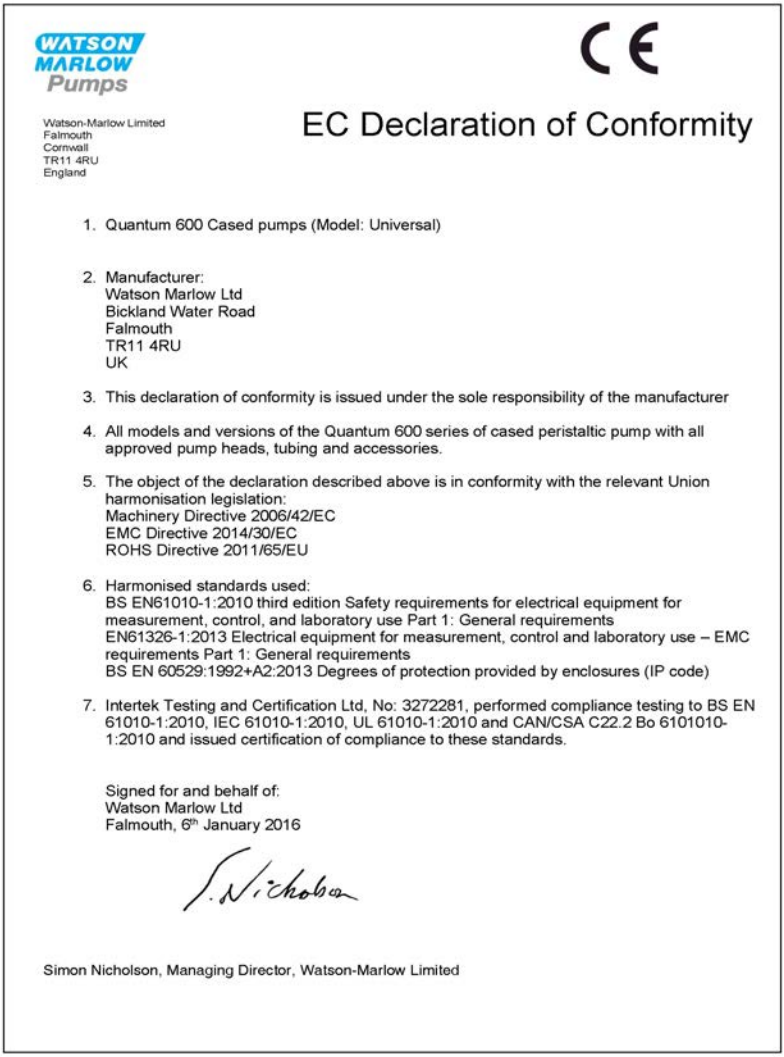
Quantum 600 Universal User Manual

Contents

1 Declaration of conformity



WATSON MARLOW Pumps

CE

Watson-Marlow Limited
Falmouth
Cornwall
TR11 4RU
England

EC Declaration of Conformity

1. Quantum 600 Cased pumps (Model: Universal)

2. Manufacturer:
   Watson Marlow Ltd
   Bickland Water Road
   Falmouth
   TR11 4RU
   UK

3. This declaration of conformity is issued under the sole responsibility of the manufacturer

4. All models and versions of the Quantum 600 series of cased peristaltic pump with all approved pump heads, tubing and accessories.

5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
   Machinery Directive 2006/42/EC
   EMC Directive 2014/30/EC
   ROHS Directive 2011/65/EU

6. Harmonised standards used:
   BS EN61010-1:2010 third edition Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements
   EN61326-1:2013 Electrical equipment for measurement, control and laboratory use – EMC requirements Part 1: General requirements
   BS EN 60529:1992+A2:2013 Degrees of protection provided by enclosures (IP code)

7. Intertek Testing and Certification Ltd, No: 3272281, performed compliance testing to BS EN 61010-1:2010, IEC 61010-1:2010, UL 61010-1:2010 and CAN/CSA C22.2 Bo 6101010-1:2010 and issued certification of compliance to these standards.

Signed for and behalf of:
Watson Marlow Ltd
Falmouth, 6th January 2016

S. Nicholson

Simon Nicholson, Managing Director, Watson-Marlow Limited

2 Declaration of incorporation

WATSON MARLOW Pumps

Watson-Marlow Ltd
Falmouth
Cornwall
TR11 4RU
England

Declaration of Incorporation

In accordance with the Machinery Directive 2006/42/EC that if this unit is to be installed into a machine or is to be assembled with other machines for installations, it shall not be put into service until the relevant machinery has been declared in conformity.

We hereby declare that:

Peristaltic Pump

Series: Quantum 600 cased pumps

the following harmonised standards have been applied and fulfilled for health and safety requirements:

Safety of Machinery – EN ISO 12100

Safety of Machinery – Electrical Equipment of Machines BS EN 60204-1

Quality Management System – ISO 9001

and the technical documentation is compiled in accordance with Annex VII(B) of the Directive.

We undertake to transmit, in response to a reasoned request by the appropriate national authorities, relevant information on the partly completed machinery identified above. The method of transmission shall be by mail or email.

The pump head is incomplete and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive.

Person authorised to compile the technical documents:

Andrew Green, Design & Engineering Director, Watson-Marlow Ltd.

Place and date of declaration: Watson-Marlow Ltd, 31.07.2015

Responsible person:

Simon Nicholson, Managing Director, Watson-Marlow Ltd

3 Safety notes

This safety information should be used in conjunction with the rest of this operating manual.

In the interests of safety, this pump and pumphead should only be used by competent, suitably trained personnel after they have read and understood the manual and considered any hazard involved. If the pump is used in a manner not specified by Watson-Marlow Ltd, the protection provided by the pump may be impaired. Any person who is involved in the installation or maintenance of this equipment should be fully competent to carry out the work. In the UK this person should also be familiar with the Health and Safety at Work Act 1974.

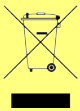
This symbol, used on the pump and in the manual, means: Caution, refer to accompanying documents.

These symbols, used on the pump and in the manual, mean: Caution, rotating crush hazard, do not allow hands to contact moving parts.

This symbol, used on the pump and in the manual, means: Caution, hot surface.

This symbol, used on the pump and in the manual, means: Caution, risk of electric shock.

This symbol, used on the pump and in the manual, means: Personal Protective Equipment (PPE) must be worn.



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

The supplied "Bolt Down Bracket" must be fitted to this pump in situations where the pumphead would be unsupported.

An unsupported pumphead is likely to cause the pump unit to tip up and fall from its mounting location, which may cause damage or injury.

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. The motor must be secured against accidental start-up.

Removal of the track and cartridge replacement should only be carried out by suitably trained personnel using the appropriate service tool.

Always isolate the pump from the mains power supply using the switch on the front of the unit (or other external means) before opening any track, or performing any positioning, removal or maintenance operation.

Only restore power after all parts are correctly refitted in place and locked.

Any operators or users who have not been suitably trained should not perform this task or have access to the tool.

This pump weighs more than 38kg (the exact weight depends on the model and pumphead - see on the pump). Lifting should be performed according to standard Health and Safety guidelines.

There is a user-replaceable type fuse in the fuse holder positioned to the left of the power input connector at the back of the pump. In some countries, the mains power plug contains an additional replaceable fuse.

There are no user-serviceable fuses or parts inside this pump.

Connect power using the supplied Harting PushPull Power® cable. The mains plug at the opposite end of the cable is NOT IP66 rated. It is your responsibility to ensure that the connection to the mains supply is IP66 rated.

The Harting connector used to provide power to the pump, must be correctly installed/sealed to IP66 by firmly pushing until latched and then be fixed with the supplied clip, power must not be connected/disconnected under load.

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. 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.

The pump's front main switch and mains power plug are the disconnecting devices (for isolating the motor drive from the mains supply in an emergency). Ensure the pump is positioned to allow easy access to disconnect the unit.

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.

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

Ensure the chemicals to be pumped are compatible with the pumphead, tubing, pipework and fittings to be used with the pump. Please refer to the chemical compatibility guide which can be found at: www.wmftg.com/chemical. If you need to use the pump with any other chemical please contact Watson-Marlow to confirm compatibility.

Pump will start as soon as power is applied if Auto restart is on and pump was running when power was disconnected.

There are moving parts inside the pumphead. Before opening the tool-unlockable track, ensure that the following safety directions are followed:

1. **Ensure the pump is isolated from the mains power using the power switch on the front of the unit (or other external means).**
2. **Ensure that there is no pressure in the pipeline.**
3. **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.**
4. **Ensure that appropriate Personal Protective Equipment (PPE) is worn.**

Exterior surfaces of the pump may become hot during operation. The unit should be allowed to cool prior to conducting any repositioning or maintenance operations.

4 Peristaltic pumps - an overview

Peristaltic pumps are the simplest possible 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.

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.

5 When you unpack your pump

5.1 Unpacking 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.

5.2 Packaging disposal

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

5.3 Inspection

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

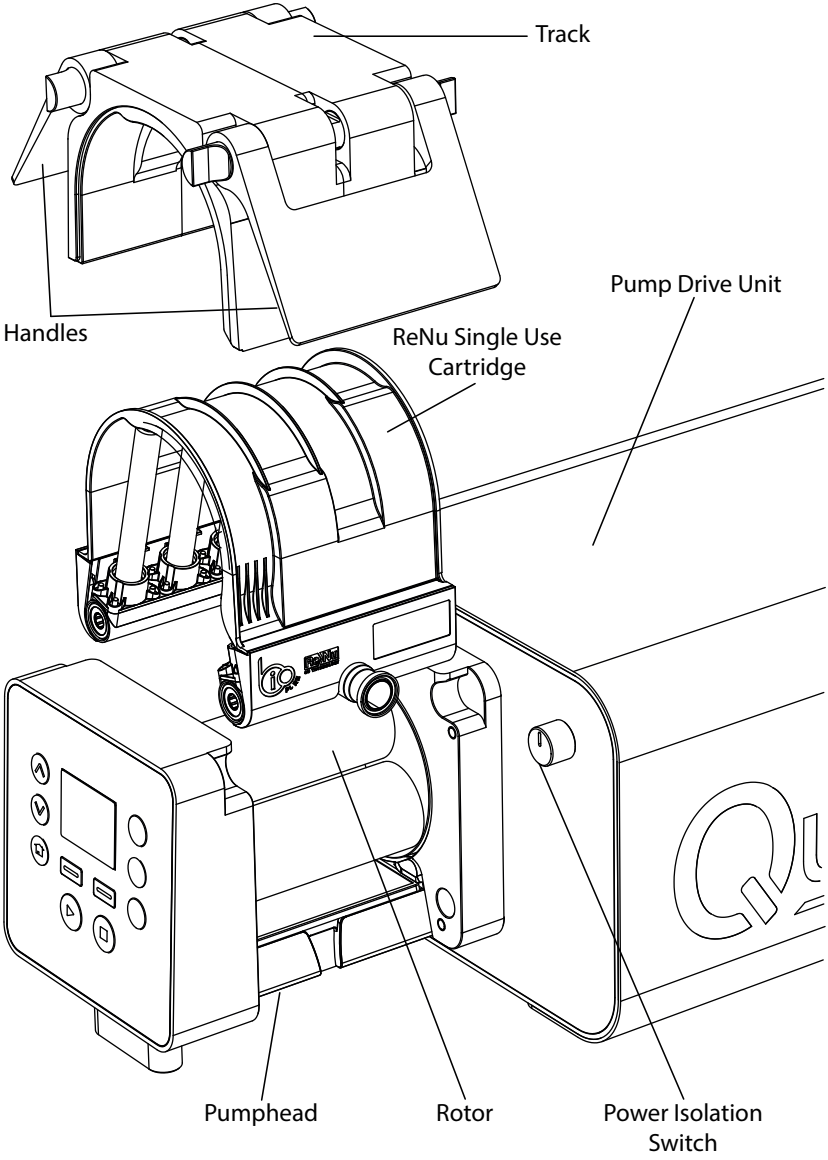
5.4 Components supplied

- Quantum 600 pump drive unit
- The designated power cable
- 14AF combination spanner
- Bolt Down Bracket
- 2xM6 Hex bolts
- 2xM6 Anti-Vibration Washers
- Product safety information booklet incorporating quick start manual

5.5 Storage

This product has an extended shelf life. However, care should be taken after storage to ensure that all parts function correctly. Please observe the storage recommendations and use-by dates which apply to tubing you may wish to bring into service after storage.

6 Main Parts Description



7 Start-up check list

Note: See also "Cartridge replacement" on page 70.

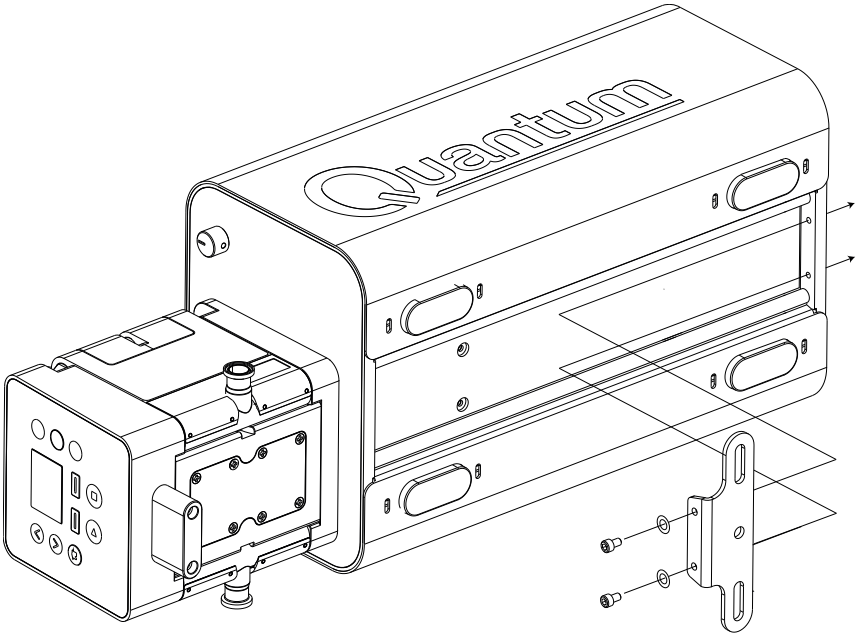
- Ensure that a single use cartridge is installed in the pumphead BEFORE the pump power is first turned on, (otherwise it is more difficult to set the operating language).
- Ensure that proper connections are achieved between the pump and suction and discharge piping.
- Ensure proper connection has been made to a suitable power supply.
- Ensure that the recommendations in the section "Good pump installation practice" on page 73 are followed.

8 Bolt Down Bracket Installation

The supplied "Bolt Down Bracket" must be fitted to this pump in situations where the pumphead would be unsupported.

An unsupported pumphead is likely to cause the pump unit to tip up and fall from its mounting location, which may cause damage or injury.

Mount the supplied Bolt Down Bracket to the pump body using the supplied 2xM6 bolts and 2xM6 anti-vibartion washers.



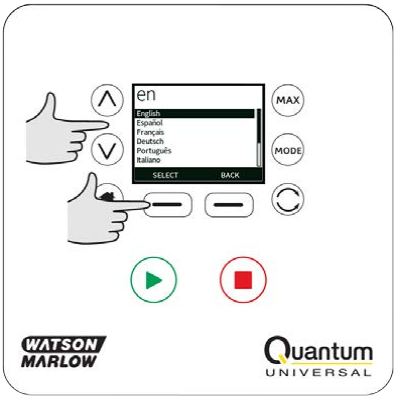
Secure the bolt down bracket to the pump body's mounting surface using 2xM10 bolts and M10 anti-vibration washers. M10 bolts and M10 washers are not supplied.

9 Switching the pump on for the first time

Power up the pump. The pump displays the start-up screen with the Watson-Marlow Pumps logo for three seconds.

9.1 Selecting the display language

1. Use the ∧/∨ keys to select your chosen language, and press **SELECT**.



2. Your selected language will now be displayed on screen. Choose **CONFIRM** to continue or choose **REJECT** to return to the language choice screen.

3. After confirming your language choice, all text will now appear in that language.

9.2 First-time start-up defaults

The pump is preset with operational parameters as shown in table below.

Parameter	Default setting
Language	Not set
Default mode	Manual
Default manual speed	375rpm
Pump status	Stopped
Max speed	400rpm
Direction	CW
Cartridge	ReNu SU 20/3P
Tube material	TPU
Flow calibration	53.33 ml/rev
Flow units	rpm
SG value	1
Keypad lock	Disabled
Auto-restart	OFF
Analog signal type	mA
Analog scaling type	mA
Analog min current	5mA
Analog max current	19mA
Analog min flow rate/rpm	0rpm
Analog max flow rate/rpm	400rpm
Beeper	ON
Security code	Not set
MemoDose flow rate	Mid flow rate of chosen pumphead
MemoDose volume	10 litres
Remote start/stop input	High = stop
Leak detector input	High = leak
Input 4	Disabled
Input 5	Disabled
Output 1	Run/stop
Output 1 - status	High = run
Output 2	Direction
Output 2 - status	High = CW
Output 3	Auto/man
Output 3 - status	High = auto
Output 4	General alarm
Output 4 - status	High = alarm

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

Note: The display background colour changes according to running state as follows:

- White background indicates pump stopped
- Grey background indicates pump running
- Red background indicates error or alarm

All operating parameters may be changed by means of key-presses (see section "Pump operation" on page 19).

10 Switching the pump on in subsequent power cycles

Subsequent power-up sequences will jump from the start-up screen to the home screen.

- The pump runs a power-on test to confirm proper functioning of the memory and hardware. If a fault is found, an error code is displayed.
- The pump displays the start-up screen with the Watson-Marlow Pumps logo for three seconds followed by the home screen
- Start-up defaults are those in place when the pump was last switched off

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 "Pump operation" on page 19).

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.

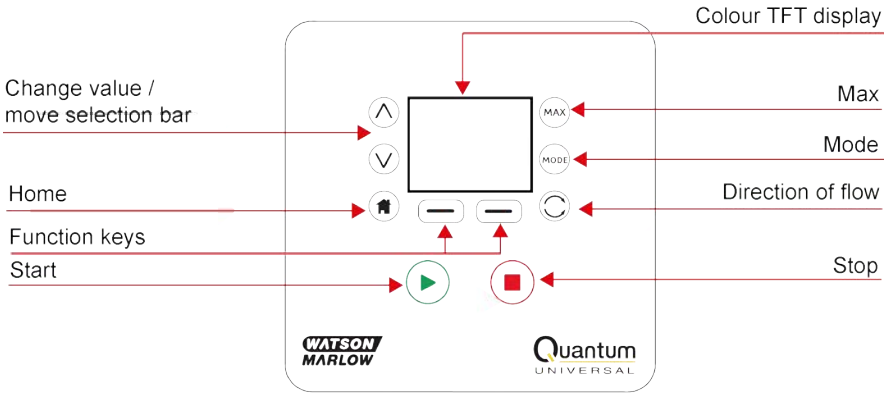
Stop/start power cycles

Do not power up/power down the pump more than 20 times in an hour, whether manually or by means of the auto-restart facility. We recommend remote control where a high frequency of stop/start cycles is required.

Pump will start as soon as power is applied if Auto restart is on and pump was running when power was disconnected.

11 Pump operation

11.1 Keypad Layout and Key IDs



HOME key

When the HOME key is pressed it will return the user to the last known operating mode. If modifying pump settings when the HOME key is pressed, it will disregard any setting changes and return you to the last known operating mode.

FUNCTION keys

FUNCTION keys, when pressed, will perform the function displayed on the screen directly above the relevant function key.

∧ and ∨ keys

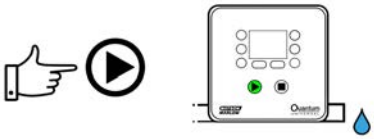
These keys are used to change the programmable values within the pump. These keys are also used to move the selection bar up and down in the menus.

MODE key

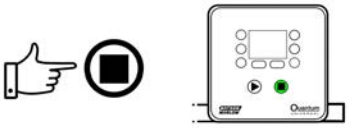
To change modes or mode settings, press the MODE key. The MODE key can be pressed at any time to enter the mode menu. If modifying pump settings when the MODE key is pressed, it will disregard any setting changes and return you to the MODE menu.

11.2 Starting and stopping

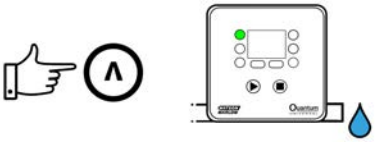
Press key to start the pump.

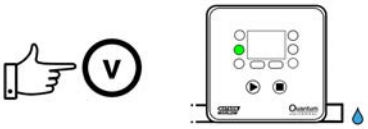


Press key to stop the pump.



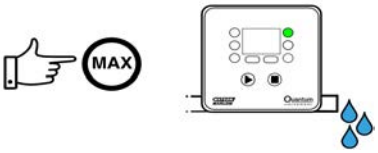
11.3 Using up and down keys



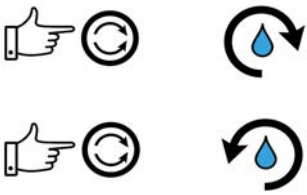


11.4 Maximum speed

Press key to start pump at maximum speed.



11.5 Change rotation direction



12 Main menu

To access the main menu press the **MENU** button from one of the HOME screens or INFO screens.

This will display the main menu as shown below. Use the ∧ /∨ keys to move the selection bar between the available options.

Press **SELECT** to choose an option.

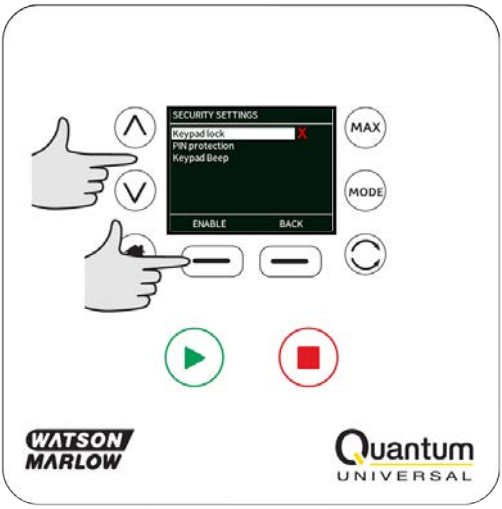
Press **EXIT** to return to the screen from where the MENU was called.

12.1 Security settings

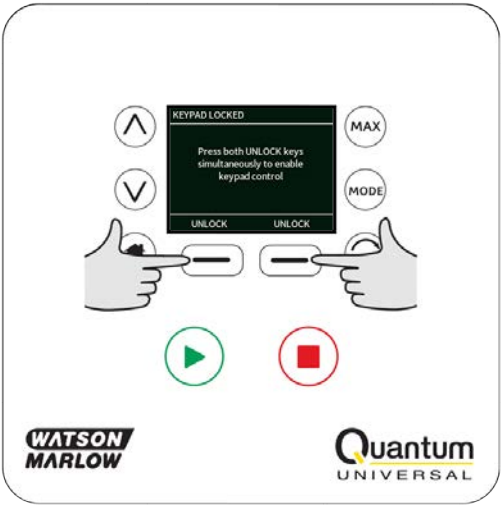
Security settings can be changed by selecting **SECURITY SETTINGS** from the Main menu.

Auto keypad lock

Press **ENABLE**/**DISABLE** to switch on/off the Auto keypad lock. When active the keypad will 'lock' after 20 seconds of inactivity.



Once locked it will display the screen below when any key is pressed. To unlock the keypad press the two **UNLOCK** keys together.



The padlock icon will appear on the operating mode home screen to show that keypad lock is activated.

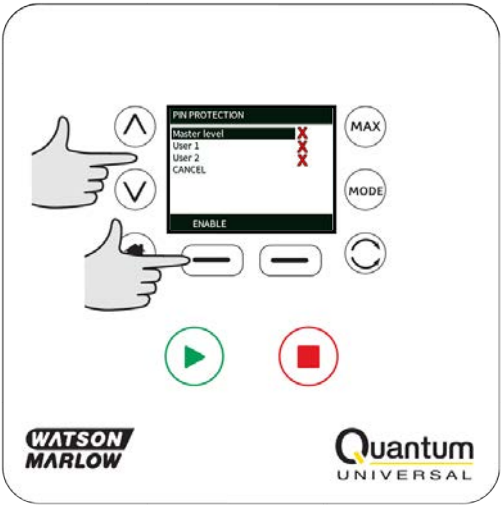
Note that the STOP key will always work whether the keypad is locked or not.

PIN protection

Using the ∧ /∨ keys select **PIN protection** from the SECURITY SETTINGS menu and press **ENABLE/DISABLE** to switch on/off the PIN protection. If PIN protection has been enabled, a Master level PIN will be required to disable PIN lock.

Setting Master PIN

Setting the Master PIN protects all functionality. The Master is able to selectively enable functionality for two additional operators. These are defined as User 1 and User 2. They will be able to access this functionality by entering a PIN code assigned to them by the Master user. To set the Master PIN, scroll to Master level and press **ENABLE**.



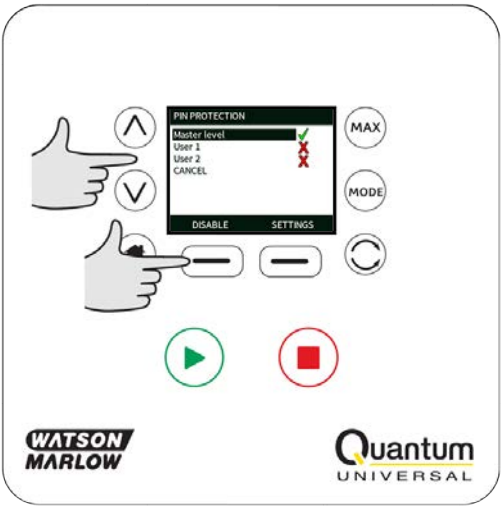
To define a four digit Master PIN, use the ∧ /∨ keys to select each digit from 0-9. Once you have the required digit press the **NEXT DIGIT** key. After selecting the fourth digit press **ENTER**.

Now press **CONFIRM** to check that the number entered is the PIN you require. Press **CHANGE** to return to PIN entry.

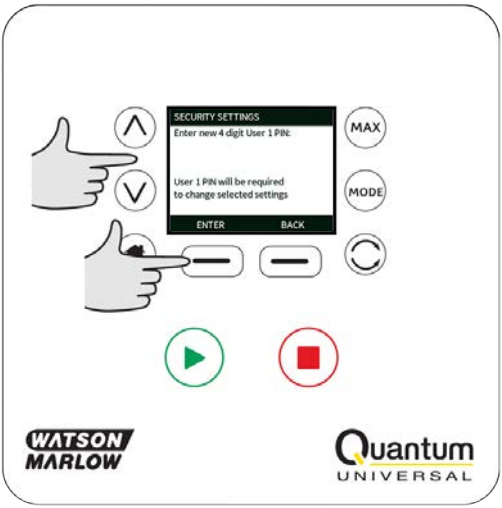
The following screen will be displayed to indicate that the Master PIN has been applied to access all functionality. Press **NEXT** to selectively enable functionality access for User 1 and User 2.

Configure User 1 security settings

The PIN PROTECTION level screen will be displayed with User 1 highlighted, press **ENABLE** to configure User 1 security settings or scroll to configure an alternative User.

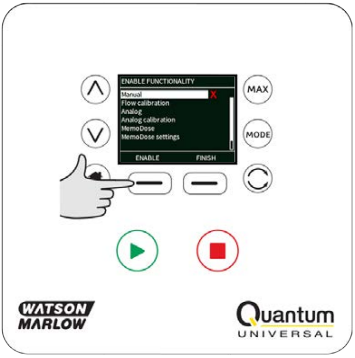


ENABLE user 1 security settings displays the PIN entry screen for User 1. To define a four digit User 1 PIN, use the ∧ /∨ keys to select each digit from 0-9. Once you have the required digit press the **NEXT DIGIT** key. After selecting the fourth digit press **ENTER**.



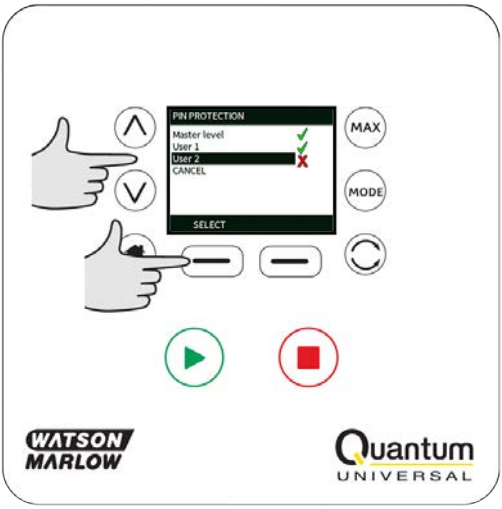
Now press **CONFIRM** to verify that the number entered is the PIN you require. Press **CHANGE** to return to PIN entry.

To define the allowed functionality, use the ∧ /∨ keys to select the functionality and press **ENABLE**. User 1 PIN will allow access to only the enabled functionality, to disable functionality, highlight the enabled functionality and press **DISABLE**. When all the required functionality has been enabled, press **FINISH**.

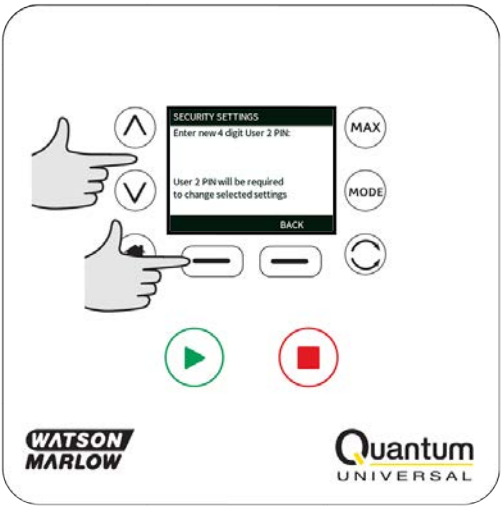


Configure User 2 security settings

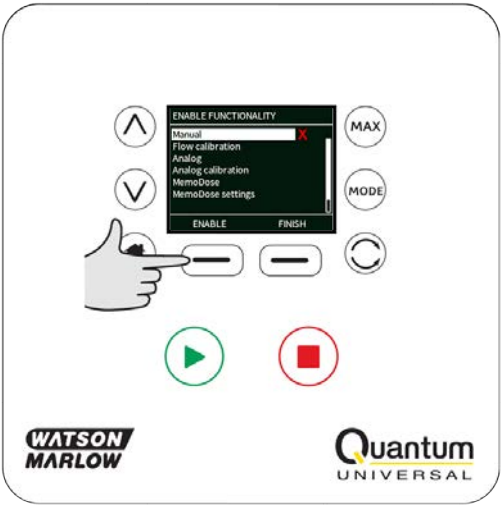
The PIN PROTECTION level screen will be displayed with User 2 highlighted, press **ENABLE** to configure User 2 security settings or scroll to configure an alternative User.



ENABLE user 2 security settings displays the PIN entry screen for User 2. To define a four digit User 2 PIN, use the ∧ /∨ keys to select each digit from 0-9. Once you have the required digit press the **NEXT DIGIT** key. After selecting the fourth digit press **ENTER**.



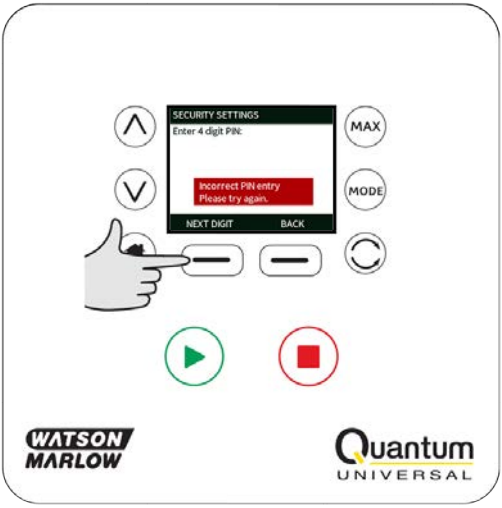
To define the allowed functionality, use the ∧ /∨ keys to select the functionality and press **ENABLE**. User 2 PIN will allow access to only the enabled functionality, to disable functionality, highlight the enabled functionality and press **DISABLE**. When all the required functionality has been enabled, press **FINISH**.



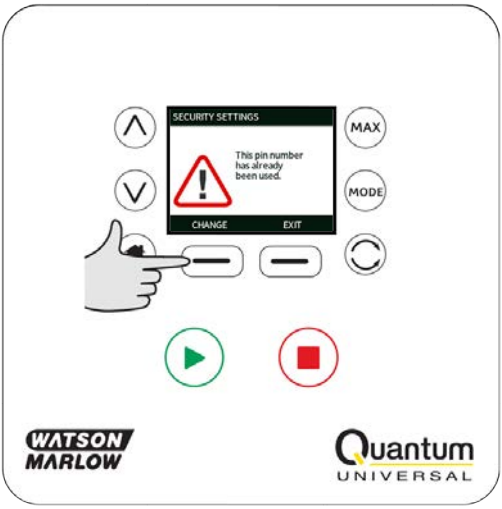
Note: Once Security Settings for User 1 and User 2 have been set by the Master, only the Master PIN will allow access to Security Settings.

The HOME screen will be displayed. A PIN is now required to access all functionality. The Master PIN accesses all pump functionality and the User 1 and User 2 PINs access only the defined functionality. To enter the PIN, use the ∧ /∨ keys to select each digit from 0-9. Once you have the required digit press the **NEXT DIGIT** key. After selecting the fourth digit press **ENTER**.

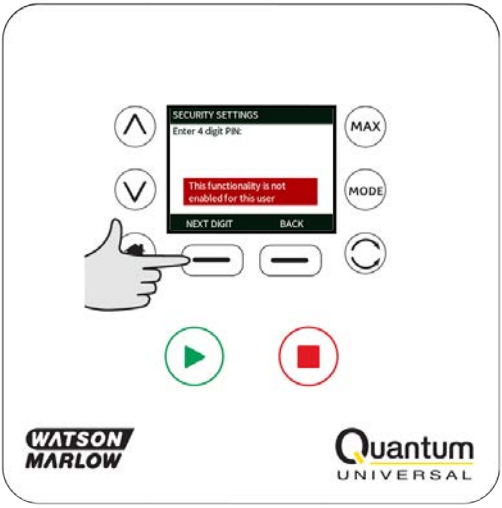
If an incorrect PIN has been entered the following screen will be displayed. NOTE: this screen will also display if the PIN entered does not allow access to that functionality.



If a PIN number is entered that is already in use, the following screen will be displayed, press **CHANGE** to input an alternative PIN or **EXIT** to abort

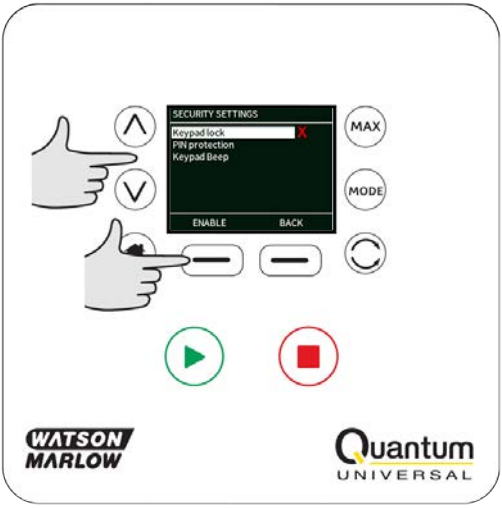


If the PIN entered does not allow access to the functionality the following screen will be displayed.



Keypad beep

From SECURITY settings scroll to Keypad beep using the ∧ /∨ keys and select **ENABLE**. The pump will now beep at every key press.



12.2 General settings

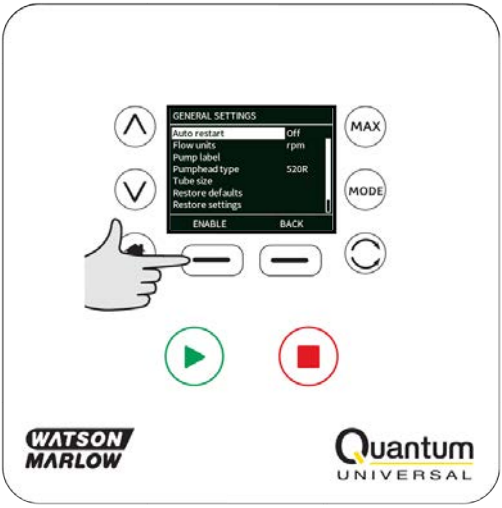
To view the general settings menu, select **GENERAL SETTINGS** from the main menu.

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.

For example, if the pump was running in analog mode prior to power loss, it would return to the same operating mode and continue to run at a proportional speed to the analog input.

Press **ENABLE**/**DISABLE** to turn the auto restart feature on/off.



Do not use auto restart for more than 20 mains power starts per hour. We recommend remote control where a high number of starts is required.

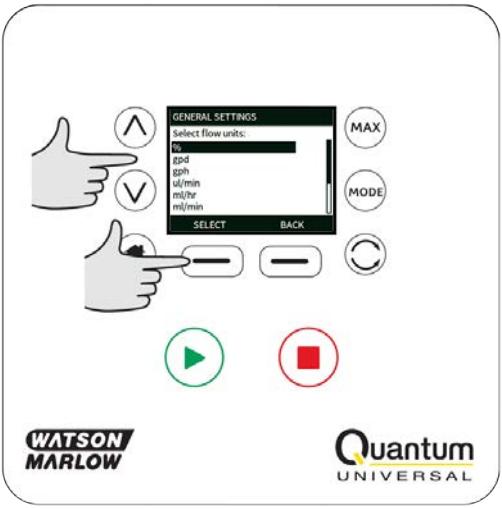
Pump will start automatically if start conditions are met.

The **!** icon is displayed on the home screens to indicate that the auto restart feature is active.

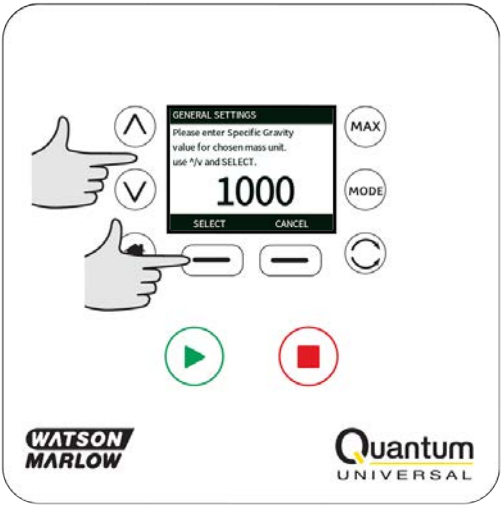
Flow units

The current chosen flow unit is displayed on the right hand side of the screen. To change flow units move the selection bar over the flow unit menu entry and press **SELECT**.

Use the ∧ /∨ keys to move the selection bar over the required flow unit, then press **SELECT**. All flow rates displayed on screens will now be in the chosen units.



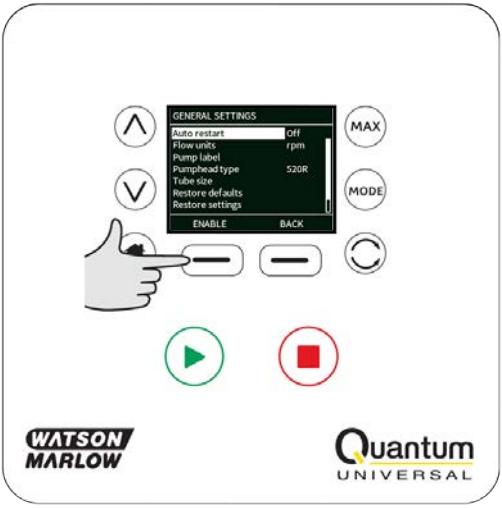
If a mass flow unit is selected, the specific gravity of the fluid must be entered. The following screen is displayed.



Use the ∧ /∨ keys to enter the value of the specific gravity, and press **SELECT**.

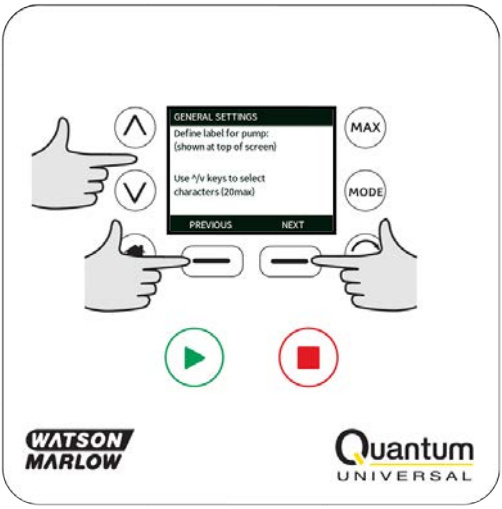
Pump label

The pump label is a user defined 20 digit alphanumeric label which is displayed in the header bar of the home screen. To define or edit the pump label, move the selection bar over the Pump label menu entry and press **SELECT**. If a pump label has been previously defined, this will be displayed on screen to allow editing, otherwise it will display the default label "WATSON-MARLOW".

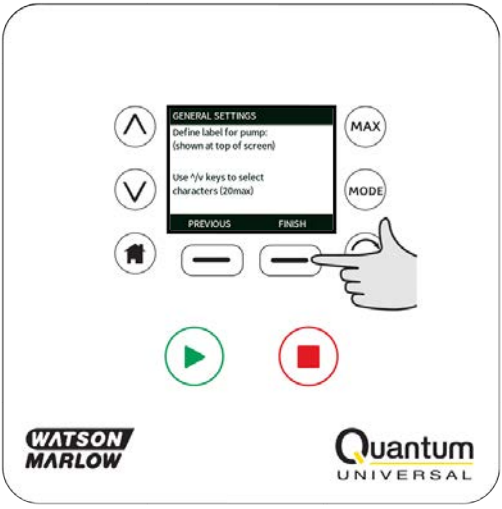


Use the ∧ /∨ keys to scroll through the available characters for each digit. The available characters are 0-9, A-Z and SPACE.

Press **NEXT** to move onto the next character, or **PREVIOUS** to move back to the previous character.

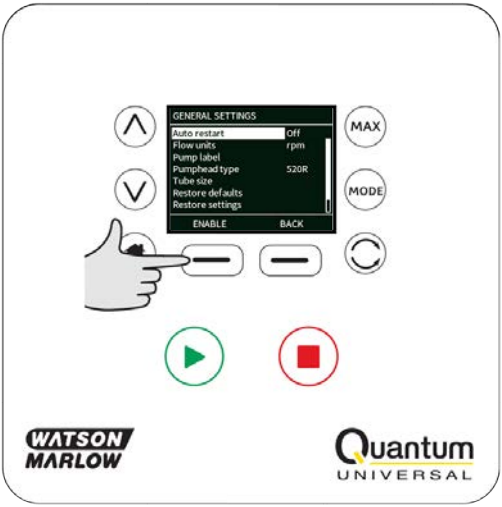


Press **FINISH** to save the entry and return to the general settings menu.

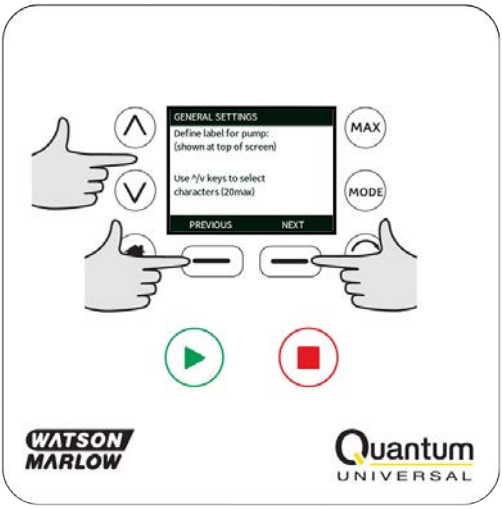


Pumphead information

Use the ∧ /∨ keys to move the selection bar over **Pumphead** and press **SELECT**. The following screen will be displayed.



Use the ∧ /∨ keys to move the selection bar over **Pumphead** and press **SELECT**.



The PUMPHEAD MODEL screen allows the cartridge Lot Number to be recorded for future reference. Use the ∧ /∨ keys to move the selection bar over **Cartridge lot number** and press **SELECT**.

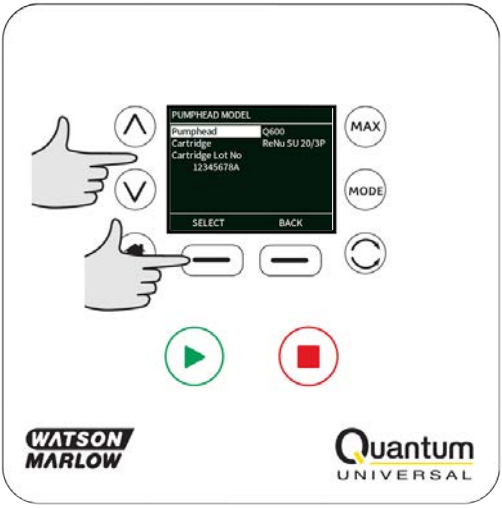
Use the ∧ /∨ keys to scroll through the available characters for each digit. The available characters are 0-9, A-Z, and SPACE.

Press **NEXT** to move onto the next character, or **PREVIOUS** to move back to the last character.

Press **FINISH** to save the entry and return to the general settings menu.

Cartridge information

Select **Cartridge** from GENERAL SETTINGS, to view the cartridge model.



Restore defaults

To restore the factory default settings select **Restore defaults** from the general settings menu.

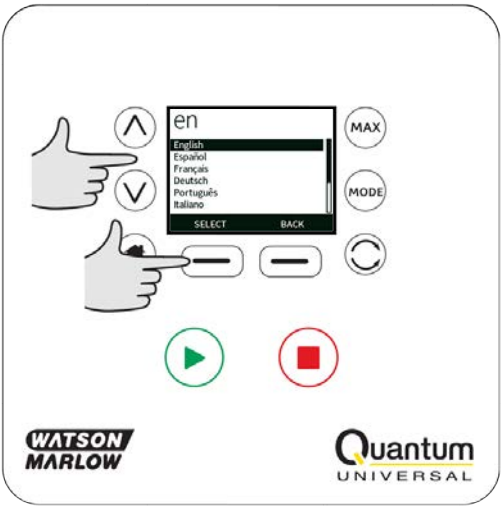
There are two confirmation screens to ensure that this function is not carried out in error.

Press **CONFIRM** followed by **RE-CONFIRM** to restore the defaults.

Language

Select language from the general settings menu to choose an alternative display language for the pump. The pump must be stopped before changing the language.

Use the ∧ /∨ keys to move the selection bar to your required language. Press **SELECT** to confirm.



Your selected language will now be displayed on screen. Press **CONFIRM** to continue, all displayed text will now appear in your chosen language.

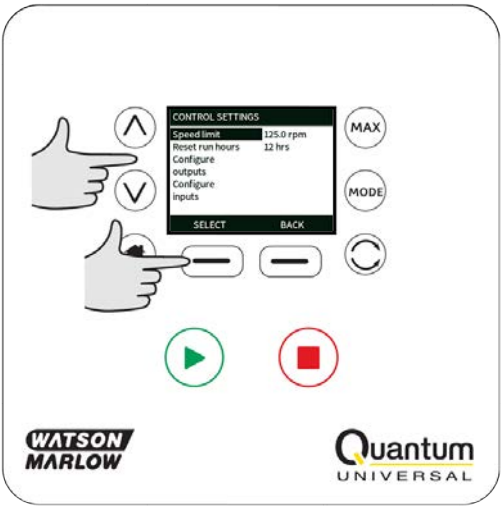
Press **REJECT** to return to the language choice screen.

MODE menu

Selecting **MODE** menu from the main menu will navigate you to access the sub-menu shown below. This is the same as pressing the **MODE** key. Please see "Mode menu" on page 46 for further details.

12.3 Control settings

Select **CONTROL SETTINGS** from the main menu to access the sub menu shown below. Use the ∧ /∨ keys to move the selection bar. Press **SELECT** to choose the required function.



Speed limit

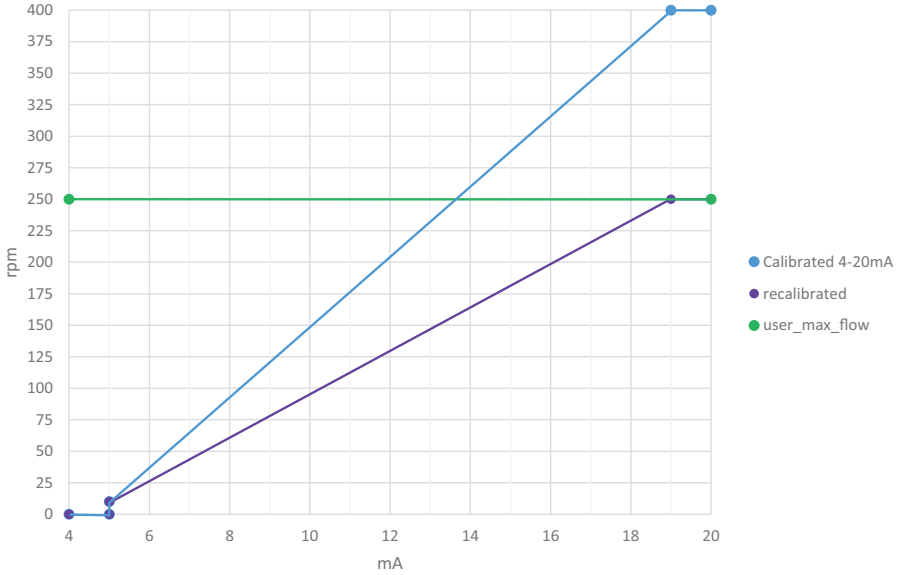
The maximum speed the pump is capable of running at is 400rpm.

Select **Speed limit** from the control settings menu to define a lower maximum speed limit for the pump.

This speed limit will be applied to all operating modes.

Use the ∧ /∨ keys to adjust the value and press **SAVE** to set.

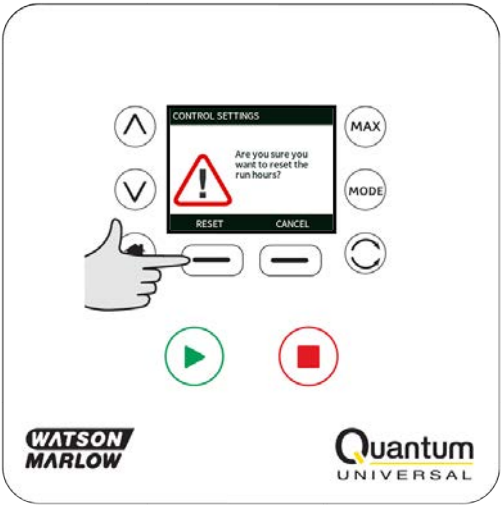
Applying a speed limit automatically re-scales the analog speed control response.



Reset run hours

Select **Reset run hours** from the control settings menu.

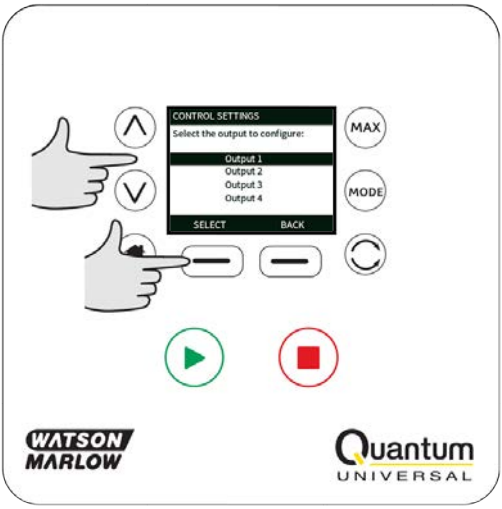
Select **RESET** to zero the run hours counter. The run hours counter can be viewed by pressing **INFO** from your home screen. The following screen will be displayed. Press **RESET** to reset the run hours or **CANCEL** to return to the CONTROL SETTINGS menu.



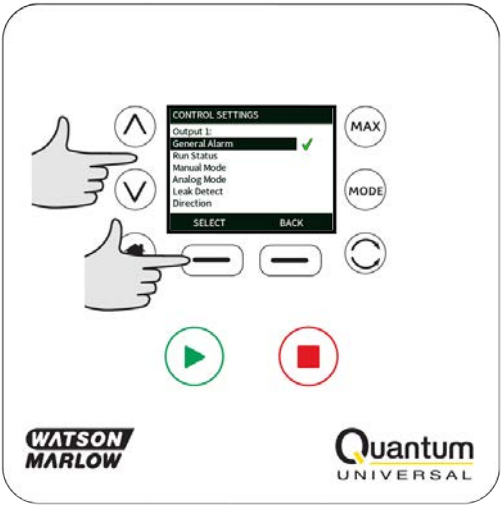
12.4 Configure outputs

Select **Configure outputs** from the CONTROL SETTINGS menu.

Use the ∧ /∨ keys and press **SELECT** to choose which output to configure.

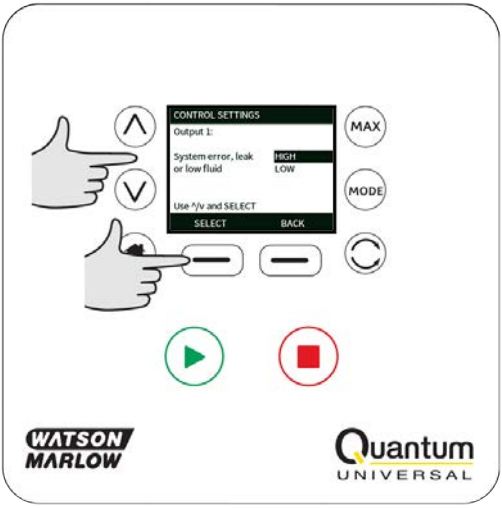


Use the ∧ /∨ keys and press **SELECT** to choose which pump status you require for the chosen output. The tick symbol indicates the current setting.



Use the ∧ /∨ keys and press **SELECT** to choose the logic state of the chosen output.

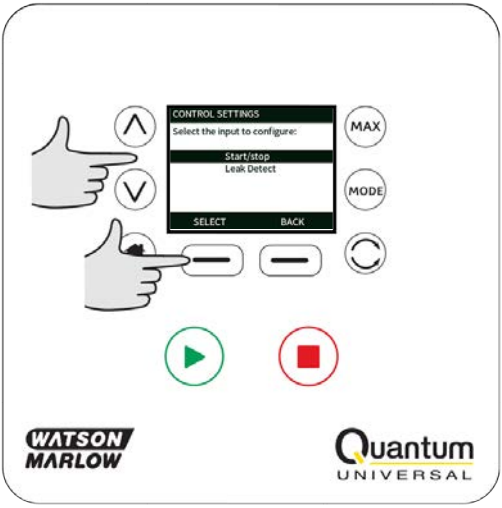
Press **SELECT** to program the output or **BACK**to cancel.



12.5 Configure inputs

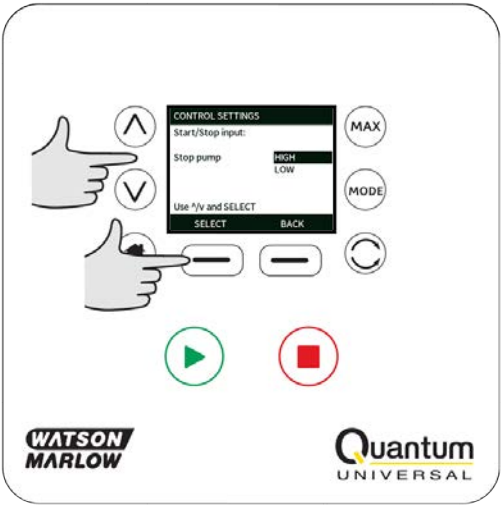
Select **Configure inputs** from the CONTROL SETTINGS menu.

Use the ∧ /∨ keys and press **SELECT** to choose which input to configure.



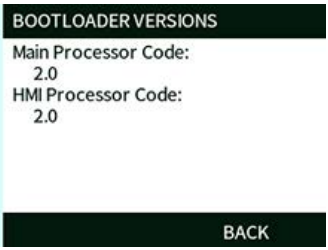
Use the ∧ /∨ keys and press **SELECT** to choose the logic state of the chosen output.

Press **SELECT** to program the output or **BACK** to cancel.



12.6 Help

Select Help from the main menu to access the help screens.

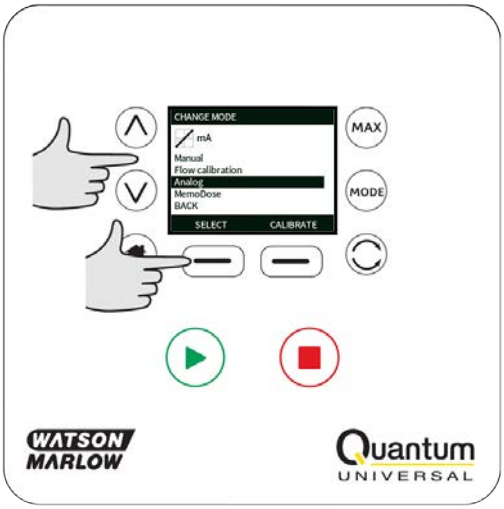


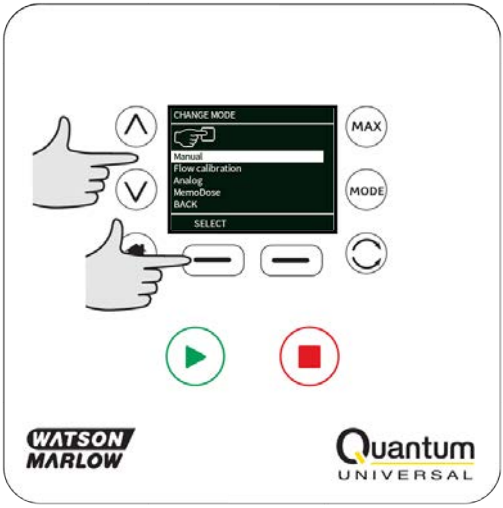
13 Mode menu

Press **MODE** to display the Change mode menu.

Use the ∧ and ∨ keys to scroll through the available modes:

- Manual (default)
- Flow calibration
- Analog
- Network
- MemoDose
- BACK





Use **SELECT** to choose mode. Use the right hand function key to alter mode settings.

14 Manual

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 in: "Switching the pump on in subsequent power cycles" on page 18, the manual mode home screen will be displayed unless auto restart is enabled.

If auto restart is enabled, the pump will return to the last known operating state when the power was lost. When the pump is running it displays an animated clockwise arrow. In normal operation, the direction of flow is into the left port of the pumphead and out of the right port.

If an exclamation mark (!) is displayed, it indicates that Auto restart is on (see "General settings" on page 33). If a padlock icon shows, it indicates that the keypad lock is on.

14.1 START

Starts the pump at the current flow displayed, and the display background changes to grey. If the pump is running, pressing this has no effect.

14.2 STOP

Stops the pump. The display background changes to white. If the pump is not running pressing this has no effect.

14.3 INCREASING AND DECREASING FLOW RATE

Using the ∧ and ∨ keys will increase or decrease the flow rate.

Decreasing flow rate

- A single key press will decrease flow rate by the least significant digit of the chosen flow rate unit.
- Repeat key presses as required to achieve the desired flow rate.
- Hold down the key for flow rate scrolling.

Increasing flow rate

- A single key press will increase flow rate by the least significant digit of the chosen flow rate unit.
- Repeat key presses as required to achieve the desired flow rate.
- Hold down the key for flow rate scrolling.

14.4 MAX FUNCTION (Manual mode only)

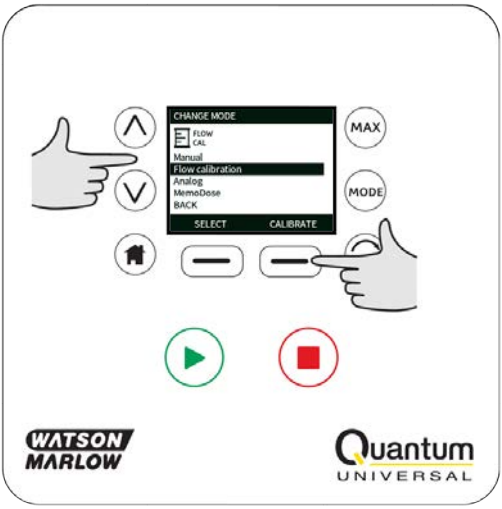
- Press and hold the **MAX** key to run at maximum flow.
- Release the key to stop the pump.
- The volume dispensed and time elapsed are displayed while the **MAX** key is pressed and held.

15 Flow calibration

This pump displays flow rate in ml/min.

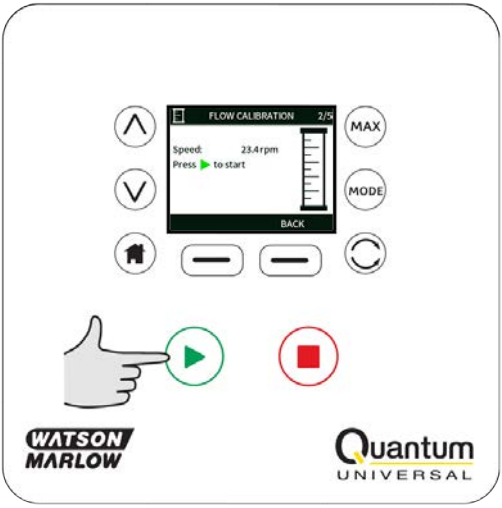
15.1 Setting the flow calibration

Using the ∧ /∨ keys, scroll to **Flow calibration** and press **CALIBRATE**.

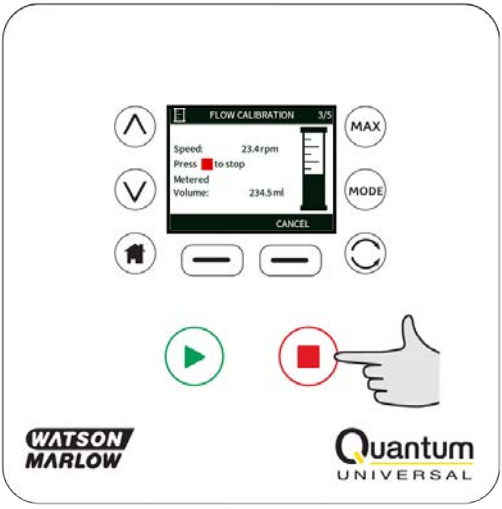


Using the ∧ /∨ keys, enter the maximum flow rate limit and press **ENTER**.

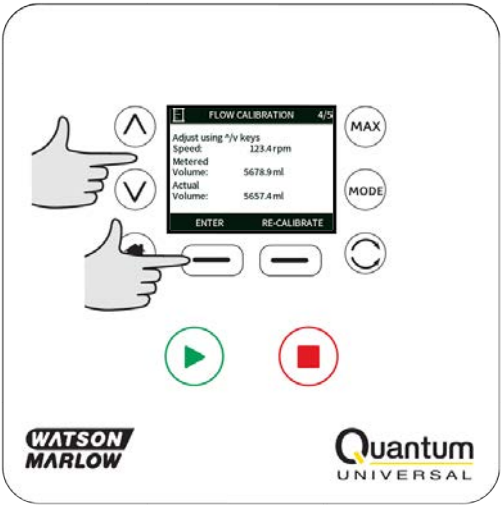
Press **START** to begin pumping a volume of fluid for calibration.



Press **STOP** to stop pumping fluid for the calibration.



Use the ∧ /∨ keys to enter the actual volume of fluid pumped.



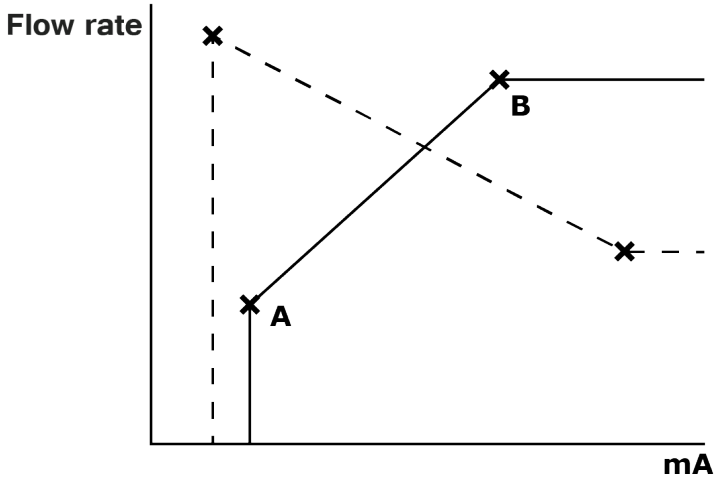
To accept the new calibration press **ACCEPT** or **RE-CALIBRATE** to repeat the procedure. Press **HOME** or **MODE** to abort.

The pump is now calibrated.

16 Analog mode

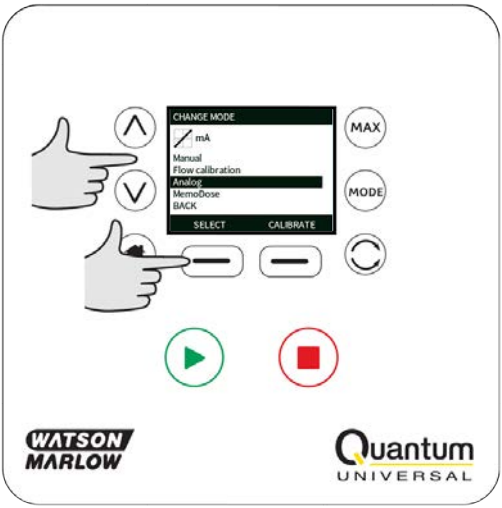
In this remote operating mode the flow rate will be proportional to the external milliamp or voltage signal input received by the pump. The relationship between the external analog signal and the flow rate is determined by configuring the two points A and B as shown in the graph below. The rate of flow can be proportional or inversely proportional to the analog input.

The default values stored in the pump are A (5mA, 0 rpm) and B (19mA, 400 rpm).

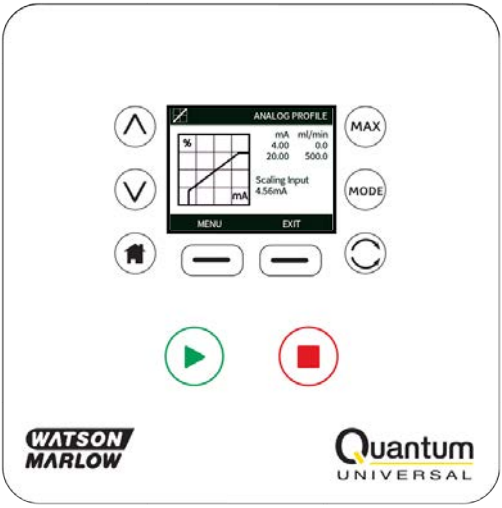


When the analog signal received is greater than the level defined by point A, the run status output will be energised as the pump is running.

To select Analog mode select **MODE**. Using the ∧ /∨ keys, scroll to **Analog** and press **SELECT**.



The analog signal being received by the pump is displayed, for information only, on the INFO screen. Press **INFO** to display this information.



16.1 Analog calibration

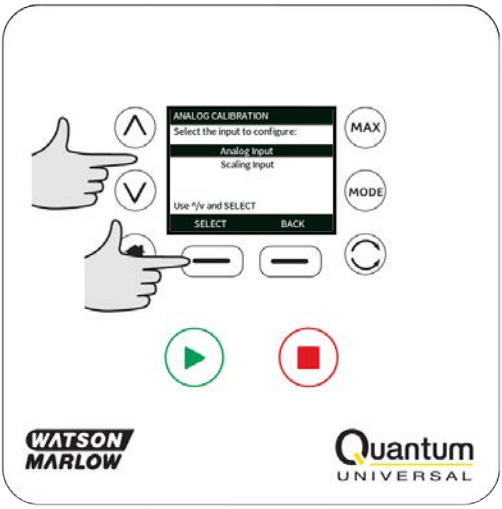
The pump must be stopped before attempting to calibrate the values.

High and low signals must be within range. If the signal sent is out of range you will not be able to set the signal input value and progress to the next step in the process.

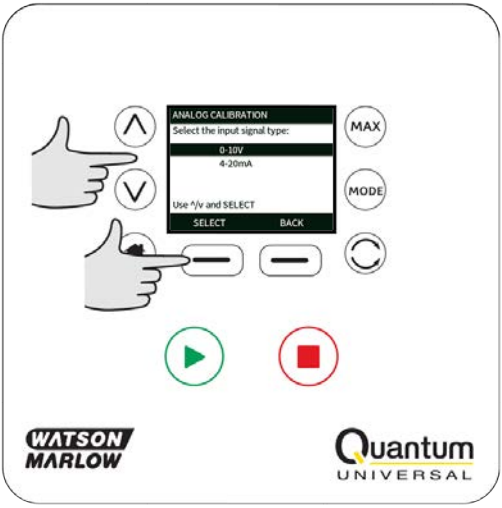
Select **MENU**, then select **MODE** menu. Using the ∧ /∨ keys, scroll to **Analog** and press **CALIBRATE**.

16.2 Calibrate Input 1

Using the ∧ /∨ keys, scroll to **Analog Input** and press **SELECT**.



Select the input signal type using the ∧ /∨ keys and press **SELECT**.

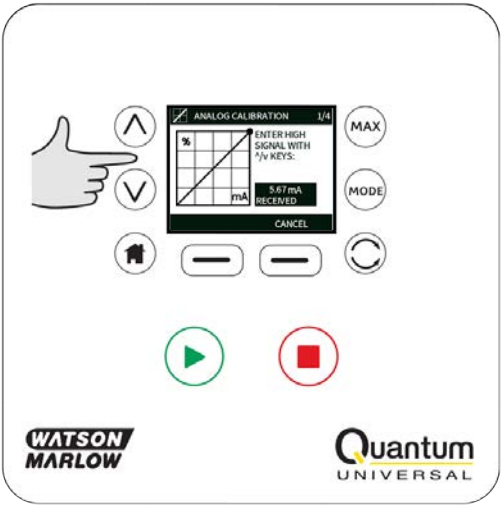


The pump gives the option to enter the high and low mA or V signals manually or via the analog input. Entering mA values is described here, however the process for entering V signals is identical.

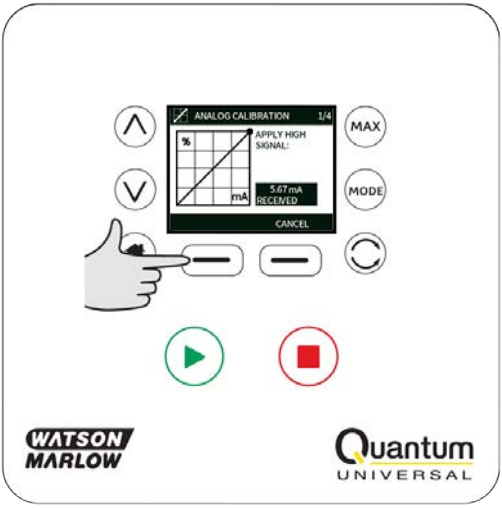
Choose whether to enter the current values manually via the keypad, or whether to apply the current signals electrically to the analog input.

16.3 Setting a high signal

Send the high signal input to the pump, or enter the current value using the ∧ / ∨ keys.

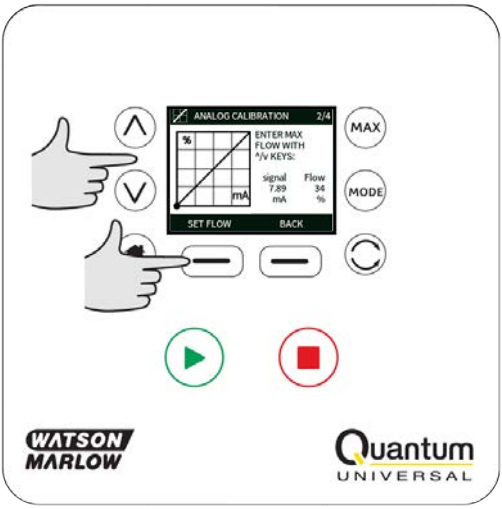


ACCEPT appears when high mA signal is within tolerance limits. Press **ACCEPT** to accept the high signal input or **CANCEL** to return to the previous screen.



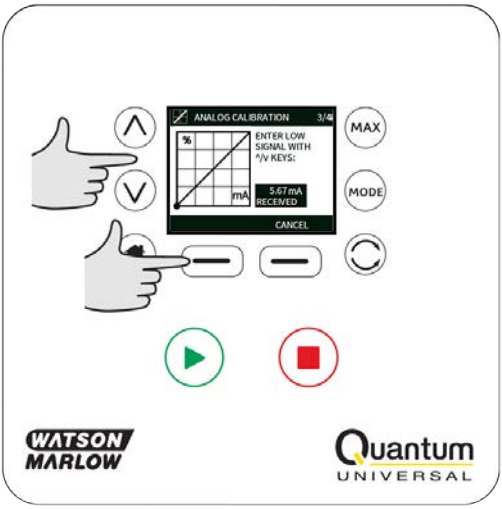
16.4 Setting high flow calibration

Using the ∧ / ∨ keys, scroll to the desired flow rate. Select **SET FLOW** or press **BACK** to return to the previous screen.

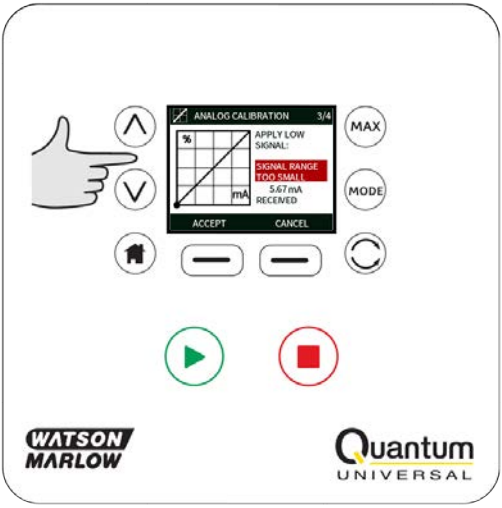


16.5 Setting a low signal

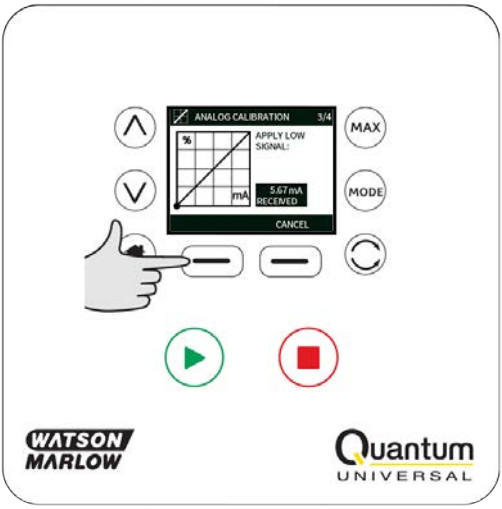
Send the low signal input to the pump, or enter the current value using the ∧ / ∨ keys.



If the range between the low and high signal is less than 1.5mA, the following error message will be displayed.

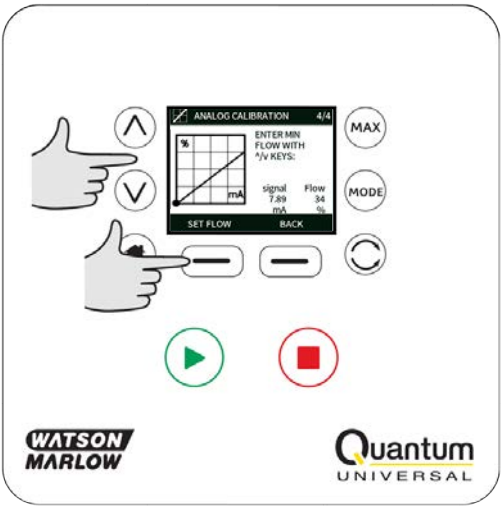


ACCEPT appears when low mA signal is within tolerance limits. Press **ACCEPT** to accept the low signal input or **CANCEL** to return to the previous screen.



16.6 Setting low flow calibration

Using the ∧ / ∨ keys, scroll to the desired scale factor. Select **SET FLOW**.



This proceeds to the screen confirming calibration is complete. Select **ANALOG** to start in analog mode or **MANUAL** to continue in manual mode.

17 MemoDose mode

Each time the pump is started by pressing **START**, it records the number of pumphead revolutions which occur until **STOP** is pressed. The number of revolutions is proportional to the volume of fluid which has been dispensed: the dose. MemoDose mode allows the user to repeat-dose a precise volume of fluid. This can be achieved by dispensing a master dose, or entering a dose volume manually using the keypad. MemoDose can repeat this dose exactly or proportionately.

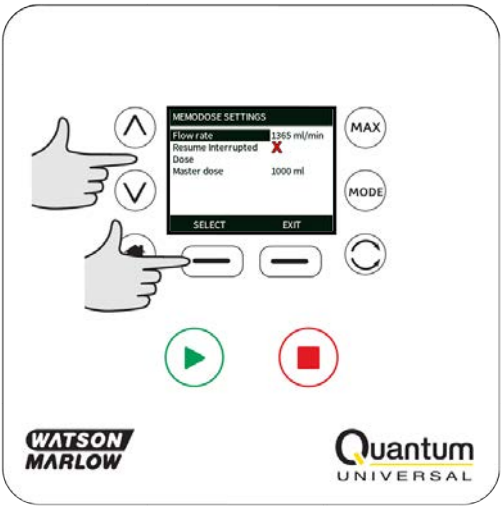
17.1 To configure MemoDose

- Select **MODE**
- Using the ∧ /∨ keys, scroll to **MemoDose**and press **SETTINGS**

Note: the pump must be stopped to enter MemoDose Settings.

17.2 Set flow rate

Using the ∧ /∨ keys, scroll to **Flow rate** and press **SELECT**.

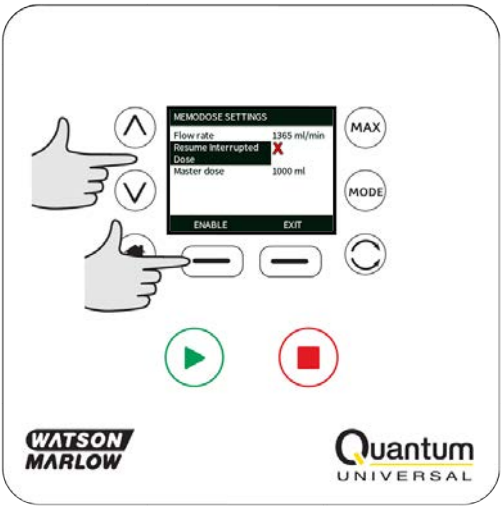


Using the ∧ /∨ keys, enter the dose flow rate and press **SELECT**.

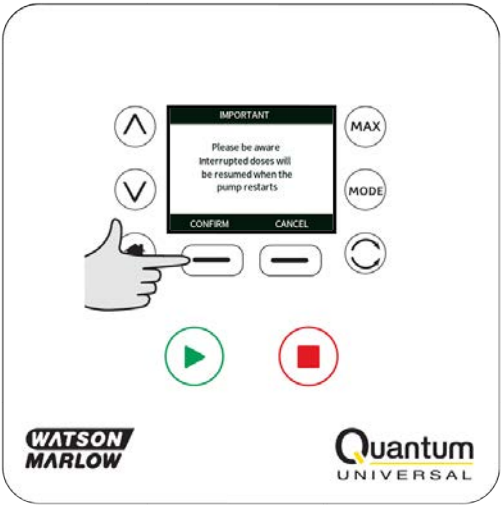
17.3 Resume interrupted doses

MemoDose Mode gives you the opportunity to resume interrupted doses following a power cycle (Note: Auto-restart must be on for this to function). Alternatively interrupted doses can be discarded and a new dose started when power is resumed.

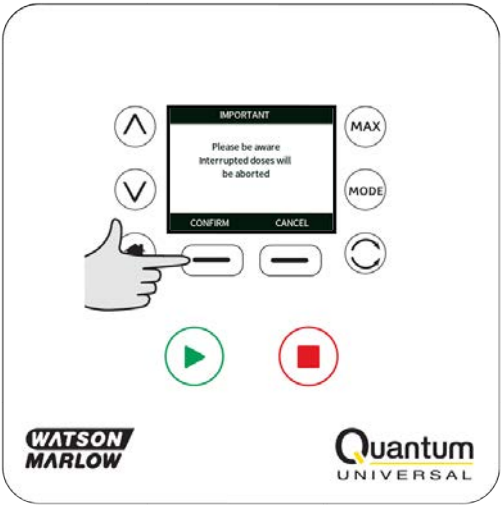
From the MemoDose settings screen, use the ∧ /∨ keys to scroll to **Resume Interrupted Dose** and press **ENABLE**. The red cross will become a green tick to indicate that Resume interrupted dose is enabled. If this function is enabled the **ENABLE** key becomes **DISABLE**. If this is pressed interrupted doses will be discarded after a power cycle.



If resume interrupted doses has been set the following warning screen is displayed, press **CONFIRM** to save this setting.

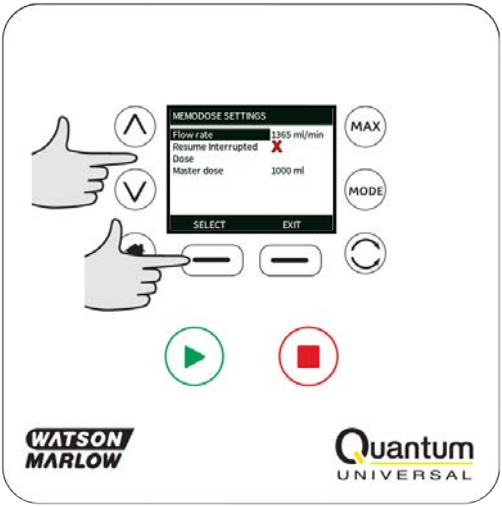


If resume interrupted doses has NOT been set the following warning screen is displayed, press **CONFIRM** to save this setting.



17.4 Master dose

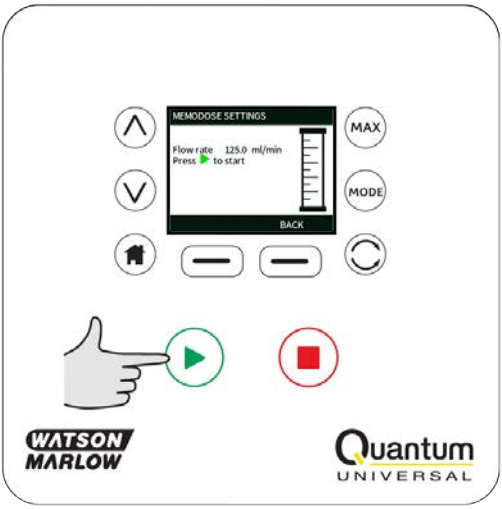
Using the ∧ /∨ keys, scroll to **Master dose** and press **SELECT**.



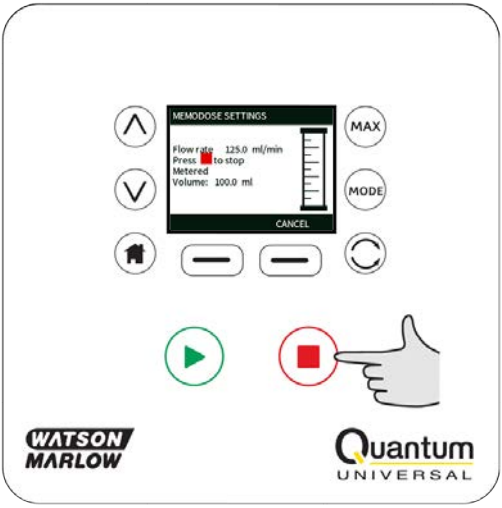
The following screen is displayed; press **MANUAL** to enter a dose via the keypad or **DOSE** to dispense a master dose.

Dispensing a master dose

Press **START** to begin dispensing the Master Dose.

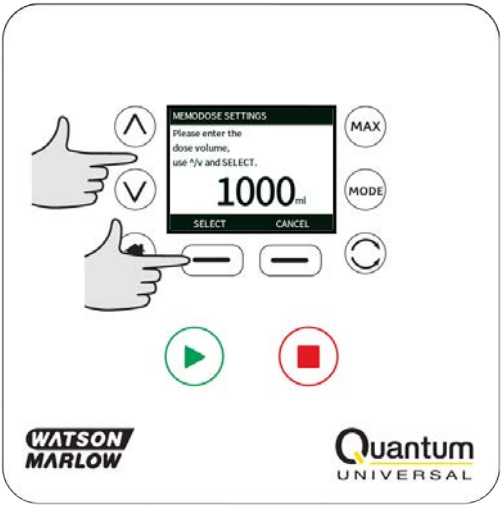


Press **STOP** to finish dispensing the Master Dose.



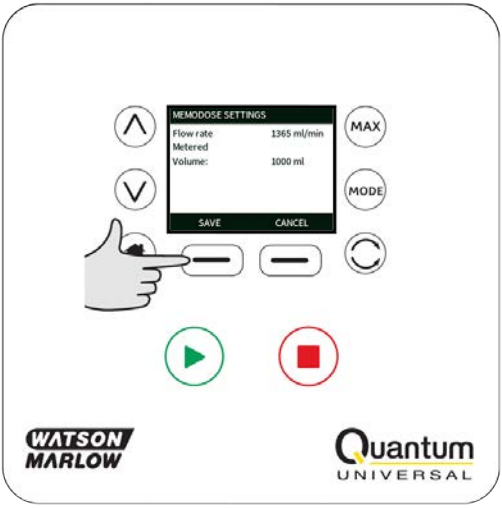
Manual dose entry

Press **MANUAL** on the master dose screen. Using the ∧ /∨ keys enter the required dose volume and press **SELECT** to record the master dose or **CANCEL** to return to MemoDose Settings.



Save dose volume

Press **SAVE** to record the Master Dose or **CANCEL** to return to MemoDose settings.



When MemoDose SETTINGS are complete the following screen is displayed; press **MEMODOSE** to start in MemoDose Mode or **BACK** to return to MemoDose settings.

17.5 Manual dosing

From the MemoDose Home screen, press **START** to deliver a dose. The screen displays the dose flow rate and the dose remaining counting down from 100% to 0%.

If the delivered dose differs from the volume required, the percentage may be adjusted within the limits 1% to 999% of the master dose. Use the ∧ /∨ keys to alter the percentage. The new dose size is displayed as a percentage on the home screen.

If **STOP** is pressed during dosing, the pump stops. Pressing **START** will resume, or discard, the interrupted dose depending on the settings in "Resume interrupted doses" on page 64.

18 Cartridge replacement

Removal of the track and cartridge replacement should only be carried out by suitably trained personnel using the appropriate service tool.

Always isolate the pump from the mains power supply using the switch on the front of the unit (or other external means) before opening any track, or performing any positioning, removal or maintenance operation.

Only restore power after all parts are correctly refitted in place and locked.

Any operators or users who have not been suitably trained should not perform this task or have access to the tool.

To replace the Quantum cartridge, follow these steps:

You must remove the track before replacing the cartridge.

The tool for removal of the track should not be accessible to the operator of the equipment. Only suitably trained service personnel should perform track or cartridge replacement / removal procedures.

Using the spanner supplied, release the Quantum Track Handles on the pumphead.

Lift up the Quantum Track Handles.

Lift the cartridge out of the pumphead.

The pump head with the cartridge removed.

Install the new cartridge over the rotors.

Lastly, close the Quantum Track Handles on the pumphead. Ensure the track is securely fitted and locked.

Connector types

ReNu SU 20/3P cartridge is fitted with 3/4" TriClamp connectors.

19 Tube Replacement - Sanitary Connectors

Ensure that the pump is switched off.

Take applicable precautions to catch any residual liquid that may be left in the tubes and cartridge.

Follow the procedure below to install sanitary connectors, removal is a reverse procedure.

1. Biobarb
2. Braided Platinum-Cured Silicone Hose
3. Biopure Platinum—Cured Silicone Gasket (3/4'' Triclamp)
4. 3/4'' Tri-clamp Cartridge Connection port'
5. Q-Clamp

1.

2.

3.

4.

20 Good pump installation practice

20.1 General recommendations

It is recommended that the pump is sited on a flat, horizontal, rigid surface, free from excessive vibration, to ensure the correct pumphead operation. Allow a free flow of air around the pump to ensure that heat can be dissipated. Ensure that the ambient temperature around the pump does not exceed the recommended maximum operating temperature.

Exterior surfaces of the pump may become hot during operation. The unit should be allowed to cool prior to conducting any repositioning or maintenance operations.

The STOP key on the pump 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.

Do NOT stack the pump.

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

Peristaltic pumps are self-priming and self-sealing against backflow. No valves are required in inlet or discharge line, except those specified as below.

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.

20.2 Dos and don'ts

- Do not build a pump into a tight location without adequate airflow around the pump.
- Do keep delivery and suction tubes as short and direct as possible - though ideally not shorter than one metre - 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 must not restrict the flow. Any valves in the flow line must be open when the pump is running.
- Do ensure that on longer tube runs at least one metre of smooth bore, flexible tubing is connected to the inlet and discharge port of the pumphead to help to minimise impulse losses and pulsation in the pipeline. This is especially important with viscous fluids and when connecting to rigid pipework.
- Do use suction and delivery pipes equal to or larger than the tubing diameter bore. When pumping viscous fluids use pipe runs with a bore several times larger than the pump tube.
- 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 run at slow speed when pumping viscous fluids. Flooded suction will enhance pumping performance, particularly for materials of a viscous nature.
- Do recalibrate after changing cartridge, fluid or any connecting pipework. It is also recommended that the pump is recalibrated periodically to maintain accuracy.
- Do not pump any chemical not compatible with the cartridge or pumphead.

- Do not run the pump without a ReNu cartridge fitted to the pumphead.
- Do not strap the control and mains cable together.
- Ensure that the M12 connectors are properly sealed in order to maintain the IP/NEMA rating.
- Ensure that any unused M12 connectors are suitably sealed in order to maintain the IP/NEMA rating.

Cartridge selection: The chemical compatibility guide published on the Watson Marlow website is for guidance. If in any doubt about the compatibility of a material and the duty fluid, contact Watson-Marlow.

21 Connecting 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 devices, such as 3-phase contactors and inductive heaters without special attention being paid to unacceptable mains-borne noise.

Make suitable connection to an earthed, single-phase mains electricity supply, 100-120V/200-240V 50/60Hz.

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

Ensure that all power supply cables are adequately rated for the equipment.

The pump's front main switch and mains power plug are the disconnecting devices (for isolating the motor drive from the mains supply in an emergency). Ensure the pump is positioned to allow easy access to disconnect the unit.

The pump must be positioned so that the disconnection device is easily accessible when the equipment is in use.

Connect power using the supplied Harting PushPull Power® cable. The mains plug at the opposite end of the cable is NOT IP66 rated. It is your responsibility to ensure that the connection to the mains supply is IP66 rated.

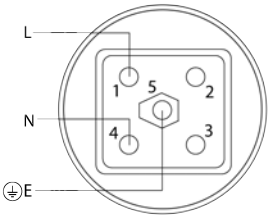
The Harting connector used to provide power to the pump, must be correctly installed/sealed to IP66 by firmly pushing until latched and then be fixed with the supplied clip, power must not be connected/disconnected under load.

21.1 Harting connector

The pump is connected to the mains supply via a Harting connector plug on the rear of the pump, with connections as shown in the following diagram.

Connect to IP66 standard by firmly pushing the plug until it is latched and then fix in place with the supplied clip.

(The illustration shows the Quantum unit connector, rear view: Harting 0935 231 0312.)



For installations that do not use the supplied mains lead, connect power using a suitably rated Harting PushPull Power® mating connection. To mate with Harting part 0935 231 0312 (internal connector). Cables should be current rated with respect to applied voltage, 100 to 120Vac : 10Amps, 200 to 240VAC : 6 Amps. Suggested cable size: 100-120VAC 1.3mm^2, 220-240VAC 1.00mm^2, 300V (minimum), 60C (minimum), VW-1 rated.

The Harting connector used to provide power to the pump must always be fixed with the clip supplied and power must not be connected/disconnected under load. Always isolate power before connecting or diconnecting the unit.

Attaching the mains power connector clip

For correct operation of the product, the mains connector retainer clip shown below (Part No. QT0030M) needs to be in place.

Ensure the security clip is secured to the power connector with a tie wrap (as shown) and the Harting power connector is in place before power is applied to the unit.

22 Control wiring

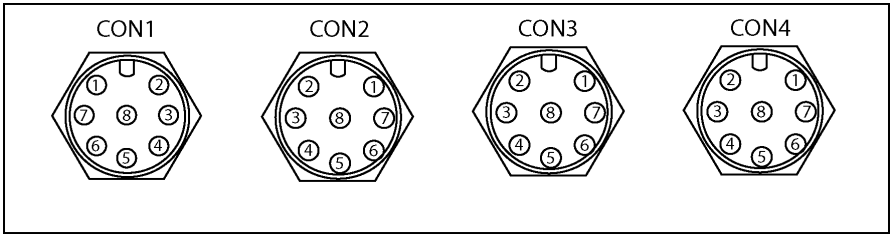
22.1 Quantum M12 interface power supply limits

Signal	Connector	Pin	Voltage	Load
5V Ref	1	4	4.5 - 5V @ no load	Total of all pins 10mA max
	2	4		
	3	4		
10V Ref	3	5	10V @ no load	Minimum load 4K7 ohms

22.2 Quantum universal interface

M12 pin assignments

The illustration below shows the M12 connectors as they appear on the rear panel, with their respective pinouts listed in the following table.



Pin	CON1	CON2	CON3	CON4
1	RELAY 1 N/O	RELAY 2 N/O	RELAY 3 N/O	RELAY 4 N/O
2	GND 0V	GND 0V	GND 0V	GND 0V
3	RUN/STOP I/P	DIRECTION ENABLE I/P	AUTO/MAN I/P	TUBE MONITOR I/P
4	+4.5 - 5V	+4.5 - 5V	+4.5 - 5V	TACHO O/P DCV
5	GND 0V	TACHO O/P FREQUENCY	+10V REM. POT.	TACHO O/P 4-20mA
6	RELAY 1 N/C	RELAY 2 N/C	RELAY 3 N/C	RELAY 4 N/C
7	RELAY 1 C	RELAY 2 C	RELAY 3 C	RELAY 4 C
8	ANALOGUE 1	DIRECTION I/P	Do not connect	DOSE I/P

Recommended control cable, metric = 0.14sq mm - 0.33 sq mm, USA : 26 to 22AWG stranded.

External unit connections must be compatible with, M12A-08PFFP-SF8002 and M12A-08PMMP-SF8002.

Compatible, IP rated external shielded mating connector types:

Amphenol, MSAS-08BFFB-SL7001, MSAS-08BMMB-SL7001.

IP rated unshielded: Amphenol 12-08BMMA-SL8001, 12-08BFFA-SL8001.

Shielded connections are recommended for minimising EMC emissions.

The cable section must be circular to ensure a seal.

Never apply mains power to the M12 terminals. Apply the correct signals to the terminals. Limit signals to the maximum values shown. Do not apply voltage across other terminals. Permanent damage, not covered by warranty, may result. The maximum rating on the relay contacts of this pump is 30V DC; maximum load 30W.

Note: Also suitable for low power: ie, 1mA at 5V DC minimum.

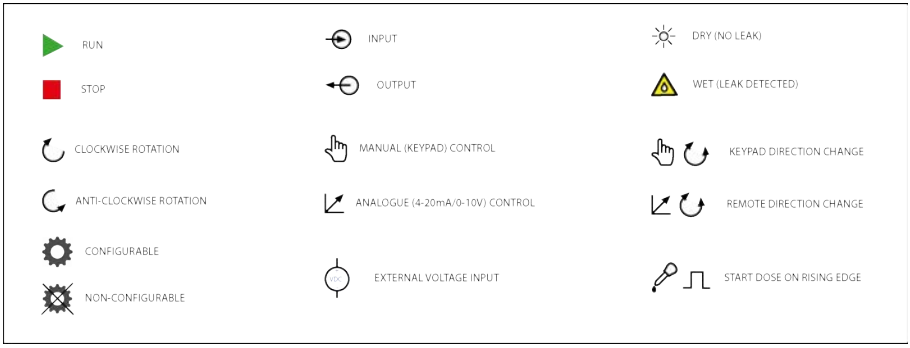
The recommended cable and cable glands must be used for the IP66 (NEMA 12/13) version of the pump; otherwise ingress protection may be impaired.

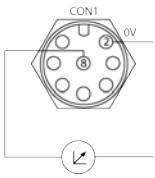
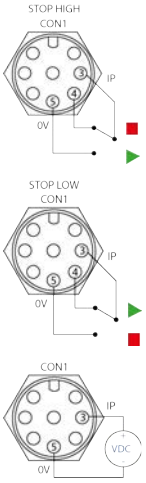
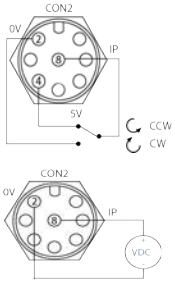
Ensure that M12 Quantum unit connectors are mated with IP66 (NEMA 12/13) minimum ingress rated mating connectors at all times. Failure to do so may compromise the IP66 (NEMA 12/13) protection.

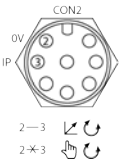
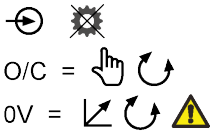
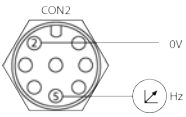
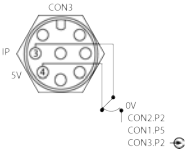
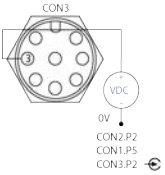
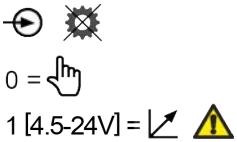
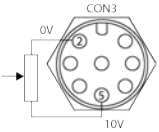
Ensure that unused M12 connections on the unit are sealed. Failure to do so may compromise the IP66 (NEMA 12/13) protection.

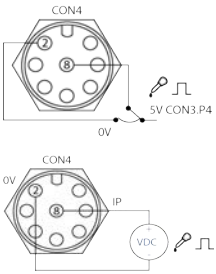
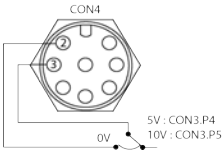
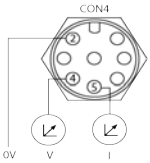
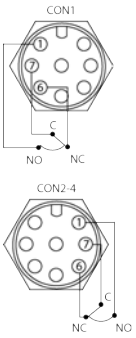
22.3 Wiring the inputs and outputs

Key to symbols



Function	Signal Response
ANALOGUE 1 	0 10V/4-20mA [34K/250R] =
RUN/STOP 	**Stop = high** 0 = 1 [4.5-24V] = **Stop = low** 0 = 1 [4.5-24V] =
DIRECTION 	0 = 1 [4.5-24V] =

Function	Signal Response
DIRECTION ENABLE 	
TACHO F 	
AUTO/MAN  	
REMOTE POT. 	

Function	Signal Response
DOSE 	1 [4.5-24V] = 0 =
LEAK DETECT 	**Leak = high** 0 = 1 [4.5-24V] = **Leak = low** 0 = 1 [4.5-24V] =
TACHO 	V = 0-10V I = 4-20mA
RELAY 1 - 4 	Low = N/C High = N/O 24VDC Max

23 Pump specifications

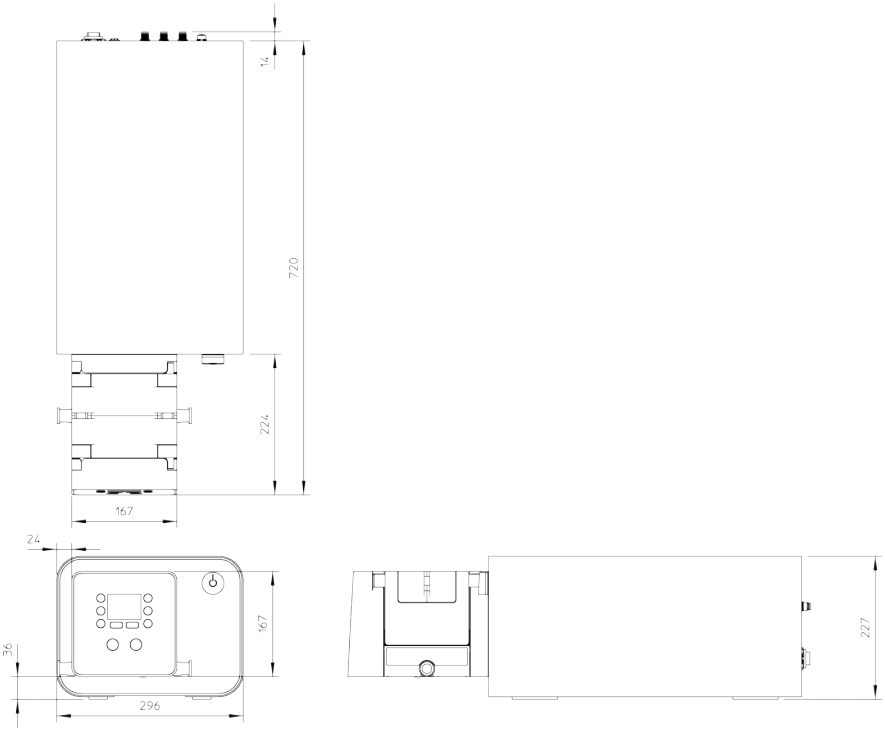
23.1 Specification ratings

Operating temperature	5C to 30C (41F to 86F)
Storage temperature	-40C to 70C (-40F to 158F)
Humidity (non-condensing)	80% up to 31C (88F) decreasing linearly to 50% at 40C (104F)
Maximum altitude	2000m
Power consumption	650VA
Supply voltage	Filtered 100-120V/200-240V 50/60Hz 1pH
Maximum voltage fluctuation	+/-10% of nominal voltage.
Full load current	<2.9A@ 230V; <5.7A @ 115V
Fuse rating	High breaking capacity, 6x32mm, 10.0A, 250V AC, Time Delay
Installation category (overvoltage category)	II
Pollution degree	2
IP	IP66 to BS EN 60529. Equivalent to NEMA 12/13 to NEMA 250 (indoor use - protect from prolonged UV exposure)
dB rating	<70dB (A) @ 1m
Control ratio	0.1-400rpm (4000:1)
Maximum speed	400rpm
Maximum pressure	3 bar
Maximum fluid temperature	5C to 37C (41F to 98F)
Maximum fluid viscosity	Do not use fluids with viscosity >80cP at 5C (41F)
Weight	38kg

This pump weighs more than 38kg (the exact weight depends on the model and pumphead - see on the pump). Lifting should be performed according to standard Health and Safety guidelines.

23.2 Dimensions

All dimensions are in millimetres.

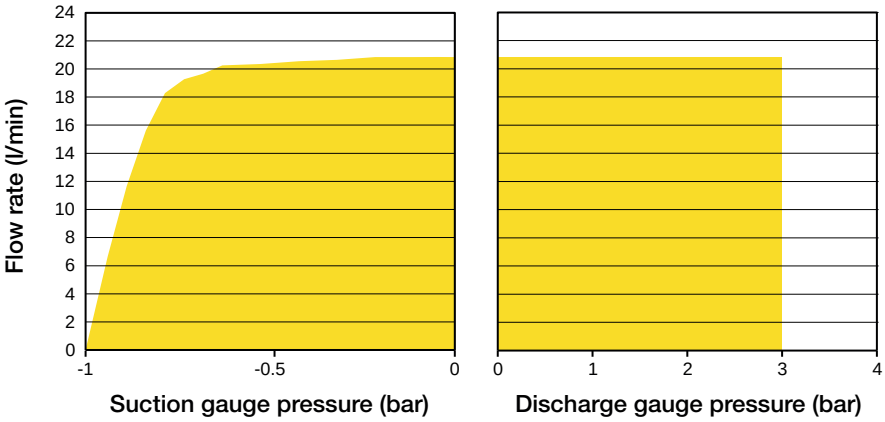


24 Performance data

24.1 Performance curves

Flow rates of suction and discharge pressures for the pumphead at different drive speeds.

This data was produced pumping water at ambient temperature.



25 Troubleshooting

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

- Check that the mains power is available to the pump.
- Check the fuse in the wall plug if one is present.
- Check the mains power switch on the front of the pump.

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

- Check that fluid is supplied to the pump.
- Check for any kinks or blockages in the lines.
- Check that any valves in the line are open.
- Check that the cartridge is correctly fitted in the pumphead.
- Check that a tube is not split or burst.
- Check that the correct cartridge is being used.
- Check the direction of rotation.

If the pump turns on, but will not run:

- Check the remote stop function and configuration.
- Check the mode you are in, are you in analog mode.
- Try to operate and run the pump in manual mode.

25.1 Error codes

If an internal error occurs, an error screen with a red background is displayed. Note: Signal out of range, over signal and leak detected error screens report the nature of an external condition. They do not flash.

Error code	Error condition	Suggested action
Er 0	FRAM write error	Attempt to reset by switching power OFF/ON. Or seek support.
Er 1	FRAM corruption	Attempt to reset by switching power OFF/ON. Or seek support.
Er 2	FLASH write error during drive update	Attempt to reset by switching power OFF/ON. Or seek support.
Er 3	FLASH corruption	Attempt to reset by switching power OFF/ON. Or seek support.
Er 4	FRAM shadow error	Attempt to reset by switching power OFF/ON. Or seek support.
Er 9	Motor stalled	Stop pump immediately. Check pumphead and tube. Power OFF/ON may reset. Or seek support.

Error code	Error condition	Suggested action
Er10	Tacho fault	Stop pump immediately. Power OFF/ON may reset. Or seek support.
Er14	Speed error	Stop pump immediately. Power OFF/ON may reset. Or seek support.
Er15	Over current	Stop pump immediately. Power OFF/ON may reset. Or seek support.
Er16	Over voltage	Stop pump immediately. Check supply. Power OFF/ON may reset.
Er17	Under voltage	Stop pump immediately. Check supply. Power OFF/ON may reset.
Er19	Over temperature	Stop pump immediately. Turn OFF. Seek support.
Er20	Signal out of range	Check analog control signal range. Trim signal as required. Or seek support.
Er21	Over signal	Reduce the analog control signal.
Er30	Over power	Turn OFF. Check power supply. Check pumphead and tubing. Wait 30 minutes. Power ON may reset. Or seek support.
Err50	Communication error	Attempt to reset by switching power OFF/ON. Or seek support.

25.2 Technical support

Watson-Marlow Fluid Technology Group
Falmouth, Cornwall
TR11 4RU
UK
Telephone: +44 (0) 1326 370370
Fax: +44 (0) 1326 376009
Email: aftersales.uk@wmftg.com
www.wmftg.com

26 Drive maintenance

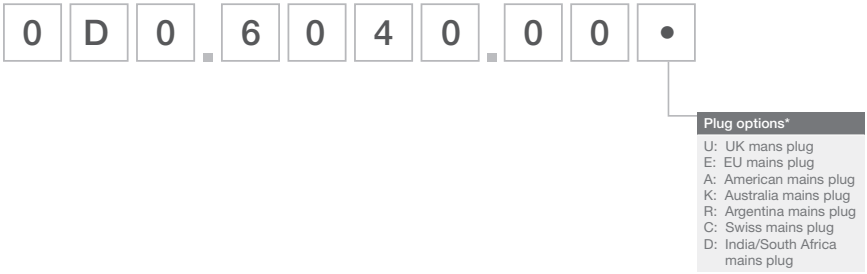
There are no user serviceable parts inside the pump. The unit should be returned to Watson-Marlow for service.

27 Drive spares

Description	Part No.
Quantum Main Fuse	FS0067
Bolt Down Bracket	QT0042T
Quantum track assembly (with handles fitted)	QTA0071A
Quantum spallation tray	QT0068M
14mm AF chrome vanadium combination spanner	TT0018
IP Sealed CAP M12 CON1	MN2890B
IP Sealed CAP M12 CON2, 3, 4	MN2889B
Head Foot	MN2507M

28 Ordering information

28.1 Pump part numbers



28.2 Cartridge part numbers

Description	Partcode
ReNu SU 600 20/3P	33-1061-000001
ReNu SU CONNECTION KIT, BRAID TUBING, 3/4" TC E/E, 0.5 MTR	33-1069-000001
ReNu SU CONNECTION KIT, BRAID TUBING, 3/4" TC E/E, 1 MTR	33-1069-000002
ReNu SU CONNECTION KIT, BRAID TUBING, 3/4" TC E/E, 3 MTR	33-1069-000003

29 Warranty

Watson-Marlow Limited warrants this product to be free from defects in materials and workmanship for five years from the date of shipment, under normal use and service.

Watson-Marlow Limited's sole responsibility and the customer's exclusive remedy for any claim arising out of the purchase of any product from Watson-Marlow Limited is, at Watson Marlow's option: repair, replacement or credit, where applicable.

Unless otherwise agreed in writing, the foregoing warranty is limited to the country in which the product is sold.

No employee, agent or representative of Watson-Marlow Limited has the authority to bind Watson-Marlow Limited to any warranty other than the foregoing unless in writing and signed by a director of Watson-Marlow Limited. Watson-Marlow Limited makes no warranty of the fitness of its products for a particular purpose.

In no event:

i. shall the cost of the customer's exclusive remedy exceed the purchase price of the product;

ii. shall Watson-Marlow Limited be liable for any special, indirect, incidental, consequential, or exemplary damages, however arising, even if Watson-Marlow Limited has been advised of the possibility of such damages.

Watson-Marlow Limited 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. Watson-Marlow Limited 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 Limited to bear any costs of removal, installation, transportation, or other charges which may arise in connection with a warranty claim.

Watson-Marlow Limited shall not be responsible for shipping damage of returned items.

Conditions

- Products must be returned by pre-arrangement to Watson-Marlow Limited, or a Watson-Marlow Limited approved service centre.
- All repairs or modifications must have been made by Watson-Marlow Limited, or a Watson-Marlow Limited approved service centre or with the express permission in writing of Watson-Marlow Limited, signed by a manager or director of Watson-Marlow Limited.
- Any remote control or system connections must be made in accordance to Watson-Marlow Limited recommendations.

Exceptions

- Consumable items including tubing and pumping elements are excluded.
- Pumphead rollers are excluded.
- Repairs or service necessitated by normal wear and tear or by lack of reasonable and proper maintenance are excluded.
- Products which, in the judgement of Watson-Marlow Limited, have been abused, misused, or subjected to malicious or accidental damage or neglect are excluded.
- Failure caused by electrical surge is excluded.
- Failure caused by incorrect or sub-standard system wiring is excluded.
- Damage by chemical attack is excluded.
- Ancillaries such as leak detectors are excluded.

- Failure caused by UV light or direct sunlight.
- All ReNu pumpheads are excluded.
- Any attempt to disassemble a Watson-Marlow Limited product will invalidate the product warranty.

Watson-Marlow Limited reserves the right to amend these terms and conditions at any time.

Watson-Marlow reserves the right to amend these terms and conditions at any time.

30 Information for returning pumps

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 it subsidiaries or distributors. Failure to do so will cause delays. Please ensure that you email us this information and receive a RGA (Returned Goods Authorisation) before you despatch the product(s). A copy of the RGA form must be attached to the outside of the packaging containing the product(s).

Please complete a separate decontamination certificate for each product and attach it to the outside of the packaging containing the product(s). A copy of the appropriate decontamination certificate can be downloaded from the Watson-Marlow website at www.wmftg.com

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

31 Name and address of manufacturer

Watson-Marlow Fluid Technology Group
Falmouth, Cornwall
TR11 4RU
UK
Telephone: +44 (0) 1326 370370
Fax: +44 (0) 1326 376009
Email: aftersales.uk@wmftg.com
www.wmftg.com

32 Trademarks

Watson-Marlow, Quantum and ReNu are trademarks of Watson-Marlow Limited.

33 Publication history

m-Quantum 600-gb-01 Quantum 600 Universal

First published 01.17.

34 Disclaimers

The information contained in this document is believed to be correct but Watson-Marlow Fluid Technology Group accepts no liability for any errors it contains and reserves the right to alter specifications without notice.

WARNING: This product is not designed for use in and should not be used for, patient-connected applications.