

# HARVARD APPARATUS

## SYRINGE PUMPS



**INSTECH**

*The equipment behind the science.*

# HARVARD APPARATUS SYRINGE PUMPS

Syringe pumps are the gold standard in laboratory animal research thanks to their ability to deliver low flow rates with high accuracy. As part of a twenty-three-year-old corporate partnership, Instech is proud to offer the complete line of pumps from Harvard Apparatus, the leading manufacturer of syringe pumps for life science research.

Harvard Apparatus's current pump models are the Pump 11 Elite and the PHD Ultra™. They feature improved flow specifications and an easy-to-use graphical user interface.

## CHOOSING A PUMP

### If you need...

A simple, easy-to-use pump for drug infusion infusion with one or two syringes

A simple dual syringe pump with smooth flows at the low rates required for microdialysis

The most advanced pump for complex flow profiles, multiple syringes, widest flow rate range, high force

### PUMP 11 ELITE





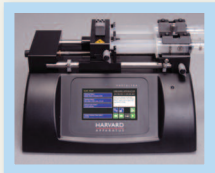
### PICO PLUS ELITE



### PHD ULTRA SERIES



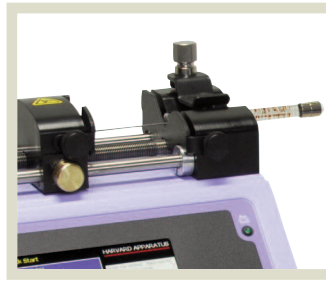
## SPECIFICATIONS

	 11 ELITE	 PICO PLUS ELITE	 PHD ULTRA
Accuracy / Repeatability	0.50% / 0.05%	0.35% / 0.05%	0.25% / 0.05%
Step Resolution (smoothness of flow)	0.069µm/µstep	0.013µm/µstep	0.005µm/µstep
Pusher Travel Rate			
- minimum	0.15µm/min	0.02µm/min	0.18µm/min
- maximum	159mm/min	72mm/min	191mm/min
Syringe Size Range	0.5µl-60ml (-10ml dual)	0.5µl-10ml	0.5µl-140ml
Flow Rate			
- minimum	1.28pl/min (0.5µl syringe)	0.54pl/min (0.5µl syringe)	1.56pl/min (0.5µl syringe)
- maximum	88ml/min (60ml syringe); 26ml/min (10ml)	12ml/min (10ml syringe)	221ml/min (140ml syringe)
Linear Force (at 100% force selection)	16kg	16kg	34kg
Adjustable Force	Yes	Yes	Yes
Syringe Lookup Table	Yes	Yes	Yes
Display	Color touch screen	Color touch screen	Color touch screen
Power supply	12-30VDC; 100-240VAC 50/60Hz input	12-30VDC; 100-240VAC 50/60Hz input	100-240VAC, 50/60Hz
Dimensions / Weight	23x18x15cm / 2.1kg	23x18x15cm / 2.1kg	31x22x18cm / 4.5kg
<b>Part Numbers</b>			
Infuse Only			
- single syringe	HA1100	-	-
- dual syringe	HA1100D	-	HA3000I
Infuse / Withdraw			
- single syringe	-	-	-
- dual syringe	-	-	HA3000W
Programmable Infuse/Withdraw			
- single syringe	HA1100W	-	-
- dual syringe	HA1100WD	HA1100DU	HA3000P
Syringe Rack Upgrade Kits			
- 6/10 (10x 0.5µl-20ml or 6x 30-60ml)	-	-	HA3020A
- 4x140 (4x 30-140ml)	-	-	HA3021A
- microliter (4x 0.5µl-10ml, various sizes at once)	-	-	HA3022A

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



## Syringe Racks



Single 0.5µl to 50/60ml



Dual 0.5µl to 10ml

## User Interface

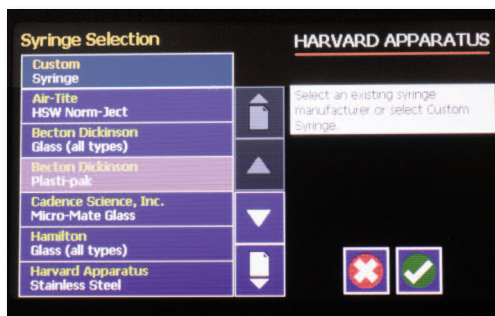
### Infuse Only Models

These high-performance pumps will meet most laboratory animal research needs. An LCD color touch screen with icon-based software makes set up, control and monitoring simple. Flow performance specifications, including reproducibility, flow rate range and smoothness of flow, are all improved over the predecessor Pump 11 series. The maximum linear force has been doubled to 16kg, and may be adjusted from 100% down to 20% to avoid damaging delicate glass syringes.

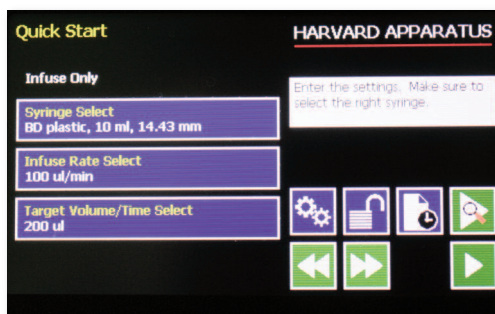
The pump's firmware can be upgraded remotely, and FlowControl™ software is available for computer control.

There are five models to choose from:

- **Infuse only, single syringe (HA1100).** Holds one syringe of 0.5µl-60ml and pumps forward only. Select syringes from a lookup table, enter flow rates and target volume or time. Includes footswitch and USB connectors.
- **Infuse only, dual syringe (HA1100D).** As above but holds 2 syringes of 0.5µl-10ml (both are pushed at the same rate).
- **Programmable, single syringe (HA1100W).** Holds one syringe of 0.5µl-60ml and can infuse or withdraw. Create and store 2 user-defined methods of up to 50 steps each. Methods can be saved to a computer and transferred to other pumps. Includes footswitch, USB, RS-485 and digital I/O connectors.
- **Programmable, dual syringe (HA1100WD).** As above but holds 2 syringes of 0.5µl-10ml.
- **Pico Plus Elite (HA1100DU)** A programmable, dual syringe model optimized for smooth flow at the lowest flow rates. Ideal for microdialysis.



Select syringe from a lookup table using the touch screen.



Enter flow rate and target volume or time.



Monitor infusion progress.

© [www.instechlabs.com/Pumps/syringe/11elite.php](http://www.instechlabs.com/Pumps/syringe/11elite.php)

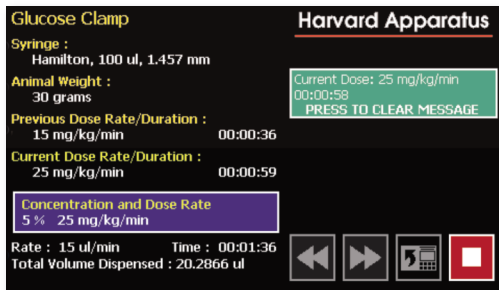


# PUMP 11 ELITE

## Programmable Infuse/Withdraw Models



Use a programmable 11 Elite when you need to do more than simply infuse at one rate. Select standard infuse or withdraw Methods or set up a custom Method that can contain up to 50 separate steps. Gradient, ramp and autofill profiles are available. Custom methods can be saved to a PC or transferred to other pumps.



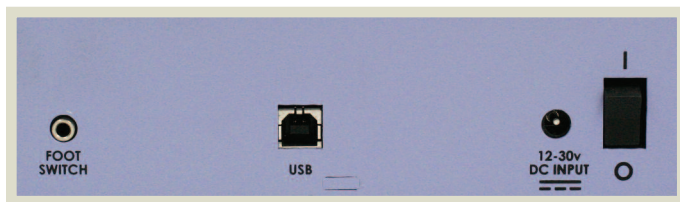
Programmable pumps include a **Glucose Clamp Method** that can be uploaded from a PC or preinstalled on request. Enter the animal weight, concentration and dose rate and the pump will calculate the infusion rate. Change the dose rate on the fly without stopping the pump (not possible in other Methods or with Infuse Only pumps). The previous rate and duration is displayed to aid record keeping.



The touchscreen on all 11 Elites can be rotated so that you can orient the pump vertically to save benchtop space and allow gravity to clear air bubbles. (Shown here on a rack configured for infusion and automated blood sampling.)

## Connectivity

### Infuse Only Models



The HA1100 and HA1100D models include a footswitch input (for starting and stopping the pump) and USB connector for connection to a PC (to update firmware or for use with FlowControl or user created software).

### Programmable Infuse/Withdraw Models



The HA1100W, HA1100WD and HA1100DU models add RS-485 connectors for pump-to-pump connections (including the option of power via RS-485) and a digital I/O connector.



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.

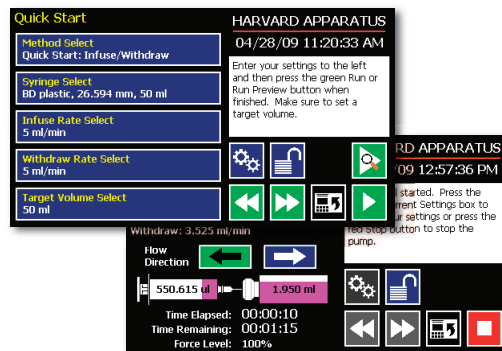
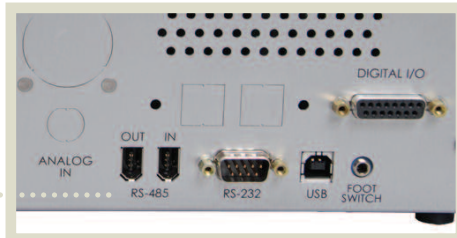
The Ultra pumps are available in a full range of configurations, including infuse-only to fully-programmable, multi-syringe racks, push/pull mechanism, high force motors, and remote pump control.

## FEATURES

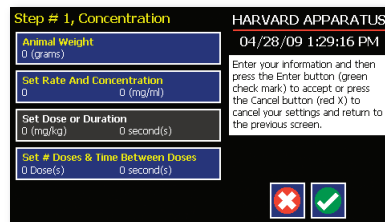
**Advanced mechanism** achieves the smoothest flow and highest accuracy across the broadest range of rates. Also provides the highest force of any Harvard pump model.

**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.

**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.

# PHD ULTRA™


## 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 Ultra pumps are capable of infusing and withdrawing.

	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

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

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



HA3000P with HA3020A 6-10 multirack. Can be used for simultaneous infusion of multiple animals.

## Syringe Racks

Standard PHD Ultras include a built-in two-syringe rack that can handle syringes from 0.5µl to 140ml in size. 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.

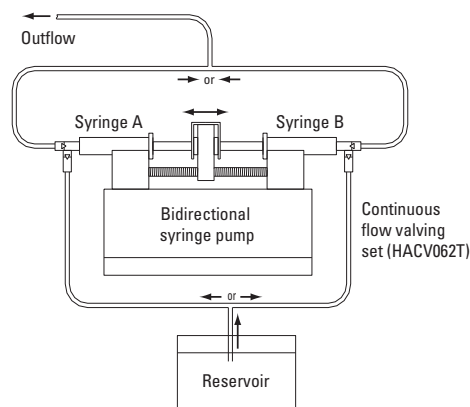
Order the rack upgrade separately using the part numbers below. When ordered at the same time as a pump, use the part numbers below with an 'A' at the end for a significant discount.

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

## Special Configurations

**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 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!

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



**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.

**Ultra-High Pressure Remote.** The HA3000PRX model can handle four 50 to 200ml stainless steel syringes and pump with 433lbs (197 kg) of linear force, nearly six times that of the standard models. Remote control with a 5 foot cable is standard.