

Syringe Pumps...And More

So Advanced They're Simple!



***kd*Scientific**

www.kdscientific.com

The KD Scientific Advantage

Recognized Worldwide...

KD Scientific syringe pumps are the #1 choice of life science and industrial researchers for their:

- High performance accuracy and precision
- Easy-to-use interface for simple operation
- Rugged design for long-life and reliability
- Anti-vibration technology eliminating operational noise
- Stall detection and alarms
- Superior engineering design without fans, eliminates thermal and environmental contamination for higher reliability and operation
- Configurability for your applications:
 - Single, double, four, ten syringes
 - Infuse or infuse/withdraw or push pull
 - Programmable and advanced programmable
 - Specialized systems
 - OEM models
 - High pressure
- Broad flow rate range from high to low
- World-wide support when you need it

KD Scientific pumps are acknowledged as the industry's highest valued solution for delivering precise and smooth flow. KD Scientific is recognized worldwide for quality and reliability at an economical price and has the broadest line of syringe pumps to meet your specific application. KD Scientific is committed to delivering the highest level of customer satisfaction, as well as technical support for all their products.

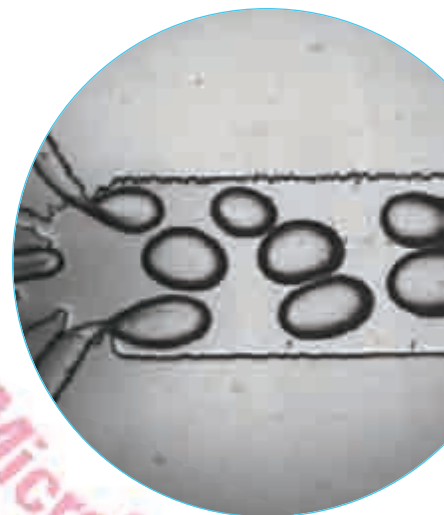


The following is an extensive list of application areas in which syringe pumps are utilized. The superior performance of KD Scientific syringe pumps has made them prominent in publications for their outstanding performance, smooth flow and rugged design. Bibliographies and publications are available at:

www.kdscientific.com

Extensive Applications

- Calibration
- Diluting
- Dispensing
- Dosing
- Emulsification
- Fluid Transfer
- Infusion of Fluids
- Mixing
- Perfusion
- Timed Delivery
- Withdrawal of Fluids
- Slow Infusion
- Volumetric Dispensing
- MS Calibration
- Microfluidics/Microfluidic Channel Injections
- Surface Plasma Resonance
- Biotech Research and Development
- Drug Discovery
- Neuroscience
- Organic Synthesis
- Aerosol Injection/Nebulization
- Agriculture
- Animal Drug/Nutrient Injections
- Automotive Research
- Cell Injections

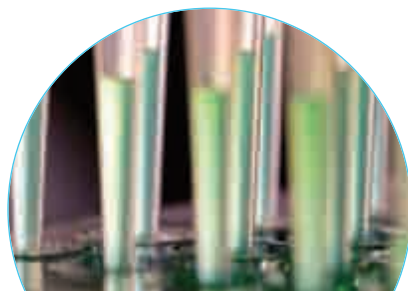
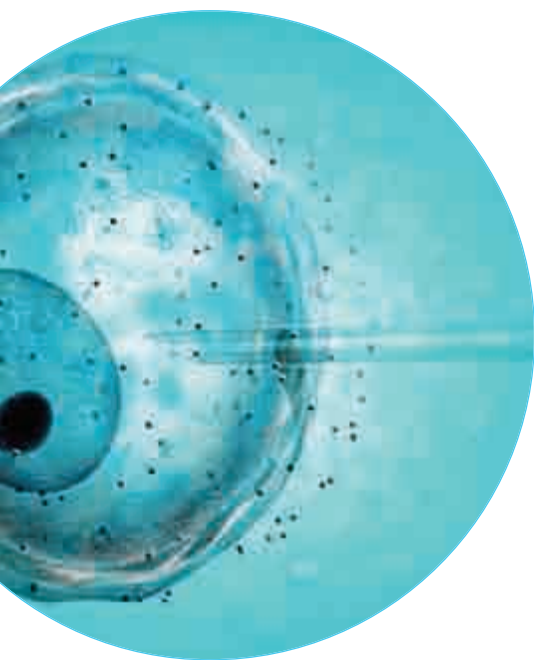


Microfluidics

Electrospinning

Electrospray

Mass Spec



- Chemical Development
- Pilot Plant Reactor Dosing
- Continuous Flow
- Dye Dilution
- Dye/Isotope Injection
- Electrospinning
- Emulsification
- Emulsion Polymerization
- Entomology
- Geological Sampling
- Isotope Injections
- Liquid Chromatography Injections
- Metered Dispensing
- Microdialysis
- Micro-Filtration
- Perfusion
- Pharmaceutical Development
- Polymer Research
- Post Column Addition
- Electrospray (ESI-MS)
- HPLC Mass Spec
- Lock Mass Infusion/Calibration
- MALDI-TOF Matrix Addition
- Nano Flow Rates
- Precision Mass Spec
- Capillary Electrophoresis

- Cell Manipulation
- Cell Patterning
- Cell Separation
- Chemical Binding Coefficients
- Chemical Gradient Formation
- Enzyme Reaction Kinetics
- Flow Cytometry
- Fluid Viscosity
- Immunoassays
- Reactor Injections
- Toxicology Studies
- Viscosity/Viscometer Systems
- Weather Research

Organic Synthesis

Drug Infusions

Emulsifier

Maldi-TOF



The Legato product line is the latest generation of syringe pumps. The Legato™ series offers unparalleled ease of use through the high resolution color touch screen user interface. The full touch screen interface enables the user to quickly create configurations and recall them for easy use. The 4.3" TFT color display with touch pad interface presents all the pump operating parameters on one easy to view run screen.

Legato™ Series: The Newest

- Displays More Information Simultaneously
- Easy to Use and Set up Different Configurations
- Intuitive Graphic Interface and Touch screen
- International Icons Easy to Use in Any Language
- Alarm Indication and Messages
- Pump Diagnostic/Information
- USB Interface
- Graphic Software to configure and monitor the pumps



Legato™
100 Series



Legato™
200 Series

Legato's Design Advantages

In today's economic environment, multiple users with different experiments are using the same pump. The next generation of pump has to meet these demands. The pump's role in the experiment now changes more readily with multiple users using one pump and multiple tests being done with a single pump.

- Programs need to be stored & easily recalled
- Users wanted the flexibility of changing syringe mechanisms in the field: going from large to small syringes, or from 2 to 10 syringes
- Better flow performance and repeatability with measurements down to nl/hour
- Stronger syringe clamping at higher pressures -not just simple spring clamping

Engineered to Meet Global Regulatory Compliance

Worldwide use of the pumps and changing regulatory compliance meant redesigning the unit to meet these new standards including lead free boards. The new Legato™ is a pump that will meet worldwide regulations.



WEEE



RoHS



Underwriters
Laboratories

CB
Scheme

Benchmark for Ease of Use

Optimize Bench Space

The Legato™ Series optimizes the bench space in your lab. For limited laboratory space the Legato™ series can be placed on its side to reduce the footprint by 4 Times. The display orientation changes automatically with the Legato™ 200 Series. The Legato™ 100 Series display orientation can be changed manually to allow the user operate the pump vertically.

Horizontal
Orientation

Vertical
Orientation
Display
Rotates 90°

Intuitive Run Screen

Combining multiple parameters simultaneously with internationally recognizable icons allow the Legato™ Series to provide a new level of intuitive syringe pump operation.

Graphic indication of the syringes filling indicating the volume

Flow Rate is easy to read

Current time and date is shown (Legato 200 Series only)

All Program settings are indicated on the display

Flow Direction with arrow indicator

TIME ELAPSED: 00:00:09

TIME REMAINING: 00:00:08

STATUS: INFUSING

TOTAL INF VOLUME: 4.741 ml

Total Volume Delivered

Current status of the Pump

Total Remaining Time of the Program

Total Elapsed Time of the Program

Dead Volume can be quickly eliminated with a fast forward feature

The pusher block can also be released with a fast reverse feature

MODE: Infuse Only

SYRINGE: KDS Glass 10 ml

FORCE LEVEL: 100%

TARGET: No target set

INFUSION TIME: 00:00:16

SETUP

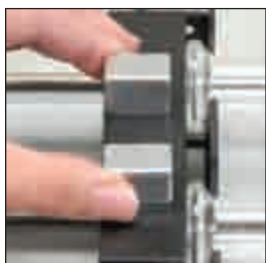
CFG

STOP

The Legato's proven syringe mechanism design is easy to use and securely holds the syringes for smooth flow performance.

A Rugged Design, Maximum

- One touch quick release pusher block is easy to use and is always engaged.
- Advanced mechanical syringe mechanism incorporates a dual purpose, syringe clamp for large syringes, >30 ml, or simply flip the syringe clamp to hold smaller syringes, <30 ml to 0.5 µl.
- Rubber pads retain syringe in place preventing accidental breakage of glass syringes.
- Curved syringe clamp design securely retains syringes, eliminating slippage of the syringe under high force applications with viscous fluids.
- Adjustable linear force, ensures the right force is applied for the various syringe sizes.



Performance and Reliability

Less Vibration & Deformation

The welded steel chassis out-performs the conventional plastic chassis. The chassis provides a rigid platform without deformation under high pressure. Operation of the pump is quieter and there is less vibration transferred to the syringes because of this unique design.



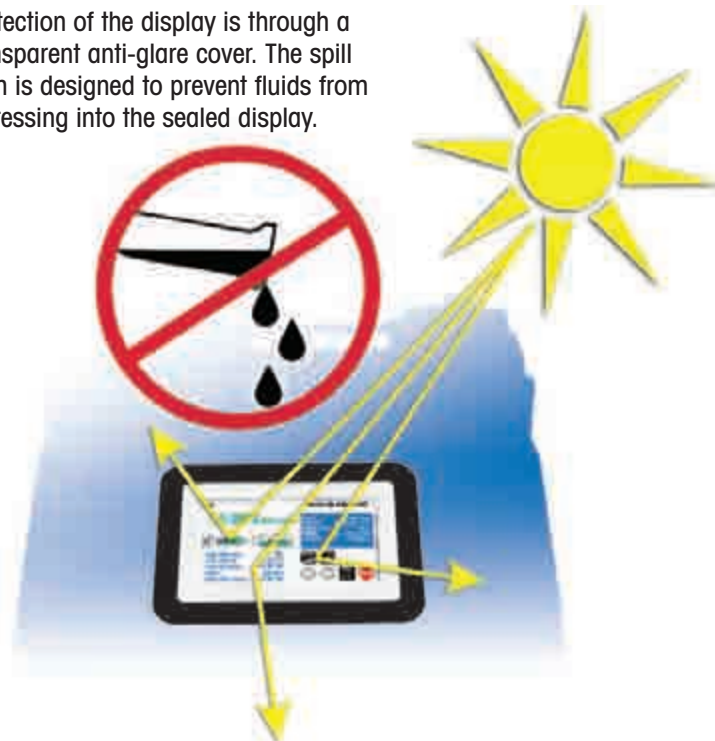
Optimal EMI/RFI Shielding with Welded Steel Chassis

The superior design of the full metal chassis provides noise isolation and anti-vibration features for increased reliability. All syringe racks are hardened rolled steel and will not deform with pressure.



Chemically Resistive Anti-Glare Cover

Protection of the display is through a transparent anti-glare cover. The spill dam is designed to prevent fluids from ingressing into the sealed display.



No other syringe pump performs like the Legato™ Series. It offers a broad flow rate range along with superior accuracy and repeatability.

Advanced KDS Mechanical

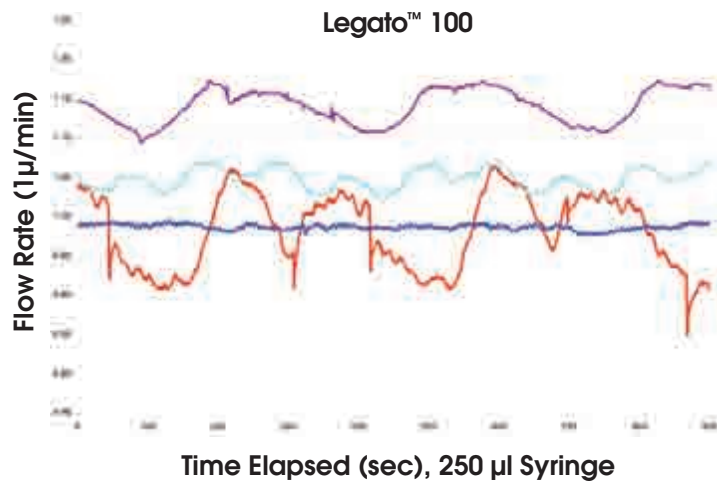
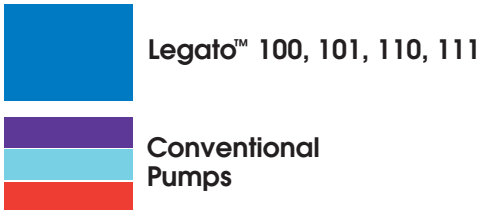
Legato's Superior Flow Performance

Flow performance is optimized with a small step angle microstepping motor that drives a precision lead screw and pusher block. Advanced micro-stepping techniques are employed to further reduce the step angle to eliminate flow pulsation. Legato's 200 Series accuracy is $\pm 0.35\%$ and has 0.05% reproducibility. A wide dynamic flow range from 5 $\mu\text{l}/\text{min}$ to 220.97 ml/min can be programmed into the pump. The Legato 100 Series has 0.5% accuracy and 0.05% reproducibility. Additionally, flow rates are user selectable with engineering units from ml , μl , nl , pl , and hours, minutes and seconds. Legato 180 is the ultimate picoliter flow pump. It has 0.35% accuracy and 0.05% reproducibility with a flow range from 0.58 $\mu\text{l}/\text{min}$ to 11.70 ml/min .

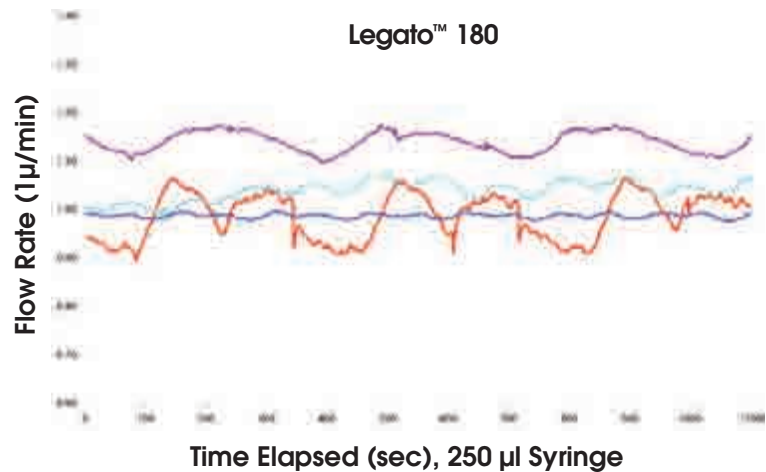
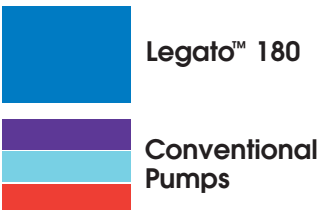


Design for Superior Flow Performance

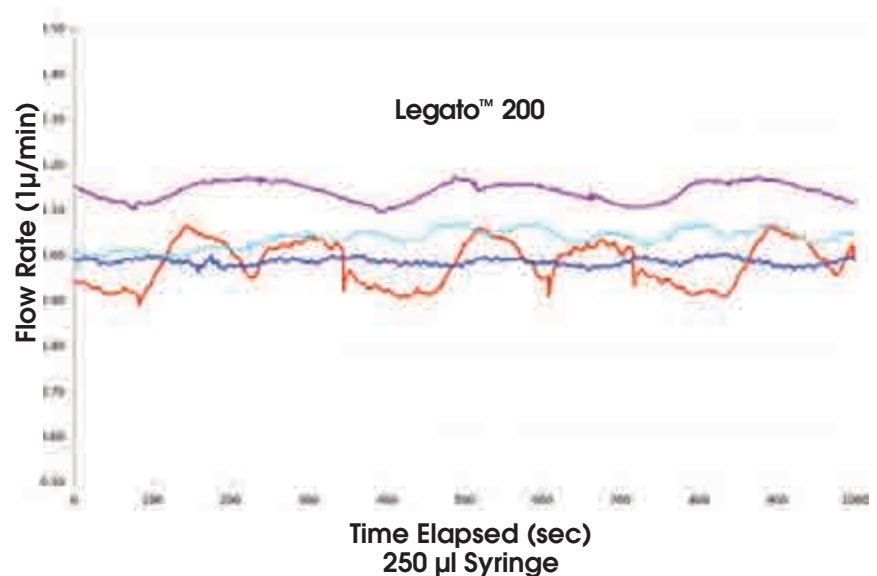
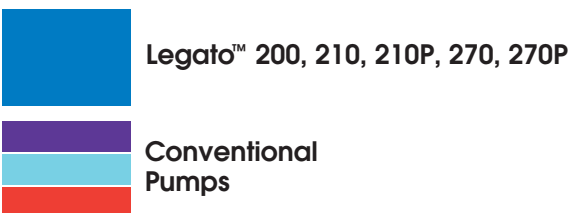
Legato™ 100 versus Conventional Syringe Pumps



Legato™ 180 versus Conventional Syringe Pumps



Legato™ 200 versus Conventional Syringe Pump



Legato™ is quick to configure; an easy to use screen shows all the parameters in one display. In four quick steps....

- 1** Select the Mode
- 2** Select the Syringe Size and Type
- 3** Select the Flow Rate
- 4** Select the Total Volume to be delivered or select the Total Time

A Fast Experimental Setup



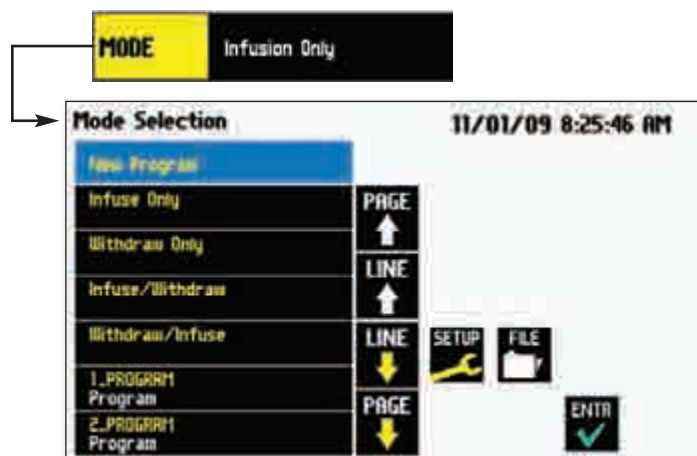
The interface Configuration Screen with simultaneous display of parameters makes experimental setup and execution as simple as a touch of the screen.



Step 1: Mode Selection

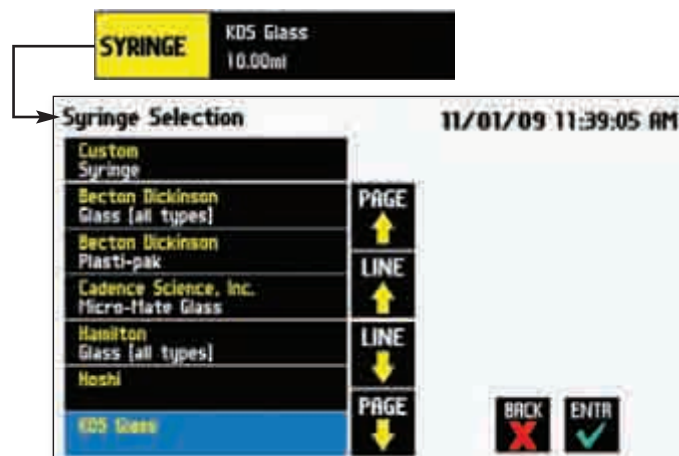
Depending on the model of pump, the unit can be configured to:

- Infuse Only
- Withdraw Only
- Infuse/Withdraw
- Infuse/Withdraw Continuous
- Infuse/Withdraw Programmable
- Withdraw/Infuse
- Withdraw/Infuse Programmable
- Define Your Own Custom Programs/Recipes



Step 2: Wide Range of Syringes

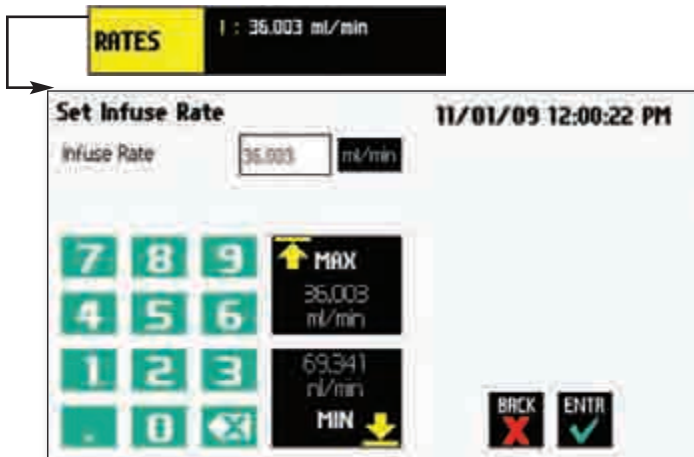
Use any manufacturers' syringes, from 0.5 μ l to 140 ml. Any type of syringe including glass, plastic and stainless steel syringes.



and Execution

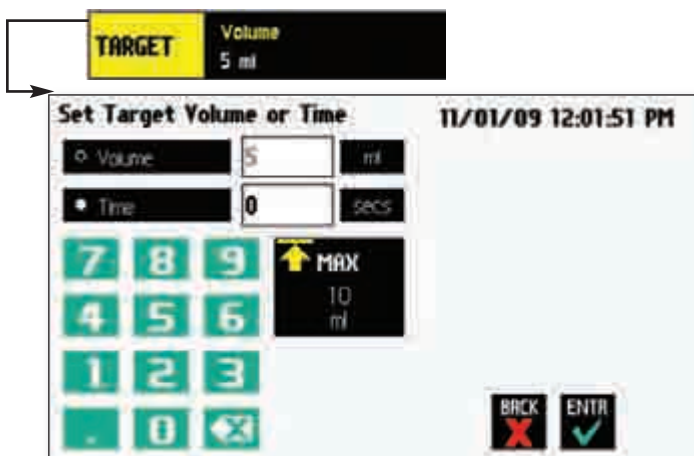
Step 3: Wide Flow Rate Range

Minimum and Maximum flow shown for each size of syringe.



Step 4: Selectable Target Volume & Time

Select the total volume from nl to ml. Units are selectable - or for infuse only, select the time.



Setup is Easy with Diagnostics and Pump Information

Select the parameters for the configuration and display the pump information. The Diagnostic Pump Information screen shows:

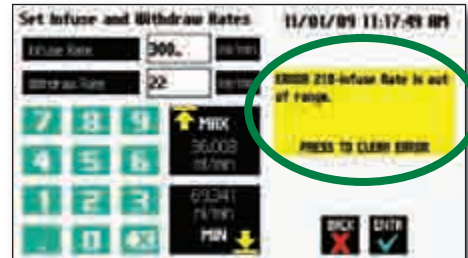
- The pump's parameters, including the calibration and maintenance dates.
- Messages indicating when it is time to recalibrate the unit or when it is time for regular maintenance.
- Pump software version, calibration & lubrication intervals.



(Legato 200 Series Shown)

Notifications and Error Messages

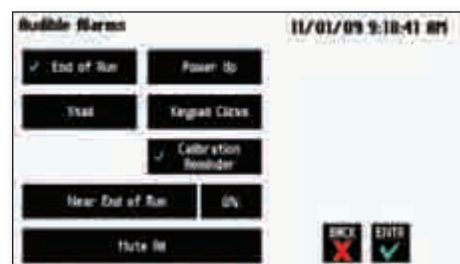
Notifications and error messages are displayed for the user to acknowledge, eliminating any guesswork about problems.



Legato™ Features 5 Different Alarms:

The pump's alarm configurability includes alarms for near-end of run (user selectable), completion of run, power-up, keypad clicks, stall detection and calibration reminder.

- End of Run
- Near End of Run
- Power Up
- Stalled Condition
- Calibration Reminder (Only available on the Legato 200 Series)



* All screens shown for the Legato 200 Series

Multiple users can use the programmable pump saving their specific configurations and recalling them with a touch of a button. Also, different tests can be setup and stored for quick operation. The Multi-step program models offer maximum flexibility and capability for configuring and running different programs/recipes.

Simple Configurations for Configure Custom Programs Quickly

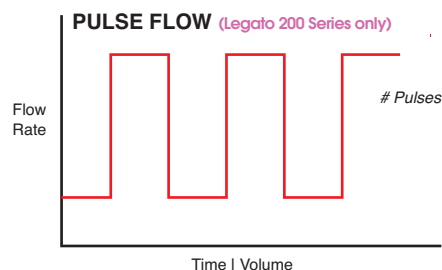
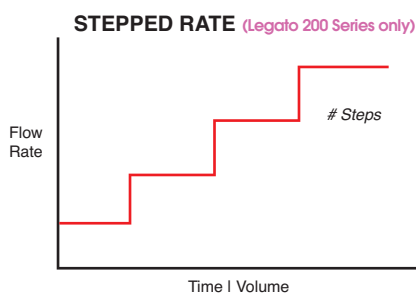
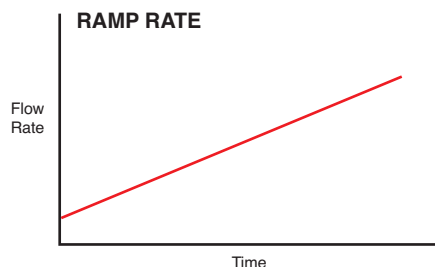
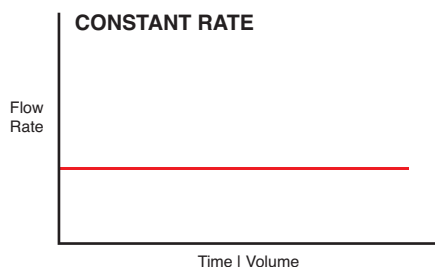
Standard profiles make custom programs easy to setup. If more complexity is needed the user can select from advanced preprogrammed functions including:

- **Constant Rate**
- **Ramp**
- **Stepped** (Legato 200 Series Only)
- **Pulse** (Legato 200 Series Only)



Pre-defined profiles for easy configuration.

- Easy retrieval of multiple programs with labels.
- Easy flow configuration with predefined functions such as ramp, constant rate, pulse, link, start, stop, and elapsed time.



- Control the programs through real and relative clock
- Legato 200 Series Programmable has up to 40 programs of 20 steps each that can be configured and stored in the unit; quickly recalling programs with the touch of a button.
- Legato 110, 111 & 180 have 2 programs with 50 steps each.
- Identify programs with a 15-character alphanumeric name for easy identification. Store custom programs on the computer and download at future dates.
- Start and stop programs with real time clock or using elapsed time (Real time clock with the Legato 200 Series only)

Linking and activating steps is easy with:

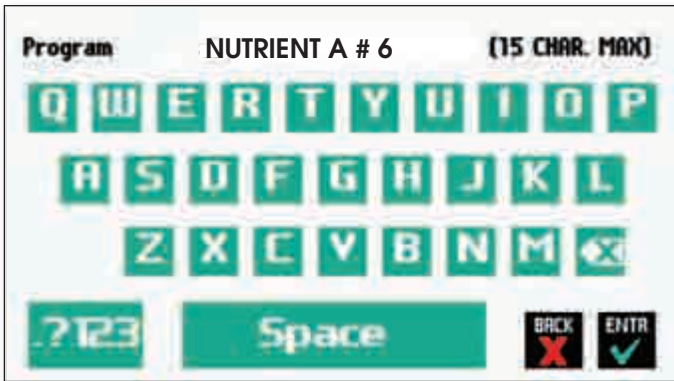


Trigger programs with pre-defined options.

- Go-To statements*
- Time Delays
- Repeating steps
- Linking different programs*
- Stopping the pump
- Triggering the pumps using TTL output
- Accepting an event input, such as a user touch or motor stall
- In addition, events can trigger the pump to withdraw or infuse

*Note: Only available with Legato 200 Series.

Routine & Complex Applications

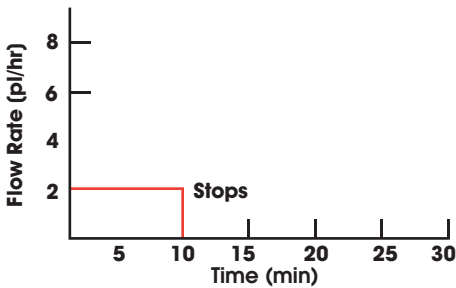


Unique labeling for each program.

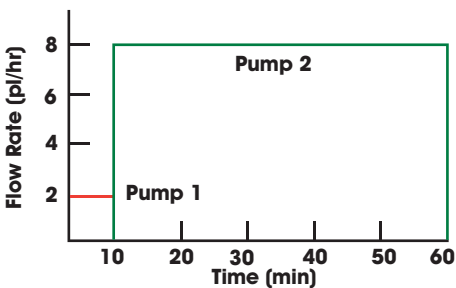
NAME: ORGANIC SYN 12

Infuse for 10 minutes at 2 pl/hr. Stop then, toggle Pump 2 to start infusing and pump at 8 pl/hr for 50 minutes.

Organic Syn 12 - Pump 1



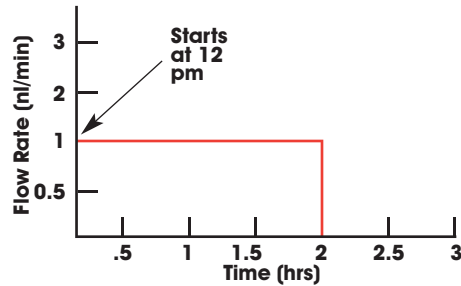
Organic Syn 12 - Pump 2



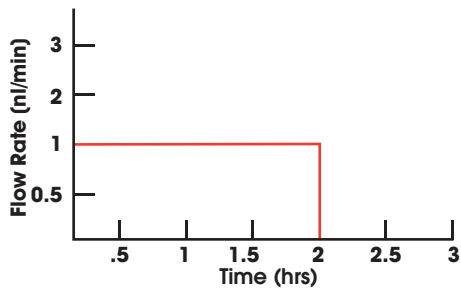
RECIPE NAME: DRUG 8302

Start on December 30 at 12:00 pm. Infuse at 1 nl/min for 2 hours every day at 12:00 pm for 2 days. Then stop.

Drug 8302 - Day 1



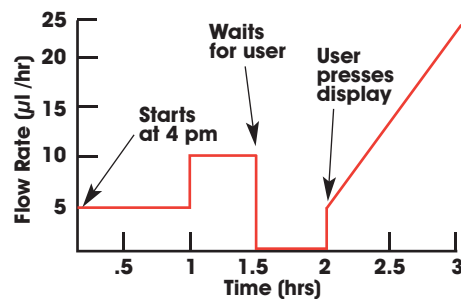
Drug 8302 - Day 2



RECIPE NAME: NUTRIENT A #6

A test begins at 4 pm and runs at a flow rate of 5 μ l/hr for 1 hour then goes to 10 μ l/hr for 30 minutes. Waits for the user to press the display then continues for 1 more hour ramping from 5 μ l/hr to 25 μ l/hr.

Nutrient A #6

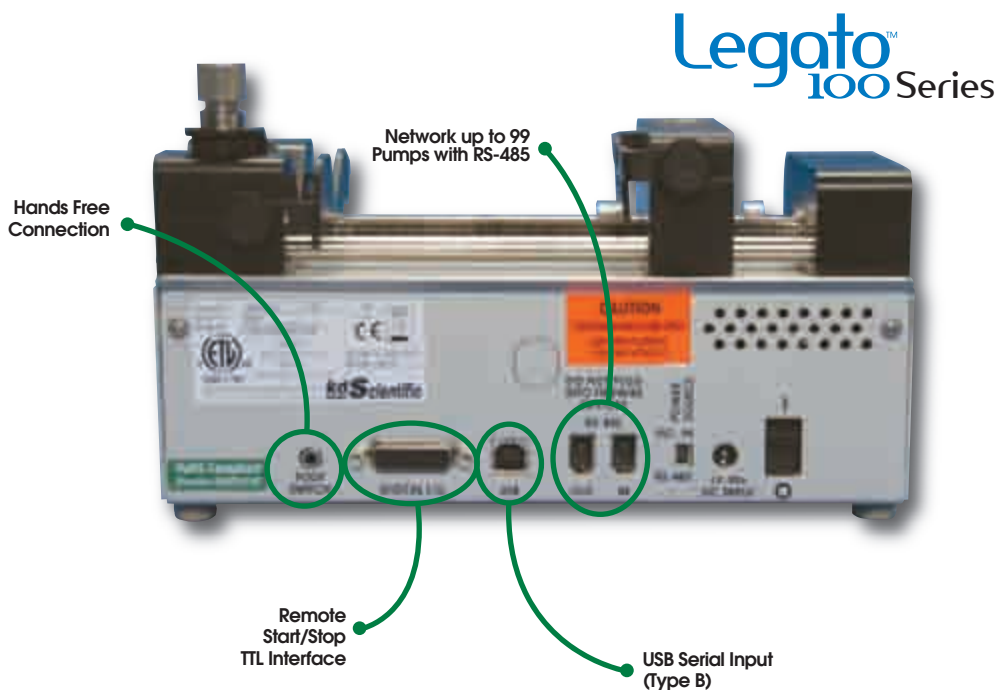
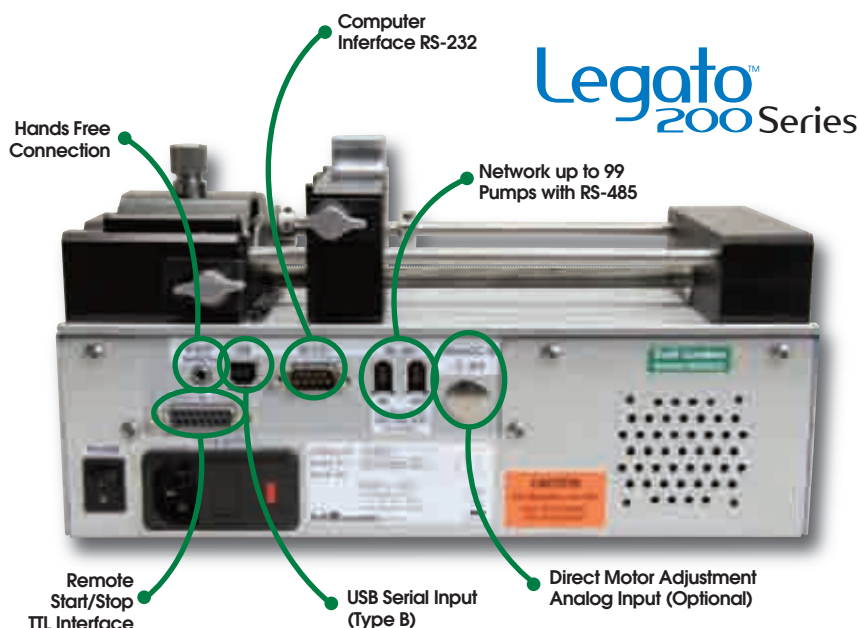


Easy external connections to a computer or other control devices are through USB interface or RS-232 (9 pin Dsub). Simple ASCII commands make communication with the pump easy. For direct control of the pump the user can use the I/O interface. (15 pin Dsub) Pump direction can be changed. Trigger input & output external events such as a process parameter is available. The footswitch input will allow the control of the pump through an external device. The unit also has an output for run indication allowing connection to a remote light.

The Legato's Versatility is

In Communication — Multi Pump Mode of Operation

The pumps are versatile and can be interconnected through the RS-485 interface. All Legato™ models can be mixed and matched in the daisy chain offering maximum flexibility. Up to 99 pumps can be linked together through the RS-485 interface. This interface is easy to use and each pump has its own unique pump address.



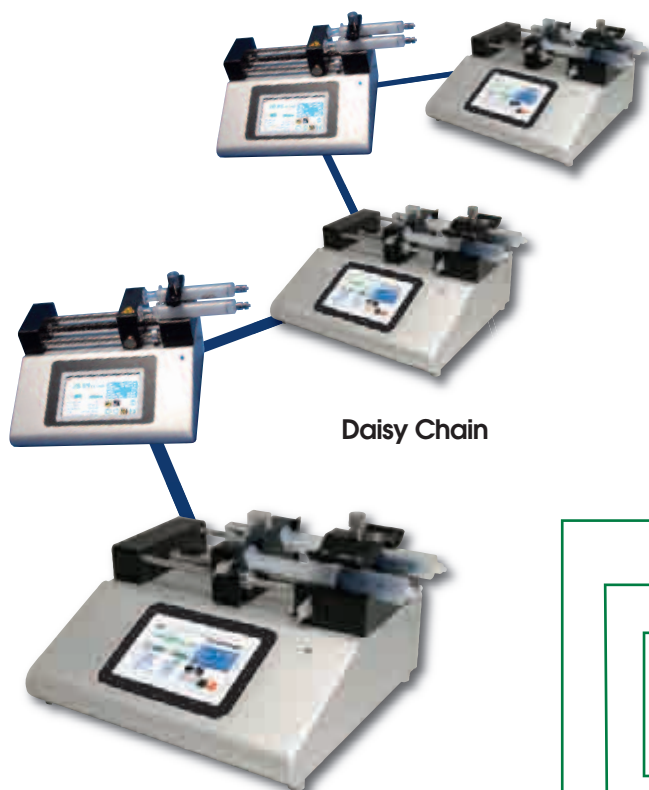
Second to None

Ensure the consistency and accuracy of programs with the ability to:

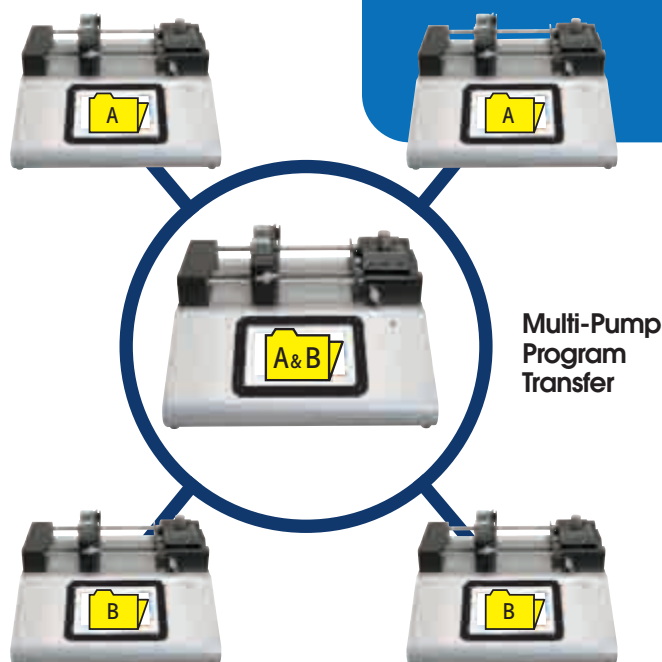
- export programs to a PC
- export a program to another pump
- duplicate programs
- append one program to another
- rename programs
- delete programs

Multiple tests are easy to run and control, as well as gradients, by linking up to 99 pumps together through the RS-485 interface. This interface is easy to use and each pump can be assigned its own unique pump address.

LEGATO™
SERIES



Daisy Chain



Multi-Pump
Program
Transfer

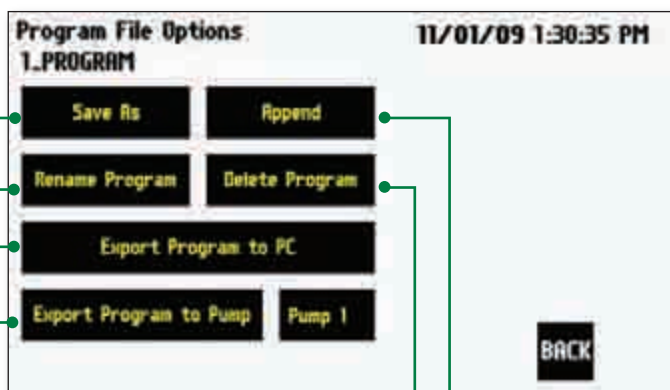
The Legato™ Series pumps permit the daisy chaining up to 99 pumps. To facilitate operation in these modes, the Legato™ Series application software includes a variety of commands designed to simplify the export/import of programs between the pump and external devices.

Mix and Match Legato™ 100 Series and 200 Series.

Transfer programs to a computer
(Legato 210P, 270P, 110, 111 & 180)

Rename Recipes

Store Configurations for easy recall



Manipulate programs quickly.

Ensure pump to
pump program
consistency

Attach a
configuration
to another
configuration

Delete configuration

The Legato™ 200 Series offers three basic pump models ensuring the right pump for your application.

- Infuse Only
- Infuse and Withdraw
- Continuous Push/Pull

The infuse and withdraw and push/pull pumps are available in a programmable version for maximum flexibility and capability. Each of the basic models works with one syringe or two and can be reconfigured in the field to use multiple syringes.

A Variety of Legato™ 200

Legato™ 200
Infuse Only
Syringe Pump



Legato™ 200

Dual Syringe Infusion Pump

Infuse Only Syringe Pump. Accommodates 2 syringes 0.5 μ l to 140 ml. User definable flow rates with selectable target volumes or time values to control the total infusion volume.

Legato™ 210 & 210P

Dual Syringe Infuse/Withdraw Pump & Multi-step Programming

Accommodates 2 syringes 0.5 μ l to 140 ml. This unit supports infuse only, withdraw only, infuse/withdraw, withdraw/infuse and continuous mode. User defined flow rates with selectable target volumes.

The Legato™ 210P features multi-step programming with user defined configurations/programs of up to 800 steps. Up to 40 programs of 20 steps each can be stored in memory.

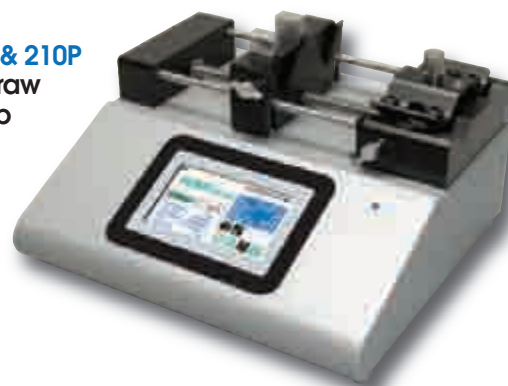
Legato™ 270 & 210P

Continuous Syringe Pump & Multi-step Programming

Push/Pull Syringe Pump. Accommodates 2 syringes 0.5 μ l to 140 ml for infusion and 2 syringes for withdrawal. This model supports infusion and withdrawal simultaneously at user defined flow rates and with selectable target volumes to control the total volume pumped. It also supports infuse only, withdraw only, infuse/withdraw, withdraw/infuse and continuous mode. User defined flow rates with selectable target volumes.

The Legato™ 270P Push/Pull Pump features multi-step programming with 40 custom programs of up to 20 steps each. Multiple programs can be stored in memory.

Legato™ 210 & 210P
Infuse/Withdraw
Syringe Pump



Legato™ 270 & 270P
Continuous Push/Pull
Syringe Pump



Series to Meet Your Needs

Large Syringe
Multi-Rack 4 x 140 ml



Small Syringe
Multi-Rack 6/10



Microliter
Syringe
Rack



Modular syringe racks can be purchased to create a multichannel syringe pump.

- Up to six 10 ml syringe rack
- Up to four 140 ml syringe rack
- Microliter syringe rack

Two options are available for the Legato™ Series. The analog input option which allows the analog control of the motor speed. By applying a 10 VDC max to the circuit, the motor speed can be varied. The second option is for an internal fan. These will be factory installed.

LEGATO™
SERIES

Small Syringe Multi-Rack

Option (78-8300)

The Small Syringe Multi-Rack option will accommodate up to six 30 to 60 ml syringes or up to ten 0.5 µl to 20 ml syringes. The rack will work with the Legato™ 200, Legato™ 210 or Legato™ 210P.

- Infuse/Withdraw 6/10 Multi-Rack
- Six 30 to 60 ml plastic syringes or ten 0.5 µl to 20 ml syringes
- Can be sold for Infuse Only as well

Large Syringe Multi-Rack

Option (78-8301)

The Large Syringe Multi-Rack option will accommodate up to four 60 to 140 ml plastic syringes. The field installable rack will work with the Legato™ 200, Legato™ 210 or Legato™ 210P.

- Infuse/Withdraw 4 x 140 Multi-Rack
- Four 60 to 140 ml syringes
- Can be sold for Infuse Only as well

Microliter Syringe Multi-Rack

Option (78-8302)

The Microliter Syringe Multi-Rack Option will accommodate up to four 0.5 µl to 10 ml syringes. The field installable rack will work with the Legato™ 200, Legato™ 210 or Legato™ 210P.

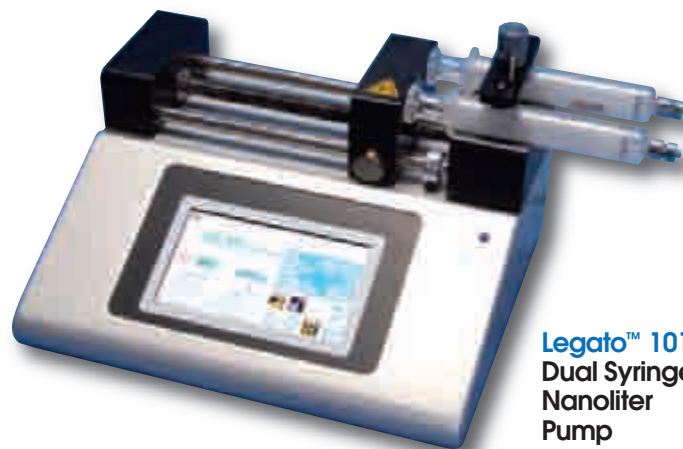
- Infuse/Withdraw Microliter Rack
- Four 0.5 µl to 10 ml syringes
- Can be sold for Infuse Only as well

The Legato 100 series is the latest generation of pumps from KD Scientific. This 100 series incorporates many of the features in the Legato 200 series including a touch screen graphic interface. The run screen has all the pump parameters, as well as, the pumps current running conditions including instantaneous flow rate, elapsed time and time remaining, total volume dispensed. Set up is easy using the icon driven software. Engineering units can be changed for the flow rate and volume dispensed. This is truly the next generation of entry level pumps.

A Variety of Legato™ 100



Legato™ 100
Single Syringe
Infusion Pump



Legato™ 101
Dual Syringe
Nanoliter
Pump



Legato™ 110
Single Syringe
Infuse/Withdraw
Pump

Legato™ 100

Single Syringe Infusion Pump

Entry level pump in the Legato series. This basic pump offers the same easy to use touch screen configuration and pump "run" screen as the more advanced Legato 200. This pump is ideal for electrospraying, nutrient feeding, mass spec calibration and other applications where a single syringe is used.

- Single syringe 0.5 μ l to 60 ml
- Wide flow range up to 88 ml/min

Legato™ 101

Dual Syringe Nanoliter Pump

This infusion only pump is ideal for surface plasma resonance,, organic synthesis, and other applications where a dual syringes are required with small volumes under 10 ml.

- Two syringes 0.5 μ l to 10 ml
- Minimum flow rate 1.280 pl/min for a 0.5 μ l syringe

Legato™ 110

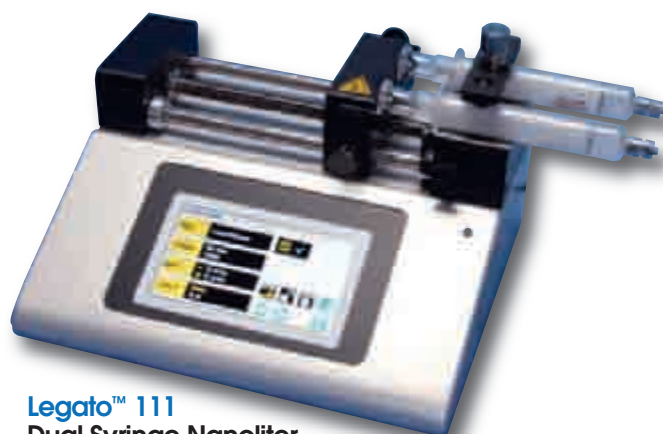
Single Syringe Infuse/Withdraw Pump

The Legato 110 is based on the Legato 100. It offers infuse/withdraw flow control and programmability for up to two multi-step programs of 50 steps each. This pump is ideal for more complex multi-step dosing and has multi-mode operation including infusion only, withdrawal only, infusion and withdrawal and withdrawal/infusion modes.

- Single Syringe 0.5 μ l to 60 ml
- Two Multi-step Programs
- Multi- mode operation

Series to Meet Your Needs

The Legato 111/130/180 offer the smoothest flow of all the Legato Pumps. Both pumps have multi-mode capability; including infusion only, withdraw only, infusion/withdrawal, withdrawal/infusion. They can be continuously operated repeating the infusion/withdrawal or the withdrawal/infusion modes.

LEGATO™
SERIES


Legato™ 111
Dual Syringe Nanoliter
Infuse/Withdraw Pump

Legato™ 111 Dual Syringe Nanoliter Infuse/Withdraw Pump

The Legato 111 is based on the Legato 101 and is enhanced with multimode capability like the Legato 110 and multi-step programming.

- Two syringes 0.5 μ l to 10 ml
- Minimum flow rate 1.280 pl/min for a 0.5 μ l syringe
- Two Multi-step Programs
- Multi-mode Operation

Legato™ 130 Single Syringe Nanoliter Infusion/Withdraw Pump

The Legato 130 works exclusively with micro syringes from 0.5 μ l to 1000 μ l. It has a remote pump head which can be placed close to the experiment to eliminate dead volume with long tubing. The remote pump head makes it ideal for use with a micromanipulator, stereotaxic and other clamping devices.

The syringe plunger can be tightly secured with a movable mounting screw, eliminating any movement of the syringe. The new fixed cable with the remote head to the controller ensures the pump head and the controller are secure.

- Remote Pump head
- 0.5 μ l to 1000 μ l syringes
- Minimum flow 3.66 pl/min (0.5 μ l syringe)
- Maximum flow 3.818 ml/min (1000 μ l syringe)

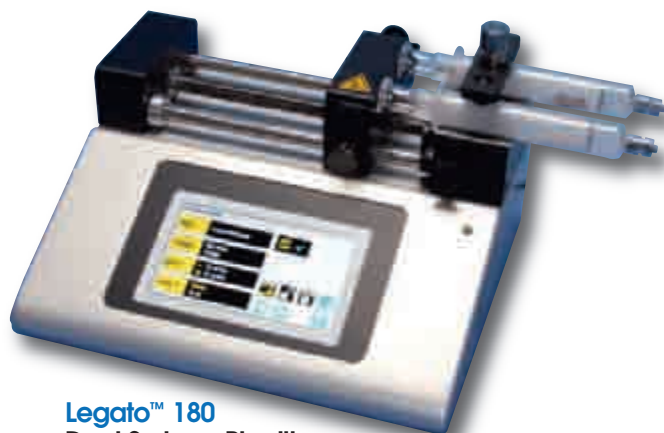
Legato™ 180 Dual Syringe Picoliter Infuse/Withdraw Pump

This pump is the ultimate in precision flow delivery. It offers the most stable flow delivery of all the Legato products. The Legato 180 has a finer lead screw and a different pulley ratio from the Legato 101/111. The Legato 180 offers multi-mode capability and 2 multi-step programs, each with 50 steps. The Legato 180 is the ideal pump for flow chemistry and small volume infusions or withdrawals of <10 ml.

- Two syringes 0.5 μ l to 10 ml
- Minimum flow rate 0.580 pl/min for a 0.5 μ l syringe
- +/-0.35% Accuracy
- Two Multi-step Programs
- Multi-mode Operation



Legato™ 130
Dual Syringe Nanoliter
Infuse/Withdraw Pump



Legato™ 180
Dual Syringe Picoliter
Infuse/Withdraw
Pump

Legato™ Series Specifications

	Infuse Only					
Legato Model	Legato 100	Legato 101	Legato 200	Legato 110	Legato 111	
Order code	78-8100	78-8101	78-8200	78-8110	78-8111	
Mode	Infuse Only	Infuse Only	Infuse Only	Infuse/Withdraw	Infuse/Withdraw	
# Syringes	One	Two	Two	One	Two	
Syringe Size	0.5 µl to 60 ml	0.5 µl to 10 ml	0.5 µl to 140 ml	0.5 µl to 60 ml	0.5 µl to 10 ml	
User Interface	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen	
Display	4.3" QVGA Display	4.3" QVGA Display	4.3" QVGA Display	4.3" QVGA Display	4.3" QVGA Display	
Accuracy	+/-0.5%	+/-0.5%	+/-0.35%	+/-0.5%	+/-0.5%	
Repeatability	+/-0.05%	+/-0.05%	+/-0.05%	+/-0.05%	+/-0.05%	
Linear Force	30 lbs/13.6kg	30 lbs/13.6kg	75 lbs (34 kg)	30 lbs/13.6kg	30 lbs/13.6kg	
Force Adjustment	Yes	Yes	Yes	Yes	Yes	
Minimum Flow Rate 0.5 µl Syringe	1.28 pl/min	1.28 pl/min	3.12 pl/min	1.28 pl/min	1.28 pl/min	
Maximum Flow Rate 10 ml Syringe	25.99 ml/min	25.99 ml/min	31.190 ml/min	25.99 ml/min	25.99 ml/min	
Maximum Flow Rate 60 ml Syringe	88.28 ml/min	88.28 ml/min	105 ml/min	88.28 ml/min	88.28 ml/min	
Drive Motor	0.9" Stepper Motor	0.9" Stepper Motor	1.8" Stepper Motor	0.9" Stepper Motor	0.9" Stepper Motor	
Microprocessor Motor Drive Control	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	
# microsteps/one revolution of lead screw	15360	15360	6400	15360	15360	
Advance per Microstep	0.069 µm/ustep	0.069 µm/ustep	0.1656 µm/µstep	0.069 µm/µstep	0.069 µm/µstep	
Min Step Rate	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep	
Max. Step Rate	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	
Pusher Travel Rate						
Minimum	0.15 µm/min	0.15 µm/min	0.36 µm/min	0.15 µm/min	0.15 µm/min	
Maximum	159 mm/min	159 mm/min	190.8 mm/min	159 mm/min	159 mm/min	
Multi-step Programming	N/A	N/A	N/A	2 Programs/50 steps each	2 Programs/50 steps each	
Constant Rate				Yes	Yes	
Ramp				Yes	Yes	
Pulsed				No	No	
Stepped				No	No	
Program Export/Import				Yes	Yes	
Pusher Block Stall Detection	Yes	Yes	Yes	Yes	Yes	
Computer Interface	USB	USB	USB/RS-232	USB	USB	
TTL	Yes	Yes	Yes	Yes	Yes	
Networking	RS-485	RS-485	RS-485	RS-485	RS-485	
Real Time Clock	No	No	Yes	No	No	
External Triggers	One	One	Two	One	One	
Analog Output	No	No	Yes (option)	No	No	
Footswitch Interface	Yes	Yes	Yes	Yes	Yes	
Maintenance Reminder	Yes	Yes	Yes	Yes	Yes	
Calibration Reminder	No	No	Yes	No	No	
Password Lock	Yes	Yes	Yes	Yes	Yes	
Audible Alarm Indication	Yes	Yes	Yes	Yes	Yes	
Display Rotation	Manual Selection	Manual Selection	Automatic	Manual Selection	Manual Selection	
Multisyringe Rack Accessories	No	No	Yes	No	No	
Run LED	Blue	Blue	Blue	Blue	Blue	
Power	12-32 VDC	12-32 VDC	100/240 VAC 50/60 Hz	12-32 VDC	12-32 VDC	
Weight	2.66 kg/5.9 lbs	2.66 kg/5.9 lbs	4.9 kg/10.97 lbs	2.66 kg/5.9 lbs	2.66 kg/5.9 lbs	
Dimensions (in)	9 x 7.5 x 5	9 x 7.5 x 5	3.5 x 10 x 11	9 x 7.5 x 5	9 x 7.5 x 5	
Dimensions (cm)	22.6 x 19.05 x 15	22.6 x 19.05 x 15	8.89 x 25.4 x 27.94	22.6 x 19.05 x 15	22.6 x 19.05 x 15	
Certifications						
CE, ETL, UL, CSA, CB Scheme	Yes	Yes	Yes	Yes	Yes	
EN 61010, EN 61326	Yes	Yes	Yes	Yes	Yes	
WEEE, EU RoHS	Compliant	Compliant	Compliant	Compliant	Compliant	

Legato Series

Infuse/ Withdraw Pumps					Continuous Cycle Pump	
	Legato 180	Legato 130	Legato 210	Legato 210P	Legato 270	Legato 270P
	78-8180	78-8130	78-8210	788212	78-8270	78-8272
	Infuse/Withdraw	Infuse/Withdraw	Infuse/Withdraw	Infuse/Withdraw	Infuse/Withdraw/Continuous	Infuse/Withdraw/Continuous
	Two	One	Two	Two	Two and Two (Four total)	Two and Two (Four total)
	0.5 µl to 10 ml	0.5 µl to 1 ml	0.5 µl to 140 ml	0.5 µl to 140 ml	0.5 µl to 140 ml	0.5 µl to 140 ml
	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen
	4.3" QVGA Display	4.3" QVGA Display	4.3" QVGA Display	4.3" QVGA Display	4.3" QVGA Display	4.3" QVGA Display
	+/-0.35%	+/-0.5%	+/-0.35%	+/-0.35%	+/-0.35%	+/-0.35%
	+/-0.05%	+/-0.05%	+/-0.05%	+/-0.05%	+/-0.05%	+/-0.05%
	30 lbs/13.6kg	11 lbs/5kg	75 lbs (34 kg)	75 lbs (34 kg)	75 lbs (34 kg)	75 lbs (34 kg)
	Yes	Yes	Yes	Yes	Yes	Yes
	0.58 pl/min	3.66 pl/min	3.12 pl/min	3.12 pl/min	5 pl/min	5 pl/min
	11.7 ml/min	3.818 ml/min (1ml syringe)	31.190 ml/min	31.190 ml/min	31.190 ml/min	31.190 ml/min
	N/A	N/A	105 ml/min	105 ml/min	105 ml/min	105 ml/min
	0.9" Stepper Motor	1.8" Stepper Motor	1.8" Stepper Motor	1.8" Stepper Motor	1.8" Stepper Motor	1.8" Stepper Motor
	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping
	20480	3200	6400	6400	6400	6400
	0.031 µm/µstep	0.198 µm/µstep	0.1656 µm/µstep	0.1656 µm/µstep	0.1656 µm/µstep	0.1656 µm/µstep
	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep
	26 µsec/µstep	52 µsec/µstep	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep
	0.02 µm/min	0.433 µm/min	0.36 µm/min	0.36 µm/min	0.36 µm/min	0.36 µm/min
	71.55 mm/min	228.97 mm/min	190.8 mm/min	190.8 mm/min	190.8 mm/min	190.8 mm/min
	2 Programs/50 steps each	2 Programs/50 steps each	N/A	40 Programs/20 steps each	N/A	40 Programs/20 steps each
	Yes	Yes		Yes		yes
	Yes	Yes		Yes		yes
	No	No		Yes		yes
	No	No		Yes		yes
	Yes	Yes		Yes		yes
	Yes	Yes	Yes	Yes	Yes	Yes
	USB	USB	USB/RS-232	USB/RS-232	USB/RS-232	USB/RS-232
	Yes	Yes	Yes	Yes	Yes	Yes
	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485
	No	No	Yes	Yes	Yes	Yes
	One	One	Two	Two	Two	Two
	No	No	Yes (option)	Yes (option)	Yes (option)	Yes (option)
	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes
	No	No	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	yes
	Manual Selection	Manual Selection	Automatic	Automatic	Automatic	Automatic
	No	No	Yes	Yes	Yes	Yes
	Green	Blue	Blue	Blue	Blue	Blue
	12-32 VDC	12-32 VDC	100/240 VAC 50/60 Hz	100/240 VAC 50/60 Hz	100/240 VAC 50/60 Hz	100/240 VAC 50/60 Hz
	2.66 kg/5.9 lbs	1.96 kg/4.32 lbs	4.9 kg/10.97 lbs	4.9 kg/10.97 lbs	4.9 kg/10.97 lbs	4.9 kg/10.97 lbs
	9 x 7.5 x 5	9 x 7.5 x 3.67	3.5 x 10 x 11	3.5 x 10 x 11	3.5 x 10 x 11	3.5 x 10 x 11
	22.6 x 19.05 x 15	22.6 x 19.05 x 9.32	8.89 x 25.4 x 27.94	8.89 x 25.4 x 27.94	8.89 x 25.4 x 27.94	8.89 x 25.4 x 27.94
	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes
	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant

The Adagio™ Graphic Software adds a new dimension to pump control. Issue manual pump commands or run the pumps automatically with multistep programs. Works with the entire Legato 200 and 100 pump series. Adagio Pump Software – Enhances the Legato Pumps Use.

Adagio™ will allow you to configure the pump through the software as well as operate one or multiple pumps. Programs can be executed as a tabular data drive spreadsheet or as a graphical. Control up to 50 pumps with the Legato 200 series and up to 20 pumps with the Legato 100 series. Pumps can be mixed or matched.

Adagio™ has been designed to maximize the use of the pumps functions and features and does not require knowledge of software programming.

Introducing the all NEW



Adagio's versatile functionality will allow you to:

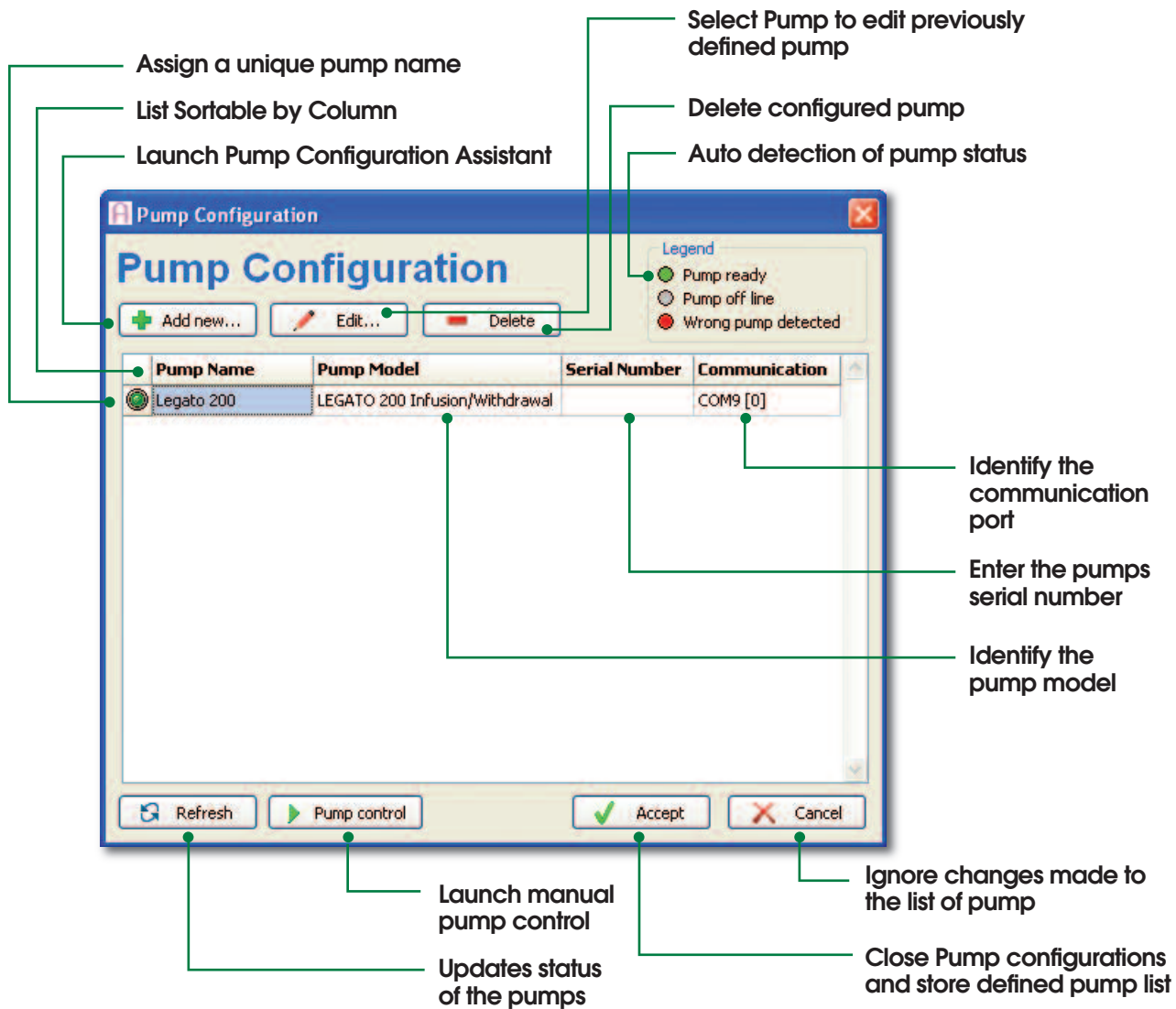
- Track multiple pumps by serial number and unique name
- Data log and store program information
- Store multiple programs by name
- Define and execute programs in the Adagio Software
- Independent Manual Pump Control Program
- Graphic Interface or Tabular data interface
- Automatic pump communicator program
- Start/Stop/Reset programs in multiple pumps
- View pumps flow profile in multiple windows

Computer requirements include:

- 2 Ghz Pentium processor or higher
- 512 MB of RAM (1 GB recommended)
- Windows XP SP3 or Vista (XP recommended)
- Free RS232 or USB 2.0 ports
- Microsoft Excel 97 or higher.

Adagio™ Syringe Pump Software

Adagio is easy-to-use with a
Automatic Configuration Assistant



Define the Pump Configuration

Connect the pumps to the computer.

Auto Checks the Pump
Model & Identification

Pump Configuration Assistant

Pump Configuration

Pump Name:

Serial Number:

Com Port: Pump Address:

☐ Try to detect baud rate if default fails

Enter A Unique
Name

Enter Pump
Serial Number

Legato Pump
Address

Enter
Communication
Port Baud Rate

Lists All Available
Communication
Ports

Pump Configuration Assistant

Pump Configuration

Select specific pump model:

Min. Flow:

Max. Flow:

Pump Configuration Assistant

Pump Configuration

Select specific pump model:

Min. Flow:

Max. Flow:

Quick & Easy Manual Pump Control

The manual pump control tool allows easy direct control of the pump.

Legato 200.0 - COM9 [0] - Manual Pump Control

Syringe Data

Select the syringe model mounted in the pump:

Syringe Diameter: **4.8 mm**

Min. Flow: **6.677 nl/min**

Max. Flow: **3.444 ml/min**

Pump Control

Flow rate: Flow units:

100.000 nl/min

Command Log

Select Syringe Type & Size

Define Flow Rate

Stop Pump

Select Flow Direction

Time Stamped Log
of Commands

Easily Accessible Programs List

Manage programs easily. Programs are stored in a list and can be easily retrieved.

Unique program name up to 255 characters

Sortable by columns

Duplicate Programs

Total Volume Infused

Date Program last modified

Program Duration

Total Number of Program Step

Identifies Legato Model

Edit Existing Programs

Method Name /	Pump Model	# of Steps	Total Duration	Total Volume	Modified
Program 1	LEGATO 200	2	00:33:20	0.000 pl	8/3/2010
Ramp	LEGATO 200	1	00:13:19	13.317 ul	8/3/2010

Program Definition

Easily configure multiple steps in the programs by dragging the cursor or in table format

Pump Duration Meter

Flow Rate Zoom In & Out

Two different program displays (Graph or Table)

Select Syringe Type and Size

Select a pump

Name the Program

Loop steps

Describe the Program

Maximum and Minimum flow indicator for syringe size

Start flow marker

Time Zoom In & Out

Indicates information where the cursor is pointed

Infuse

Withdraw

Method Flow Tracker

Flow rate (ml/min)

Time (Minutes)

Flow: 0.000 µl/hr Duration: 00:00:01 Volume: 223.300 ul Rec Vol: 250.000 ul

Graph View

Spreadsheet View

Method name: Program 1

Modified Date:

Created Date:

Method description:

Pump model:

of Syringes: 1

Syringe model: Becton Dickinson

Flow units: ul

Max. flow rate: 100.000 ul/min

Min. flow rate: 200.000 ul/min

Loop properties:

Enable loop

From Step 1

To Step 2

iterations: 0000

Spreadsheet View to See Program in a Table Format

Enter Parameters in a table format

Flow Direction

Start and End Flow Rate

Program Name

Method Setup - [Program 1]

Method name: **Program 1** Modified Date: 8/3/2010 Created Date: 7/28/2010 Method description:

Pump model: LEGATO 200 Infusion/Withdrawal with Dual Syringe

of Syringes: 1 Syringe model: Becton Dickinson Plasti-pak 50 ml | 2 Flow units: ml min Max. flow rate: 105.730 ml/min Min. flow rate: 204.958 nl/min # Iterations: 1000

Loop properties: ☒ Enable loop From Step 1 To Step 2

Graph View Spreadsheet View

Step #	Start Rate	End Rate	Flow	Step	Step Time	Acc. Time	Step Volume	Acc. Volume
1	90.000 ml/min	90.000 ml/min	I	1000	00:00:01	00:00:01	1.500 ml	1.500 ml
2	90.000 ml/min	90.000 ml/min	W	1000	00:00:01	00:00:02	-1.500 ml	0.000 pl
TOTAL	-	-	-	-	-	00:33:20	-	0.000 pl

Accept Cancel

Total Volume

Step Volume

Adding Step is Easy

Manually enter the step information or drag and drop the duration marker on the graph.

Step editor [Step 4]

Step values Accumulated values

Volume: 21.649 ml

Start flow: ☒ Same as end flow of previous step 15.000 ml/min

End flow: 16.300 ml/min

Duration: 00:01:23 (hh:mm:ss)

OK Cancel

Selectable
Step Volume

Start/End
Flow Rate

Duration of
the Step

Step editor [Step 4]

Step values Accumulated values

Volume: 372.074 ml

Time: 00:10:55 (hh:mm:ss)

OK Cancel

Accumulated Time

Accumulated Volume

Multiple Pump Control

Start/Stop/Pause programs from the method execution display.

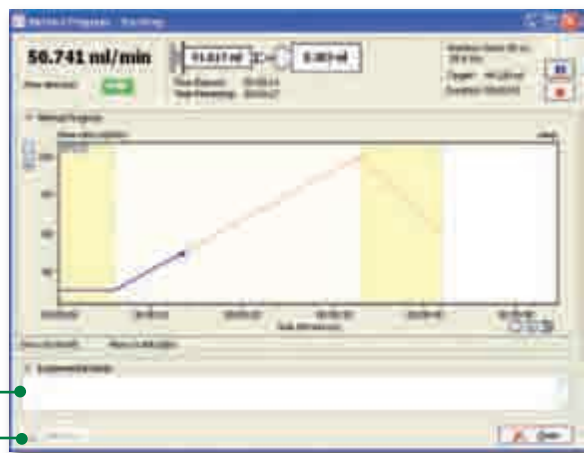
The screenshot shows the 'Method Execution' window with a table of pump data and control buttons. The table has columns: Method, Pump name, Current flow, Elapsed Time, Progress, Duration, Status, and Individual Pump Control. The 'Individual Pump Control' column contains buttons for Start, Stop, and Reset. The 'Status' column shows 'Stopped' for both pumps. The 'Progress' column shows '0%' for both pumps. The 'Duration' column shows '00:00:00' for both pumps. The 'Elapsed Time' column shows '00:00:00' for both pumps. The 'Current flow' column shows '0.00 units' for both pumps. The 'Pump name' column shows 'Pump' and 'P2'. The 'Method' column shows '<None>' for both pumps.

Labels pointing to the screenshot:

- Pump Name
- Program Name
- Control individual or all pumps simultaneously
- Current Pump Status
- Total Program Duration
- Program Progress (0 to 100%)
- Elapsed Program Time
- Current Flow Rate with Pump Direction

Monitor One or More Pumps

Multiple programs can be opened at the same time the programs progression is tracked and can be stored in a file for later access.



- Log the data to a file. *.bmp, *.xls or *.txt
- Add a comment to the test

Data Logging

Data can be stored in a file. Selectable formats include *.bmp, *.xls or *.txt. Comments in the text can be manually entered and will be stored in the data file.

Pump parameters are stored as well as an event record table.

Pump Parameters

- Start time
- Name of the program executed
- Pump, rack and syringe models used
- Total duration of the program execution (in format hh:mm:ss)
- Total volume infused (accumulated positive flows)
- Total volume withdrawn (accumulated negative flows)
- Total volume disposed by the program (difference between infused and withdrawn)
- Flow units considered