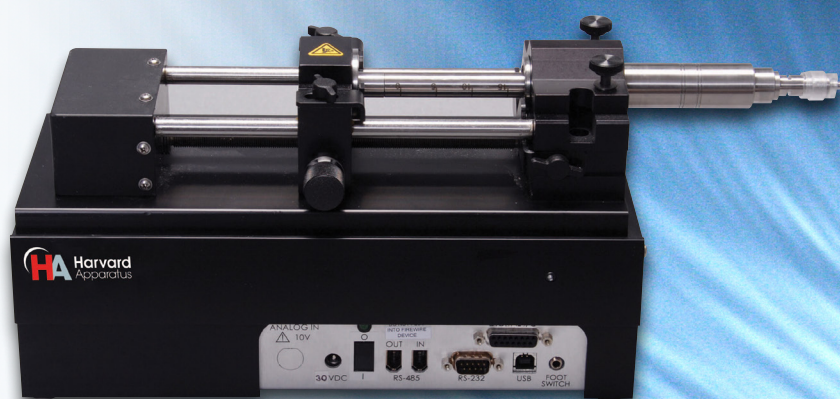


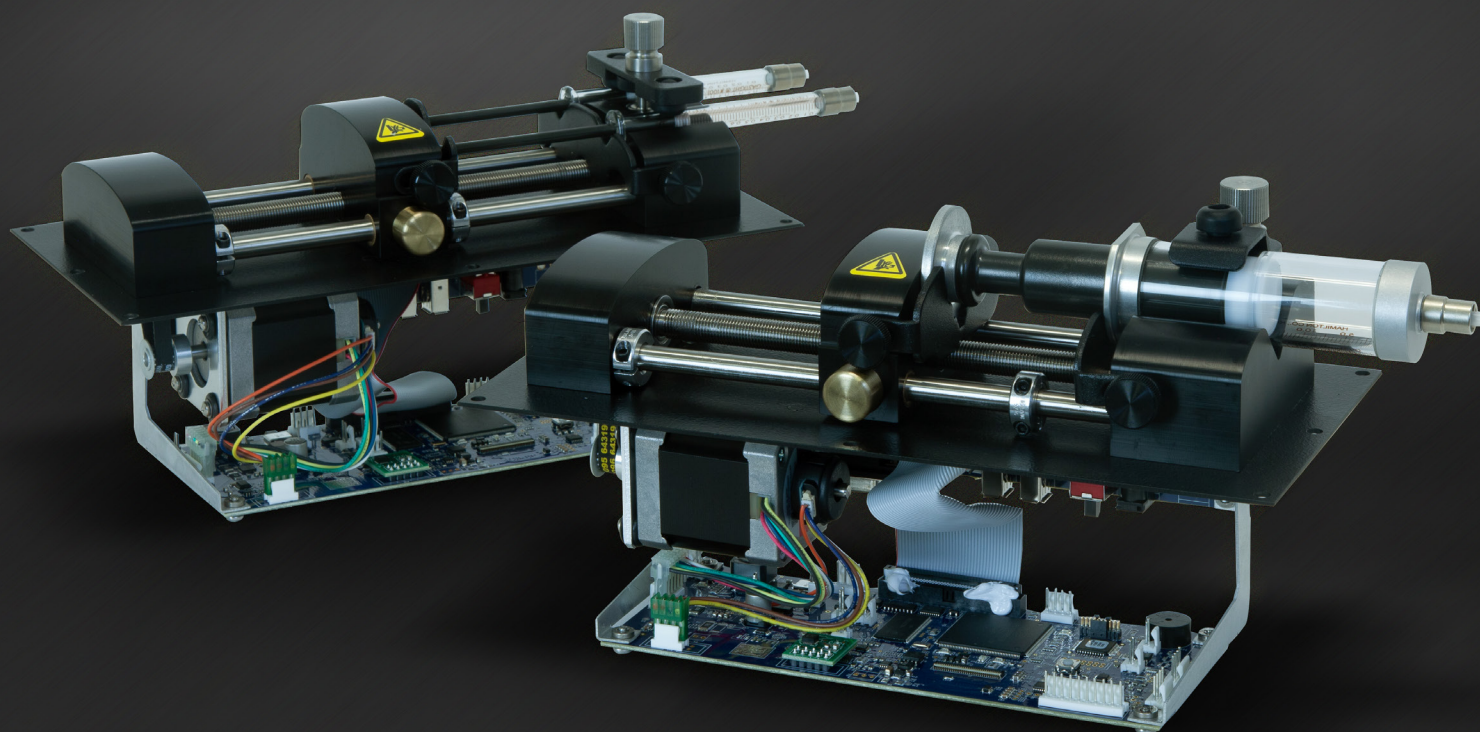
OEM Syringe Pump Solutions

Mass Spectrometer Calibration • Chemical Synthesis Devices
Microfluidic Systems • Particle Characterization Instruments
Rheology Systems



Custom OEM Pump Solutions

Infusion Efficiency with World Class Precision



Pump 11 Elite/Pico Plus Elite Open Baseplate

As an Original Equipment Manufacturer (OEM), your success depends on your reputation. And your reputation is literally built on your ability to consistently deliver reliable, quality products at competitive prices.

When it comes to manufacturing pumps, it is essential that you have best-in-class components that offer flexibility, so you can satisfy your varying customer application needs. And, it is critical that the mechanisms you use consistently deliver the precise, accurate and reliable flow that your customers demand.

Wouldn't it be nice to partner with a reputable vendor who could provide both proven, state-of-art mechanisms and the support you need to easily and affordably develop your fluidics analysis systems?

Harvard Apparatus has a wealth of experience in the development and manufacture of specialized fluidic systems. With a full line of OEM pumps, we offer the broadest selection of fluidics components, systems and specials. Whether your requirement is for a single order/one-time study or you need a fluidic module to integrate into your systems, we have the solution. And, we can readily customize to best meet your application needs.

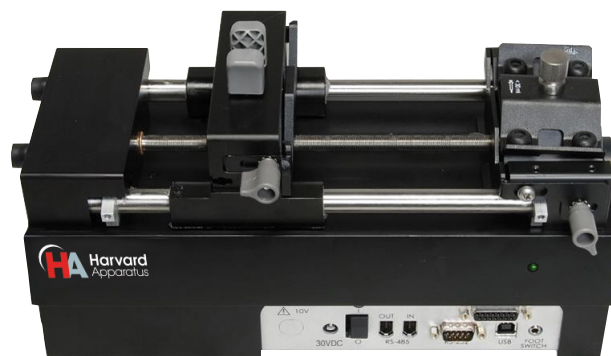
Cited in thousands of studies across a myriad of applications, Harvard Apparatus pumps are best-in-class. In fact, from pre-clinical disease to microfluidic disease modeling to drug creation and drug testing, our syringe pumps are already relied upon globally by tens of thousands of scientists to reach their research objectives.

All of the Harvard Apparatus OEM modules are based upon our proven digital syringe pumps. They deliver the same accuracy and reproducibility as our stand alone pumps. We offer a wide range of flow rates and applied forces ranging from 6 lb to 1,000 lb.

Syringe diameter, flow rates and target volumes are stored in non-volatile memory. Serial communication is handled through either the RS-232 or USB ports depending upon the module. Every module is supplied with a serial cable. Some of the modules are available with or without a power supply while others come standard with a power supply.

Sample Applications

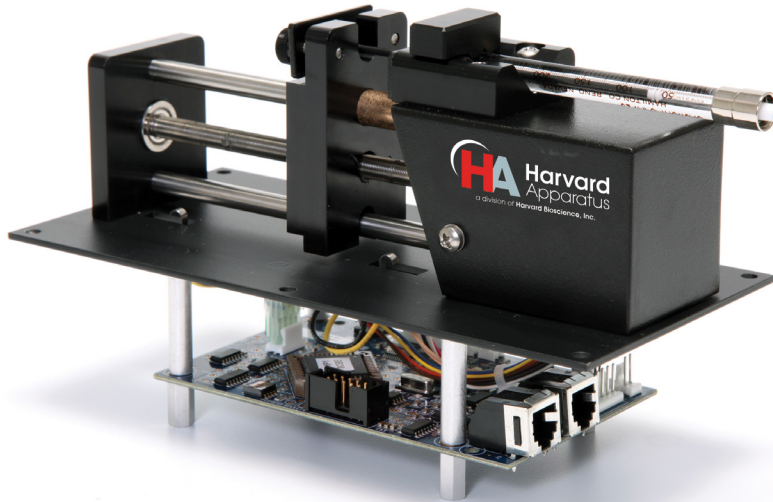
- Mass Spectrometer Calibration
- Chemical Synthesis Devices
- Microfluidic Systems
- Rheology Systems
- Particle Characterization Instruments
- And More!



PHD ULTRA™ Syringe Pump Module

Microliter Syringe Pump Module

Small volume, small footprint syringe pump component.

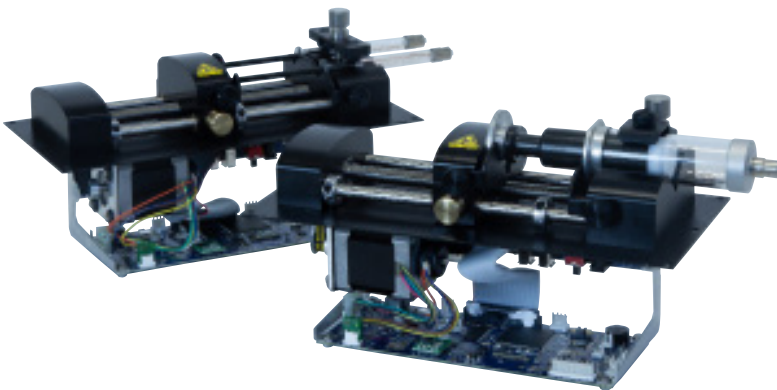


Key Features:

- Accuracy of $\pm 0.5\%$
- Footprint of 4.5 x 9.25 x 3.25 in
- 0.001 μl to 1.33 ml/min
- CE, WEEE, & RoHS

Pump 11 Elite/Pico Plus Elite Open Baseplate

Small to medium volume syringe pump component with compact size and high accuracy.

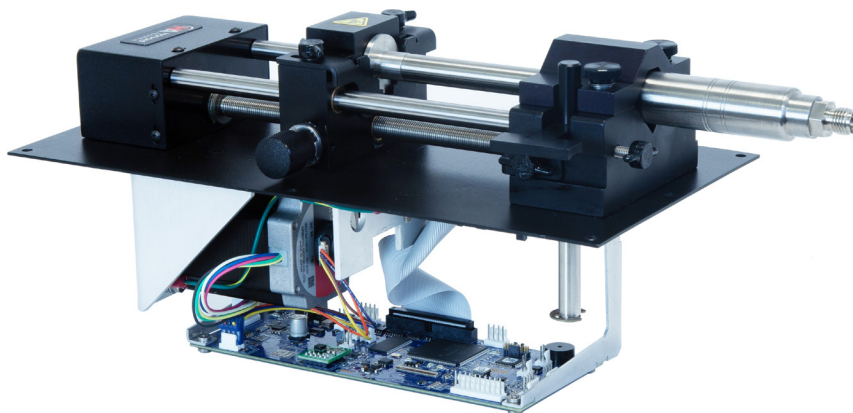


Key Features:

- Accuracy of $\pm 0.35\%$ or $\pm 0.50\%$
- Footprint of 9.5 x 6.75 x 4.2 in
- 0.54 $\mu\text{l}/\text{min}$ to 88.28 ml/min (model dependent)
- WEEE, EU RoHS

PHD ULTRA™ 4400 Open Baseplate

Medium volume, high pressure syringe pump component with excellent precision.

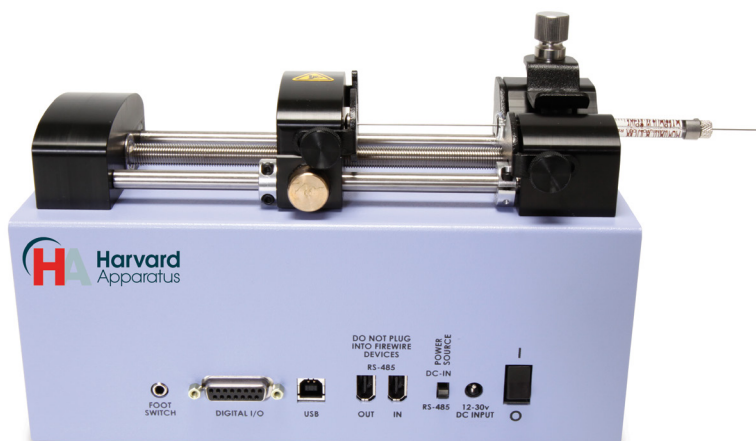


Key Features:

- Accuracy of $\pm 0.35\%$
- Footprint of 11.9 x 6.0 x 6.5 in
- 3.16 $\mu\text{l}/\text{min}$ to 215.8 ml/min
- WEEE, EU RoHS & CB Scheme

Pump 11 Elite/Pico Plus Elite OEM Module

Small to medium volume enclosed syringe pump component with compact size and high accuracy.



Key Features:

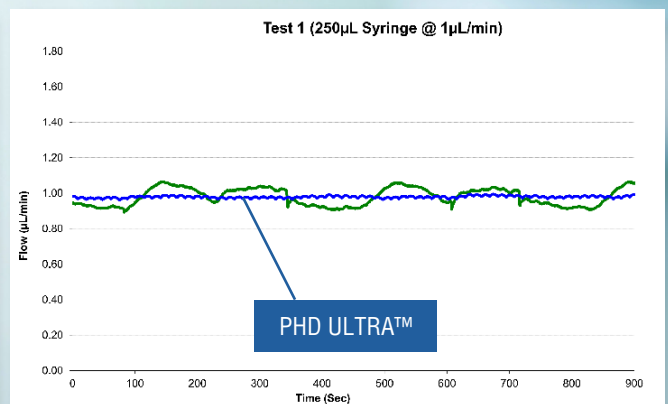
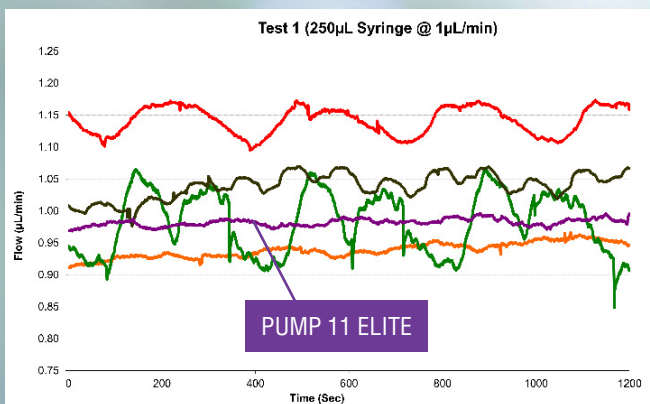
- Accuracy of $\pm 0.35\%$ or $\pm 0.50\%$
- Footprint of 6.5 x 9.5 x 4.25 in
- 0.54 $\mu\text{l}/\text{min}$ to 88.28 ml/min (model dependent)
- CE, ETL (UL, CSA), WEEE, EU RoHS & CB Scheme



General Features and Capabilities

- All of our OEM modules are based upon our proven digital syringe pump technology delivering the same accuracy and reproducibility as our stand alone pumps.
- The modules consist of 3 basic components — a drive mechanism assembly, a motor assembly, and a circuit board assembly. In standard configurations, all are mounted to a base plate. These sub-assemblies can be purchased individually if required.
- All units have the ability to run in either direction (infuse/withdraw) at separate rates and target volumes.
- Although computer control is most commonly used for communication, a voltage level control for start/stop and change of direction is available. Our PHD ULTRA™ based modules can be rate controlled using an external DC 0 to10 volt signal.
- All systems will accept input voltages over the range of 12 to 30 volts DC.
- Modification to accommodate existing designs or future designs is available.
- Modules can be linked together in a daisy chain fashion for complete computer control of up to 16 separate pumps at once. The PHD ULTRA™ based versions can control up to 99 pumps simultaneously.
- Our advanced syringe pump design incorporates a stable mechanism, has an extended pushing block, larger guide rods, and easily adjustable capturing brackets and limit stops which fully protect the syringe and prevent siphoning.
- All syringe pumps offer adjustable force. These also offer a more enhanced I/O control and a USB serial port.

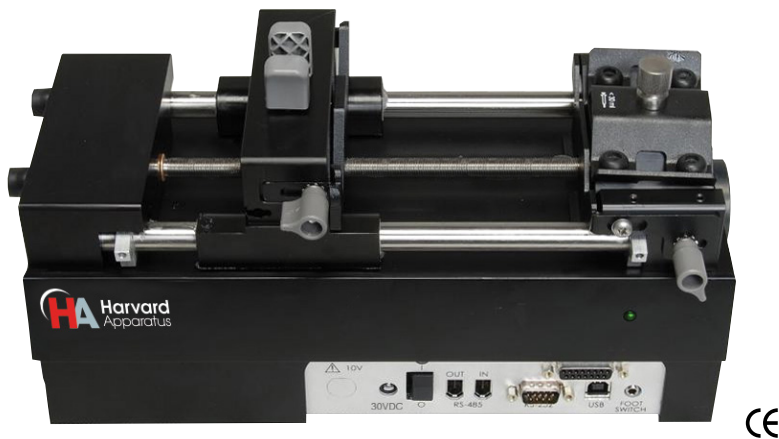
The Importance of Accuracy and Precision:



All syringe pumps are not created equal. The graphs above shows the flow profiles of the Pump 11 Elite and PHD ULTRA™ mechanisms versus competitive pumps run under the same conditions. When volume accuracy and flow stability are important to your instrumentation, only Harvard Apparatus delivers.

PHD ULTRA™ Syringe Pump Module

Our legendary PHD ULTRA™ high precision mechanism in a sturdy enclosure.

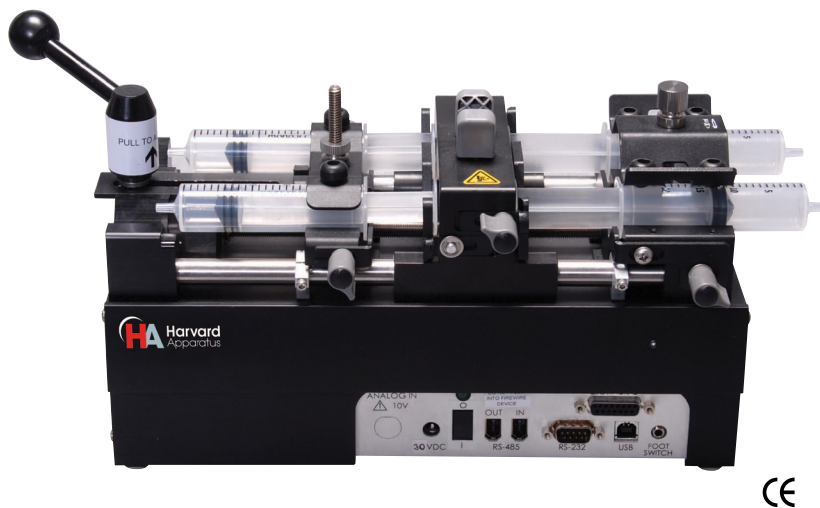


Key Features:

- Accuracy of $\pm 0.25\%$
- Footprint of 11.75 x 5.5 x 6.5 in
- 3.06 $\mu\text{l}/\text{min}$ to 215.8 ml/min
- CE, ETL (UL, CSA), WEEE, EU RoHS & CB Scheme

PHD ULTRA™ Push/Pull Syringe Pump Module

Continuous flow of a peristaltic pump with syringe pump precision.

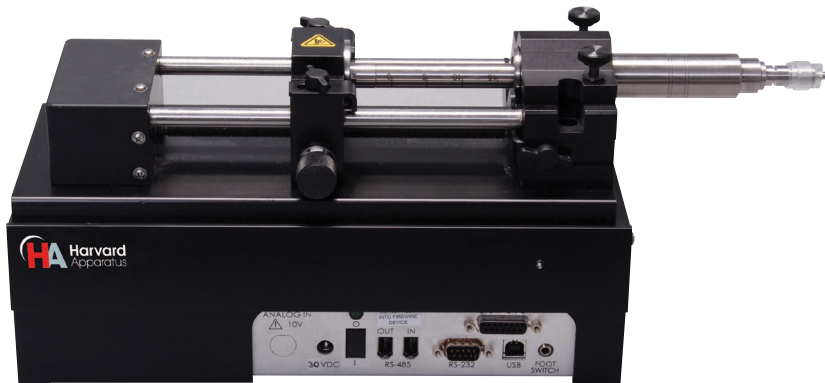


Key Features:

- Accuracy of $\pm 0.25\%$
- Footprint of 11.75 x 5.5 x 6.5 in
- 3.06 $\mu\text{l}/\text{min}$ to 215.8 ml/min
- CE, ETL (UL, CSA), WEEE, EU RoHS & CB Scheme

PHD ULTRA™ 4400 Syringe Pump Module

Medium volume, high pressure, enclosed syringe pump component with excellent precision.



Key Features:

- Accuracy of $\pm 0.35\%$
- Footprint 11.75 x 5.5 x 6.5 in
- 3.06 $\mu\text{l}/\text{min}$ to 215.8 ml/min
- CE, ETL (UL, CSA), WEEE, EU RoHs & CB Scheme



PHD ULTRA™ XF Syringe Pump Module

Our highest pressure syringe pump system.



Key Features:

- Accuracy of $\pm 0.5\%$
- Footprint of 16 x 12 x 8.5 in
- 50.79 nl/min to 144.08 ml/min
- CE, ETL (UL, CSA), WEEE, EU RoHs & CB Scheme



Specifications

MICROLITER SYRINGE PUMP MODULE	
TYPE	Microprocessor single syringe, infusion/withdrawal
ACCURACY	±0.5%
SYRINGE TYPE	Glass or plastic
SYRINGE SIZE:	
Size Minimum	0.5 µl
Size Maximum	1 ml
FLOW RATE:	
Minimum	0.001 ml/hr
Maximum	1.33 ml/min
AVERAGE LINEAR FORCE	2.73 kg (6 lb) @ 100% force selection
CONNECTORS:	
RS-232	4-pin RJ11 telephone jack; dual RS-232 ports
DC Power	2-pin Header (friction lock)
POWER	+12 VDC, 5%, 1A (12 W) (User supplied)
DIMENSIONS	
Overall, H x W x D	11.4 x 18.4 x 8.3 cm (4.5 x 7.25 x 3.25 in)
Mounting	22.2 x 7.0 cm (8.75 x 2.75 in); Mounting holes for (4) #8 screws
WEIGHT	0.84 kg (1.85 lb)

PUMP 11 ELITE/PICO PLUS ELITE OPEN BASEPLATE MODULE	
TYPE	Microprocessor infusion/withdrawal
ACCURACY	±0.5% (Pump 11 Elite) ; ±0.35% (Pico Plus)
SYRINGE TYPE	Plastic, glass or stainless steel
SYRINGE SIZE:	
Size Minimum	0.5 µl
Size Maximum	60 ml (10 ml dual)
FLOW RATE:	
Minimum (both single & dual syringe models)	1.26 pl/min (Pump 11 Elite) 0.54 pl/min (Pico Plus Elite)
Maximum (single syringe model)	88.28 ml/min(Pump 11 Elite) 39.77 pl/min (Pico Plus Elite)
MAXIMUM (DUAL)	26.03 ml/min(Pump 11 Elite) 11.70 pl/min (Pico Plus Elite)
AVERAGE LINEAR FORCE	16 kg (35 lbs) @ 100% force selection
CONNECTORS:	
RS-232	9 pin D-Sub Connector cable included
RS-485	IEEE-1394, 6 position
USB	Type B
I/O & TTL	15 pin D-Sub Connector
DIMENSIONS:	
Overall, H x W x D	24.13 x 17.15 x 10.67 cm (9.5 x 6.75 x 4.2 in)
WEIGHT	1.68 kg (3.70 lb)
POWER	12 to 30 VDC (24V recommended, supply not included)
REGULATORY CERTIFICATIONS	WEEE, EU RoHS & CB Scheme

PHD ULTRA™ 4400 OPEN BASEPLATE MODULE	
TYPE	Microprocessor infusion/withdrawal
ACCURACY	±0.35%
SYRINGE TYPE	Plastic, glass or stainless steel
SYRINGE SIZE:	
Size Minimum	0.5 µl
Size Maximum	140 ml
FLOW RATE:	
Minimum	3.16 pl/min
Maximum	215.8 ml/min
AVERAGE LINEAR FORCE	91 kg (200 lbs) @ 100% force selection
CONNECTORS:	
RS-232	9 pin D-Sub Connector cable included
RS-485	IEEE-1394, 6 position
USB	Type B
I/O & TTL	15 pin D-Sub Connector
DIMENSIONS:	
Overall, H x W x D	11.9 x 6.0 x 6.5 (30.2 x 15.2 x 46.6 cm)
WEIGHT	1.68 kg (3.70 lb)
POWER	12 to 30 VDC (30V recommended, supply not included)
REGULATORY CERTIFICATIONS	WEEE, EU RoHS & CB Scheme

PHD ULTRA™ SYRINGE PUMP MODULE SPECIFICATIONS	
TYPE	Microprocessor dual syringe, infusion/withdrawal
ACCURACY	±0.25%
SYRINGE TYPE	Plastic, glass or stainless steel
SYRINGE SIZE:	
Size Minimum	0.5 µl
Size Maximum	140 ml
FLOW RATE:	
Minimum	3.06 pl/min
Maximum	215.8 ml/min
AVERAGE LINEAR FORCE	34 kg (75 lb) @ 100% force selection
CONNECTORS:	
RS-232	9-pin D-Sub Connector
RS-485	IEEE-1394, 6 position
USB	Type B
I/O & TTL	15-pin D-Sub Connector
DIMENSIONS:	
Overall, H x W x D	29.8 x 14.0 x 16.5 cm (11.75 x 5.5 x 6.5 in)
WEIGHT	5.1 kg (11.2 lb)
REGULATORY CERTIFICATIONS	CE, ETL (UL, CSA), WEEE, EU RoHS & CB Scheme

Specifications

PUMP 11 ELITE OEM MODULE	
TYPE	Microprocessor dual syringe, infusion/withdrawal
ACCURACY	±0.5% (Pump 11 Elite) ; ±0.35% (Pico Plus Elite)
SYRINGE TYPE	Plastic, glass or stainless steel
SYRINGE SIZE:	
Size Minimum	0.5 µl
Size Maximum	60 ml (10 ml dual)
FLOW RATE:	
Minimum (both single & dual syringe models)	1.26 pl/min (Pump 11 Elite); 0.54 pl/min (Pico Plus Elite)
Maximum (single syringe model)	88.28 ml/min (Pump 11 Elite); 39.77 pl/min (Pico Plus Elite)
Maximum (dual)	26.03 ml/min (Pump 11 Elite); 11.70 pl/min (Pico Plus Elite)
AVERAGE LINEAR FORCE	16 kg (35 lb) @ 100% force selection
CONNECTORS:	
RS-232	9-pin D-Sub Connector
RS-485	IEEE-1394, 6 position
USB	Type B
I/O & TTL	15-pin D-Sub Connector
DIMENSIONS	
Overall, H x W x D	17.15 x 24.1 x 10.8 cm (9.5 x 6.75 x 4.25 in)
WEIGHT	2.3 kg (5.1 lb)

PHD ULTRA™ 4400 SYRINGE PUMP MODULE	
TYPE	Microprocessor single syringe, infusion/withdrawal
ACCURACY	±0.35%
SYRINGE TYPE	Plastic, glass or stainless steel
SYRINGE SIZE:	
Size Minimum	0.5 µl
Size Maximum	140 ml
FLOW RATE:	
Minimum	3.06 pl/min
Maximum	215.8 ml/min
AVERAGE LINEAR FORCE	34 kg (75 lb) @ 100% force selection
AVERAGE LINEAR FORCE	91 kg (200 lb) @ 100% Force Selection
CONNECTORS:	
RS-232	9-pin D-Sub Connector
RS-485	IEEE-1394, 6 position
USB	Type B
I/O & TTL	15-pin D-Sub Connector
DIMENSIONS:	
Overall, H x W x D	29.8 x 14.0 x 16.5 cm (11.75 x 5.5 x 6.5 in)
WEIGHT	5.3 kg (11.2 lb)
REGULATORY CERTIFICATIONS	CE, ETL (UL, CSA), WEEE, EU RoHS & CB Scheme

PHD ULTRA™ PUSH/PULL SYRINGE PUMP MODULE	
TYPE	Microprocessor four syringe, push/pull infusion/withdrawal
ACCURACY	±0.25%
SYRINGE TYPE	Plastic, glass or stainless steel
SYRINGE SIZE:	
Size Minimum	0.5 µl
Size Maximum	140 ml
FLOW RATE:	
Minimum	3.06 pl/min
Maximum	215.8 ml/min
AVERAGE LINEAR FORCE	34 kg (75 lb) @ 100% Force Selection 30 VDC Input
CONNECTORS:	
RS-232	9-pin D-Sub Connector
RS-485	IEEE-1394, 6 position
USB	Type B
I/O & TTL	15-pin D-Sub Connector
DIMENSIONS:	
Overall, H x W x D	29.8 x 14.0 x 16.5 cm (11.75 x 5.5 x 6.5 in)
WEIGHT	5.1 kg (11.2 lb)
REGULATORY CERTIFICATIONS	CE, ETL (UL, CSA), WEEE, EU RoHS & CB Scheme

PHD ULTRA™ XF SYRINGE PUMP	
TYPE	Microprocessor dual syringe, infusion/withdrawal
ACCURACY	±0.5%
SYRINGE TYPE	Stainless steel or plastic
SYRINGE SIZE:	
Size Minimum	20 ml
Size Maximum	200 ml
FLOW RATE:	
Minimum	50.79 nl/min
Maximum	144.08 ml/min
AVERAGE LINEAR FORCE	454 kg (1000 lb) @ 100% force selection
CONNECTORS:	
RS-232	9-pin D-Sub Connector
RS-485	IEEE-1394, 6 position
USB	Type B
I/O & TTL	15-pin D-Sub Connector
DIMENSIONS	
Overall, H x W x D	40.64 x 30.48 x 21.6 cm (16 x 12 x 8.5 in)
WEIGHT	20 kg (44 lb)
REGULATORY CERTIFICATIONS	CE, ETL (UL, CSA), WEEE, EU RoHS & CB Scheme

Ordering Information

ITEM NUMBER	PRODUCT
70-2220	Microliter Syringe Pump Module without Power Supply
70-2225	Microliter Syringe Pump Module with Power Supply
70-4810	Pump 11 Elite Open Baseplate Single Syringe*
70-4811	Pump 11 Elite Open Baseplate Dual Syringe*
70-4812	Pump 11 Pico Open Baseplate Single Syringe*
70-4813	Pump 11 Pico Open Baseplate Dual Syringe*
70-3610*	PHD ULTRA™ 4400 Open Baseplate Single Syringe
70-2219	Milliliter Syringe Pump Module without Power Supply
70-2226	Milliliter Syringe Pump Module with Power Supply
70-3610	PHD ULTRA™ 4400 Pump Component
70-4800	Pump 11 Elite OEM Single Syringe
70-4801	Pump 11 Elite OEM Dual Syringe
70-4802	Pump 11 Pico OEM Dual Syringe
70-4803	Pump 11 Pico OEM Single Syringe
70-3506	PHD ULTRA™ Syringe Pump Module with Power Supply
70-3508	PHD ULTRA™ Push/Pull Syringe Pump Module with Power Supply
70-3510	PHD ULTRA™ 4400 Syringe Pump Module with Power Supply
70-3514	PHD ULTRA™ XF Syringe Pump Module with Power Supply

*Power supply not included, 70-4029 Supply w/ US cord, 70-4030 Supply w/ EU cord, 70-4031 Supply w/ UK cord. **All 70-48XX come with Power Supply

With more than 100 years of success behind us and a proven track record of designing and manufacturing high quality reliable syringe and peristaltic pumps, only Harvard Apparatus has the scientific depth and fluidics knowledge to recommend the right pump and accessories for your application. Our superior technical experts are available to assist you from start to finish. Harvard Apparatus invented the lead screw based syringe pump in the 1950's and introduced the first microprocessor pump, the now legendary Pump 22, in the 1980's. Our syringe pumps are so accurate, that even at low flow rates they have become the standard for mass spectrometry calibration, physiological research and anywhere accurate volumes must be delivered.



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