

# Precision Syringe Pumps

## **NEW** PHD 22/2000 Hpsi (High Volume & Pressure)



BS4 70-2023 PHD 22/2000 Hpsi with four 200 ml Stainless Steel Syringes (syringes not included)

- High capacity — up to 800 ml with four 200 ml syringes
- Ultra high pressure — provides over 400 lbs of pumping force
- $\pm 0.5\%$  precision
- $\pm 0.1\%$  reproducibility
- Programmable — advanced capabilities with programming from the keypad
- Built to last — rugged construction for a lifetime of service
- Accepts only Harvard's stainless steel syringes
- 2 year warranty

### High Capacity

This NEW PHD 22/2000 Hpsi Syringe Pump provides the highest capacity output of all of Harvard Apparatus' microprocessor syringe pumps. This pump can hold up to four syringes from 20 to 200 ml. By combining the output from four 200 ml syringes, this pump is able to infuse up to 800 ml of fluid without refilling.

### Ultra High Pressure

This NEW PHD 22/2000 Hpsi Syringe Pump over 400 pounds of force against the syringe plungers, higher than any other pump we manufacture. For applications with viscous fluids or requiring high pressure, this is the pump to handle the job.

### Versatility

This Programmable PHD 22/2000 Hpsi syringe pump provides advanced capabilities directly from the keypad. No external computer is required. The pump can store up to four programs of 10 sequences each. Programs are stored in non-volatile memory. No other pump can provide this level of control and flexibility with the accuracy of the PHD 22/2000 syringe pump series. Like all of Harvard Apparatus' other pumps, this new high capacity pump is easy to use.

### Built-to-Last

This pump uses high quality, industrial grade components that will deliver years of smooth operation.

### To Accommodate Almost Every Workbench

This pump is provided with a standard 5 foot cable that connects the control box to the pumping mechanism box. If additional distance is required between the controller and pump, a 30 foot remote extension cable is offered as an accessory.

### Stainless Steel Syringes

Only Harvard Apparatus' stainless steel syringes can be used with this pump. They can withstand high pressure applications and provide years of service, see page A70.

### Flow Rates for PHD 22/2000 Hpsi (High Volume and Pressure) The Rates listed are for Single Syringe

Syringe Size	Minimum	Maximum
20 ml	1.5 $\mu$ l/hr	20 ml/min
50 ml	3.4 $\mu$ l/hr	46 ml/min
100 ml	5.0 $\mu$ l/hr	68 ml/min
200 ml	8.2 $\mu$ l/hr	112 ml/min

### Specifications

Type	Microprocessor driven syringe pump
Accuracy	$\pm 0.5\%$
Reproducibility	$\pm 0.05\%$
Syringes (Min/Max)	Holds 20 to 200 ml stainless steel syringes
Flow Rate:	
Minimum	1.5 $\mu$ l/hr
Maximum	112 ml/min
Non Volatile Memory	Stores all settings
RS-232	RJ11-4 conductor
TTL	9 pin D-Sub. Connector
Average Linear Force	433 lbs
Drive Motor	1.8° stepper motor, geared 1:10
Motor Drive Control	Microprocessor controlled from 1/2 to 1/32 microstepping
Motor Steps per one Revolution of Lead Screw	From 8,000 to 128,000
Step Rate:	
Minimum	27.3 sec/step
Maximum	416.7 $\mu$ sec/step
Pusher Travel Rate:	
Minimum	0.09 $\mu$ m/min
Maximum	71.210 mm/min
Power	65 W, 0.5 A fuse
Voltage Range	95 to 130 VAC, 60 Hz; 220 to 260 VAC, 50 Hz, selectable
Cable Length	152 cm (60 in) approx.
Dimensions, H x W x D:	
Control Box	9.5 x 27.9 x 22.9 cm (3.75 x 11 x 9 in)
Syringe Holder	22.9 x 43.2 x 30.5 cm (9 x 17 x 12 in)

Catalog No.	\$	Product
BS4 70-2023		PHD 22/2000 Hpsi
BS4 72-0199		Remote Extension Cable, 1.5 m (5 ft)
BS4 72-1405		Remote Extension Cable, 9.1 m (30 ft)
BS4 70-2022		PHD 22/2000 RS-232 Adapter, 9-pin to standard phone jack
BS4 70-2263		SS Syringe, 200 ml, with 1/16 inch SWAGELOK®
BS4 70-2264		SS Syringe, 200 ml, with 1/8 inch SWAGELOK®
BS4 70-2265		SS Syringe, 200 ml, with 1/4 inch SWAGELOK®
BS4 70-2266		SS Syringe, 200 ml, with Luer Lock