OPERATOR
Instructions

PERIMATIC GP
OPERATOR MANUAL

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N° FM 15114
N° RS 27480

CE

SOFTWARE VERSION 4.00
DOC REV 1.3

JENCONS (SCIENTIFIC) LTD

MANUFACTURER & DISTRIBUTOR
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The **JENCONS PERIMATIC GP** has been carefully designed and manufactured as a programmable automatic pump which can be used as a stand alone unit or interfaced with the **JENCONS PERIMATIC ROBOTIC MODULE** filling station.

Packaging

This system is supplied complete with an instruction manual, mains lead, foot switch and a range of silicone tubing (3mm, 5mm & 8mm).

Technical Data

A full technical specification is detailed on page *16*.

Installing the Tubing

PERIMATIC silicone tubing is fitted by loosening the red knob and lifting off the tubing clamp, both of which are illustrated in *figure 1*. The tubing is then laid into the arc of the rotor casting, facilitated by turning the rotor by hand as required, before clamping the tubing into place and tightening the red knob.

NOTE. Ensure that the clamp does not pinch or constrict the tubing through over-tightening of the red knob. The unit will not operate unless the door panel is down.

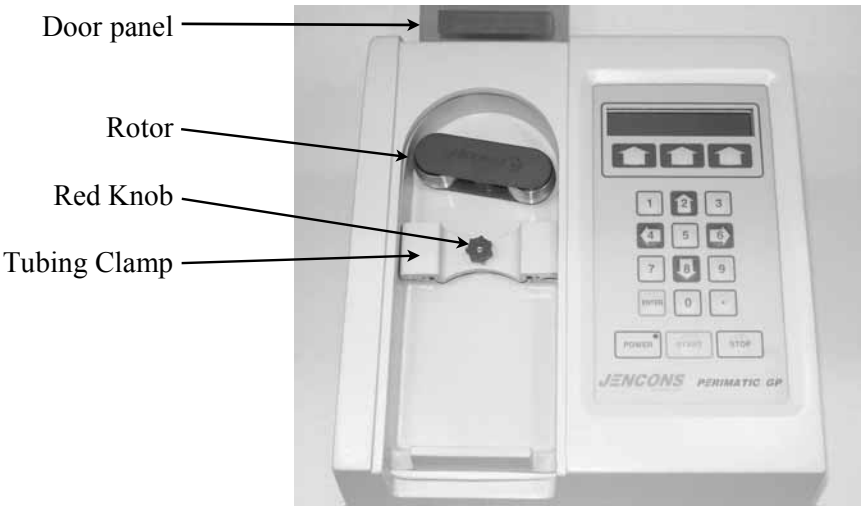


Figure 1 Installing **PERIMATIC** **Tubing**

Interfacing with the PERIMATIC GP

The **PERIMATIC GP** has two sockets on the rear panel:-

- Mains socket
- Foot switch/ **ROBOTIC MODULE** socket

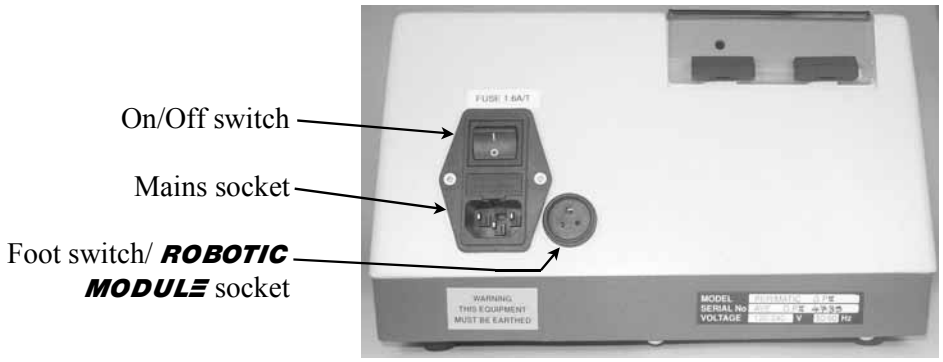


Figure 2 *Rear Panel of* **PERIMATIC GP**

1 Ensure that the voltage selector, found on the underside of the unit, is switched to the appropriate voltage, either 120V for 110-120V operation or 240V for 220-240V operation.
2 Plug the mains lead into mains socket at rear of unit.
3 Use the second socket for connecting the foot switch or the interface lead (for use with the **PERIMATIC ROBOTIC MODULE**).

Additional Components Available

Cat. No.	Component
256-065	**PERIMATIC ROBOTIC MODULE**
686-203	Tubing (bore x ϕ) 3x7mm
686-210	Tubing (bore x ϕ) 5x9mm
686-216	Tubing (bore x ϕ) 8x12mm

Approvals

The **PERIMATIC** pump conforms to the following requirements :-

- Machine safety regulations No 3073 (1992)
- Elec equipment for measurement/lab use BS EN 61010-1
- EMC directive BS EN50081-1 / BS EN50082-1 (1992)
- Low voltage directive (73/23/CEE)

Quick-start for a pre-programmed PERIMATIC GP

In order to initiate a pump sequence on a pre-programmed **PERIMATIC GP**, the user should switch the unit on (switch located on rear panel), and will be presented with the following screen display:

Software Version X.X
MEMORY SETUP PUMP

Having checked that the silicone tubing is correctly mounted around the rotor and is terminated at appropriate source and recipient vessels, press the 'PUMP' button or the <START> key to begin a fill cycle. The **PERIMATIC GP** will operate using the parameters last used or most recently set up in memory.

The remainder of the manual explains, in detail, how to program the system for a variety of filling applications using different tubing sizes and fluid types.

Introduction

The front panel keypad is shown below in *figure 3*. Beneath the display are three rectangular soft function keys whose function is denoted by the text located directly above them, on the lower line of the LCD display.

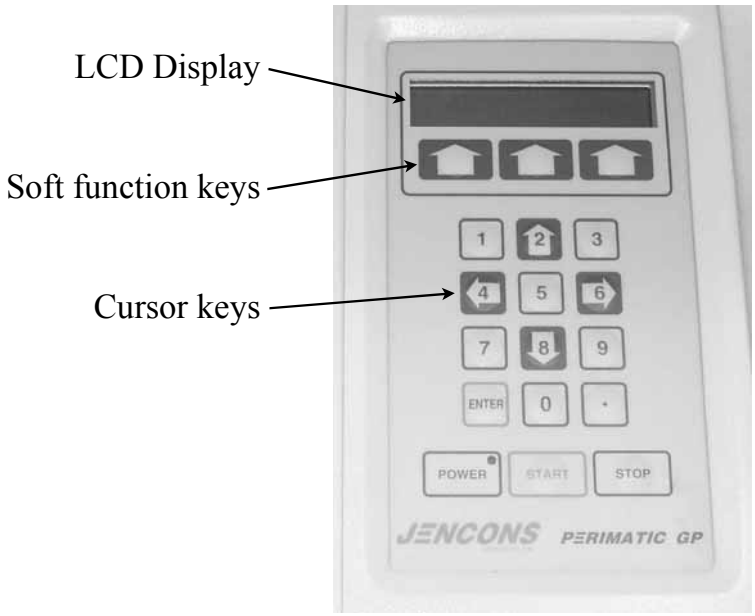


Figure 3 *Front Panel Keypad*

The keypad serves two functions:

- To enable parameters to be entered in the operating program of the **PERIMATIC GP**.
- To enable the operator to prime, calibrate and run the system.

Conventions used in the manual

Throughout the manual the following conventions are used to describe the keyboard keys:

- The soft keys are referred to as 'buttons', e.g. from the main menu press the 'MEMORY' button.
- The keypad keys and the START/STOP keys are shown enclosed thus <START>.

Initial Setup

This section illustrates how the user would set up various parameters, such as language used, speed etc, upon receipt of a new machine. It also shows that this procedure need only be carried out once as all parameters remain stored, even when the unit is switched off.

Accessing the Setup Menu

The Setup Menu is accessed by holding down any one of the soft keys whilst the power is switched on at the rear of the machine. When the key is released the display will show the following message:

Setup Program
Enter Password

Enter the system password (default 1212) the display will show the following message (Setup Menu):

Setup Program
COUNTRY MEM ACCEPT

Selecting a Language

Press the key beneath the 'COUNTRY' option on the display. The display will show the following message:

ENGLISH NEXT ACCEPT

Still using the soft keys, press 'NEXT' until the desired language is displayed and press 'ACCEPT' to confirm this selection. The program will then return to the Setup Menu.

Clearing Memory

NOTE. This should only be necessary after maintenance work or after a software upgrade. This operation will erase all settings, including calibration, stored in the module.

NB. Additional parameters can be set up by an Engineer for special applications. Clearing the memory will also clear these settings back to defaults.

At the setup menu press the 'MEM' button. The display will show the following message:

Erase Memory
ACCEPT QUIT

Press the 'ACCEPT' button to erase all memory locations, or the 'QUIT' button to cancel the operation and return to the Setup Menu.

Exit Program Mode

To exit the Setup Menu press the 'ACCEPT' button in the main Setup Menu above. The ***PERIMATIC GP*** will reset and the display will show the Main Menu.

Introduction

Before dispensing is performed the **PERIMATIC GP** needs to know certain things, these are :-

1 How much liquid to dispense.
2 Whether the dispenser is running in Automatic or Manual Mode.
3 How many times to repeat dispensing (Automatic Mode only).
4 The delay from the finish of one dispense to the start of the next dispense (Automatic Mode only).
5 The pumping profile and timings.
6 The tubing diameter in use.
7 Whether better accuracy is required by pumping an exact number of rotor half turns.
8 The direction of rotation.

The **PERIMATIC GP** is switched on by depressing the mains ON/OFF switch, located above the mains socket on the rear panel.

When the **PERIMATIC GP** has initialised the display will show:

Software Version X.X		
MEMORY	**SETUP**	**PUMP**

X.X identifies the installed software version number.

Press ‘SETUP’; the display will show:

Setup GP		
PRIME	**CAL**	**OPTIONS**

Press ‘OPTIONS’; the display will show:

Setup GP		
VOLUME	**COUNT**	**NEXT**

Setting the dispensing volume

Press ‘VOLUME’; the display will show:

Volume	10.0 ml	
ACCEPT	**QUIT**	**DELETE**

The previously set volume will be displayed, enter the volume of fluid required to be dispensed (in millilitres) using ‘DELETE’ to erase any erroneous entries.

Press <ENTER> to update the display with the new value.

Press 'ACCEPT' to store the volume and exit to the previous menu.

Press 'QUIT' to exit from this menu without changing the original volume.

NOTE. Using 'QUIT' is a quick way of verifying the programmed volume.

Setting the repeat dispense count

From the Setup Options Menu press 'COUNT'; the display will show:

No of Doses 10		
ACCEPT	**QUIT**	**DELETE**

The previously set value will be displayed. Enter the number of times that you require the dispensing to be repeated when Automatic Mode is in use. Use 'DELETE' to correct any errors.

Press <ENTER> to update the display with your entered value.

Press 'ACCEPT' to store the value and exit to the previous menu or 'QUIT' to exit from this menu without changing the original value.

From the Setup Options Menu press 'NEXT'; the display will show:

Setup GP		
DELAY	**MODE**	**NEXT**

Setting the delay between dispensings

When the ***PERIMATIC GP*** is operating in the Automatic Mode a delay is inserted between dispensings. This delay can be set from 0.1 to 9.9 seconds.

Press 'DELAY'; the display will show:

Dose Delay 1.0 s	
ACCEPT	**QUIT**

Enter the time delay using the cursor keys (the decimal point is inserted automatically).

Press ‘ACCEPT’ to exit and store the value or ‘QUIT’ to exit without changing anything. The previous menu will be displayed.

Automatic & Manual Modes

In Automatic Mode the dispenser will perform a dispense (set using ‘VOLUME’ command) and then wait for a predefined time (set using the ‘DELAY’ command). This sequence may then be repeated a number of times (set using ‘COUNT’).

In Manual Mode the ***PERIMATIC GP*** will dispense one dose and return to its previous menu.

Selecting Automatic or Manual Modes

Press ‘MODE’; the display will show:

Dispensing is manual
NEXT ACCEPT

The current selected mode (in this case Manual) is displayed on the top line.

Press ‘NEXT’ to change to the other (Automatic) mode; the display will show:

Dispensing is auto
NEXT ACCEPT

Press ‘ACCEPT’ to exit and store the selected mode. The previous menu will be displayed.

Press ‘NEXT’; the display will show:

Setup GP
PROFILE TUBE NEXT

Setting the pumping rate

The pumping rate initially takes two forms; slow pumping and fast pumping. In addition to this the **PERIMATIC GP** also performs the following combinations :

START	RUN	FINISH
SLOW	SLOW	SLOW
FAST	FAST	FAST
SLOW	FAST	FAST
SLOW	FAST	SLOW
FAST	FAST	SLOW

NOTE. Using a slow start & finish reduces the possibility of splashing.

Press ‘PROFILE’; the display will show:

SLOW	**SLOW**	**SLOW**
	NEXT	**ACCEPT**

The word on the left of the top line denotes the start speed, the middle word the run speed and the right word the finish speed.

Press the ‘NEXT’ button until the required combination of start, run & finish speeds are displayed.

You will notice that when a combination of slow and fast speeds are selected an additional ‘TIME’ button appears. This allows the time spent at the selected start or finish speed to be set.

EXAMPLE. Using the SLOW-FAST-SLOW speed option.

Press ‘TIME’; the display will show:

Start/ Finish Time		
START	**QUIT**	**FINISH**

‘START’ allows the time spent at the selected start speed to be set. ‘FINISH’ allows the time spent at the selected finish speed to be set.

Press ‘START’; the display will show:

Start Time 1.0 s	
ACCEPT	QUIT

Enter the time to spend at the selected start speed between 0.1 and 9.8 seconds.

Press ‘ACCEPT’ to store the value and exit.

Press ‘QUIT’ to exit without changing the previous value.

The previous menu will be displayed.

Press ‘FINISH’; the display will show:

Finish Time 1.0 s	
ACCEPT	QUIT

Enter the time to spend at the selected finish speed; between 0.1 - 9.8 seconds.

Press ‘ACCEPT’ to store the value and exit to the previous menu or QUIT to exit without changing the previous value.

Press ‘QUIT’; the display will show:

SLOW	FAST	SLOW
TIME	NEXT	ACCEPT

Press ‘ACCEPT’ to store the settings. The previous menu will be displayed.

Setting the tubing diameter

To enable the ***PERIMATIC GP*** to dispense fluid accurately it needs to know the size of the tubing in use. These sizes are specified by the **internal diameter** (i.d.) of the tube. The ***PERIMATIC GP*** can accept tubing in sizes from i.d. 3.0 to 8.0mm.

Press ‘TUBE’; the display will show:

3mm I.D.	NEXT	ACCEPT

The currently selected tube diameter is displayed. Press ‘NEXT’ until the correct tubing size is displayed.

Press ‘ACCEPT’ to store the selection and exit to the previous menu.

Press ‘NEXT’; the display will show:

Setup GP
DIRECTION ROUND NEXT

Setting the rotor direction

The rotor on the ***PERIMATIC GP*** can run either clockwise or anti-clockwise.

Press ‘DIRECTION’; the display will show:

Run Clockwise
NEXT ACCEPT

Press ‘NEXT’ to change the rotation direction and ‘ACCEPT’ to store the setting. The previous menu will be displayed.

Rounding up or down for greater accuracy

The ***PERIMATIC GP*** will dispense most volumes with good repeatability. However, due to the fact that the start and finish points may not always fall on a complete half turn of the rotor, errors may be apparent.

The ‘ROUND’ command allows the user to set the rotor movement to a multiple of complete half turns. For example. If a pump is dispensing and the rotor takes 2¼ turns rounding up will make the rotor take 2½ turns and rounding down will take 2 turns.

Press ‘ROUND’; the display will show:

Round to Half Turn
↓↓ QUIT ↑↑

Press UP ‘↑↑’ to round the volume up to the nearest half rotor turn and DOWN ‘↓↓’ to round down to the nearest half rotor turn.

NOTE. When the **PERIMATIC GP** is dispensing, the display will show 'Rounded' if the round option has been selected. The display will reflect the calculated, rounded volume as the dispense volume.

This completes the set up of **PERIMATIC GP** options. Press <ENTER> to return to the setup menu. The display will show:

Setup GP		
PRIME	**CAL**	**OPTIONS**

Priming the system

Press 'PRIME'; the display will show:

Ready to Prime	
ACCEPT	**QUIT**

Once the 'ACCEPT' button is pressed the rotor will begin to turn and fluid will be drawn into the tubing. Press 'ACCEPT' when the tubing is full and the rotor will stop.

Press 'QUIT' to return to the main menu.

Calibration procedures

The **PERIMATIC GP** has default settings for flow constants with various tubing sizes. These are based on measurements taken using water at 20ºC. The **PERIMATIC GP** can be recalibrated to take account of liquids that are at a higher or lower temperature and/or have different viscosities.

NOTE: The calibration process requires an accurate balance to be available to ascertain the weight of the dispensed volume of liquid. Furthermore, calculations may be necessary to convert from weight in grams to millilitres based on the viscosity and temperature of the liquid.

NOTE: Modification to the calibration constants are made on the currently selected tubing diameter only. If different tubing sizes are used then each must be calibrated if required.

From the main menu press 'SETUP'; the display will show:

Setup GP		
PRIME	**CAL**	**OPTIONS**

Press ‘CAL’; the display will show:

Calibrate GP
VOLUME QUIT ROUND

Press ‘VOLUME’; the display will show:

Volume 10.0 ml
ACCEPT QUIT DELETE

The previously set calibration volume will be displayed. Enter the volume required for calibration, in millilitres. Use ‘DELETE’ to correct any errors.

Press <ENTER> to update the display or ‘QUIT’ to exit from this menu without changing the currently set volume.

Press ‘ACCEPT’ to store the volume and exit to the next menu as shown:

Press START to pump
QUIT

Press <START> to dispense the volume entered. When the ***PERIMATIC GP*** has finished pumping, the display will show:

Actual Vol 10.0 ml
ACCEPT QUIT DELETE

Ascertain the volume of liquid by weighing (allow for temperature & viscosity). Enter the actual volume dispensed in millilitres. Use ‘DELETE’ to correct any errors.

Press <ENTER> to update the display and ‘ACCEPT’ to store the volume and exit to the next menu.

The ***PERIMATIC GP*** will recalibrate its new flow constants for the liquid and then return the user to the ‘PRESS START to PUMP’ display.

Press ‘QUIT’ to exit from this menu and store the calibration values and, finally, press <START> to pump a new sample to check the dispensed volume.

Manual dispensing

In Manual Mode press 'PUMP' or <START> to display:

```
1          10.0ml
MAN          SFS
```

The **PERIMATIC GP** will dispense its programmed volume, using the programmed speed profile.

During manual dispensing the display shows the following information :

1 Total number of manual dispensings since setup. Shown on the top, left side of the display.
2 The dispense volume. Shown on the right side of the top display line.
3 The dispense mode (MAN). Shown on the left side of the bottom display line.
4 The pumping rate; shown in the middle of the bottom display line.
5 'Rounded' will be displayed in the bottom right corner of the display if the 'ROUND' option has been selected.

When the **PERIMATIC GP** has finished dispensing the display reverts to the main menu. Subsequent pressing of either 'PUMP' or <START> will repeat the dispensing process.

NOTE. The dispense count will increment each time 'PUMP' or <START> is pressed.

Automatic dispensing

In Automatic Mode press the 'PUMP' button or <START> key and the display will show:

```
1 of 100   10.0ml
AUTO         SFS
```

The **PERIMATIC GP** will dispense the programmed volume, using the programmed speed profile, and wait for the programmed delay time.

During automatic dispensing the display will show the following information :

1 A continuous tally count of dispenses completed and the programmed number of dispenses to reach is shown on the top left side of the display (e.g. 1 of 100).
2 The dispense volume is shown on the top, right side of the display.
3 The dispensing mode (AUTO); shown on the bottom, left side display.
4 The speed profile is shown in the middle of the bottom display line.
5 'Rounded' will be displayed in the bottom right corner of the display if the 'ROUND' option has been selected.

When the programmed number of dispenses are complete the display reverts to the main menu. Subsequent use of the 'PUMP' button or <START> key repeats the dispensing process.

Dispensing with the PERIMATIC ROBOTIC MODULE

1 Set up the **PERIMATIC GP** for manual dispensing.
2 Set up the **PERIMATIC ROBOTIC MODULE** for the appropriate fill profile (see separate instruction manual).
3 Connect the **PERIMATIC GP** to the **PERIMATIC ROBOTIC MODULE** using the interface lead.
4 With the Main Menu shown on both units, press <START> on the **PERIMATIC ROBOTIC MODULE**.

The **PERIMATIC ROBOTIC MODULE** will move to its first start position and the **PERIMATIC GP** will dispense. The **PERIMATIC ROBOTIC MODULE** will then continue to control the **PERIMATIC GP** for all other programmed fill positions.

When the fill sequence is finished both units will stop and revert to their Main Menus.

Dispensing using the foot switch

Plug the foot switch into the 3 pin socket on the rear of the **PERIMATIC GP**. Press the foot switch once to start the pumping operation and again to stop. Using the foot switch in this way is identical to using the 'PUMP' soft key or <START> button in Manual or Automatic Mode.

When power is removed from the **PERIMATIC GP** the current setup is remembered. In addition to this the **PERIMATIC GP** can store and recall up to 10 previous settings, each of which may have a 20 character description attached to it to describe its various parameters.

All operating information for the **PERIMATIC GP** is stored in a memory location, including the language in use as well as pump speed and tubing flow constants.

From the Main Menu press 'MEMORY' to enter the Memory Menu:

```
Recall/ Store/ Review
RECALL    STORE    REVIEW
```

Storing a program in memory

From the Memory Menu press 'STORE':

```
Store Memory No    01
ACCEPT    QUIT
```

Enter the memory number to which you wish to store the current setup using the numeric keypad.

Press 'QUIT' to return to the main menu. Press 'ACCEPT' to store the program then the memory description screen will appear:

```
01:PROGRAM TITLE
ACCEPT     QUIT
```

The display will show the current description stored for that location. Use keys <4> and <6> to move cursor left and right and the <2> and <8> keys to increase or decrease the character under the cursor. Pressing <5> will copy the character to the left of the cursor to the current cursor position.

Press 'ACCEPT' to store the description and return to the main menu.

Recalling a program from memory

From the Memory Menu press ‘RECALL’:

```
Recall Memory  No    01
ACCEPT      QUIT
```

Enter the memory number to recall using the numeric keypad. Press ‘ACCEPT’ to recall the program or ‘QUIT’ to return to the Main Menu.

If the memory number entered does not contain a valid program the display will show:

```
******* ERROR *******
MEMORY IS EMPTY
```

Re-enter a valid memory location number or use ‘REVIEW’ (below) to select from the valid memories stored.

Reviewing programs in memory

From the Memory Menu press ‘REVIEW’:

```
01:PROGRAM TITLE
 NEXT       QUIT       RECALL
```

This will show the description attached to the first valid memory location. Pressing ‘NEXT’ moves to the next location with a valid program stored in it. When the last stored location is displayed and ‘NEXT’ is pressed the first location is displayed again.

If ‘REVIEW’ is pressed and there are no valid programs in memory then the review button appears to be ignored.

Press ‘RECALL’ to load the contents of the selected memory location (you will be returned to the Main Menu) or press ‘QUIT’ to return to the previous menu.

Error Message	Description
*********ERROR********* **MEMORY IS EMPTY**	An empty memory location was selected. Re-enter a valid memory number or use review to select.
*********ERROR********* **ONLY 01 - 10 ALLOWED**	A memory number outside of the range 01 to 10 was entered (invalid). Re-type with a number between 01 and 10.
*********ERROR********* **Cannot Pump 0ml**	A dispensing volume of 0ml was entered (invalid). Try again with a volume between 0.5ml and 9999.9ml.
*********ERROR********* **MAX VOL is 9999.9ml**	The ***PERIMATIC GP*** can only dispense up to 9999.9ml. Re-enter a lower figure.
*********ERROR********* **ONLY 0.1 - 9.9 ALLOWED**	A time delay was entered as 0 (invalid). Re-type with a number between 0.1 and 9.9.
*********ERROR********* **Max doses are 999**	The ***PERIMATIC GP*** can only repeat a dispense count of up to 999. Re-enter a lower figure.
Operating Error	Description
Speed profile set to SLOW /FAST/ SLOW but ***PERIMATIC GP*** pumps all of dose on fast	SPEED profile has been selected but not the START and FINISH times.
Speed profile set to SLOW /FAST/ SLOW but ***PERIMATIC GP*** pumps runs at slow all of the time.	Time allocated for the START SLOW run is too long OR the volume specified is dispensed before the slow run time has expired.

Accuracy - ± 1.0% for volumes over 20ml

Repeatability - Generally <1% Discrepancy

Dispensing volume - 0.5ml (min) 9999.9ml (max)

Tubing bore - 3mm (min) 8mm (max)

Tubing wall - 2mm thick (max)

Pumping method - Peristaltic

Rotor speed - 70 rpm (slow)
- 170 rpm (fast) for pipe size 3mm to 5mm
- 150 rpm (fast) for pipe size 6mm to 8mm

Pumping rate
3mm bore - 2.1ml/s (slow) 4.4ml/s (fast)
5mm bore - 4.6ml/s (slow) 11.8ml/s (fast)
8mm bore - 11.9ml/s (slow) 22.4ml/s (fast)

Electronics - Microprocessor controlled

Program Storage - 10

Languages - English, French, German, Italian, & Spanish (selectable)

Power supply - 110/120 and 220/240V (selectable) 50/60Hz single phase

Power consumption - 90W

Fuse rating - T1.6A

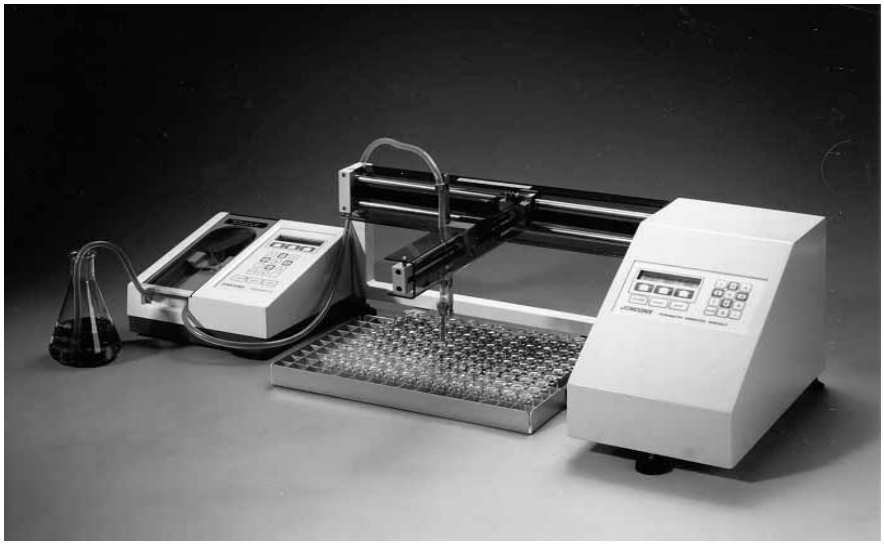
I/O ports - Foot switch/XY Module

Dimensions - 290 x 250 x 150mm (WxDxH)

Weight - 7Kg (net)

OPERATOR
Instructions

PERIMATIC GP



PERIMATIC ROBOTIC MODULE - available as option

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CE **PERIMATIC GP** is CE marked to Low Voltage Directive 72/23/EEC and Electromagnetic Compatibility Directive 89/336/EEC