user to calibrate the pump with default figures for a range of pumpheads and tubes, as well as to refine the flowrate figures with a calibration dose facility.

### Setup

**Setup** allows the user to set the pump's operating parameters under 17 headings: **Pump address, PROFIBUS enable, Display, Flow units, Run time, Auto-restart, Set max speed, Set min speed, Scrolling, Date/time, Backlight, ROM, Language, Defaults, Beep, Security code** and **Exit**.

**Bp**

### Pin out details

Selecting **Pin out details** causes the pump to display an information screen and then its preset pin and voltage details under seven headings: PROFIBUS I/O, Leak input, Supply, 0 volts, Earth, Others and Exit.

**BpN**

Pin out information is not relevant to the 620BpN IP66/NEMA 4X pumps. Selecting **Pin out details** causes the pump to display a warning screen and redisplay the main menu.

**BpN, Bp**

### MemoDose

The **MemoDose** facility is used to remember the number of revolutions needed to dispense a previously dispensed volume of fluid, and cause the pump to dispense that volume repeatedly.

### Exit

If **Exit** is selected, the pump returns to its last manual state with the pump stopped.

BpN, Bp

# 16 PIN-secure process protection

The 620BpN and 620Bp feature PIN-secure process protection. This allows the pump to be configured to suit the application, and for the setup to be protected by two levels of PIN code.

| Menu option or keypress | With Main code set | With User code set | Code set and keypad locked |
|---|---|---|---|
| **Menu (SHIFT, 7)** | Available | Available | Not available |
| **Calibrate** | Available | Available | Not available |
| **Accept** | Available | Available | Not available |
| **Change** | Main PIN needed | Main PIN or User PIN needed | Not available |
| **Setup** | Main PIN needed | **Main PIN needed; User PIN invalid** | Not available |
| **Cal (SHIFT, 8)** | Available | Available | Not available |
| **Accept** | Available | Available | Not available |
| **Change** | Main PIN needed | Main PIN or User PIN needed | Not available |
| **Max (SHIFT, 4)** | Available | Available | Not available |
| **Dir (SHIFT,1)** | Main PIN needed | Main PIN or User PIN needed | Not available |
| **Auto (SHIFT, 9)** | Available | Available | Not available |
| **Man (SHIFT, 6)** | Available | Available | Not available |
| **Up** | Available | Available | Not available |
| **Down** | Available | Available | Not available |
| **SHIFT and Up** | Available | Available | Not available |
| **SHIFT and Down** | Available | Available | Not available |
| **Start** | Available | Available | Available |
| **Stop** | Available | Available | Available |
| **Enter** | Available | Available | Not available |
| **MemoDose** | Available | Available | Available |
| **Keypad lock** | Main PIN needed | Main PIN or User PIN needed | Main PIN or User PIN needed |
| **Auto-restart** | Available | Available | Available |

The main code gives access to **Calibrate**, **Setup**, **Direction** change and **Keypad lock**.

The secondary (User) code permits **Calibrate**, **Direction** change and **Keypad lock** but bars **Setup** change.

If either code is used in conjunction with Keypad lock, all keys are disabled except **STOP** and **START**.

To activate and set a security code, see 18.16 *Security code*.

**If the main code is lost or forgotten**: The Setup main security code can be bypassed by entering a special key sequence; all codes can then be cancelled and reset. Contact Watson-Marlow or your distributor for details.

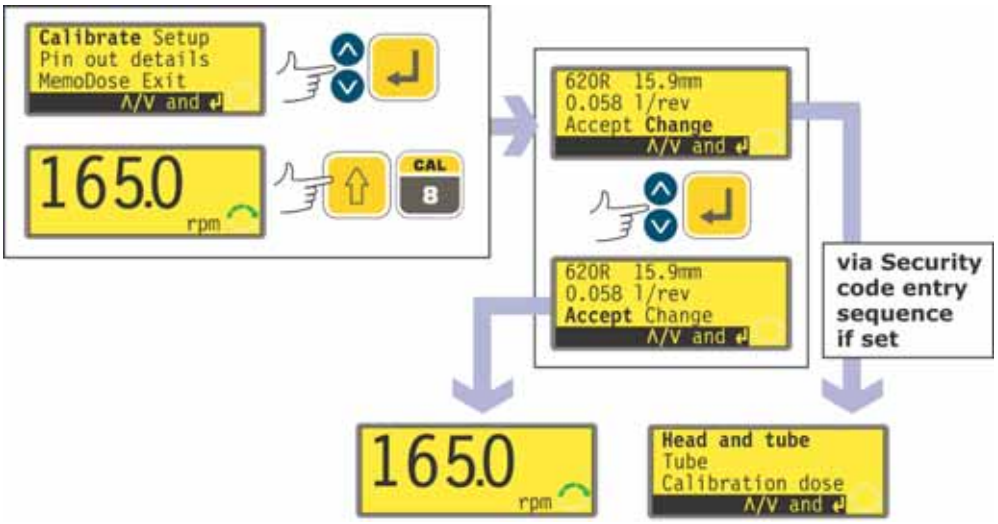
BpN, Bp

# 17 Head and tubing calibration

The pump can display flowrate in a choice of units as well as speed in revolutions per minute. It must first be calibrated.

Pump calibration can be limited to users who correctly enter a three-digit security code. If a security code has been set, selecting **Change** from the calibration details screen and confirming with the **ENTER** key causes the pump to display the Security code entry sequence. See 18.16 *Security code*. If no security code has been set, the pump displays the first screen of the calibration sequence.

To dispense the correct amount of fluid the pump must know which pumphead is fitted and the tube size in the pumphead. The pump is pre-programmed with default flow rate figures for a range of pumpheads and tubes. You may also measure the flow from the pump and enter this value for the most accurate calibration.




- Use the **UP** and **DOWN** keys to highlight **Calibrate** in the main menu. Press **ENTER** to confirm.

**Alternatively ...**

- Press **CAL (SHIFT, 8)** to enter the calibration screen from the main running screen, and return there after calibrating.

Then:

- The pump displays its current settings: pumphead, tube size and flowrate; the default for each standard pumphead is the largest tube the pumphead can take. Example information is shown here.
- Use the **UP** and **DOWN** keys to highlight **Accept** or **Change**. Press **ENTER** to confirm.
- If **Accept** is selected, the default or previously set flowrate data for that pumphead and tube size are used. The pump displays the main running screen.
- If **Change** is selected with a security code in place, the pump starts its security code entry sequence. See 18.16 *Security code*. When the correct code is entered, the pump offers three options: **Head and tube**; **Tube**; and **Calibration dose**. If **Change** is selected with no security code in place, the three options are displayed immediately.
- Use the **UP** and **DOWN** keys to make a selection. Press **ENTER** to confirm.

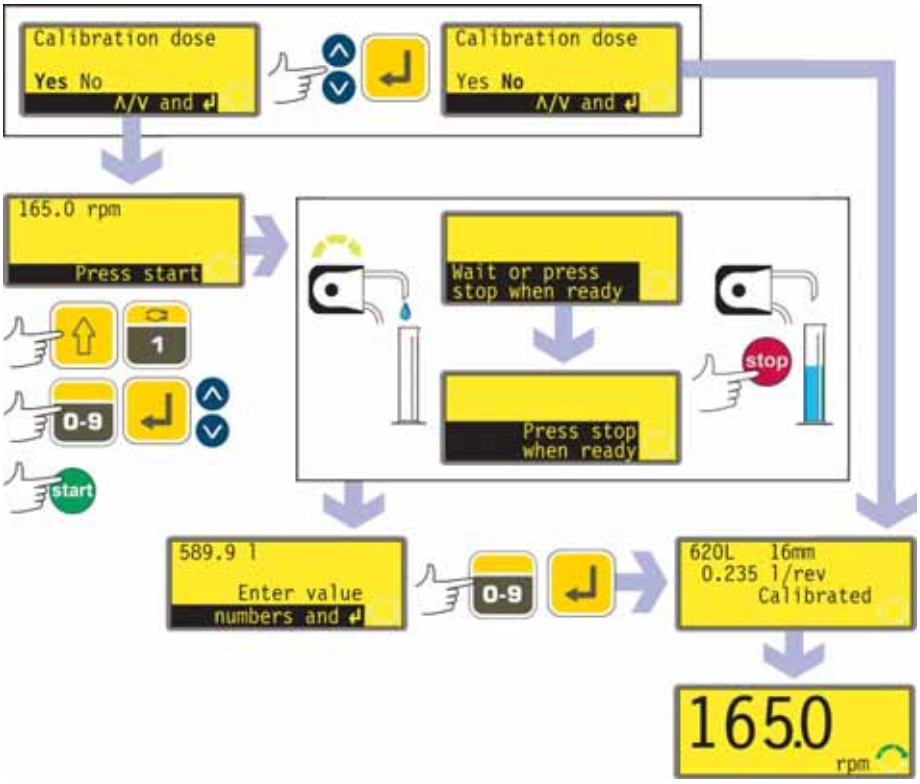
### Head and tube


- If **Head and tube** is selected, the pump displays a list of standard pumpheads that can be fitted to the pump.
- Use the **UP** and **DOWN** keys to make a selection. Press **ENTER** to confirm. An example is shown here.
- The pump displays tube sizes, as below.

### Tube


- If **Tube** is selected or a pumphead choice has just been made, the pump displays a list of standard tube sizes that can be used in the pumphead previously identified.
- Use the **UP** and **DOWN** keys to make a selection. Press **ENTER** to confirm.

### Calibration dose




choose **Yes** or **No**. Press **ENTER** to confirm. Examples are shown here.

- If **No** is selected after a tube selection has been made (see *Tube* above), the pump briefly displays a confirmation screen showing current head, tube and flow settings, and redisplays the main menu.
- If **Calibration dose** is selected or if **Yes** is selected after a tube selection has been made (see *Tube* above), the pump displays the speed and direction at which it was last running in manual mode or to which it has just been set and invites the user to press **START**.
- **Note**: it is possible at this point to change the direction of rotation using the **DIRECTION (SHIFT, 1)** key, and to change the speed of rotation using the numeric keys (followed by **ENTER**), or the **UP** and **DOWN** keys, within the minimum and maximum limits that have been set. See 18.7 *Set maximum allowed speed* and 18.8 *Set minimum allowed speed*.
- Put a measuring container at the pump outlet. Press **START**. The pump runs for 4 minutes, displaying an information screen for 15 seconds and a further information screen for the rest of the 4 minutes. You may stop the calibration dose at any time with the **STOP** key - but allow the pump to run as long as possible to obtain the most accurate calibration. A minimum of 15 seconds is recommended.

- Measure the quantity of fluid dispensed. The pump displays its calculated dose, based on previous calibration data. Use the numeric keys to adjust this reading to match the measured volume. Press **ENTER**. The pump briefly displays the new head, tube and flow settings, and displays the main running screen. Example figures are shown here.


**Note**: If the pump has been set to display flow rate in units of mass (see 18.4 *Flow units*), as in this example, the pump displays a screen allowing you to confirm the specific gravity of the duty fluid immediately before the final press on **ENTER**.

**Note**: if calibration was entered by pressing **CAL (SHIFT, 8)** from the main running screen, **the pump redisplays the main running screen and restarts immediately without waiting for a further command**.

**Note**: Always recalibrate after changing pump tubes, fluid, or any connecting pipework. It is also recommended that the pump is recalibrated periodically to maintain accuracy.

**Note**: If the pump power is cycled while flow rate is displayed, calibration is lost and a warning is displayed.

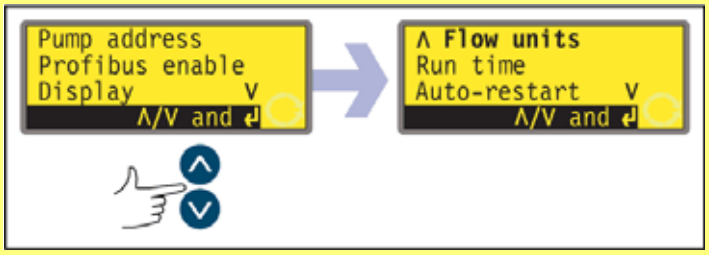
BpN, Bp

# 18 Setup

Entry to the Setup menu is from the Main menu and can be limited to users who correctly enter a three-digit security code. If a security code has been set, selecting **Setup** and confirming with the **ENTER** key causes the pump to display the Security code entry sequence. See 18.16 *Security code*. If no security code has been set, the pump displays the first of five screens containing the Setup menu.

### The Setup menu

**The Setup menu occupies five screens. The first two are shown here.**




**To move from one screen to subsequent screens, repeatedly press DOWN. Each item is highlighted in turn until the last item on the screen is highlighted.**

**A further press on the DOWN key displays the next screen of the menu, with the first item highlighted.**

**Follow the reverse procedure using the UP key to move to an item on a previous screen of the menu.**

Make a selection using the **UP** or **DOWN** keys and press **ENTER** to confirm your choice.

# 18.1 Pump address

The 620Bp and 620BpN pumps can be individually controlled under PROFIBUS as one of up to 125 devices. Its default network address is 126. It can be given another address.


- In the first screen of the Setup menu select **Pump address** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen allowing you to change the pump's address. Use the **UP** and **DOWN** keys to change the number in the display to an integer from 1 to 125 and press **ENTER** to confirm your decision. An example is shown here.
- The pump displays the first screen of the Setup menu.
- Switch off power to the pump, wait for 3 seconds and switch on. The pump address is now updated.

**Note**: While the pump still carries its default address—126—its address can be changed as described here, or changed remotely from the PROFIBUS master. If its address is no longer 126, any further address change must be made as described here.

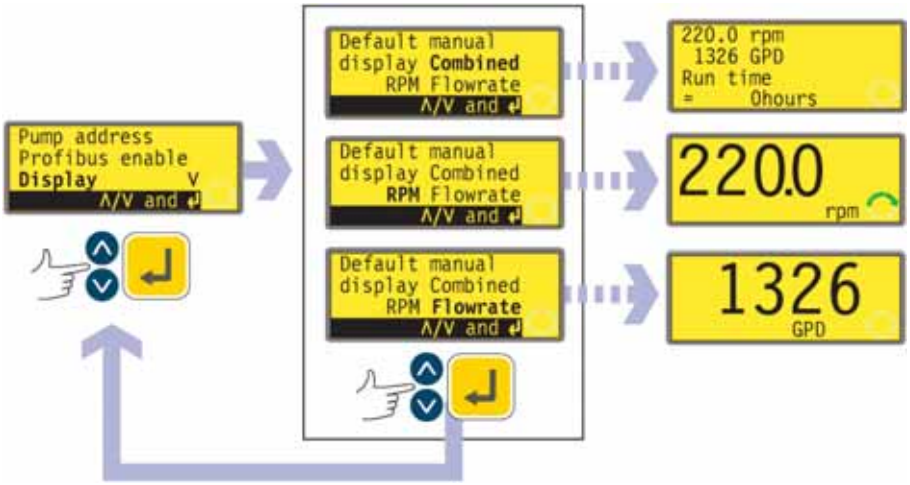
# 18.2 PROFIBUS enable

The pump's default state is PROFIBUS-enabled, allowing it to be connected to a PROFIBUS network. See 23 *Switching to PROFIBUS network control*. It can be PROFIBUS-disabled and re-enabled.


- In the first screen of the Setup menu select **PROFIBUS enable** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen allowing the user to enable or disable PROFIBUS. Use the **UP** and **DOWN** keys to choose **Yes** or **No** and press **ENTER** to confirm your choice.
- The pump displays the first screen of the Setup menu.

# 18.3 Display

The pump can display three default screens in manual mode: revolutions per minute, flow rate in a choice of units, or both.



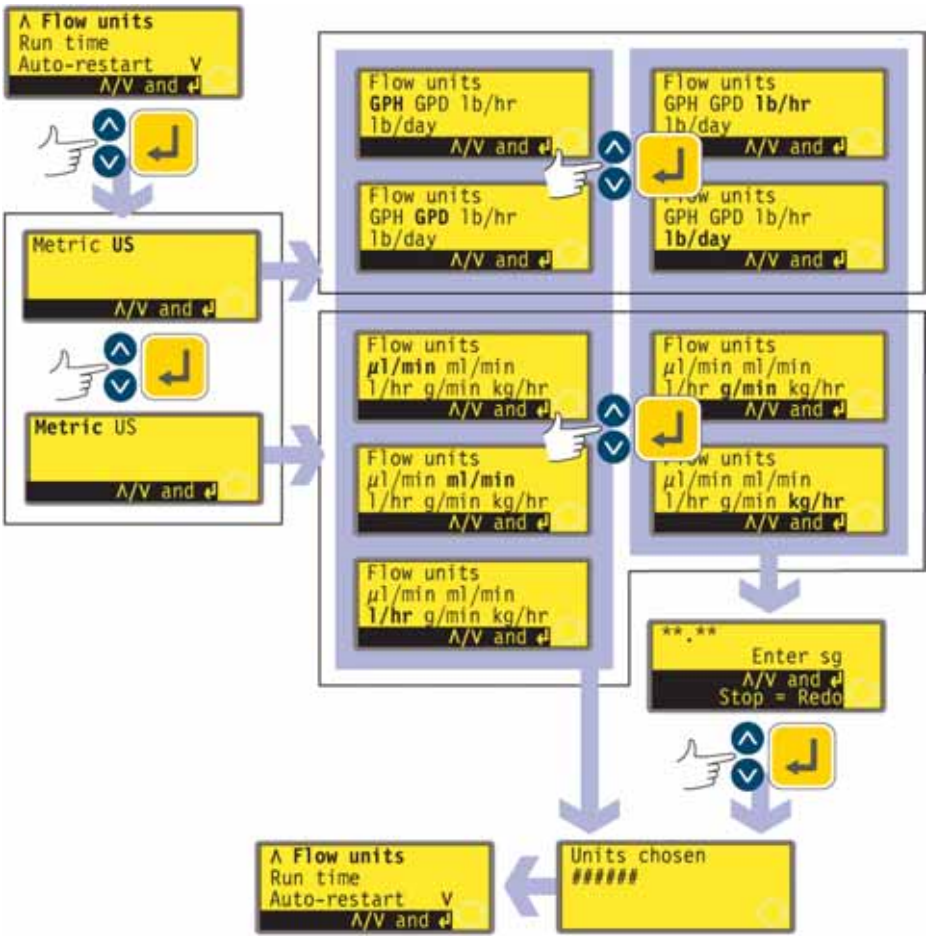

- In the first screen of the Setup menu select **Display** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen allowing you to choose the format of the manual mode main screen. Use the **UP** and **DOWN** keys to choose and press **ENTER** to confirm your decision.
- If you choose **flow rate** and you have not calibrated the pump since switching it on, a warning screen is displayed for 4 seconds. The warning does not appear if the display screen formats are cycled again, unless the pump has been switched off in the mean time.
- The pump redisplays the first screen of the Setup menu.
- When the pump next runs, the manual mode main screen will display pump activity in rpm, flow rate (in the units you chose - see 18.4 *Flow units*) or both, according to your choice, plus a run time figure. Examples are shown here.

**Alternatively ...**

- In the manual mode main screen, repeatedly press **ENTER** to cycle the display between rpm, flow rate (in the units you chose - see 18.4 *Flow units*) or combined, according to your choice. This cycle operates if the pump is running and if it is stopped. While the pump is running, you can cycle the display in the same way by repeatedly pressing **START**. In both cases, if you have not calibrated the pump since switching it on, a warning screen is displayed for 4 seconds before the flow rate screen appears. The warning does not appear if the display screen formats are cycled again, unless the pump has been switched off in the mean time.
- The pump redisplays the first screen of the Setup menu.

# 18.4 Flow units

The pump can display its flow rate in metric (SI) or US (imperial) units of volume or mass.

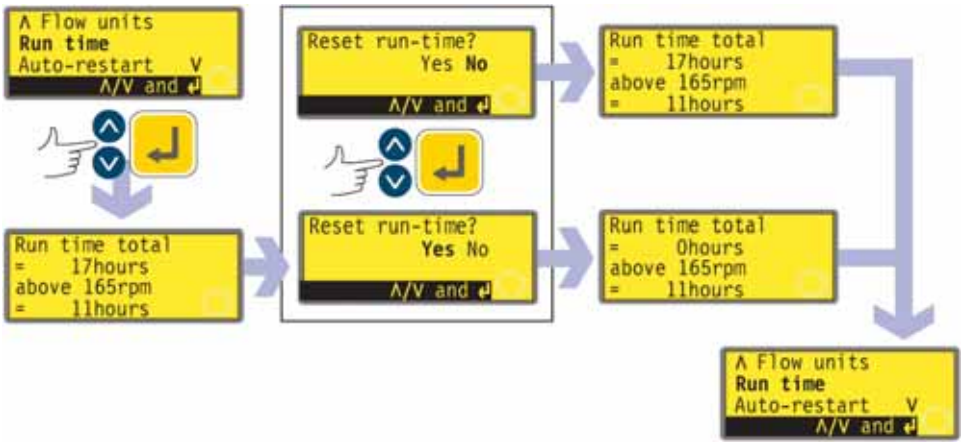



- In the second screen of the Setup menu select **Flow units** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen offering Metric or US. Use the **UP** and **DOWN** keys to choose and press **ENTER** to confirm your decision.
- If you chose Metric, the pump offers a choice of units: µl/min, ml/min, l/hr, g/min or kg/hr. Use the **UP** and **DOWN** keys to choose and press **ENTER** to confirm your decision.
- If you chose US, the pump offers a choice of units: US Gallons/hr, US Gallons/day, lb/hr or lb/day. Use the **UP** and **DOWN** keys to choose and press **ENTER** to confirm your decision.

- If you chose a volumetric flow rate from either screen, a confirmation screen appears briefly and the pump displays the second screen of the Setup menu.
- If you chose a mass flow rate from either screen, the pump asks for the specific gravity of the fluid to be pumped. Use the **UP** and **DOWN** keys to enter a value between 0.01 and 15.00. Press **ENTER** to confirm your decision. Press **STOP** if you decide to make a different choice of units.
- A confirmation screen appears briefly and the pump displays the second screen of the Setup menu.

## 18.5 Run time

The pump cumulatively records how many complete hours its motor runs and the hours it has run above 165 prm. The figures can be displayed and the first figure can be reset to zero.



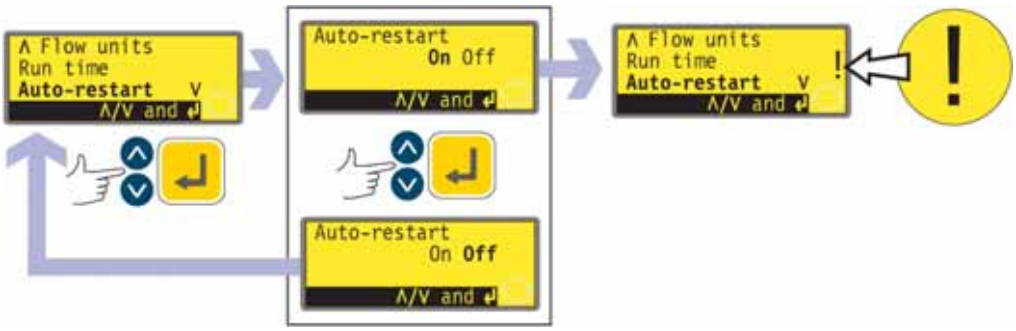

- In the second screen of the Setup menu select **Run time** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump briefly displays the total hours its motor has operated since the last time the counter was reset to zero hours; and the hours it has operated above 165 prm since the pump was first operated; followed by an opportunity to reset the first of those totals to zero hours. An example is shown here. Use the **UP** and **DOWN** keys to choose **Yes** or **No** and press **ENTER** to confirm your decision.
- The total hours screen is briefly displayed with its first total reset to zero hours, or unchanged, as appropriate. The pump displays the second screen of the Setup menu.

**Note**: The number of hours the pump has operated above 165 rpm is not reset; it shows a cumulative total since the pump was first operated. Operating above that speed and at pressures greater than 2 bar invalidates the warranty on a 620RE rotor. See 8.1 *Pressure capability*.

**Note**: Run time since the last time the counter was reset to zero hours is displayed on the Combined display. See 18.3 *Display*. Run time does not zero when factory default is selected.

# 18.6 Auto-restart

This pump offers an auto-restart feature. If active on power loss, it restores the pump when power returns to the operating state it was in when power was lost. It does not operate when powering down in the middle of a dose: when the pump is restarted, it will await a press on the **START** key to begin the interrupted dose again. Auto-restart is retained while the pump is switched off. When the pump starts running, look for the **!** symbol on the display. This **!** symbol indicates that the pump is set for auto-restart.




- In the second screen of the Setup menu select **Auto-restart** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen allowing the user to activate auto-restart. Use the **UP** and **DOWN** keys to choose **On** or **Off** and press **ENTER** to confirm the decision.
- If **Off** is chosen, the pump returns the user to the second screen of the Setup menu. The auto-restart facility will not operate.
- If **On** is chosen, the pump returns the user to the second screen of the Setup menu, where an exclamation mark ( **!** ) is now visible. This mark confirms that the auto-restart feature is in place and will operate the next time power is lost and restored.

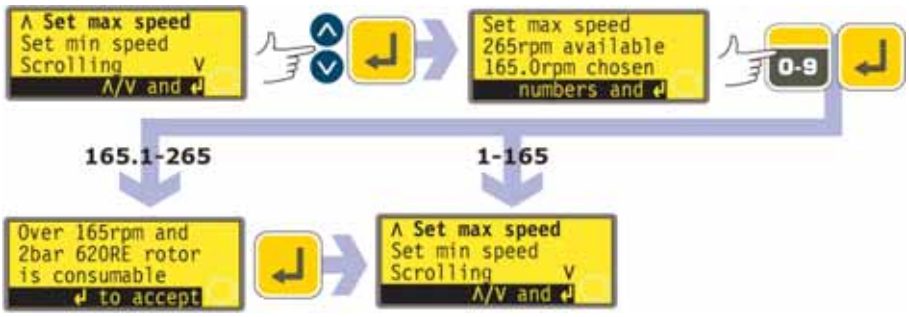
### Alternatively ...

- Stop the pump. Turn off the mains power switch at the rear of the pump.
- Hold down the **START** key and turn on the mains power switch. The **!** symbol shows on the display.
- Start the pump. If the mains supply is interrupted the pump will automatically restart when the mains power returns.
- To remove auto-restart switch off the mains power at the rear of the pump. Hold down the **STOP** key and turn the mains power switch on. The **!** symbol does not appear.

**Do not use auto-restart for more than 100 starts per hour. A minimum interval of 3 seconds is required between power cycles. We recommend remote control where a high number of starts is required.**

## 18.7 Set maximum allowed speed

The maximum allowed speed of the drive defaults to 165rpm. It is possible to set this limit at any speed down to 1rpm as long as the minimum allowed speed is at least 1rpm less, or up to 265rpm; however, see 8.1 *Pressure capability* for use above 165rpm.




- In the third screen of the Setup menu select **Set max speed** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen allowing the user to set the maximum speed of the pump equal to or lower than the maximum available. Use the numeric keys to set the maximum allowed speed and press **ENTER** to confirm the figure.
- The pump displays the third screen of the Setup menu, after a warning screen requiring the user to press **ENTER** if he selected a speed greater than 165rpm.

## 18.8 Set minimum allowed speed

The minimum allowed speed of the drive defaults to 0.1rpm. It is possible to set this limit at any speed up to 264rpm, as long as the maximum speed is at least 1rpm greater.


- In the third screen of the Setup menu select **Set min speed** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen allowing the user to set the minimum speed of the pump equal to or higher than the minimum available. Use the numeric keys to set the minimum allowed speed and press **ENTER** to confirm the figure.
- The pump displays the third screen of the Setup menu.

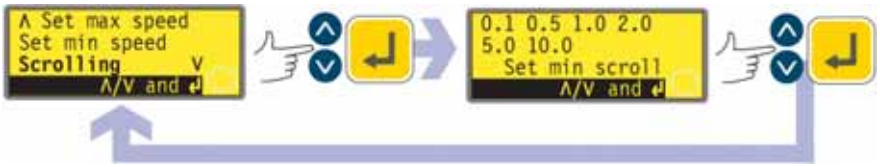
# 18.9 Scrolling

The pump's speed can be set, up to the maximum allowed speed and down to the minimum allowed speed, by pressing the numeric keys or by using the **UP** and **DOWN** keys.

The numeric keys allow the user to select a speed in increments of one-tenth of a revolution per minute (or the equivalent in flow rate if the pump has been configured to display its performance in units of flow).

The **UP** and **DOWN** keys allow the speed to be set in increments of the user's choice: one-tenth of a revolution per minute; one half of a revolution per minute; one, two, five or ten revolutions per minute (or their equivalents in flow rate if the pump has been configured to display its performance in units of flow). Each press on **UP**, for example, offers a speed one increment greater than the current speed.

**Note**: For 0.1rpm, 0.5rpm and 1rpm settings, the increments increase progressively as long as the **UP** or **DOWN** key is continually held down.




- In the third screen of the Setup menu select **Scrolling** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen allowing the user to set the **UP** and **DOWN** keys' scrolling increment. Use the **UP** and **DOWN** keys to choose **0.1**, **0.5**, **1.0**, **2.0**, **5.0** or **10.0**. Press **ENTER** to confirm your choice.
- The pump displays the third screen of the Setup menu.

**Note**: If the maximum allowed speed has been set to a figure which is not a multiple of the chosen increment, the last active press on **UP** raises the speed to that maximum rather than to the next multiple of the chosen increment. Similarly, if the pump is running at a speed which is not a multiple of the chosen increment, the first press on **UP** raises the speed to the next multiple of the chosen increment.

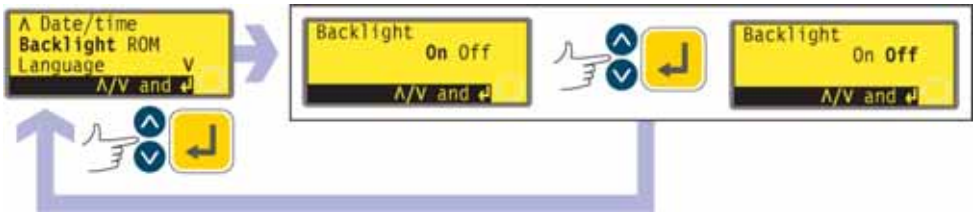
## 18.10 Date and time

The pump's real-time clock can be set with the date and time.


- In the fourth screen of the Setup menu select **Date/time** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice. The pump displays any previous setting.
- If the setting displayed is correct, press **ENTER**. The pump displays the fourth screen of the Setup menu.
- If you wish to change the setting, use the **UP** and **DOWN** keys to enter the current date (two digits), month (three letters), year (four digits), hour, minute and second (all two digits), pressing **ENTER** to confirm each one.
- When **ENTER** is pressed to confirm the seconds, the pump displays the fourth screen of the Setup menu.

## 18.11 Backlight

The pump's display can be illuminated or not according to choice.




- In the fourth screen of the Setup menu select **Backlight** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays a screen allowing the user to switch the display backlight on or off. Use the **UP** and **DOWN** keys to choose **On** or **Off** and press **ENTER** to confirm the decision.
- The pump displays the fourth screen of the Setup menu. The display is now illuminated or not according to the user's decision.

**Alternatively ...**

- To turn the backlight off: press **STOP** and **DOWN** together.
- To turn the backlight on: press **STOP** and **UP** together.

## 18.12 ROM

The pump can display its software version, model number and pump speed.


- In the fourth screen of the Setup menu select **ROM** using the UP and **DOWN** keys. Press **ENTER** to confirm your choice.
- The pump displays the software version, model number and the maximum allowed pump speed for four seconds (an example is shown here), then displays the fourth screen of the Setup menu. It also displays a checksum: CHK 123, for example. This may be required if reporting pump performance to the Watson-Marlow service department.

**Alternatively ...**

Press **1 (DIRECTION)** and **DOWN** together to interrupt the display and show the pump's ROM version for four seconds.

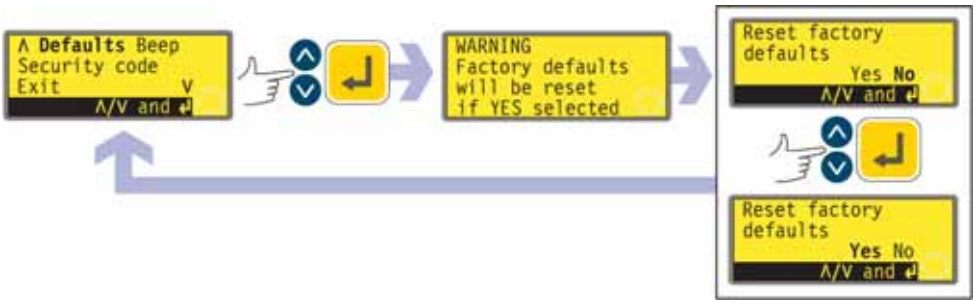
## 18.13 Language

The pump can be set to operate in several languages.


- In the fourth screen of the Setup menu select **Language** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- In the next screen, choose a language using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice. The pump displays the fourth Setup screen in your chosen language. All screens will subsequently appear in your chosen language.

## 18.14 Defaults

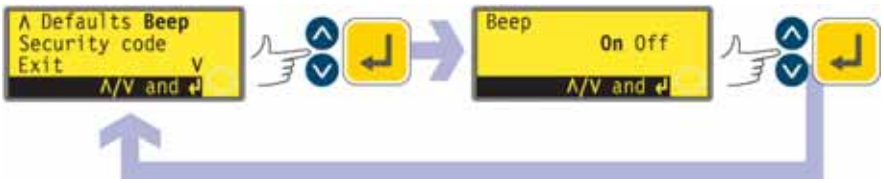
All the pump's user-set data can be reset to factory defaults.




- In the fifth screen of the Setup menu select **Defaults** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- A warning is displayed for four seconds, and the pump asks the user to confirm that factory defaults are to be reset. Use the **UP** and **DOWN** keys to choose **Yes** if you wish the pump to reset all user-set data back to factory defaults (see 12 *Switching the pump on for the first time*); or **No** if you do not wish to do this. Press **ENTER** to confirm your decision. If **Yes** was chosen, the pump resets its factory defaults and displays the fifth Setup screen. If **No** was chosen, the pump makes no changes to its setup and displays the fifth Setup screen.

## 18.15 Beep

The pump keypad can operate silently or indicate a positive key-press with a beep sound.




- In the fifth screen of the Setup menu select **Beep** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- In the next screen, use the **UP** and **DOWN** keys to choose **On** or **Off**. Press **ENTER** to confirm your decision. The pump displays the fifth Setup screen.

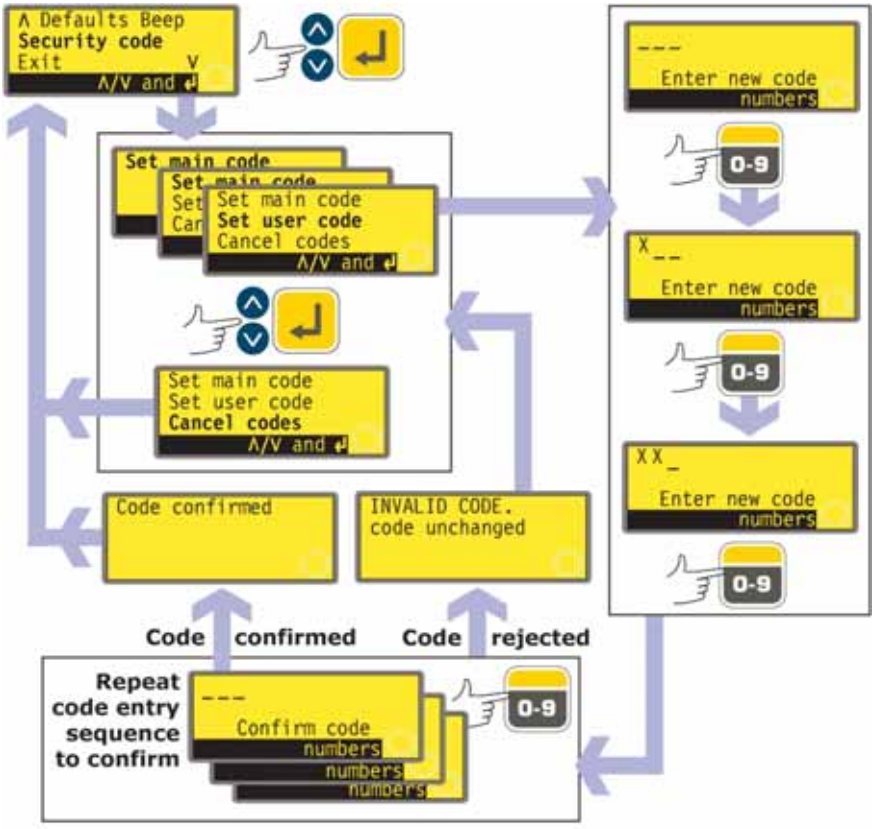
**Alternatively ...**

- To toggle the sound on and off, stop the pump. Turn off the mains power switch at the rear of the pump.
- Depress the **UP** and **1 (DIRECTION)** keys while switching on the mains power switch at the rear of the pump.

## 18.16 Security code

Access to the pump's Setup and Calibration menus, direction control and keypad lock can be restricted to those who correctly enter a three-digit security code: the main code. A secondary user code can be set, which permits PIN access to calibration, direction and keypad lock, but blocks access to Setup. See 18 *Setup*, 17 *Head and tubing calibration*, 14.3 *Direction* and 14.4 *Keypad lock*.

The codes must first be set.




- In the fifth screen of the Setup menu select **Security code** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- If no code has been set, a screen is displayed inviting the user to set a main code. Press **ENTER** to proceed (or **STOP** to return to the fifth screen of the Setup menu).

- If a main code has been set, a screen is displayed inviting the user to set a new main code, to set a user code (or a new user code if one has already been set), or to cancel all codes. Choose **Set main code**, **Set user code** or **Cancel codes** using the **UP** and **DOWN** keys. Press **ENTER** to confirm your choice.
- If you chose **Cancel codes**, any codes previously set are cancelled and access to the pump is not restricted.
- If you chose **Set main code** or **Set user code**, the pump displays a screen with three blank spaces for digits and the instruction "Enter new code". Use the numeric keys to enter three digits. The pump displays a similar three-digit entry screen and the instruction "Confirm code".
- Repeat the digit-entry sequence.
- If the second three-digit code entered differs from the first, or if the digits chosen as a user code are the same as those already set as a main code, the pump briefly displays an error message and displays the set code options screen.
- If the codes tally and, for a user code, if there is no clash with a previously set main code, the pump briefly displays a confirmation message and displays the fifth Setup screen. Access to the Setup and Configuration menus, direction control and keypad lock is now protected by the new security code.
- If **STOP** is pressed during code entry, the pump displays the fifth Setup screen. If **STOP** is pressed during code confirmation, the pump displays the first digit-entry screen.

**Note**: A user code cannot be set unless a main code has previously been set. If you wish to cancel only a user code, you must use **Cancel codes** to cancel both user and main codes, then use **Set main code** to set a new main code.

**Note**: If a code has been set but forgotten, it is still possible to access the Setup screens to cancel the code or reset it to another three-digit number. Contact your supplier or Watson-Marlow Technical support for the bypass sequence.

## 18.17 Exit

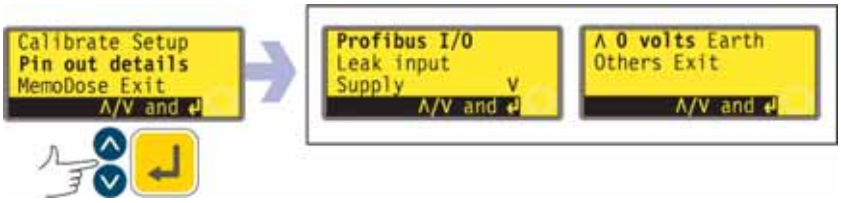

- In the fifth screen of the Setup menu **Exit** is highlighted. Press **ENTER**.
- The pump displays the main menu.

Bp

# 19 Pin out details

Selecting **Pin out details** from the main menu causes the pump to display an information screen and then its preset pin and voltage details under six headings: **PROFIBUS I/O, Leak input, Supply, 0 volts, Earth** and **Others**. No user input is available in this section; it displays information only.

In the main menu, select **Pin out details** using the **UP** or **DOWN** keys and press **ENTER** to confirm your choice.




### The Pin out details menu

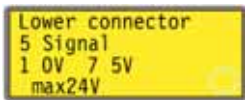
**The Pin out details menu occupies two screens. To move from one screen to the next, repeatedly press DOWN. Each item is highlighted in turn until the last item on the screen is highlighted. A further press on the DOWN key displays the next screen of the menu, with the first item highlighted.**

**Follow the reverse procedure using the UP key to move to an item on the first screen of the menu.**

Make a selection using the **UP** or **DOWN** keys and press **ENTER** to confirm your choice.

The information on pin outs duplicates the details described in this instruction manual under Automatic control wiring.

The screens available are all presented in a similar manner. For example, on selecting **Leak input**, the following screen is displayed:




This indicates that the leak detector input signal must be applied to pin 5 of the lower D-connector at the rear of the pump, where 0 volts is available on pin 1 and 5 volts on pin 7. The maximum permitted voltage is 24 volts.

The information available on selecting **Supply** and **Others** is presented on two screens each. Pressing **DOWN** when the first screen of each is displayed causes the second screen to appear. **UP** performs a similar function.

Pressing **STOP** or **ENTER** in any Pin out information screen returns the user to the appropriate Pin out menu screen.

### To leave the Pin out menu screens

Display the second screen of the Pin out menu. Select **Exit** using the **UP** or **DOWN** keys and press **ENTER** to confirm your choice.

### Alternatively ...

Repeatedly press **STOP** to go back level by level until the main menu is displayed.

**BpN**

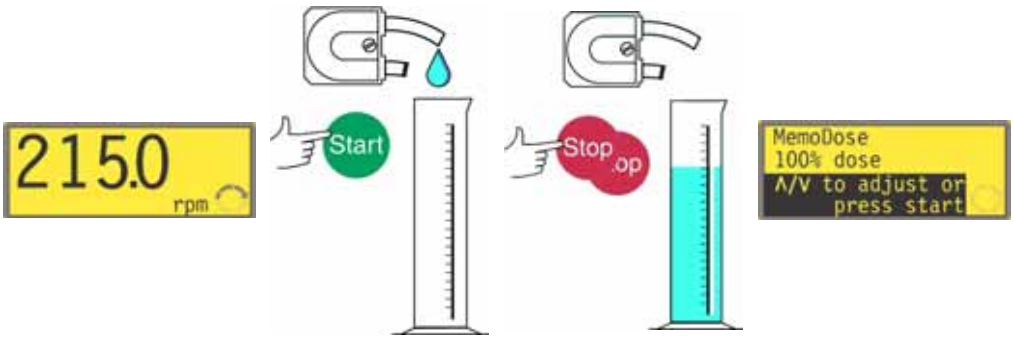
Pin out information is not relevant to the 620BpN IP66 / NEMA 4X pump. Selecting **Pin out details** causes the pump to display a warning screen and redisplay the main menu.

BpN, Bp

# 20 MemoDose

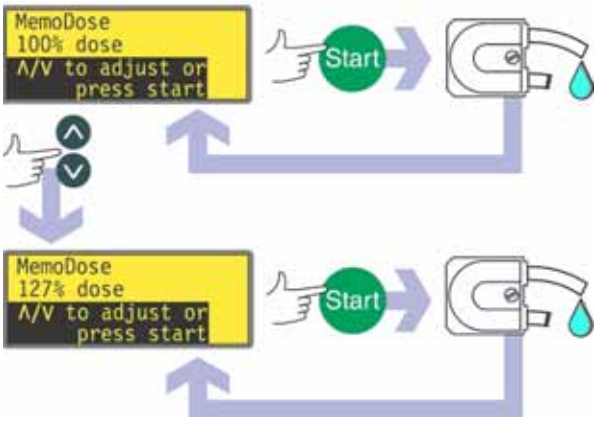
Each time the pump is started by pressing **START**, it records the number of pump-head revolutions which occur until **STOP** is pressed. The number of revolutions is proportional to the volume of fluid which has been dispensed: the dose. The MemoDose facility allows the user to repeat-dose a precise volume of fluid. To do so, a quantity of fluid must be dispensed as the master dose which the MemoDose facility can repeat exactly or proportionately.

### To dispense a master dose




- In the manual mode main screen, set the appropriate pump speed and direction using the **UP** or **DOWN** keys and the **DIRECTION (SHIFT, 1)** key. An example is shown here. A slower speed may make it easier for the user to measure accurately - though it may not represent the duty condition.
- Place a suitable measuring vessel under the pump delivery tube.
- Press **START**. The pump runs and fluid is pumped into the vessel.
- When the required volume of fluid has been dispensed, it is necessary to stop the pump and display the MemoDose screen. This can be achieved in three ways.
  1. Press the **STOP** key twice within half a second. The pump stops and immediately displays the MemoDose screen.
     OR...
  2. Press the **STOP** key once. The pump stops. (This may make it easier to ensure that the quantity of fluid that has been dispensed is sufficiently precise.) Then press the **STOP** key twice within half a second. The pump displays the MemoDose screen.
     OR ...
  3. Press the **STOP** key. The pump stops. Press the **MENU (SHIFT, 7)** key. Use the **UP** or **DOWN** keys to select **MemoDose**. Press **ENTER** to confirm. The pump displays the MemoDose screen.

### To repeat the dose

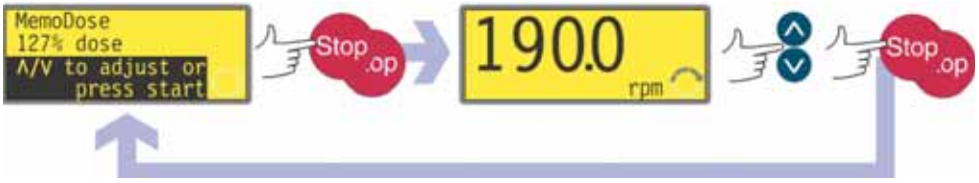



- The pump has recorded the number of pumphead revolutions required to dispense the master dose. If the volume of fluid in the measuring vessel is the volume required, press **START** to repeat the dose.
- If the volume of fluid in the measuring vessel differs from the volume required, the percentage may be adjusted within the limits 1% to 999% of the master dose. Use the **UP** or **DOWN** keys to alter the percentage. Press **START** to dispense the new dose.
- The display counts down as the dose proceeds and stops when the dose is complete.
- If **STOP** is pressed during dosing, the pump stops and returns the user to the MemoDose percentage screen.

Press the **STOP** key twice within half a second if you wish to exit MemoDose and return to manual operation.

## 20.1 Changing dosing speed

The user must exit MemoDose in order to change pump speed. After returning to MemoDose, the pump dispenses the previous dose size at the new speed.




- Press the **STOP** key twice within half a second. The pump displays the manual mode main screen.
- **Do not start the pump. Doing so erases the previously recorded master dose and replaces it in the pump's memory with the current, unmeasured dose.** Adjust the speed showing on the display using the **UP** or **DOWN** keys.
- Press the **STOP** key twice within half a second to return to MemoDose. The display shows the previous percentage dose size. The pump will dose at the new speed.

**Note**: To retain the MemoDose value through a power interruption the pump must be in auto-restart mode. The dosing cycle will resume at the start of a dose and wait for **START** to be pressed, with the MemoDose percentage screen displayed. See 18.6 *Auto-restart*.

**BpN, Bp**

# 21 Exit

Press **Exit** in the Main menu to return to the Manual mode main screen.

BpN, Bp

# 22 PROFIBUS network control wiring and leak detection device wiring

Interfacing the pump with other devices is by means of 9-pin D-connectors positioned on the rear of the pump. IP66 models' D-connectors are within the watertight module. The module must be removed to allow these operations and refitted.

Bp

## 22.1 620N module removal and replacement

**To remove the 620N watertight module:**

The module is secured to the back of the drive unit by six M5x12 Pozidriv countersunk stainless steel screws.

- Remove the six screws using a suitable crosspoint screwdriver, leaving the top centre screw till last. Even when all screws have been removed, the sealing strip may cause the module to adhere to the drive. If so, a gentle tap will free it. Do not use a tool to lever it off.

- The sealing strip should be retained within its channel on the face of the module. The transparent on/off switch cover should be retained on its flange on the face of the module. Check the integrity of the seal and the transparent on/off switch cover. If either is damaged, it must be renewed to maintain ingress protection.
- If necessary, remove the module's earth link from the back of the drive. However, the link is long enough to allow the module to fold back to give access to the back of the drive.

### To replace the 620N watertight module:




- Check that the fuse in the fuseholder (ringed) does not need to be replaced. Check that the voltage selector switch is correctly set.
- Check that the sealing strip is fully in its channel on the face of the module.
- Attach the module's earth link wire. Replace and tighten its screw to 2Nm.
- Push home any 9-pin D-connectors on to their counterparts on the rear of the drive and tighten their locking screws.
- Hold the module in place. Do not disturb the seal or pinch the earth link wire or D-connector cables, and screw in the retaining screws (top centre first). Tighten to 2.5Nm

**Note**: The 620N module must be properly fitted using all six screws. Without them, the screw holes may corrode and IP66 (NEMA4X) protection will be compromised.

BpN, Bp

# 22.2 Wiring up

## 22.2.1 PROFIBUS wiring

**Note: For full details on PROFIBUS cabling, refer to *PROFIBUS Installation Guideline for Cabling and Assembly*, published by PROFIBUS International.**

Interfacing the pump with other PROFIBUS devices is by means of a dedicated PROFIBUS female 9-pin D-connector positioned on the rear of the pump (within the 620N watertight module, if the pump is a 620BpN). Cable suitable for use in PROFIBUS DP installations must be used.

BpN

The cable must be passed into the module through a watertight cable gland and wired according to PROFIBUS recommendations to the IN terminals of a dedicated PROFIBUS male 9-pin D-connector (not supplied), which is plugged into the dedicated PROFIBUS female 9-pin D-connector. The cable must be circular in section, 4.5mm-9.5mm in diameter to ensure a seal within the gland.





- Use a 19mm spanner to unscrew the sealing plug. Discard the nylon sealing washer.
- Screw in one of the supplied M16x1.5 cable glands in place of the plug, using the new nylon sealing washer supplied. Tighten the gland to 2.5Nm to ensure a seal, using a 21mm spanner. If a different gland is used, it must be watertight to IP66.
- Loosen the gland cap (do not remove it) and pass the PROFIBUS cable in through the gland.
- Pull through sufficient cable to allow convenient connection to a dedicated PROFIBUS male 9-pin D-connector.

**Note**: Users are advised to pass PROFIBUS cables through the module glands nearest to the switch cover. Doing so will minimise bends in the cables when the module is attached to the back of the pump.

**BpN, Bp**

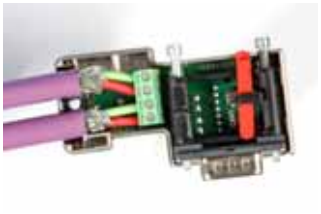


- Connect to the IN terminals of a dedicated PROFIBUS male 9-pin D-connector, following the directions supplied with the connector. An example is shown here.

**BpN**

- If the pump IS NOT the last device on its PROFIBUS communication line, a second cable must be passed into the module through another watertight cable gland and wired according to PROFIBUS recommendations to the OUT terminals of the dedicated PROFIBUS male 9-pin D-connector and to the next device on the PROFIBUS network line.

**Bp**




- If the pump IS NOT the last device on its PROFIBUS communication line, a second cable must be wired according to PROFIBUS recommendations to the OUT terminals of the dedicated PROFIBUS male 9-pin D-connector and to the next device on the PROFIBUS network line.

**BpN, Bp**


- If the pump IS NOT the last device on its PROFIBUS communication line, move the terminator switch built into the dedicated PROFIBUS male 9-pin D-connector to OFF.
- If the pump IS the last device on its PROFIBUS communication line, move the terminator switch built into the dedicated PROFIBUS male 9-pin D-connector to ON.

- Push home the dedicated PROFIBUS male 9-pin D-connector on to its counter-part on the rear of the drive (top D-connector) and tighten its locking screws.

**BpN**

- As the module is brought into alignment with the rear of the pump ready to fix it into position, gently pull cable through the glands to reduce the length of cable within the module to an appropriate length.
- Refit the 620N module as described above: see 22.1 *620N module removal and replacement*. Tighten gland caps to 2.5Nm.

**BpN, Bp**

**Avoid sharp bends in PROFIBUS communication cables.**

**It is important to check that the pump's voltage setting matches the supply. The voltage selection switch is on the rear panel of the drive. If the pump is a 620BpN, the module must be removed (and replaced) to allow it to be checked.**

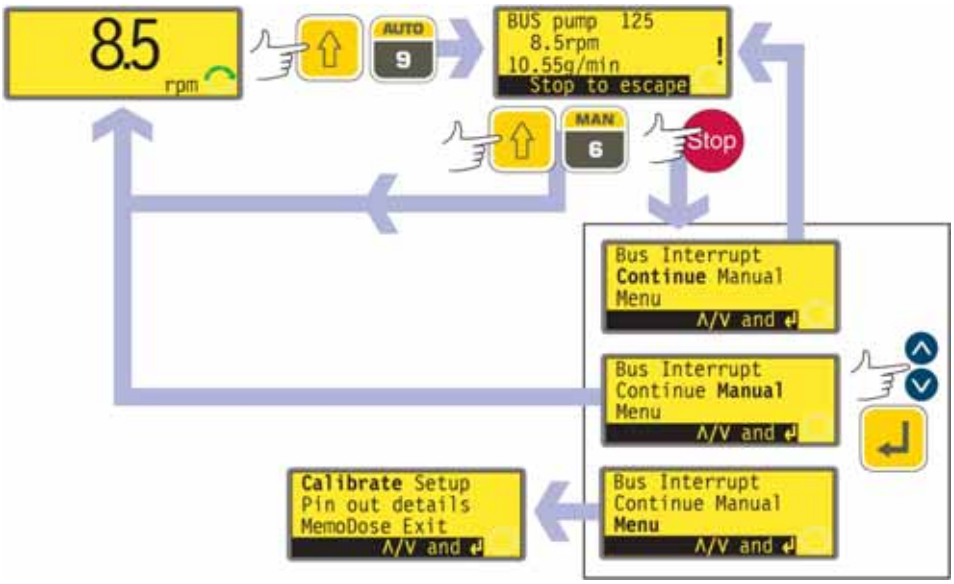
## 22.2.2 Wiring leak detection devices

Fit a Watson-Marlow tube monitor or leak detector according to the directions supplied with the device.

BpN, Bp

# 23 Switching to PROFIBUS network control

**Note**: The pump can be switched to PROFIBUS network control only if PROFIBUS is enabled. See 8 *Pump specifications*, 18.1 *Pump address* and 18.2 *PROFIBUS enable*.




### How to get into PROFIBUS network operation

- While the manual mode main screen is displayed, press the **AUTO (SHIFT, 9)** key.
- The pump stops (if it was pumping while under manual control). It is now under PROFIBUS control, waiting for a PROFIBUS telegram from the PROFIBUS master. It displays its PROFIBUS address, and its speed, direction of rotation and flowrate from its previous manual operation. It is automatically switched into auto-restart mode and displays the **!** icon. The only keys active are **STOP** and **MAN (SHIFT, 6)**.
- Leak input is active. See 24.1 *Error codes*.

**Note**: If PROFIBUS is not enabled (see 18.2 *PROFIBUS enable*) when **AUTO (SHIFT, 9)** is pressed, the keypress is ignored.

**WARNING: When switched to PROFIBUS control the pump may start unexpectedly.**

### How to get out of PROFIBUS network operation

- Pressing the **MAN (SHIFT, 6)** key returns the pump to manual control. It retains the set speed and run status from its previous PROFIBUS operation: if it was running it continues to run; if it was stopped it remains stopped. Auto-restart is cancelled unless it was in place the last time the pump was under manual control. All keys are now active.

**Note**: While the pump is under manual control, it responds to interrogation by the PROFIBUS master if it is connected to a PROFIBUS network (see 22.2.1 *PROFIBUS wiring*) and PROFIBUS is enabled (see 18.2 *PROFIBUS enable*).

### Emergency stop

- In an emergency while the pump is under PROFIBUS control press the **STOP** key. The pump stops and displays an interruption screen.
  - Select **Continue** to return to PROFIBUS control. The pump remains stopped, displays the set speed and run status from its previous PROFIBUS operation and waits for a PROFIBUS telegram from the PROFIBUS master.
  - Select **Manual** to set the pump to manual control (see 14 *Manual operation*). The pump remains stopped and displays the set speed and run status from its previous PROFIBUS operation. Auto-restart is cancelled unless it was in place the last time the pump was under manual control. All keys are now active.
  - Select **Menu** to display the main menu (see 15 *Main menu*).
  - Use the **UP** and **DOWN** keys to choose and press **ENTER** to confirm.

## 23.1 PROFIBUS GSD file

The Watson-Marlow 620BpN and 620Bp can be integrated into a PROFIBUS DP V0 network using a General Station Data (GSD) file. The file identifies the pump and contains key data including its communication settings, the commands it can receive and the diagnostic information it can pass to the PROFIBUS master on interrogation.

The GSD file—file name WMFP0A9F.GSD—can be installed from the CDROM supplied with this pump; or downloaded from the Watson-Marlow website and installed; or typed into a PROFIBUS master directly from this manual using a GSD editor program.

**Note**: The data-flow to and from the pump may need to be byte-reversed, due to differences of handling the data between suppliers of master devices.

## The GSD file, filename: WMFP0A9F.GSD

```
;*********************************************************************
;***                                                               ***
;***    Watson-Marlow Bredel Pumps                                 ***
;***    Bickland Water Road                                        ***
;***    Falmouth                                                   ***
;***    Cornwall                                                   ***
;***    TR11 4RU                                                   ***
;***    ENGLAND                                                    ***
;***    Telephone:     +44(1326)370370                             ***
;***    Fax:           +44(1326)376009                             ***
;***                                                               ***
;*********************************************************************
;***                                                               ***
;***    Filename: WMFP0A9F.GSD                    (c) 2007         ***
;***    GSD file version 1 from  20.09.2007                        ***
;***                                                               ***
;*********************************************************************
;
;       ATTENTION:
;       ==========
;       Changes in this file can cause configuration or communication problems.
;       This file is compatible to the firmware of the device.
;
;       Changes
;       =======
;       20.09.2007   V1.000  I. Guffick      -  created

#PROFIBUS_DP

GSD_Revision          = 1
Vendor_Name           = "Watson Marlow"
Model_Name            = "Pump 520/620/720"
Revision              = "Version 1.000"
Ident_Number          = 0x0A9F
Protocol_Ident        = 0
Station_Type          = 0
Hardware_Release      = "Version 1.000"
Software_Release      = "Version 1.000"
Implementation_Type   = "netX"
9.6_supp              = 1
19.2_supp             = 1
45.45_supp            = 1
93.75_supp            = 1
187.5_supp            = 1
500_supp              = 1
1.5M_supp             = 1
3M_supp               = 1
6M_supp               = 1
12M_supp              = 1
MaxTsdr_9.6           = 60
MaxTsdr_19.2          = 60
MaxTsdr_45.45         = 60
MaxTsdr_93.75         = 60
MaxTsdr_187.5         = 60
MaxTsdr_500           = 100
MaxTsdr_1.5M          = 150
MaxTsdr_3M            = 250
MaxTsdr_6M            = 450
MaxTsdr_12M           = 800
Redundancy            = 0
Repeater_Ctrl_Sig     = 2
24V_Pins              = 0
Freeze_Mode_supp      = 0
Sync_Mode_supp        = 0
Auto_Baud_supp        = 1
Set_Slave_Add_supp    = 1
Min_Slave_Intervall   = 6
Modular_Station       = 0
Max_Diag_Data_Len     = 244
Slave_Family          = 0

User_Prm_Data_Len     = 6
User_Prm_Data         = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00

Bitmap_Device         = "NXDPSR"
Bitmap_Diag           = "NXDPSD"
Bitmap_SF             = "NXDPSS"


Module                = "WM pump, 3/6 word out/in" 0x62,0x55
1
EndModule
```

## 23.2 PROFIBUS data exchange

The data in this section are provided as reference material for a PROFIBUS network operator. Operating this pump under PROFIBUS control is beyond the scope of this instruction manual. Consult your PROFIBUS network literature for further information.

| | |
|---|---|
| Default address: 126 | |
| PROFIBUS Ident: 0x0A9F | |
| GSD File: WMFP0A9F.GSD | |
| Config: 0x62, 0x55 (3 words out, 6 words in) | |
| User Parameter bytes: 6 | |
| | |
| Cyclic Data Write (from Master to pump) | |
| 16 bit | Control Word |
| 16 bit | Speed Setpoint |
| 16 bit | Set Flow Calibration in µl per revolution |
| Cyclic Data Read (from pump to Master) | |
| 16 bit | Status Word |
| 16 bit | Measured Speed |
| 16 bit | Hours Run |
| 32 bit | Tacho Counter * |
| 16 bit | Read Flow Calibration in µl per revolution |
| User Parameter Data | |
| 8 bit | Pump Model |
| 8 bit | Head Type |
| 8 bit | Min Speed (High byte) (not 520BpN and 520Bp) |
| 8 bit | Min Speed (Low byte) (not 520BpN and 520Bp) |
| 8 bit | Max Speed (High byte) |
| 8 bit | Max Speed (Low byte) |
| Extended Diagnostic Data | |
| Device Related Diagnostic Data | |
| 16 bit | Pump Model and Head |
| 16 bit | Tubing Size |
| 16 bit | Min Speed |
| 16 bit | Max Speed |
| 32 bit | Software Version H8 (pump) |
| 32 bit | Software Version netX (PROFIBUS) |
| Channel Related Diagnostic Data | |
| Global error | = 0xA9 (General error) |
| Guard open | = 0xB0 (Device related 0x10) |
| Over current | = 0xA1 (Short circuit) |
| Under voltage | = 0xA2 (Under voltage) |
| Over voltage | = 0xA3 (Over voltage) |
| Over temp | = 0xA5 (Over temp) |
| Motor stall | = 0xA4 (Overload) |
| Tacho fault | = 0xB1 (Device related 0x11) |
| Leak detect | = 0xB2 (Device related 0x12) |
| Setpoint out of range - low | = 0xA8 (Lower limit exceeded) |
| Setpoint out of range - high | = 0xA7 (Upper limit exceeded) |

**Note**: The data-flow to and from the pump may need to be byte-reversed, due to data-handling differences between master devices.

| Control word | |
|---|---|
| **Bit** | **Description** |
| 0 | Motor on/off (1=On) |
| 1 | Direction (0=CW, 1=CCW) |
| 2 | Tacho Reset (1=Reset Count) |
| 3 | Guard Error Reset (1=Reset) |
| 4 | Enable Fieldbus Min/Max Speeds (1=Enabled) |
| 5 | Enable Fieldbus Flow Calibration (1=Enabled) |
| 6-15 | Reserved (0) |

| Status Word | |
|---|---|
| **Bit** | **Description** |
| 0 | Motor running (1=running) |
| 1 | Global Error Flag (1=Error) |
| 2 | Fieldbus Control (1=Enabled) |
| 3 | Guard Status (1=Open) |
| 4 | Over current error |
| 5 | Under voltage error |
| 6 | Over voltage error |
| 7 | Over temperature error |
| 8 | Motor stalled |
| 9 | Tacho fault |
| 10 | Leak detected |
| 11 | Low Setpoint - Out of range |
| 12 | High Setpoint - Out of range |
| 13-15 | Reserved (0) |

| Pump Model and Pumphead | |
|---|---|
| Value | Description |
| 0x01-- | 520 Drive |
| 0x02-- | 620 Drive |
| 0x03-- | 720 Drive |
| 0x--00 | 520R head |
| 0x--01 | 520REL head |
| 0x--02 | 520REM head |
| 0x--03 | 520REH head |
| 0x--04 | 505L head |
| 0x--05 | 313 head |
| 0x--06 | 314 head |
| 0x--07 | 501RL head |
| 0x--08 | 505BA head |
| 0x--09 | 505CA head |
| 0x--0A | 314MC head |
| 0x--0B | 318MC head |
| 0x--40 | 620R head |
| 0x--41 | 620RE head |
| 0x--42 | 620RE4 head |
| 0x--43 | 620L head |
| 0x--80 | 720R head |
| 0x--81 | 720RE head |

**Note**: Numerical values cannot include a decimal point. To enter a speed, move the decimal point one place to the right and enter an integer. To enter a tube size, move the decimal point two places to the right and enter an integer. See examples below

| Data examples | |
|---|---|
| **speed** | **value** |
| 123.4 | 1234 |
| | |
| **tube size** | **value** |
| 2.38 | 238 |
| 9.6 | 960 |
| 25.4 | 2540 |

*** Note**: If the pump is run at full speed, the PROFIBUS tacho count will be reset after:

| | | |
|---|---|---|
| 520: 30 hours | 620: 25 hours | 720: 48 hours |

## 23.3 PROFIBUS network operation

**Operating this pump under PROFIBUS control is beyond the scope of this instruction manual. See 8 *Pump specifications* for PROFIBUS/620BpN and 620Bp capability. Consult your PROFIBUS network literature for further information.**

**BpN, Bp**

# 24 Troubleshooting

If the pump display remains blank when the pump is on, make the following checks:

- Check the position of the voltage selector switch. The voltage selector is mounted in the switchplate at the rear of the pump, protected from water by the 620N module. The module must be removed to allow access to the switch-plate. See 22.1 *620N module removal and replacement*.
- Check the mains power switch at the rear of the pump.
- Check that mains power is available to the pump.
- Check the fuse in the fuseholder in the centre of the switchplate at the rear of the pump.
- Check the fuse in the mains power plug if one is present.

If the pump runs but there is little or no flow, make the following checks:

- Check that the tube and rotor are in the pumphead.
- Check that fluid is supplied to the pump.
- Check that the tube is not split or burst.
- Check for any kinks or blockages in the lines.
- Check that any valves in the lines are open.
- Check that the correct wall-thickness tube is being used.
- Check direction of rotation.
- Check that the rotor is not slipping on the drive shaft.

If the pump is not controllable under PROFIBUS, make the following checks:

- Check that PROFIBUS wiring has been installed correctly.
- Check that the pump's PROFIBUS address has been set and that PROFIBUS is enabled.
- Check that the pump has been switched to PROFIBUS control using the **AUTO (SHIFT, 9)** key.
- Check that the pump is not displaying an error message.
- Check that the PROFIBUS master has not diagnosed a problem with the pump or its connection.

If trouble persists, technical assistance for this product is available from your distributor, or Watson-Marlow Ltd, Falmouth TR11 4RU, United Kingdom.

## 24.1 Error codes

If a system error (red error number) occurs, a flashing error screen is displayed on the pump display. Non-system error screens report the nature of an external signal. They do not flash. All errors except Error 0 and Error 35 are indicated through network diagnostics. Error 28 does not apply to 520 series pumps.

| Error | Condition | Comments | Action |
|---|---|---|---|
| 0 | RAM Write error | Power-on system test will pick up initial errors | Try re-powering. Seek support if error persists. **Note**: this error is indicated at the pump only |
| 9 | Motor stalled | Hall and/or Tacho inputs stopped at unrecognised time | Try re-powering. Seek support if error persists |
| 10 | Tacho fault | Tacho input not as expected | Try re-powering. Seek support if error persists |
| 11 | Motor calibration lost | Hall effects calibration data lost | Seek support |
| 14 | Wrong speed | Picked up from Hall and/or Tacho inputs | Try re-powering. Seek support if error persists |
| 15 | Over current | Hardware detects an overcurrent condition and sends an interrupt for automatic shutdown | Check tubing and the system, or seek support |
| 16 | Over voltage | Check supply voltage input | Check supply, re-power or seek support |
| 17 | Under voltage | | |
| 19 | Over temperature | Check ambient and pumping duty | Turn OFF to cool. Check duty and ambient temperature |
| 28 | Guard open | Guard switch hardware input detects open guard | Close pumphead then press Stop |
| 29 | Leak detected | Leak switch hardware input detects leak | Check and reset then press Stop |
| 30 | Network connection not present | Network unavailable or not connected | Check connection |
| 31 | Network communication lost mid-transmission | Network communications lost | Check master and connection |
| 32 | Network communications OK but parameter or address error | Network setup errors | Check parameters and address |
| 35 | $I^2t$/Current overload | Checks current average over time | Check system, re-power or seek support. **Note**: this error is indicated at the pump only |
| ERR | General error | Unrecognised or general error | Try re-powering. Seek support if error persists |

BpN, Bp

# 25 Drive maintenance

**There are no user serviceable parts inside the pump. The unit should be returned to Watson-Marlow or its appointed agents or distributors for service.**

BpN, Bp

# 26 Drive spares

| | |
|---|---|
| Replaceable main fuse, type T5A H 250V: FS0043 | Foot: MR3002M x 5 |
| Module seal: MN2516B | Module switch cover: MN2505M |
| Glands: GR0056 | Blanking plugs: GR0057 |
| Sealing washer for blanking plug and gland: GR0058 | Snap-fit vent: MN2513B |

**BpN, Bp**

**Pumphead use is independent of drive ingress protection. No reference to ingress protection rating or drive model (620BpN or 620Bp) is made throughout the pumphead sections of this manual.**

# 27 620RE MarkII, 620RE4 MarkII and 620R MarkII pumpheads

**Note**: MarkII pumpheads differ from MarkI pumpheads as follows: they have a new guard-switching arrangement which is not compatible with 623/624 drives. Similarly, older guards are incompatible with 620 drives. Elsewhere in this manual, the term "MarkII" is omitted.

## 27.1 620RE, 620RE4 and 620R key safety information

**Before opening the pumphead guard please ensure that the following safety directions are followed.**

- Ensure that the pump is isolated from mains voltage.
- Ensure that there is no pressure in the pipeline.
- If a tube failure has occurred, ensure that any product in the pumphead has been allowed to drain through the controlled waste to a suitable drain.
- Ensure that protective clothing and eye protection are worn if hazardous products are being pumped.

## 27.2 620RE, 620RE4 and 620R safe-guarding

- Primary safety on 620 series pumps is provided by the tool-lockable pumphead guard. Secondary (backup) protection is provided in the form of an electrical guard switch which stops the pump if the pumphead guard is opened. The electrical guard switch on cased pumps should never be used as primary protection. Always disconnect the mains power supply to the pump before opening the pumphead guard.

## 27.3 620RE, 620RE4 and 620R pumping conditions

### Pressure and viscosity

- All pressure values in this operating instruction, from which performance and life figures have been calculated, relate to peak pipeline pressures.
- Although rated to 4 bar peak pressure, this pump will generate in excess of 4 bar peak pressure if pipeline restrictions are in place. In instances where it is critical that a peak pressure of 4 bar is not exceeded, pressure relief valves should be installed in the pipeline.
- For pumping duties of 2-4 bar pressure, fit hard Marprene/Bioprene or standard Sta-Pure or Chem-Sure tube elements. "M" or P" in the tube element's product order code denotes suitability for higher pressure use.
- For pumping duties of 0-2 bar pressure, use standard hardness elements or the standard range of continuous peristaltic pump tubing.
- Viscosity handling is maximised by using hard Marprene/Bioprene or Sta-Pure tube elements in the pumphead.
- 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.

## 27.4 620RE, 620RE4 and 620R pump installation

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

- 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.
- 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.
- Ensure that the controlled waste blanking plug is in position if the controlled waste port is not in use. See below.
- It is advisable to use controlled waste pipe work if pumping hazardous, aggressive or abrasive fluids or products which will harden in contact with air.



- Connect waste pipe work to the waste port using the coupling adaptor supplied.
- Push out the blanking plug. Drop the threaded waste fitting into place. Secure it with the supplied locking nut. Fully tighten by hand. Ensure that there is adequate clearance underneath the pumphead. Waste pipe work should run to a suitable container or drain.
- The leak detector installation procedure is included in the leak detector kit.
- If unsure of an installation please contact your local Technical Support Office.

## 27.5 620RE, 620RE4 and 620R general operation

**Always isolate the pump from the mains power supply before opening the guard or performing any positioning, removal or maintenance.**

### Opening the pumphead guard

- Unlock the guard with the 5mm Allen key provided (or a screwdriver).
- Open the guard to its full extent. This creates the maximum clearance between the tube ports and guard to remove the tubing.

### Engaging/disengaging the rollers



- The extent of travel of the roller release levers is clear from pictures 2 and 3 above. Do not try and force the levers beyond their normal extent of travel as this will damage the rotor.
- To engage the rollers snap the roller release levers counter-clockwise making sure that the rollers lock out against the tubing. To disengage the rollers, snap the release levers clockwise to their disengaged position. For high pressure tubing elements or four roller pumpheads, a 5mm Allen key can be used to aid leverage when engaging/disengaging the rollers with the release levers.

**Make sure that fingers are clear of the rollers and the front face of the rotor hub when using the roller release levers.**

### Pre-load checks

- Before loading tubing, ensure that all rollers rotate freely, that the tube ports and location grooves are clean and that if in use, the controlled waste pipe work is free of any obstructions.

### Closing the pumphead guard and start-up

- Ensure that the guard seal is clean, replacing it if necessary.
- Ensure that the rollers are engaged and locked out against the tubing
- Close the guard and push it against the track until the latch engages.
- Connect suitable pipe work to the pumphead using the appropriate connectors for the tube element. See below.

## 27.6 620RE and 620RE4 tube element loading

**Always isolate the pump from the mains power supply before opening the guard or performing any positioning, removal or maintenance.**

620RE element pumpheads are factory set to accept Watson-Marlow LoadSure tube elements. Pumping performance will be adversely affected if LoadSure elements are not used.

- Open the guard using a suitable screwdriver or a 5mm Allen key. Disengage the rollers.
- Locate one of the "D"-shaped flanges into the lower port. (The "D" flange ensures that the element can only be loaded correctly).
- Wrap the tube element around the disengaged rollers of the rotor.
- Locate the second "D"-shaped flange into the upper port.
- Ensure the flat face of each "D" flange sits flush to the flange sealing face of the track.
- Engage the rollers.
- Close the guard and push it against the track until the latch engages.

### Connecting LoadSure elements to supply and discharge tubes

LoadSure sanitary elements - which have white connectors - are connected to a tubing system using Tri-clamps and EPDM gaskets.



- Hold the connector end of the supply or discharge tube against the element connector, with an EPDM gasket between them.
- Use a Tri-clamp to engage both flanges squarely, close it and tighten.

LoadSure industrial elements - which have black connectors - are connected to a tubing system using cam-lock (cam and groove)  fittings.



- Push the female fitting over the element connector.
- Pull both cam levers closed until they engage.

# 27.7 620R continuous tube loading

**Always isolate the pump from the mains power supply before opening the guard or performing any positioning, removal or maintenance.**






- 620R continuous tubing pumpheads are factory set to accept Watson-Marlow 600 series 3.2mm wall tubing. Pumping performance will be adversely affected if Watson-Marlow tubing is not used.
- Select the tube clamp set which is correct for the tubing size to be used.
- Locate the two "U"-shaped track clamp halves into the pumphead ports (The "U"- shape ensures correct loading).
- Locate the corresponding guard clamp halves which have raised "T" locating sections, into the slots on the inner guard face above and below the guard hinge. Push and slide into their locked position.
- Closing the guard will align the two halves of the clamp around the tubing.
- Disengage the rollers.
- Locate one end of the tubing into the lower port "U" clamp and hold firmly in position.
- Wrap the tubing tightly around the retracted rollers, making sure that there is no twisting through its length.
- Locate the other end of the tubing into the upper port "U" clamp.
- Hold both ends of the tubing in one hand maintaining tension around the retracted rollers.
- Engage the rollers.
- Close the guard and push it against the track until the latch engages.
- Ensure that continuous tubing is not loosely clamped at the pumphead ports.
- Ensure that when the pump is re-started all of the rollers have re-engaged. A roller which has not re-engaged will "click" continuously. No damage will occur if this happens but the roller should be re-engaged manually using the 5mm Allen key. See 24 *Troubleshooting*.

## 27.8 620RE, 620RE4 and 620R tube element or continuous tube removal

**Always isolate the pump from the mains power supply before opening the guard or performing any positioning, removal or maintenance.**

- Unlock the guard and disengage the rollers.
- Disconnect the tubing from the external pipeline.
- Remove the tubing from the pumphead.

## 27.9 620RE, 620RE4 and 620R maintenance

### Scheduled maintenance

- The stainless steel pumping rollers run on sealed bearings and do not require lubrication.
- Remove the rotor and lubricate the follower rollers and roller engaging mechanisms with a lithium-based grease. This should be carried out every six months for intermittent duties and every three months for 24 hour duties.
- If fluid is spilled inside the pumphead, flush the pumphead out with water and mild detergent as soon as possible. If specific cleaning agents are required to clean the spillage, please consult Watson-Marlow Technical Support Office before proceeding, in order to confirm chemical compatibility.
- If the rotor needs to be removed, refer to the guidelines below.

### Roller adjustment

620 pumpheads have provision for adjustment to reset the roller/track gap to compensate for wear after extended service in arduous applications.

Roller/track gaps can **only** be accurately judged without tubing in the pumphead. The gap should be **4.6mm** for 3.2mm wall tubing and **5.5mm** for LoadSure elements.

If the gap is more than 0.2mm greater than these dimensions, the following may be carried out:

- Note the number on the roller arm to which the engraved line on the hexagon-headed main roller pin corresponds.
- Remove the circlip (snap-ring) and roller pin.
- Relocate the main roller pin, resetting the engraved line to one number lower. For example, if the engraved line was at "-1", reset it to "-2" to reduce the roller/track gap.
- Ensure the roller pin is correctly seated into the roller arm thrust washer. Replace the circlip.

## Rotor removal




- Remove the rotor cover by hand and the central locating bolt using a 5mm Allen key. Pull the rotor off the keyed shaft. Do not use tools to lever the rear face of the rotor away from the inner face of the track: it should come off by hand.

## Track removal

- Remove the rotor as described above.
- Disconnect the waste pipework (if attached).


- Loosen the two track retaining screws using a suitable screwdriver.
- Withdraw the track fully from the gearbox.
- After removing the rotor and track, it is advisable to remove the metal key from the keyway, clean and reassamble. The key fits its keyway tightly. It may be freed by tapping gently with a screwdriver or other suitable tool.

### Track re-location

- Ensure that the track is clean.
- Align the track so that the location holes are aligned with the threaded holes in the cased drive.
- Tighten the two track retaining screws using a suitable screwdriver.
- Re-connect the waste pipework (if required).

**Note**: The track can be fitted in two positions: with ports to the right or with ports down. The ports-down position requires that the pump is positioned at the front of the surface it stands on to provide clearance for the supply and discharge tubes.

### Rotor re-location






- Before replacing the rotor, locate the key into the driveshaft keyway and apply a thin layer of grease over the shaft and key. The rotor keyway is the largest of the four slots radiating from the driveshaft socket: the top one in the first picture, above. Align the rotor keyway with the shaft key and slide the rotor into position, ensuring that a positive "stop" is achieved and ensure that the full length of the drive shaft is fitted into the rotor.
- Do not force the rotor into position. The rotor will slide into place easily if correctly aligned.
- Secure the rotor with the hexagonal locating bolt (complete with washer) to a nominal torque of 10Nm using a 5mm Allen key.
- The rotor bolt, which is impregnated with "Loctite 218" thread lock, should be subjected to a maximum of three removals/relocations before renewal. To avoid rotor bolt renewal after three removals, apply "Loctite 222" thread lock to the rotor thread before relocation. This is critical to ensure prolonged, secure location of the rotor hub to the drive shaft. **Failure to complete this action will invalidate the terms and conditions of the warranty.**
- Replace the rotor cover.

When closing the guard, check it does not make contact with the rotor. If it does, the rotor has been fitted incorrectly. Re-open the guard, remove and refit the rotor, and close the guard.

# 27.10 620RE, 620RE4 and 620R CIP and SIP

### General

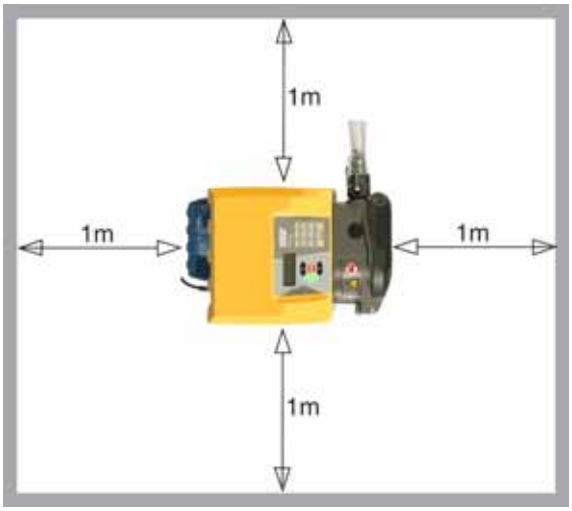
- Unlock the guard and disengage the rollers.
- Close the guard and squeeze against the track until the latch clicks.
- Observe a 1m safety area.

### CIP

- LoadSure tube elements and continuous tubing can be cleaned using CIP processes.
- Ensure that the tubing material is chemically compatible with the cleaning agent that is to be used.
- If cleaning agents are spilled over the pumphead, wash down immediately.
- Ensure that controlled waste pipe work is fitted to allow safe release of cleaning agent in the event of a tube failure.

### SIP

- Only Sta-Pure tube elements can be used in a steam-in-place sterilisation processes.
- Sta-Pure tubing elements can be sterilised to 3A Class two and FDA minimum recommended standard which is 121C (250F) at 1bar (14.5 psi) saturated steam for 20 minutes.
- Monitor the process continuously.
- If a tube failure occurs, shut down the process. Do not touch the pumphead until a 20 minute cooling period has been observed.
- Ensure a 20 minute acclimatisation period is observed before running the pump following SIP.
- Ensure that controlled waste pipework is fitted to allow a safe release of steam in the event of a tube failure.
- Ensure a 1m safety zone is maintained around the pumphead during SIP cycles.



**Ensure that the pumphead door is closed and locked before SIP cleaning commences.**

## 27.11 620RE, 620RE4 and 620R pumphead spares

| Number | Spare | Description |
|---|---|---|
| | 063.4211.000 | 620R MarkII pumphead |
| | 063.4231.000 | 620RE MarkII pumphead |
| | 063.4431.000 | 620RE4 MarkII pumphead |
| 1 | 069.4101.000 | 620RTC: continuous tubing clamp set |
| 2 | MR2052C | Oddie fastener |
| 2 | MR2053B | Clip: Oddie retainer |
| 2 | MR2054T | Oddie washer |
| 2 | SG0021 | Oddie spring |
| 2 | CX0150 | Oddie circlip (snap ring) |
| 3 | MRA3020A | Track assembly |
| 4 | MRA0249A | Roller assembly (element pumphead) |
| 4 | MRA0250A | Roller assembly (continuous pumphead) |
| 5 | MR2027T | Controlled waste threaded fitting 620R, RE, RE4 |
| 6 | MR2028M | Controlled waste port blanking plug |
| 7 | MR2018T | Hinge pin |
| 8 | MR2055M | Rotor cover |
| 9 | MR2021B | Seal - guard |
| 10 | MR2002M | Guard without latch and seal |
| 11 | MR2096T | Controlled waste threaded fitting locking nut |
| 12 | MRA0320A | Rotor assembly 2-roller element |
| 12 | MRA0321A | Rotor assembly 4-roller element |
| 12 | MRA0322A | Rotor assembly 2-roller continuous |
| 14 | XX0220 | Key - metal |
| 15 | MR2029T | Cased drive MG605 shaft/rotor hub spacer |
| 16 | MR2059T | Adaptor - Bodine (white polypropylene ring) |
| 17 | FN0488 | Cased drive track locating screws M6x10 |
| 18 | FN0523 | Close-coupled track locating screws M6x20 |
| 19 | FN0581 | Rotor locating washer M6 |
| 20 | MR2251B | Rotor locating bolt M6 x 25 |
| 21 | TT0006 | 5mm Allen key |
| 22 | MA0017 | Magnet |

# 28 620RE, 620RE4 and 620R performance data

## Pumping conditions

All performance figures in this operating instruction have been recorded against peak pipeline pressures.

This pump is rated to 4 bar (58psi) peak pressure when fitted with a 620RE, 620RE4 or 620LG pumphead using high-pressure tubing. However, it will generate in excess of 4 bar (58psi) peak pressure if the pipeline is restricted. Where it is important that 4 bar (58psi) is not exceeded, pressure relief valves should be installed in the pipeline.

Viscosity handling is maximised by using 4.0mm wall LoadSure elements with the 620RE and 620RE4 pumpheads.

Flow rates are normalised test values obtained using new tubing with the pumphead rotating clockwise pumping water at 20C with negligible inlet and discharge pressures. Actual flow rates achieved may vary because of changes in temperature, viscosity, inlet and discharge pressures, system configuration and tubing performance against time. Flow rates may also vary due to normal manufacturing tolerances of the tubing. These tolerances will make flow rate variance more pronounced at smaller bore sizes.

**For precise and repeatable performance it is important to determine flow rates under operating conditions for each new piece of tubing.**

620R and 620L family pumpheads' flow rates are directly proportional to rotor speed. If you wish to run the pump at a speed not shown in the tables below, flow figures can be reached by dividing the maximum flow shown in the tables below by the maximum rpm figure, and multiplying the result by your required speed in rpm.

In normal circumstances, rotor and tube life are maximised if the pumphead is run slowly, particularly when pumping at high pressure. However, to maintain performance at pressures above 2 bar, avoid running the pumphead below 50rpm. If low-flow, high-pressure operation is necessary, switching to a smaller tube is recommended.

Sta-Pure and Marprene TM tubing are hard to compress when new. When using tubing made of these materials, the first five pumphead revolutions should be at a speed of 10rpm or greater. If the pump is run slower, the safety system built into pump drive’s software may cause it to stop and display an over-current error message.

**Note**: Flow rates quoted have been rounded for simplicity, but are accurate to within 5% - well within the normal tubing tolerance variation of flow rate. They should therefore be taken as a guide. Real flow rates in any application must be determined empirically.

# 28.1 620RE, 620RE4 and 620R flow rates

**Metric (SI)**

**620 Sta-Pure, Chem-Sure, Neoprene, l/min**

| | 620R | | | | 620RE | | 620RE4 | |
|---|---|---|---|---|---|---|---|---|
| **Speed rpm** | **6.4 mm** | **9.6 mm** | **12.7 mm** | **15.9 mm** | **12.0 mm** | **17.0 mm** | **12.0 mm** | **17.0 mm** |
| **0.1** | 0.001 | 0.003 | 0.004 | 0.01 | 0.004 | 0.01 | 0.003 | 0.01 |
| **265** | 3.2 | 6.6 | 11 | 16 | 11 | 18 | 9.0 | 13 |

**620 Marprene TL, Bioprene TL, l/min**

| | 620R (standard) | | | | 620RE (standard) | | 620RE4 (standard) | |
|---|---|---|---|---|---|---|---|---|
| **Speed rpm** | **6.4 mm** | **9.6 mm** | **12.7 mm** | **15.9 mm** | **12.0 mm** | **17.0 mm** | **12.0 mm** | **17.0 mm** |
| **0.1** | 0.001 | 0.003 | 0.004 | 0.01 | 0.004 | 0.01 | 0.003 | 0.005 |
| **265** | 3.4 | 6.6 | 11 | 12 | 9.8 | 18 | 8.3 | 12 |

**620 Marprene TM, Bioprene TM, l/min**

| | 620RE (hard) | | 620RE4 (hard) | |
|---|---|---|---|---|
| **Speed rpm** | **12.0 mm** | **17.0 mm** | **12.0 mm** | **17.0 mm** |
| **0.1** | 0.004 | 0.01 | 0.003 | 0.004 |
| **265** | 9.8 | 16 | 8.3 | 11 |

**620 Pumpsil silicone, l/min**

| | 620R | | | | 620RE | | 620RE4 | |
|---|---|---|---|---|---|---|---|---|
| **Speed rpm** | **6.4 mm** | **9.6 mm** | **12.7 mm** | **15.9 mm** | **12.0 mm** | **17.0 mm** | **12.0 mm** | **17.0 mm** |
| **0.1** | 0.001 | 0.003 | 0.004 | 0.01 | 0.004 | 0.01 | 0.003 | 0.004 |
| **265** | 3.2 | 7.2 | 11 | 15 | 10 | 16 | 8.7 | 11 |

## US (imperial)

**620 Sta-Pure, Chem-Sure, Neoprene, USGPM**

| | 620R | | | | 620RE | | 620RE4 | |
|---|---|---|---|---|---|---|---|---|
| **Speed rpm** | **6.4 mm** | **9.6 mm** | **12.7 mm** | **15.9 mm** | **12.0 mm** | **17.0 mm** | **12.0 mm** | **17.0 mm** |
| **0.1** | 0.0003 | 0.001 | 0.001 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 |
| **265** | 0.8 | 1.8 | 2.8 | 4.3 | 2.8 | 5.1 | 2.4 | 3.5 |

**620 Marprene TL, Bioprene TL, USGPM**

| | 620R (standard) | | | | 620RE (standard) | | 620RE4 (standard) | |
|---|---|---|---|---|---|---|---|---|
| **Speed rpm** | **6.4 mm** | **9.6 mm** | **12.7 mm** | **15.9 mm** | **12.0 mm** | **17.0 mm** | **12.0 mm** | **17.0 mm** |
| **0.1** | 0.0003 | 0.001 | 0.001 | 0.002 | 0.001 | 0.002 | 0.001 | 0.001 |
| **265** | 0.9 | 1.8 | 2.8 | 3.0 | 2.6 | 4.7 | 2.2 | 3.3 |

**620 Marprene TM, Bioprene TM, USGPM**

| | 620RE (hard) | | 620RE4 (hard) | |
|---|---|---|---|---|
| **Speed rpm** | **12.0 mm** | **17.0 mm** | **12.0 mm** | **17.0 mm** |
| **0.1** | 0.001 | 0.002 | 0.001 | 0.001 |
| **265** | 2.6 | 4.1 | 2.2 | 2.9 |

**620 Pumpsil silicone, USGPM**

| | 620R | | | | 620RE | | 620RE4 | |
|---|---|---|---|---|---|---|---|---|
| **Speed rpm** | **6.4 mm** | **9.6 mm** | **12.7 mm** | **15.9 mm** | **12.0 mm** | **17.0 mm** | **12.0 mm** | **17.0 mm** |
| **0.1** | 0.0003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 |
| **265** | 0.8 | 1.9 | 2.9 | 3.9 | 2.7 | 4.3 | 2.3 | 3.0 |

# 29 620R continuous tubing product codes

|  | | | | | |
|---|---|---|---|---|---|
| mm | inch | # | **Marprene** | **Bioprene** | **Pumpsil silicone** |
| **6.4** | **1/4** | **26** | 902.0064.032 | 903.0064.032 | 913.0064.032 |
| **9.6** | **3/8** | **73** | 902.0096.032 | 903.0096.032 | 913.0096.032 |
| **12.7** | **1/2** | **82** | 902.0127.032 | 903.0127.032 | 913.0127.032 |
| **15.9** | **5/8** | **184** | 902.0159.032 | 903.0159.032 | 913.0159.032 |
|  | | | | | |
| mm | inch | # | **Sta-Pure** | **Neoprene** | **PVC** |
| **6.4** | **1/4** | **26** | 960.0064.032 | 920.0064.032 | 950.0064.032 |
| **9.6** | **3/8** | **73** | 960.0096.032 | 920.0096.032 | 950.0096.032 |
| **12.7** | **1/2** | **82** | 960.0127.032 | 920.0127.032 | 950.0127.032 |
| **15.9** | **5/8** | **184** | 960.0159.032 | 920.0159.032 | 950.0159.032 |
|  | | | | | |
| mm | inch | # | **Fluorel** | **Chem-Sure** | |
| **6.4** | **1/4** | **26** | 970.0064.032 | 965.0064.032 | |
| **9.6** | **3/8** | **73** | 970.0096.032 | 965.0096.032 | |
| **12.7** | **1/2** | **82** | 970.0127.032 | 965.0127.032 | |
| **15.9** | **5/8** | **184** | 970.0159.032 | 965.0159.032 | |

# 30 620RE and 620RE4 LoadSure tube element product codes

| | 12mm Tri-clamp 3/4in | 17mm Tri-clamp 3/4in | 12mm Cam and Groove 3/4in | 17mm Cam and Groove 3/4in |
|---|---|---|---|---|
| **Sta-Pure** | 960.0120.PFT | 960.0170.PFT | | |
| **Chem-Sure** | 965.0120.SST | 965.0170.SST | | |
| **Bioprene TM** | 903.P120.PFT | 903.P170.PFT | | |
| **Bioprene TL** | 903.0120.PFT | 903.0170.PFT | | |
| **Pumpsil silicone** | 913.0120.PFT | 913.0170.PFT | | |
| **Marprene TM** | | | 902.P120.PPC | 902.P170.PPC |
| **Marprene TL** | | | 902.0120.PPC | 902.0170.PPC |
| **Neoprene** | | | 920.0120.PPC | 920.0170.PPC |

**Note**: = for 4 bar use

# 31 620L and 620LG pumpheads

The twin offset track design of the 620L utilises 4.0mm wall double-Y tube elements to overcome pulsation for accurate dosing and dispensing. The 620L accepts Silicone and Marprene tubing up to 16.0mm bore.

Alternatively the 620L will run with two separate 4mm-wall tubes although some channel-to-channel variance and minimal pulsation may be experienced. For separate tube fitting or twin tube inlet to single tube outlet fitting tube clamping blocks must be used. See 31.8 *620L and 620LG pumphead spares*.

## 31.1 620L and 620LG key safety information

**Before opening the pumphead guard please ensure that the following safety directions are followed.**

- Ensure that the pump is isolated from mains voltage.
- Ensure that there is no pressure in the pipeline.
- If a tube failure has occurred, ensure that any product in the pumphead has been allowed to drain.
- Ensure that protective clothing and eye protection are worn if hazardous products are being pumped.

## 31.2 620L and 620LG guarding

- Primary safety on 620 series pumps is provided by the tool-lockable pumphead guard—in the case of the 620L and 620LG heads, the tool-lockable pumphead track functions as the guard. Secondary (backup) protection is provided in the form of an electrical guard switch which stops the pump if either end of the track is opened. The electrical guard switch on cased pumps should never be used as primary protection. Always disconnect the mains power supply to the pump before opening the pumphead.

## 31.3 620L and 620LG pumping conditions

**Pressure and viscosity**

**Always isolate the pump from the mains power supply before opening the guard or performing any positioning, removal or maintenance.**

- All pressure values in this operating instruction, from which performance and life figures have been calculated, relate to peak pipeline pressures.
- Although rated to 4 bar peak pressure, the 620LG may generate in excess of 4 bar working pressure if pipeline restrictions are in place. In instances where it is critical that a working pressure of 4 bar is not exceeded, pressure relief valves should be installed in the pipeline.

| | | |
|---|---|---|
| **620L** | 0-2 bar | Y element or continuous tubing |
| **620LG** | 0-4 bar | Sta-Pure and Chem-Sure Y elements only |

- 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.

## 31.4 620L and 620LG removal and installation

A 620 pump supplied with a 620L pumphead is not intended for use with any other pumphead. However, the pumphead can be removed for cleaning or maintenance.

**Always isolate the pump from the mains power supply before opening the guard or performing any positioning, removal or maintenance.**

## To remove the 620L pumphead

- To remove the pumphead you must first remove the track. The track is secured to the pumphead by cams positioned at its left and right. Where the cam shafts are visible at the front of the pumphead, they are milled square to accept a spanner. Use the 10mm or 3/8in AF spanner provided to rotate the right-hand cam shaft through 180 degrees counter-clockwise, and the left-hand camshaft through 180 degrees clockwise. The position of the cam rotation stops indicate when they are fully closed (third picture, left) and open (right). Lift off the track.
- The pumphead is secured to the black adaptor plate by two M6 screws. Use a 5mm Allen key to remove them. Lift off the pumphead.

It is not normally necessary to remove the adaptor plate. However, if it must be removed for cleaning:

- The adaptor plate is secured to the drive by four M6 screws. Use a suitable screwdriver to remove them. Lift off the adapter plate. After cleaning, reposition and secure it in the same way.

## To install the 620L pumphead

- Clean and grease the projecting dog of the drive shaft. Position the cleaned pumphead so that it engages with the drive-shaft dog. Use two M6 screws to secure the pumphead to the adaptor plate.
- Reverse the directions above to reposition the track.

# 31.5 620L and 620LG tube loading

### Double-Y elements for low-pulsation flow and dispensing applications

- See illustrations at 31.4 *620L and 620LG removal and installation*. The track is secured to the pumphead by cams positioned at its left and right. Where the cam shafts are visible at the front of the pumphead, they are milled square to accept a spanner. Use a 10mm or 3/8in AF spanner to rotate the right-hand cam shaft through 180 degrees counter-clockwise, and the left-hand camshaft through 180 degrees clockwise. The position of the cam rotation stops indicate when they are fully closed (third picture, left) and open (right). Lift off the track.



- Locate one end of double-Y element over one of the 625L clamping pegs. Stretch the element over the rotor and locate the other end of the element over the second 625L clamping peg. Replace the track as described at 33.4 620L removal and installation.

### Twin inlet tubes for best handling of viscous fluids

- See illustrations at 31.4 *620L and 620LG removal and installation*. The track is secured to the pumphead by cams positioned at its left and right. Where the cam shafts are visible at the front of the pumphead, they are milled square to accept a spanner. Use a 10mm or 3/8in AF spanner to rotate the right-hand cam shaft through 180 degrees counter-clockwise, and the left-hand camshaft through 180 degrees clockwise. The position of the cam rotation stops indicate when they are fully closed (third picture, left) and open (right). Lift off the track.




- Unscrew and remove the 625L inlet clamping peg. Connect the twin inlet tubes and outlet tube using the appropriate Y-piece connector and clips. Fit the inlet tubes into the correct size clamping block. Locate the Y-piece end of the element over the 625L clamping peg. Stretch the tubes and screw the clamping block into place. Replace the track as described at 31.4 *620L and 620LG removal and installation*.

### Two independent tubes for twin-channel pumping

- See illustrations at 31.4 *620L and 620LG removal and installation*. The track is secured to the pumphead by cams positioned at its left and right. Where the cam shafts are visible at the front of the pumphead, they are milled square to accept a spanner. Use a 10mm or 3/8in AF spanner to rotate the right-hand cam shaft through 180 degrees counter-clockwise, and the left-hand camshaft through 180 degrees clockwise. The position of the cam rotation stops indicate when they are fully closed (third picture, left) and open (right). Lift off the track.





- Unscrew and remove the 625L clamping pegs. Clamping blocks will be used to secure the continuous tube, using the same screw sockets. Fit the two tubes into the correct size clamping blocks. Distance between blocks = 230mm for up to 8.0mm bore; 240mm for 12.0mm and 16.0mm bore. Fit the inlet tube clamping block to the 625L. Stretch the tubes over the rotor and fit the second tube clamping block to the 625L. Replace the track as described at 31.4 *620L and 620LG removal and installation*. When using Marprene it is important to check the tube length after 30 minutes running time.

## 31.6 620L and 620LG care and maintenance

Check all moving parts for freedom of movement occasionally. If aggressive fluids are spilt onto the pumphead, clean using a mild detergent only.

## 31.7 620L and 620LG track adjustment

The track is set for 4.0mm wall tubing up to 16.0mm bore. Alteration of this setting using the pan head screws may be necessary to optimise performance if non-standard tubing is used. **However, the pump warranty will be invalidated if this is done.** The factory setting is 20.3mm vertically from the rotor side of the sprung track to the top of the track cover.

# 31.8 620L and 620LG pumphead spares


| Number | Spare | Description |
|---|---|---|
| | MRA3021A | 620L pumphead |
| | MRA3022A | 620LG pumphead |
| 1 | 069.4001.000 | Tube clamp set |
| 2 | MR3017S | Adaptor plate |
| 3 | MRA0144A | Tube locating peg |
| 4 | FN0493 | M6x12 screws x 6 |
| 5 | MRA0150A | Rotor assembly |
| 6 | BB0018 | Shaft bearing |
| 7 | MR0850S | Front plate |
| 8 | TT0005 | 10mm / 3/8in spanner |
| 9 | MRA3026A | Track assembly |
| | MR3002 | Foot |

# 32 620L and 620LG performance data

Sta-Pure and Marprene TM tubing are hard to compress when new. When using tubing made of these materials, the first five pumphead revolutions should be at a speed of 10rpm or greater. If the pump is run slower, the safety system built into pump drive's software may cause it to stop and display an over-current error message.

## 32.1 620L and 620LG flow rates

**Note**: Rates apply to Y elements and two channels of continuous tubing combined.

### 620L flow rates (2 bar pressure capacity)

| 620L, Neoprene, l/min | | | |
|---|---|---|---|
| **Speed** | **Tube bore (4.0mm wall)** | | |
| **rpm** | **8.0mm** | **12.0mm** | **16.0mm** |
| **0.1** | 0.002 | 0.003 | 0.005 |
| **265** | 4.6 | 7.7 | 13.3 |

| 620L, Neoprene, USGPM | | | |
|---|---|---|---|
| **Speed** | **Tube bore (4.0mm wall)** | | |
| **rpm** | **8.0mm** | **12.0mm** | **16.0mm** |
| **0.1** | 0.0005 | 0.0008 | 0.0013 |
| **265** | 1.20 | 2.03 | 3.50 |

| 620L, Marprene, Bioprene, l/min | | | |
|---|---|---|---|
| **Speed** | **Tube bore (4.0mm wall)** | | |
| **rpm** | **8.0mm** | **12.0mm** | **16.0mm** |
| **0.1** | 0.002 | 0.003 | 0.004 |
| **265** | 4.5 | 8.0 | 11.3 |

| 620L, Marprene, Bioprene, USGPM | | | |
|---|---|---|---|
| **Speed** | **Tube bore (4.0mm wall)** | | |
| **rpm** | **8.0mm** | **12.0mm** | **16.0mm** |
| **0.1** | 0.0004 | 0.0008 | 0.0011 |
| **265** | 1.18 | 2.12 | 2.98 |

| 620L, Pumpsil silicone, l/min | | | |
|---|---|---|---|
| **Speed** | **Tube bore (4.0mm wall)** | | |
| **rpm** | **8.0mm** | **12.0mm** | **16.0mm** |
| **0.1** | 0.002 | 0.003 | 0.004 |
| **265** | 4.4 | 8.5 | 11.5 |

| 620L, Pumpsil silicone, USGPM | | | |
|---|---|---|---|
| **Speed** | **Tube bore (4.0mm wall)** | | |
| **rpm** | **8.0mm** | **12.0mm** | **16.0mm** |
| **0.1** | 0.0004 | 0.0008 | 0.0011 |
| **265** | 1.17 | 2.25 | 3.05 |

### 620LG flow rates (4 bar pressure capacity)

| 620L, Sta-Pure, ChemSure, l/min | | | |
|---|---|---|---|
| **Speed** | **Tube bore (4.0mm wall)** | | |
| **rpm** | **8.0mm** | **12.0mm** | **16.0mm** |
| **0.1** | 0.002 | 0.003 | 0.005 |
| **165** | 3.1 | 5.7 | 7.8 |
| **265** | 5.2 | 9.0 | 12.4 |

| 620L, Sta-Pure, ChemSure, USGPM | | | |
|---|---|---|---|
| **Speed** | **Tube bore (4.0mm wall)** | | |
| **rpm** | **8.0mm** | **12.0mm** | **16.0mm** |
| **0.1** | 0.0005 | 0.0009 | 0.0012 |
| **165** | 0.81 | 1.52 | 2.05 |
| **265** | 1.39 | 2.38 | 3.28 |

## 32.2 620L tubing codes

| Marprene | | Dispensing information | |
|---|---|---|---|
| | | Bore | Litres/rev |
| **902.E080.K40** | Y element | 8.0mm | 0.01689 |
| **902.E120.K40** | | 12.0mm | 0.03029 |
| **902.E160.040** | | 16.0mm | 0.04251 |
| **902.0080.040** | Continuous | 8.0mm | 0.01689 |
| **902.0120.040** | | 12.0mm | 0.03029 |
| **902.0160.040** | | 16.0mm | 0.04251 |

| Bioprene | | Dispensing information | |
|---|---|---|---|
| | | Bore | Litres/rev |
| **903.E080.040** | Y element | 8.0mm | 0.01689 |
| **903.E120.040** | | 12.0mm | 0.03029 |
| **903.E160.040** | | 16.0mm | 0.04251 |
| **903.0080.040** | Continuous | 8.0mm | 0.01689 |
| **903.0120.040** | | 12.0mm | 0.03029 |
| **903.0160.040** | | 16.0mm | 0.04251 |

| Pumpsil silicone | | Dispensing information | |
|---|---|---|---|
| | | Bore | Litres/rev |
| **913.AE80.K40** | Y element | 8.0mm | 0.01672 |
| **913.A12E.K40** | | 12.0mm | 0.03214 |
| **913.A16E.040** | | 16.0mm | 0.04353 |
| **913.A080.040** | Continuous | 8.0mm | 0.01672 |
| **913.A120.040** | | 12.0mm | 0.03214 |
| **913.A160.040** | | 16.0mm | 0.04353 |

| Neoprene | | Dispensing information | |
|---|---|---|---|
| | | Bore | Litres/rev |
| **920.E080.K40** | Y element | 8.0mm | 0.01721 |
| **920.E120.K40** | | 12.0mm | 0.02901 |
| **920.E160.040** | | 16.0mm | 0.05004 |
| **920.0080.040** | Continuous | 8.0mm | 0.01721 |
| **920.0120.040** | | 12.0mm | 0.02901 |
| **920.0160.040** | | 16.0mm | 0.05004 |

## 32.3 620LG element codes

| Sta-Pure | | Dispensing information | |
|---|---|---|---|
| | | Bore | Litres/rev |
| **960.E080.K40** | Y element | 8.0mm | 0.01979 |
| **960.E120.K40** | | 12.0mm | 0.03349 |
| **960.E160.040** | | 16.0mm | 0.04689 |

| Chem-Sure | | Dispensing information | |
|---|---|---|---|
| | | Bore | Litres/rev |
| **965.E080.K40** | Y element | 8.0mm | 0.01979 |
| **965.E120.K40** | | 12.0mm | 0.03349 |
| **965.E160.040** | | 16.0mm | 0.04689 |

**BpN, Bp**

# 33 620 series pumping accessories

| Accessory | Description | Part code | Pump compatibility |
|---|---|---|---|
| 520AF | Footswitch with 25-pin D-connector | 059.3002.000 | 620U, 620Bp, 620Di |
| 624AF | Footswitch, bare lead | 069.5231.000 | 620UN, 620BpN, 620DiN |
| 520AH | Handswitch with 25-pin D-connector | 059.3022.000 | 620U, 620Bp, 620Di |
| | | | |
| 520ANC | Network cable, RS232, with 9-pin D-connectors | 059.3121.000 | 620Bp, 620Di |
| 520ANX | Network extension cable with 9-pin D-connectors | 059.3122.000 | 620Bp, 620Di |
| 520ANA | Network adaptor, 25-pin to 9-pin D-connector | 059.3123.000 | |
| 520AB | Batch records cable with 9-pin D-connectors | 059.3125.000 | 620Di |
| | | | |
| 624AV | Proximity switch for 624AS filling stand | 069.5271.000 | 620UN, 620BpN, 620DiN |
| 624AS | Stainless steel filling stand for 624AFN filling needles | 069.5001.000 | All models |
| 624AFN | Filling needle set (3 sizes) | 069.5101.000 | All models |
| | Filling needle for 8.0mm bore tubing | 069.5100.080 | All models |
| | Filling needle for 12.0mm bore tubing | 069.5100.120 | All models |
| | Filling needle for 16.0mm bore tubing | 069.5100.160 | All models |
| 624AL | Dispensing lance for use with 624AFN filling needles | 069.5251.000 | All models |
| | | | |
| | Tube monitor with 25-pin D-connector | 059.4501.520 | 620U, 620Bp, 620Di |
| | Tube monitor, bare lead | 059.450N.520 | 620UN, 620BpN, 620DiN |
| 620AL | Leak detector kit, bare lead | 069.7131.000 | 620UN, 620BpN, 620DiN |

BpN, Bp

# 34 Trademarks

Watson-Marlow, Bioprene, Pumpsil and Marprene are trademarks of Watson-Marlow Limited. Tygon is a trademark of the Saint Gobain Performance Plastics Company.

Fluorel is a trademark of 3M.

Sta-Pure and Chem-Sure are trademarks of W.L.Gore and Associates.

BpN, Bp

# 35 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.

BpN, Bp

# 36 Publication history

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**BpN, Bp**

# 37 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.*