THE MOST PUBLISHED SYRINGE PUMP SETS A NEW STANDARD!

• TOUCH SCREEN FOR EASE-OF-USE
• OUTSTANDING FLOW PERFORMANCE
• PROGRAM SIMPLE TO COMPLEX METHODS WITHOUT A PC
• DOWNLOAD METHODS TO YOUR PUMP OR EMAIL TO PEERS

PUMP 11 Elite

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THE NEW PUMP 11 Elite SYRINGE PUMPS

The Pump 11 Elite is the most utilized and published series of syringe pumps in the world for research applications. The Pump 11 Elite Series new capabilities include:

- Unparalleled ease-of-use with alphanumeric keypad for easy Method naming and recall
- Application versatility with wide range of flow rates with adjustable force across the entire flow rate range:
  - PUMP 11 Elite is from 1.28 pl/min to 88.28 ml/min
  - Pico Plus Elite is from 0.54 pl/min to 11.70 ml/min
- Superior performance and legendary reliability with a 2 year warranty
- Specialized accessories including in-line solution heaters and coolers, valves, microfluidic chips, swivels, tethers, syringes, tubing, connectors, etc.
The Pump 11 Elite Series offers unparalleled ease-of-use with:

- High resolution LCD color touch screen user interface
- Quick Start Methods and Method Profiles allow you to create and run simple to complex Methods without complex programming or a PC
- Alphanumeric keypad allows you to quickly and easily name new Methods and recall saved Methods

Quick Start Screen
Quickly and easily run an infusion or withdrawal.

Run Screen
For parameter and condition monitoring.

Advanced Method Setup Screen
Quickly and easily run an advanced program.

Advanced Method Run Screen
For parameter and condition monitoring of an advanced program.
PUMP 11 Elite » SYRINGE PUMP SERIES

PROGRAM SIMPLE TO COMPLEX METHODS WITHOUT A PC

Alphanumeric Capabilities
Alphanumeric keypad makes it easy to name new Methods and recall stored Methods.

Pre-Programmed and User-Defined Method Selection
Quick Start Methods are available on all Pump 11 Elite Syringe Pumps. User-Defined Methods are only available on Programmable models.

Pre-Programmed Functions
Pre-programmed functions make developing simple to complex Methods easy.

Constant Rate Profile:
Used to infuse or withdraw at a user-defined flow rate until a target volume or target time is reached.

Ramp:
Used to create a linearly increasing or decreasing infusion or withdrawal for a predefined time period.

I/O (in) Event:
Used to have the pump pause and wait for a signal from an external device or for a manual user input on the touch screen. These external signals are communicated via Pin 2 on the 15-pin I/O connector port.

I/O (out) Trigger:
Used to send a signal to an external device when the step in the Method is reached.

Stop:
Used to instruct the pump to stop operation. This command can be used in conjunction with I/O events to control pump operation based on external events.

Repeat:
Used to repeat steps in a Method a defined number of times. You can select what steps to repeat and how many times you want them repeated.

Gradient Profile:
Used to combine multiple flow streams from different pumps into a common output stream. The flow profiles can be constant, ramped or stepped.

Delay:
Used to insert a time delay in a Method. You can set a time delay between 0.2 seconds up to 99:99:99 (99 hours, 99 minutes, 99 seconds).

I/O (in) Event:
Used to have the pump pause and wait for a signal from an external device or for a manual user input on the touch screen. These external signals are communicated via Pin 2 on the 15-pin I/O connector port.

I/O (out) Trigger:
Used to send a signal to an external device when the step in the Method is reached.
EMAIL METHODS TO PEERS & DOWNLOAD METHODS TO YOUR PUMP

- Email Methods to peers
- Download Methods to your pump
- Upgrade new versions of software remotely

PUMP 11 Elite SAMPLE METHODS
Program once, save and recall with the touch of a button, saving time and increasing efficiency.

### Ramp (Infuse and Withdraw)

- **Flow Rate (mL/min)**
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70
  - 80
  - 90
  - 100
  - 125
  - 150

- **Time (s)**
  - 0
  - 5
  - 10
  - 15
  - 20
  - 25
  - 30
  - 35
  - 40
  - 45

### Infuse with Delay

- **Flow Rate (mL/min)**
  - 0
  - 0.5
  - 1
  - 1.5
  - 2
  - 2.5
  - 3
  - 3.5

- **Delay/Vol (mL)**
  - 0
  - 10
  - 20
  - 30
  - 40

### Ramp (Infuse only)

- **Flow Rate (µL/min)**
  - 0
  - 5
  - 10
  - 15
  - 20
  - 25
  - 30
  - 35
  - 40
  - 45

- **Seconds**
  - 0
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 9
  - 10
  - 11
  - 12
  - 13
  - 14
  - 15
  - 16
  - 17
  - 18
  - 19
  - 20
  - 21
  - 22
  - 23
  - 24
  - 25

### SYRINGE - 5 ml Hamilton Glass

- **STEP 1:** Ramp, Infuse, to 5 mL/min for 5 sec
- **STEP 2:** Constant Rate, Infuse, 15.9 mL/min for 10 sec
- **STEP 3:** Ramp, Infuse, 15.9 mL/min to 5 mL/min for 5 sec
- **STEP 4:** Ramp, Withdraw, 5 mL/min to 15.9 mL/min for 5 sec
- **STEP 5:** Constant Rate, Withdraw, 15.9 mL/min for 10 sec
- **STEP 6:** Ramp, Withdraw, 15.9 mL/min to 5 mL/min for 5 sec

### SYRINGE - 5 ml BD

- **STEP 1:** Delay for 10 sec
- **STEP 2:** Constant Rate, Infuse, 1 mL/min for 10 sec
- **STEP 3:** Constant Rate, Infuse, 2 mL/min for 10 sec
- **STEP 4:** Constant Rate, Infuse, 3 mL/min for 10 sec

### RAMP - Infuse Only

- **STEP 1:** Ramp, Infuse, 10 µL/min to 20 µL/min in 3 sec
- **STEP 2:** Ramp, Infuse, 20 µL/min to 30 µL/min in 2 sec
- **STEP 3:** Ramp, Infuse, 30 µL/min to 50 µL/min in 2 sec
- **STEP 4:** Ramp, Infuse, 50 µL/min to 70 µL/min in 1 sec
- **STEP 5:** Ramp, Infuse, 70 µL/min to 90 µL/min in 1 sec
- **STEP 6:** Ramp, Infuse, 90 µL/min to 100 µL/min in 2 sec
- **STEP 7:** Ramp, Infuse, 100 µL/min to 125 µL/min in 3 sec
- **STEP 8:** Ramp, Infuse, 125 µL/min to 150 µL/min in 4 sec
- **STEP 9:** Constant Rate, Infuse, 150 µL/min for 7 sec
APPLICATION VERSATILITY

The Pump 11 Elite Syringe Pumps have the ability to run in a horizontal or vertical orientation. This helps to minimize the dead volume depending upon the height of the tubing connection. This allows you to choose the proper orientation based on your experimental setup.

ANIMAL INFUSION HORIZONTAL ORIENTATION

During an animal infusion the tubing connection should be very close to the bench. The horizontal orientation of the Pump 11 Elite allows for minimal tubing and minimal dead volume for maximum experimental optimization.

ELECTROSspray (ESI) VERTICAL ORIENTATION

On an ESI setup for sample introduction, the ESI source is high off the bench so the vertical configuration of the Pump 11 Elite allows for minimal tubing length and minimal dead volume for maximum experimental optimization.

Using horizontal orientation, clearing bubbles can be difficult

When priming syringes to run automatically, a difficult problem is to overcome bubbles. The Pump 11 Elite Syringe Pumps series permits easy priming of syringes to eliminate bubbles. Simply orient the pump in the vertical position. The bubbles float to the top of the syringe. Combine this with the Elite’s programming and you can run the pump to automatically clear bubbles.

Using vertical orientation, bubbles float to top of syringe for easy clearing

On an ESI setup for sample introduction, the ESI source is high off the bench so the vertical configuration of the Pump 11 Elite allows for minimal tubing length and minimal dead volume for maximum experimental optimization.
EXTENSIVE APPLICATIONS

- Accurate Delivery of Coating
- Animal Feeding
- Bulk Fluid Transfer
- Calibration
- Cell Culture
- Cellular Injection

- Dispensing
- Doping
- Drug Delivery (same infusion rates)
- Drug Delivery (different infusion rates)

- Drug Delivery (time released)
- Drug Development
- Electrospinning
- Emulsification
- Electrospray
- Fluid Blending
- Fluid Sampling
- Gradients
- HPLC
- Injection Pressure Calculations
- Instrument Injections
- Low Pressure Chromatography

- Mass Spectrometry
- Medical Coating Delivery
- Microdialysis
- Microfluidics
- Nanofluidics
- Nutritional Studies
- Oocyte Applications
- Patch Clamping
- Perfusion
- Timed Delivery
- Titrations
% COMPOSITION

The Pump 11 Elite can perform automatic binary mixtures by % composition. This is useful for delivering different percent mixtures of drugs or nutrients with easy programming of either continuous or stepped composition profiles.

- Serial dilutions
- Chromatography
- Infusing different percentages of drugs or nutrients
- Change polymer ratio

ADVANCED CONNECTIVITY

The infusion only Pump 11 Elite syringe pumps come standard with a Footswitch and USB connectors. The infusion/withdrawal programmable Pump 11 Elite syringe pumps come standard with a Footswitch, USB, RS-485 and I/O connectors. There is also an option for RJ-11 connectors on the programmable pumps. This option has to be ordered at the time the pump is ordered.

- Footswitch Input - start and stop a pump
- USB Serial Input - control your pump with a computer
- RS-485 Connectors
  > Connect multiple pumps together (daisy chain up to 99 pumps)
  > Connect Satellite pumps to the Master pump for binary gradient system (% composition)

CONTROL MULTIPLE PUMPS VIA DAISY CHAIN WITH RS-485

- User I/O Connector
  > Direction Control Input - set pump to infuse or withdraw
  > Trigger Input - connect an external device to start and stop a pump or Method
  > Footswitch Input - start and stop a pump
  > Trigger 1 Output - signal another device to start and stop a pump or Method
- Run indicator – connect an external LED or monitoring device to a pump

OPTIONAL RJ-11 CONNECTORS (for Pump-to-Pump Communication)

APPLICATION VERSATILITY
The Pump 11 Elite carries on the tradition as the premier workhorse infusion pump with a combination of durable patented design and high performance fluidics. The Pump 11 Elite Series and Pump 11 Pico Plus Elite have high accuracy and precise flows from 1.28 pl/min to 88.28 ml/min (25.99 ml/min for dual syringe) and 0.54 pl/min to 11.70 ml/min respectively.

With up to 35 lbs of linear force this rugged syringe pump will provide years of performance for a wide range of applications.

**Advanced Guide Rods**
Low friction guide rods and bearings reduce mechanical drag for the smoothest, most accurate flow.

**High Precision Lead Screw**
- 24 thread lead screw (Pump 11 Elite)
- 40 thread lead screw (Pump 11 Pico Plus Elite)

**High Force Syringe Clamp**
For secure clamping of a wide range of syringe sizes.

**Mechanical Stop Collars**
To protect delicate syringes.

**Anti-Syphon Release Knob**
Allows withdrawal capabilities – assures no syringe movement unless pump is running.

**WEEE**
Global regulatory compliance assures you high performance anywhere in the world.

**RoHS**

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# Harvard Apparatus Specialized Accessories

## One Stop’ Advantage for All Applications
- Syringes
- Connectors
- Tubing
- Needles
- Valves
- Syringe Warmers
- Warmed Platforms
- In-line Solution Heaters
- Microfluidic Chips
- Cell Perfusion Chambers
- Swivels
- Tethers

## Glass Syringes
Sizes ranging from 0.5µl to 100ml. Choose glass syringes when high accuracy, sterility and low to medium force are required. Accuracy is 1%.

### 1000 Series GASTIGHT® Glass Syringes

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<th>Order #</th>
<th>Volume</th>
<th>Ter.</th>
<th>Point Style</th>
<th>Ga.</th>
<th>Replacement Parts</th>
<th>Plunger Assembly</th>
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### 1700 Series GASTIGHT® Glass Syringes

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</tbody>
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www.harvardapparatus.com  phone 800.272.2775  email techsupport@harvardapparatus.com
PLASTIC SYRINGES

Sizes ranging from 1 ml to 140 ml. Choose plastic syringes when accuracy, sterility, disposability and low force are required. Accuracy is 5%.

Sterile Monoject® Syringes without Needles

<table>
<thead>
<tr>
<th>Volume</th>
<th>Tip</th>
<th>Boxes of Syringes</th>
<th>Cases of Syringes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ml</td>
<td>Luer (long barrel)</td>
<td>100</td>
<td>72-2355</td>
</tr>
<tr>
<td>1 ml</td>
<td>Luer</td>
<td>100</td>
<td>72-2360</td>
</tr>
<tr>
<td>3 ml</td>
<td>Luer</td>
<td>50</td>
<td>72-2362</td>
</tr>
<tr>
<td>6 ml</td>
<td>Luer</td>
<td>50</td>
<td>72-2363</td>
</tr>
<tr>
<td>12 ml</td>
<td>Luer</td>
<td>80</td>
<td>72-2364</td>
</tr>
<tr>
<td>12 ml</td>
<td>Luer Lock</td>
<td>80</td>
<td>72-2365</td>
</tr>
<tr>
<td>20 ml</td>
<td>Luer</td>
<td>50</td>
<td>72-2366</td>
</tr>
<tr>
<td>20 ml</td>
<td>Luer Lock</td>
<td>50</td>
<td>72-2367</td>
</tr>
<tr>
<td>20 ml</td>
<td>Eccentric Luer</td>
<td>50</td>
<td>72-2368</td>
</tr>
<tr>
<td>35 ml</td>
<td>Luer</td>
<td>30</td>
<td>72-2371</td>
</tr>
<tr>
<td>35 ml</td>
<td>Luer Lock</td>
<td>30</td>
<td>72-2372</td>
</tr>
<tr>
<td>60 ml</td>
<td>Luer</td>
<td>20</td>
<td>72-2373</td>
</tr>
<tr>
<td>60 ml</td>
<td>Luer Lock</td>
<td>20</td>
<td>72-2374</td>
</tr>
<tr>
<td>60 ml</td>
<td>Eccentric Luer</td>
<td>20</td>
<td>72-2375</td>
</tr>
<tr>
<td>60 ml</td>
<td>Catheter</td>
<td>20</td>
<td>72-2376</td>
</tr>
<tr>
<td>60 ml</td>
<td>Toomey</td>
<td>20</td>
<td>72-2377</td>
</tr>
<tr>
<td>140 ml</td>
<td>Luer Lock</td>
<td>-</td>
<td>72-2378</td>
</tr>
</tbody>
</table>

Non-Sterile Monoject® Syringes without Needles

<table>
<thead>
<tr>
<th>Volume</th>
<th>Tip</th>
<th>Boxes of Syringes</th>
<th>Cases of Syringes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 ml</td>
<td>Luer</td>
<td>250</td>
<td>72-2400</td>
</tr>
<tr>
<td>6 ml</td>
<td>Luer</td>
<td>100</td>
<td>72-2401</td>
</tr>
<tr>
<td>12 ml</td>
<td>Luer</td>
<td>100</td>
<td>72-2402</td>
</tr>
<tr>
<td>12 ml</td>
<td>Eccentric Luer</td>
<td>100</td>
<td>72-2403</td>
</tr>
<tr>
<td>20 ml</td>
<td>Luer</td>
<td>50</td>
<td>72-2404</td>
</tr>
<tr>
<td>20 ml</td>
<td>Eccentric Luer</td>
<td>50</td>
<td>72-2405</td>
</tr>
<tr>
<td>35 ml</td>
<td>Luer</td>
<td>25</td>
<td>72-2406</td>
</tr>
<tr>
<td>60 ml</td>
<td>Luer</td>
<td>25</td>
<td>72-2407</td>
</tr>
<tr>
<td>140 ml</td>
<td>Luer</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>140 ml</td>
<td>Luer Lock</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>140 ml</td>
<td>Catheter</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Syringe Warmers

Specifications
- Heater Resistance: 18 Ω
- Voltage Requirement: Variable to 12 V max
- Temperature Range: Ambient to 85°C
- Temperature Accuracy: ±1°C
- Cable Length: 2.4 m
- Warranty: One year

Order # | Model | Product |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>64-1584</td>
<td>SWS-10</td>
<td>Syringe Heater for 10 cc Syringes</td>
</tr>
<tr>
<td>64-1585</td>
<td>SWS-60</td>
<td>Syringe Heater for 60 cc Syringes</td>
</tr>
<tr>
<td>64-1585</td>
<td>SWS-140</td>
<td>Syringe Heater for 140 cc Syringes</td>
</tr>
<tr>
<td>64-1545</td>
<td>TC-124A</td>
<td>Temp Controller, 120 VAC US</td>
</tr>
<tr>
<td>64-1545E</td>
<td>TC-124AE</td>
<td>Temp Controller, 240 VAC Europe</td>
</tr>
<tr>
<td>64-1655</td>
<td>TC-144</td>
<td>Temp Controller</td>
</tr>
<tr>
<td>64-1606</td>
<td>BAC-1</td>
<td>Battery Adapter Cable</td>
</tr>
</tbody>
</table>

www.harvardapparatus.com  phone 800.272.2775  email techsupport@harvardapparatus.com
STAINLESS STEEL SWIVELS
BY HARVARD/INSTECH
For continuous intravenous infusion or microdialysis on freely-moving rodents.

- Low torque quartz-lined dual channel swivel truly suited for microdialysis in mice
- Setting the industry standard for more than 30 years
- Single & dual channel models available
- Fully autoclavable
- Lifetime warranty on single channel swivels
- 20, 22 and 25 gauge available
- Custom swivels available by special order

**Stainless Steel Swivels**

<table>
<thead>
<tr>
<th>Application</th>
<th>Single Channel Swivels</th>
<th>Dual Channel Swivels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microdialysis for Mice and Rats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Infusion of Mice</td>
<td>72-4426 72-6122</td>
<td>72-4426 72-4426</td>
</tr>
<tr>
<td>Standard Infusion of Rats</td>
<td>72-4426 72-6130</td>
<td>72-4426 72-4429</td>
</tr>
<tr>
<td>Blood Pressure Measurements, Rapid Infusions, IV Feeding</td>
<td>72-4429 72-4429 72-4429 72-4429</td>
<td></td>
</tr>
<tr>
<td>Microdialysis with Rats</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>20</th>
<th>22</th>
<th>25</th>
<th>20</th>
<th>22</th>
<th>22</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet &amp; Outlet Tube Gauge</td>
<td>20</td>
<td>22</td>
<td>25</td>
<td>20</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Co-Ex External Tubing</td>
<td>72-4426 72-6122</td>
<td>72-4426 72-4426</td>
<td>72-4426 72-4426</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intra-Vascular Polyurethane Tubing</td>
<td>72-4429 72-6130</td>
<td>72-4429 72-4429</td>
<td>72-4429 72-4429</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poly Polyethylene Tubing</td>
<td>59-8330</td>
<td></td>
<td>59-8330</td>
<td></td>
<td>59-8330</td>
<td></td>
<td>59-8330</td>
</tr>
<tr>
<td>Center Channel ID</td>
<td>0.023 in 0.016 in 0.010 in</td>
<td>0.023 in 0.006 in 0.016 in 0.006 in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center Channel Dead Volume</td>
<td>18 µl 8 µl 3 µl</td>
<td>18 µl 1.8 µl 1.8 µl 1.4 µl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side Channel ID</td>
<td></td>
<td>0.023 in 0.006 in 0.016 in 0.016 in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side Channel Dead Volume</td>
<td></td>
<td>18 µl 2.8 µl 18 µl 18 µl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side (OD x L)</td>
<td>0.375 x 2.25 in 0.375 x 2.25 in 0.375 x 2.25 in</td>
<td>0.375 x 2.38 in 0.375 x 2.38 in 0.375 x 2.38 in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order # for Swivel</td>
<td>61-0000 61-0001 56-1324</td>
<td>61-0002 72-0000 61-0003 61-0004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Specialized Accessories**

12 www.harvardapparatus.com  phone 800.272.2775  email techsupport@harvardapparatus.com
DISPOSABLE SWIVELS
BY HARVARD/INSTECH

- 25 gauge swivel is ideal for mice
- Plastic Swivel-to-tether clamp included
- Single use, low cost, precision swivels
- Meets Harvard Apparatus’ and Instech’s strict quality standards
- Available in 3 sizes: 20 gauge, 22 gauge and 25 gauge

INFUSION HARNESS
BY HARVARD/INSTECH

- Non-surgical
- Less animal stress than normal jackets
- Proven effective on thousands of animals
- Promotes more rapid healing
- Harness grows with the animal

### Precision Disposable Swivels

<table>
<thead>
<tr>
<th>Application</th>
<th>20 Gauge</th>
<th>22 Gauge</th>
<th>25 Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Infusion of Mice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Infusion of Rats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Pressure Measurement, Rapid Infusions, IV Feeding</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

### Specifications

- **Color**: Pink, Blue, Purple
- **Inlet and Outlet Tube Gauge**: 20, 22, 25
- **Compatible Tubing**: PE90, PE50, PE20
- **Channel ID**: 0.023 in, 0.016 in, 0.010 in
- **Internal Dead Volume**: 12 µl, 6 µl, 2.5 µl
- **Size, Diameter x Length**: 0.375 x 1.69 in, 0.375 x 1.69 in, 0.375 x 1.69 in
- **Order #**
  - 61-0011 61-0014 72-6121
  - Order # with Luer Inlet 72-4072 72-4074 –

---

### Infusion Harness

<table>
<thead>
<tr>
<th>Infusion Harness</th>
<th>Rats</th>
<th>Rats</th>
<th>Mice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Channel</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual Channel</td>
<td></td>
<td>•</td>
<td></td>
</tr>
</tbody>
</table>

---

### INFUSION HARNESS

- **Harness/Body Contact Area**
  - **Mouse Harness Area**: 0.20 square inches
  - **Rat Harness Area**: 0.82 square inches

### Specifications

- **Clear Lumen**: 0.090 in, 0.105 in, 0.082 in
- **Body Surface Contact Area**: 0.82 sq in, 0.82 sq in, 0.20 sq in
- **Saddle Size**: 1.125 sq in, 1.125 sq in, 0.563 sq in
- **Spring**: 12 in, 12 in, 12 in
- **Belly Band Length**: Adjustable up to 22.9 cm (9 in), Adjustable up to 22.9 cm (9 in), Adjustable up to 11.4 cm (4.5 in)

### System Weight

- **With Spring**: 12 g, 12 g, 3.0 g
- **Without Spring**: 5 g, 5 g, 0.7 g
- **Order #**
  - 61-0041 61-0238 61-0269
**BUTTON & HEAD BLOCK TETHERS**
**BY HARVARD/INSTECH**

- Small size which is ideal for mice
- Reduced animal stress for better research results
- Quick and easy tether attachment and removal

## Button & Head Block Tethers

<table>
<thead>
<tr>
<th>Application</th>
<th>Polysulfone Button Tethers</th>
<th>Dacron Mesh Button Tethers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouse Infusion</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Rat Infusion Single Channel</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Rat Infusion Dual Channel</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Experiment Duration</td>
<td>1 to 10 days</td>
<td>10 to 60+ days</td>
</tr>
<tr>
<td>Clear Lumen</td>
<td>0.062 in</td>
<td>0.090 in</td>
</tr>
<tr>
<td>Stainless Steel Spring</td>
<td>12 in</td>
<td>12 in</td>
</tr>
<tr>
<td>Button Diameter</td>
<td>0.25 in</td>
<td>1.0 in</td>
</tr>
<tr>
<td>System Weight</td>
<td>3.0 g</td>
<td>7.2 g</td>
</tr>
<tr>
<td>Parts Included:</td>
<td>Button, sterile spring, Dacron® mesh</td>
<td>Button, sterile spring, quick disconnect coupler</td>
</tr>
<tr>
<td>Order #</td>
<td>61-0031</td>
<td>61-0027</td>
</tr>
</tbody>
</table>

## GLASS IONOMER CEMENT

- For rats and mice
- Easy-to-use
- Magnetic connection

<table>
<thead>
<tr>
<th>Order #</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>72-9168</td>
<td>Glass Ionomer Cement Kit for Headblocks, supplied individually</td>
</tr>
<tr>
<td>72-9169</td>
<td>Replacement Glass Ionomer Cement Capsules, pkg. of 50</td>
</tr>
</tbody>
</table>

## MAGNETIC HEAD BLOCK TETHER
**BY HARVARD/INSTECH**

<table>
<thead>
<tr>
<th>Order #</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>72-4476</td>
<td>Magnetic Head Block, Spring Tether, 1 base</td>
</tr>
<tr>
<td>72-4477</td>
<td>Magnetic Head Block, Looped Wire Tether, 1 base, slotted clamp</td>
</tr>
<tr>
<td>72-4478</td>
<td>Repl. Magnetic Head Block Bases, sterile, pkg. of 10</td>
</tr>
<tr>
<td>72-4479</td>
<td>Repl. Looped Wire Magnetic Tethers, non-sterile, pkg. of 5</td>
</tr>
</tbody>
</table>
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Pumps</th>
<th>Pump 11 Elite</th>
<th>Pump 11 Pico Plus Elite</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accuracy</strong></td>
<td>±0.5%</td>
<td>±0.35%</td>
</tr>
<tr>
<td><strong>Reproducibility</strong></td>
<td>±0.05%</td>
<td>±0.05%</td>
</tr>
<tr>
<td><strong>Syringes (Min./Max.)</strong></td>
<td>0.5 µl / 60 ml (10 ml dual)</td>
<td>0.5 µl / 10 ml</td>
</tr>
<tr>
<td><strong>Flow Rate:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum (0.5 µl syringe)</td>
<td>1.28 pl/min</td>
<td>0.54 pl/min</td>
</tr>
<tr>
<td>Maximum (10 µl syringe)</td>
<td>25.99 ml/min</td>
<td>11.70 ml/min</td>
</tr>
<tr>
<td>Maximum (60 µl syringe)</td>
<td>88.26 ml/min</td>
<td></td>
</tr>
<tr>
<td><strong>Number of Microsteps per one rev. of Lead Screw</strong></td>
<td>15,360</td>
<td>20,480</td>
</tr>
<tr>
<td><strong>Step Resolution</strong></td>
<td>0.069 µm/µstep</td>
<td>0.031 µm/µstep</td>
</tr>
<tr>
<td><strong>Pusher Travel Rate:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>0.15 µm/min</td>
<td>0.02 µm/min</td>
</tr>
<tr>
<td>Maximum</td>
<td>159 mm/min</td>
<td>71.55 mm/min</td>
</tr>
<tr>
<td><strong>Non-Volatile Memory</strong></td>
<td>Stores all settings</td>
<td></td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>4.3” WVGA TFT color display with touch screen</td>
<td></td>
</tr>
<tr>
<td><strong>Connectors:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS-485®</td>
<td>IEEE-1394, 6 position</td>
<td></td>
</tr>
<tr>
<td>I/O &amp; TTL®</td>
<td>15 pin D-Sub Connector</td>
<td></td>
</tr>
<tr>
<td><strong>USB</strong></td>
<td>Type B</td>
<td></td>
</tr>
<tr>
<td>Footswitch</td>
<td>Mini Phone Jack</td>
<td></td>
</tr>
<tr>
<td><strong>Linear Force (Max.)</strong></td>
<td>16 kg (35 lbs) @ 100% force selection</td>
<td></td>
</tr>
<tr>
<td><strong>Drive Motor</strong></td>
<td>0.9° stepper motor</td>
<td></td>
</tr>
<tr>
<td><strong>Motor Drive Control</strong></td>
<td>Microprocessor with 1/16 microstepping</td>
<td></td>
</tr>
<tr>
<td><strong>Step Rate:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>27.5 sec/µstep</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>26 µsec/µstep</td>
<td></td>
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<tr>
<td><strong>Input Power</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Input Power Connection</strong></td>
<td>12-30 VDC</td>
<td></td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>100-240 VAC, 50/60 Hz, 8 watts universal power supply, use only a Harvard Apparatus approved power supply and line cord</td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>22.6 x 17.78 x 15 cm (9 x 7 x 6 in)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>2.1 kg (4.6 lbs)</td>
<td></td>
</tr>
<tr>
<td><strong>Atmospheric Specifications:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>4°C to 40°C (40°F to 104°F)</td>
<td></td>
</tr>
<tr>
<td><strong>Storage Temperature</strong></td>
<td>-10°C to 70°C (14°F to 158°F)</td>
<td></td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>20% to 90% RH, non condensing</td>
<td></td>
</tr>
<tr>
<td><strong>Method of Operation</strong></td>
<td>Continuous</td>
<td></td>
</tr>
<tr>
<td><strong>Classification</strong></td>
<td>Class I</td>
<td></td>
</tr>
<tr>
<td><strong>Pollution Degree</strong></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Installation Category</strong></td>
<td>II</td>
<td></td>
</tr>
<tr>
<td><strong>Regulatory Certifications</strong></td>
<td>CE, ETL (UL, CSA), WEEE, EU RoHS &amp; CB Scheme</td>
<td></td>
</tr>
</tbody>
</table>

*RS-485 and I/O & TTL are available on I/W Programmable Models only.

### Ordering Information

<table>
<thead>
<tr>
<th>Order #</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-4500</td>
<td>Pump 11 Elite Infusion Only Single Syringe</td>
</tr>
<tr>
<td>70-4501</td>
<td>Pump 11 Elite Infusion Only Dual Syringe</td>
</tr>
<tr>
<td>70-4504</td>
<td>Pump 11 Elite Infusion/Withdrawal Programmable Single Syringe</td>
</tr>
<tr>
<td>70-4505</td>
<td>Pump 11 Elite Infusion/Withdrawal Programmable Dual Syringe</td>
</tr>
<tr>
<td>70-4506</td>
<td>Pump 11 Pico Plus Elite Infusion/Withdrawal Programmable Dual Syringe</td>
</tr>
</tbody>
</table>

### Optional Accessories:

<table>
<thead>
<tr>
<th>Order #</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-4000®</td>
<td>RS-485 Cable for Pump-to-Pump Communication, 0.5 m (2 ft)</td>
</tr>
<tr>
<td>70-4021®</td>
<td>RS-485 Cable for Pump-to-Pump Communication, 1 m (3 ft)</td>
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<tr>
<td>70-4001®</td>
<td>RS-485 Cable for Pump-to-Pump Communication, 2 m (7 ft)</td>
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<tr>
<td>70-4020®</td>
<td>RS-485 Cable for Pump-to-Pump Communication, 9 m (30 ft)</td>
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<td>70-4002</td>
<td>USB Cable for PC-to-Pump Communication, 2 m (7 ft)</td>
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<td>70-4003</td>
<td>USB Cable for PC-to-Pump Communication, 5 m (16 ft)</td>
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<td>70-4005®</td>
<td>Adapter, Digital I/O</td>
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<td>70-4006</td>
<td>Adapter, D-sub 15 to Term. Blk</td>
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<td>70-2215</td>
<td>Footswitch (with Phono Plug)</td>
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<td>55-7760</td>
<td>Cable Assy, Daisy-Chain, Legacy RS-232 RJ-11, D.5 m (2 ft)</td>
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<td>72-2478</td>
<td>Cable Assy, Daisy-Chain, Legacy RS-232 RJ-11, 2 m (7 ft)</td>
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<tr>
<td>55-8000</td>
<td>Adapter for 25ml and 50ml Hamilton GasTight™ Syringes</td>
</tr>
<tr>
<td>Location</td>
<td>Contact Details</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
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