

Nothing compares to a syringe pump when it comes to high accuracy and ultra-low flow rates. As part of a fifteen-year-old corporate partnership, Instech Solomon is proud to offer the complete line of pumps from Harvard Apparatus, the leading manufacturer of syringe pumps for life science research. With one phone call, customers can draw on Instech and Harvard's decades of combined expertise with a broad range of pump mechanisms.

CHOOSING A PUMP

If you need...

A basic pump for drug infusion with 1 or 2 syringes

A simple pump with smooth flows at low rates for microdialysis

A rugged, high-performance pump for more complex flow profiles, multiple syringes, or high forces

The most advanced pump for easy programming of complex profiles, multiple syringes, very low flow rates, high forces, or multiple communications options

PUMP 11 SERIES



PICO PLUS



PHD2000 SERIES



PHD ULTRA SERIES NEW



Specifications

	PUMP 11 SERIES	PICO PLUS	PHD2000 SERIES	PHD ULTRA SERIES
Maximum number of syringes ^a	1 or 2	2	2 to 10	2 to 10
Compatible syringe sizes ^a				
- smallest	0.5 µl	0.5 µl	0.5 µl	0.5 µl
- largest	60 ml	10 ml	140 ml	140 ml
Flow rate				
- minimum (with smallest syringe)	1.4 x 10 ⁻⁹ l/hr	78 x 10 ⁻¹² l/hr	0.1 x 10 ⁻⁹ l/hr	94 x 10 ⁻¹² l/hr
- maximum (with largest syringe)	26 ml/min	0.4 ml/min	220 ml/min	220 ml/min
Accuracy / reproducibility	±0.5% / 0.1%	±0.5% / 0.1%	±0.35% / 0.05%	±0.35% / 0.05%
Average linear force	16 lbs	25 lbs	50 lbs (66 or 250 lbs ^b)	75 lbs (433 lbs ^b)
Resolution	0.8 µm/step	0.018 µm/step	0.082 µm/step	0.082 µm/step
Step rate				
- minimum	1 step / 6.8 secs	1 step / 27.6 secs	1 step / 27.3 secs	1 step / 27.5 secs
- maximum	2400 steps/sec	200 steps/sec	2400 steps/sec	38000 steps/sec
Pusher travel rate				
- minimum	2.9 µm/min	0.04 µm/min	0.18 µm/min	0.18 µm/min
- maximum	47.6 mm/min	0.83 mm/min	190 mm/min	190 mm/min
Programmable	no	no	'P' models	'P' models
Display	2 line, 16 character	2 line, 16 character	2 line, 16 character	4.3in WQVGA color touchscreen
Communication				
- RS-232 (connector)	'W' models only (RJ11)	yes (RJ11)	yes (RJ11)	yes (9 pin D sub)
- TTL	no	yes (footswitch included)	yes (9 pin D sub)	yes (15 pin D sub)
- USB	no	no	no	yes (type B)
- other	no	no	no	RS-485, footswitch
Input power	12 VDC from 100-240 VAC 50/60 Hz adapter	12 VDC from 100-240 VAC 50/60 Hz adapter	100-240 VAC 50/60 Hz	100-240 VAC 50/60 Hz
Dimensions	13 x 23 x 12 cm	13 x 23 x 12 cm	16 x 23 x 28 cm	10 x 22 x 31 cm
Weight	2.1 kg	2.3 kg	4.5 kg	4.5 kg

^a Depends on configuration

^b High force models

For research and industrial applications only. Not approved or intended for human use. Each model carries the CE mark for sale in Europe.



Harvard Apparatus's model '11' pumps combine advanced features with small size and affordable prices. All models have bright two-line displays, six membrane keys, micro-stepping motors, non-volatile memory, end of travel limits and anti-siphon brackets. To pump, enter the syringe ID and flow rate. Set to RATE mode for continuous flow or VOLUME mode to dispense a specified amount.

The '11' series pumps are available in four standard configurations: infuse-only or infuse/withdraw and one or two syringes. The infuse/withdraw models feature an RS-232 port for computer control (see page 56 for software).

With a universal power supply, the pumps operate on any AC line voltage from 95 to 240 VAC, 50 or 60Hz, with no switches or fuses to change.



Part No.	Description	Unit
HA11	Model 11 infuse-only single syringe pump	ea
HA11D	Model 11 infuse-only dual syringe pump	ea
HA11W	Model 11 infuse/withdraw single syringe pump	ea
HA11WD	Model 11 infuse/withdraw dual syringe pump	ea

<http://www.instechlabs.com/Pumps/syringe/11.php>

PICO PLUS SYRINGE PUMP

The 'Pico Plus' is a model 11 dual syringe pump that has been enhanced for smooth flows at very low rates, making it ideal for applications such as microdialysis and intracellular injections.

It can infuse or withdraw, features RS-232 communications ports and includes a foot pedal to simplify repeated injections.



HA11DU 'Pico Plus'

Part No.	Description	Unit
HA11DU	Model 11 'Pico Plus' low-flow dual syringe pump	ea

<http://www.instechlabs.com/Pumps/syringe/picoplus.php>

The PHD2000 pump series combines a high-performance mechanism, an easy-to-use interface and a wide range of configuration options. All PHD2000 models can deliver the low, smooth flow rates required for microdialysis.

A lookup table in the pump's software contains the dimensions of syringes from all the major manufacturers. A bright, two line display lets you read all the pertinent information from across the lab. All models have RS-232 and TTL ports for external control and monitoring (see p 56 for software).

To choose a configuration: (1) determine how much functionality you need—from simple infuse-only to fully programmable, (2) determine which syringe rack best suits your application, and (3) determine whether you require any special configurations, such as high-pressure, remote control, continuous flow or MRI compatibility. In some cases functionality and syringe racks can be upgraded later, if needed.



Functionality

Infuse Only. Ideal for applications such as microdialysis that require high accuracy and low flow rates without the need for fluid withdrawal or complex protocols. While they are not fully programmable, the pumps can be set to deliver a target volume.

Infuse/Withdraw. The lead screw on these pumps can reverse direction to withdraw fluid and refill the syringe.

Programmable. Use programmable pumps to administer complex protocols. For example: deliver a bolus then ramp down to a steady infusion rate; deliver doses of a drug several times a day for several weeks on end; deliver a small dose of a potent drug, then send a TTL signal to a separate pump to flush saline through the line. Non-volatile memory stores up to four programs of nine sequences. All programmable PHD2000 pumps are capable of infusing and withdrawing.



Syringe Racks

All PHD2000 pumps include the basic dual-syringe rack. If ordered with the pump, the multi-syringe racks come pre-installed; if ordered later they can be installed in minutes with the turn of a few thumb screws.



Basic dual syringe rack. Holds one or two syringes of the same size, from 0.5µl to 140ml. To hold large syringes, the syringe bracket flips over.



6 to 10 MultiRack. Holds ten 0.5µl to 20ml syringes, or six 30ml to 60ml syringes. It is often used for simultaneous infusion of multiple animals.



4 x 140 MultiRack. Holds up to four syringes between 30ml and 140ml in size.



Microdialysis Rack. Holds four 0.5µl to 10ml syringes for microdialysis with up to four probes or other low-flow applications. Independently adjustable thumb screws let you infuse with different sized syringes simultaneously.

Ordering Information

SYRINGE RACK	INFUSE ONLY		INFUSE/WITHDRAW		PROGRAMMABLE	
	STD PRESSURE	HIGH PRESSURE	STD PRESSURE	HIGH PRESSURE	STD PRESSURE	HIGH PRESSURE
<i>Standard Configurations</i>						
Basic Dual	HA2000I	HA2000IX	HA2000W	HA2000WX	HA2000P	HA2000PX
6 to 10	HA2000I/10	HA2000IX/10	HA2000W/10	HA2000WX/10	HA2000P/10	HA2000PX/10
4 x 140	HA2000I/4	HA2000IX/4	HA2000W/4	HA2000WX/4	HA2000P/4	HA2000PX/4
Microdialysis	HA2000I/M	HA2000IX/M	HA2000W/M	HA2000WX/M	HA2000P/M	HA2000PX/M
<i>Remote Configurations</i>						
Basic Dual	HA2000IR	HA2000IRX	HA2000WR	HA2000WRX	HA2000PR	HA2000PRX
6 to 10	HA2000IR/10	HA2000IRX/10	HA2000WR/10	HA2000WRX/10	HA2000PR/10	HA2000PRX/10
4 x 140	HA2000IR/4	HA2000IRX/4	HA2000WR/4	HA2000WRX/4	HA2000PR/4	HA2000PRX/4
Microdialysis	HA2000IR/M	HA2000IRX/M	HA2000WR/M	HA2000WRX/M	HA2000PR/M	HA2000PRX/M
<i>Special Configurations</i>						
Push-Pull			HA2000W/P		HA2000P/P	
Continuous					HA2000P/C	
MRI Compatible			HA2000WRMI		HA2000PRMI	
"Big Bertha"						HA2000PRXB
<p>(\$) http://www.instechlabs.com/Pumps/syringe/phd2000.php (standard configurations) http://www.instechlabs.com/Pumps/syringe/specialconfig.php (special configurations)</p>						

NOTE: Add 'E' to the end of the part number for European power cord.

FLOW RATES AND PRESSURES

Syringe Size	Min Flow	Max Flow	Max Pressure ¹
0.5 µl	0.0001 µl/hr	0.0953 ml/hr	- ²
1 µl	0.0002 µl/hr	0.1907 ml/hr	- ²
2 µl	0.0004 µl/hr	0.3813 ml/hr	- ²
5 µl	0.0010 µl/hr	0.9532 ml/hr	- ²
10 µl	0.0019 µl/hr	1.9013 ml/hr	- ²
25 µl	0.0046 µl/hr	4.7752 ml/hr	- ²
50 µl	0.0092 µl/hr	9.5511 ml/hr	- ²
100 µl	0.0183 µl/hr	19.153 ml/hr	- ²
250 µl	0.0454 µl/hr	47.532 ml/hr	- ²
500 µl	0.0911 µl/hr	95.492 ml/hr	- ²
1000 µl	0.0031 µl/min	190.95 ml/hr	- ²
1 ml	0.0033 µl/min	205.30 ml/hr	1000 PSI ²
2 ml	0.0119 µl/min	747.35 ml/hr	400 PSI ²
2.5 ml	0.0076 µl/min	476.21 ml/hr	400 PSI ²
3 ml	0.0108 µl/min	11.231 ml/min	300 PSI ²
5 ml	0.0208 µl/min	21.781 ml/min	200 PSI ²
10 ml	0.0301 µl/min	31.486 ml/min	105 PSI ²
20 ml	0.0523 µl/min	54.804 ml/min	60 PSI
30 ml	0.0673 µl/min	70.518 ml/min	45 PSI
50 ml	0.1019 µl/min	106.76 ml/min	30 PSI
100 ml	0.1740 µl/min	182.40 ml/min	20 PSI
140 ml	0.2106 µl/min	220.82 ml/min	15 PSI

¹ If using more than one syringe, divide by number of syringes. For "Big Bertha" pump, multiply by 5.

² Maximum pressure generated by pump is too high for glass or plastic syringes. Use stainless steel syringes when pressures may exceed 100 PSI.

Special Configurations

High Pressure. The motor in any of the PHD2000 models described above (except the Push-Pull/Continuous version) can be upgraded from 50 to 66lbs linear force. This is useful when pumping viscous solutions or driving multiple syringes. Consult the pressure chart at right to ensure the high pressures are compatible with your syringes.



Remote Control. When working with hazardous materials use the remote control configuration to put up to 30 feet between the pump mechanism and the control box. Available with most configurations.



MRI Compatible. Made of mostly non-magnetic materials, the remote pump mechanism can be placed near an imaging magnet while in use. The control box can be positioned up to 60 feet (20m) away.



Special Configurations (continued)

Push-Pull / Continuous Flow.

Holds four syringes from 0.5ml to 60ml, two in each direction. Set up as a push/pull pump, it can infuse and withdraw the same amount simultaneously. Use it when you don't want an infused or sampled volume to alter blood pressure. When the programmable model is combined with Instech's special valving system, it becomes a continuous flow syringe pump. Finally, no limits on the delivered volume from a syringe pump!



HA2000P/C

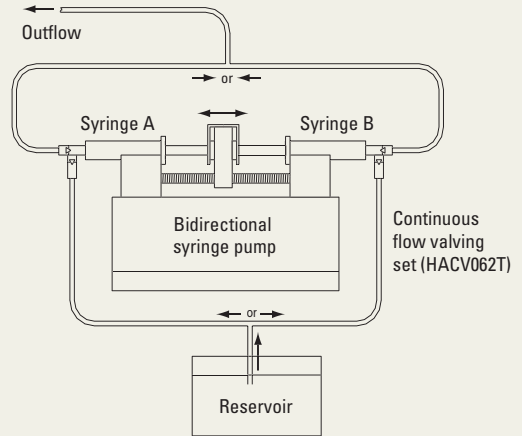


HA2000PRXB

Ultra-High Pressure High Capacity.

Also known as "Big Bertha," this pump can handle four 50 to 200ml syringes and deliver a whopping 250 lbs (113 kg) linear force. Remote control with a 5 foot cable is standard. Order stainless steel syringes separately.

CONTINUOUS FLOW PUMP



Syringe A empties while B fills, then the process reverses, providing continuous outflow except for a slight pause at the transition.

PHD ULTRA™ SYRINGE PUMPS NEW



The PHD Ultra series of pumps raises the bar set by the PHD2000 series. The software behind the touchscreen interface includes templates and wizards to simplify the most complex tasks. A redesigned pump mechanism delivers the best performance yet in a laboratory syringe pump, and several other new features make it easier to use and more versatile.

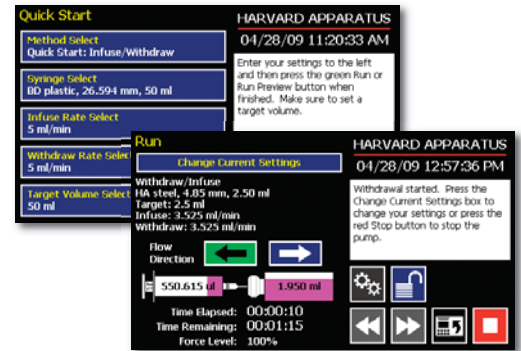
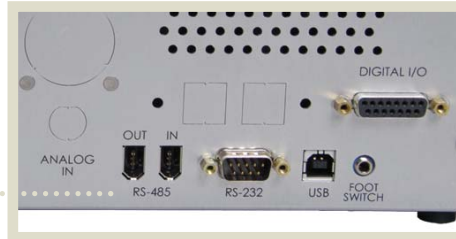
The Ultra pumps are available in a full range of configurations, including infuse-only to fully-programmable, multi-syringe racks, push/pull mechanism, high force motors, and remote pump control.

FEATURES

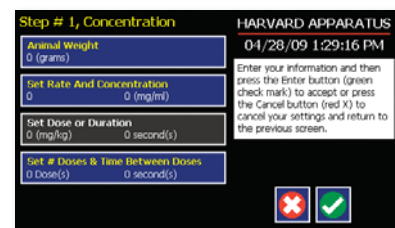
Advanced mechanism achieves the smoothest flow and highest accuracy across the broadest range of rates. Also provides the highest force of any Harvard pump model.

Vertical or horizontal operation lets you choose the orientation that is best for your experiment; it can minimize dead volumes or make it easier to clear air bubbles. The display rotates automatically (like an iPhone®).

More connectivity options than ever before, including USB and RS-232 for computer control, RS-485 to daisy-chain pumps, a footswitch input, a 15-pin I/O connector, an optional analog input, and optional legacy RJ11 RS-232 connectors.



Graphical touchscreen interface simplifies both basic operation and advanced programming.



Concentration mode streamlines set up when dose is specified in mg/kg and rate varies by animal weight.

Ordering Information

	INFUSE ONLY	INFUSE/WITHDRAW	PROGRAMMABLE
Standard	HA3000I	HA3000W	HA3000P
Push/Pull	-	HA3000W/P	HA3000P/P
Continuous	-	-	HA3000P/C
Remote	HA3000IR	HA3000WR	HA3000WP
Push/Pull Remote	-	HA3000WR/P	HA3000PR/P
High Pressure Remote	-	-	HA3000PRX
Multi-Animal Feeding Station	-	-	HA3000PRX/10

Ⓢ <http://www.instechlabs.com/Pumps/syringe/phdultra.php>

Add 'E' to the end of the part number to specify a European power cord.

To learn more about the the PHD Ultra pump series, browse the User's Guide. Download now from www.instechlabs.com/Support/manuals.

PHD Ultra™ Syringe Racks

Like the PHD2000s, Ultras include a two-syringe rack that can handle syringes from 0.5µl to 140ml in size. Similarly, there are three multi-syringe rack upgrade options.

6 to 10 Rack. Holds ten 0.5µl to 20ml syringes or six 30ml to 60ml syringes.

4 x 140 Rack. Holds four 30ml to 140ml syringes.

Microdialysis Rack. Holds four 0.5µl to 10ml syringes. Independent thumb screws let you infuse with different sized syringes simultaneously.

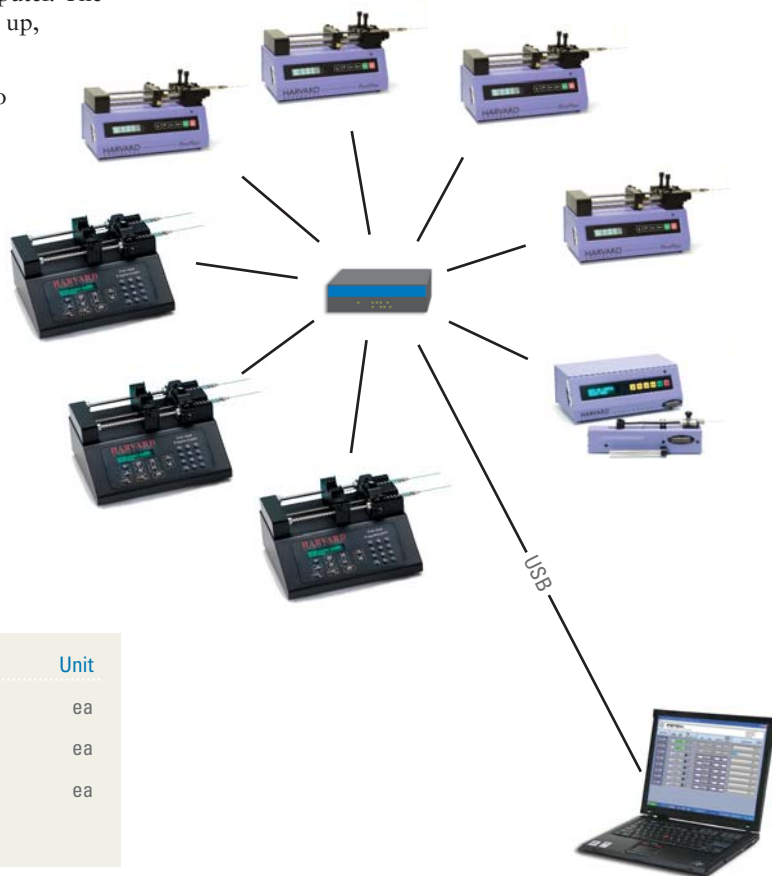
Order the rack upgrade separately using the part numbers below. When ordered at the same time as a pump, use the part numbers below with an 'A' at the end for a significant discount.

Part No.	Description	Unit
HA3020A	Add-on 6-10 multi syringe rack for PHD Ultra	ea
HA3021A	Add-on 4x140 multi syringe rack for PHD Ultra	ea
HA3022A	Add-on microdialysis syringe rack for PHD Ultra	ea

Instech's M/1 syringe pump control software controls multiple Harvard Apparatus syringe pumps from a single computer. The software dramatically simplifies the process of setting up, running and monitoring these types of pumps.

Enter flow rates and target volumes or times for up to eight pumps on a single screen. Start and stop pumps individually or all at once with a single button press. You can even program a day and time for the pumps to start in the future. Centrally monitor volume delivered on the graphical and numerical displays.

The software is compatible with any PHD2000, model 11 or model 22 Harvard Apparatus pump with an RS-232 communications port. The M/1 version of the software works with simple one-step flow profiles only. While it can control pumps in a standard RS-232 loop, Instech recommends a USB-to-RS-232 converter hub for improved reliability, response times, flexibility, and ease-of-use.



Central computer control of multiple Harvard Apparatus pumps

Part No.	Description	Unit
HASPC/M1	Syringe pump software, multi-pump/one-step	ea
ABS1/USB08	USB-to-serial conversion hub, 8 port	ea
HARS232	Harvard pump cable, RS-232 modular to 9 pin	ea

<http://www.instechlabs.com/Pumps/syringe/spc.php>

Specifications

Hardware requirements	PC or laptop running Microsoft Windows 2000, XP or Vista	
Compatible syringe pumps	HA11W HA11WD HA11DU HA11NM HA22I HA2000I HA2000W HA2000P	Pump 11 infuse/withdraw single syringe (70-2211) Pump 11 infuse/withdraw dual syringe (70-2212) Pump 11 Pico Plus low flow dual syringe (70-2213) Pump 11 Nanomite remote single syringe (70-2217) Pump 22 infuse-only dual syringe (55-2222) PHD2000 infuse-only dual syringe (70-2000) PHD2000 infuse/withdraw dual syringe (70-2001) PHD2000 programmable dual syringe (70-2002) ¹
Communications modes	USB RS-232	Up to 8 pumps of different types (ABS1/USB08 hub required) 1 or 2 pumps of the same type (no hub required); more than 2 pumps not recommended due to latency of 9600 baud daisy-chain configuration

¹ M/1 software does not use the programmable features of this pump.

SOFTWARE INPUTS

- Units ($\mu\text{l}/\text{min}$, $\mu\text{l}/\text{hr}$, ml/min or ml/hr)
- Flow rate + target volume or delivery time
- Syringe type (software-based lookup table)
- Infuse or withdraw (pump permitting)
- Run/stop pumps individually or all-at-once; immediately or at a future date and time

NOTE: Harvard Apparatus, a Harvard Bioscience company, is a leading manufacturer of syringe pumps. Instech Laboratories, Inc. has independently designed the M/1 software for use with these pumps; the software carries no warranty from Harvard Apparatus.

EASE-OF-USE COMPARISON

Step

Set units
(to $\mu\text{l/hr}$)

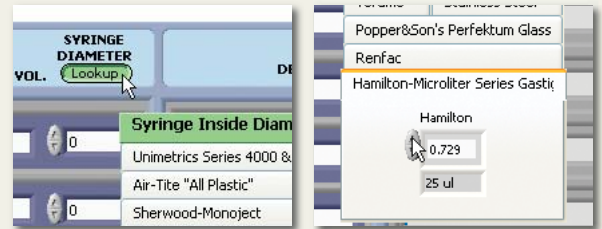
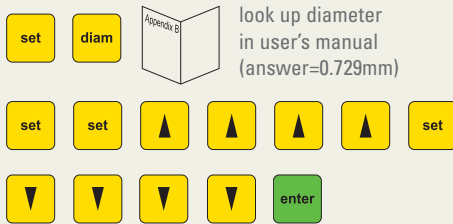
Manual (each icon represents a button push on a Pump 11)



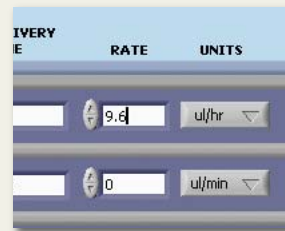
Using SPC/M1 software



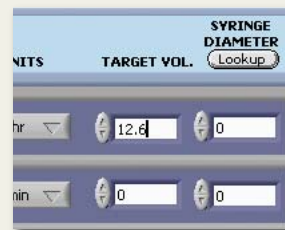
Set syringe type
(to Hamilton 25 μl)



Set flow rate
(to 9.6 $\mu\text{l/hr}$)



Set volume
to be infused
(to 12.6 μl)



Start



Total: 47 steps

6 steps