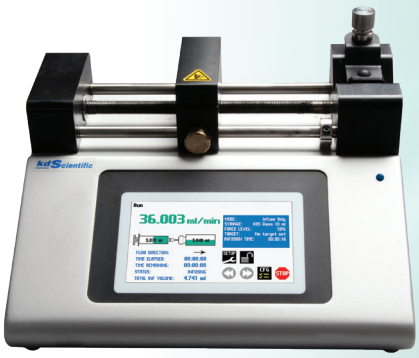
Syringe Pumps and Dispensers

So advanced, they're simple



Agence Nord:
ZA Object'Ifs Sud - Lot A3
6 Allée Emilie du Châtelet
14123 Ifs
tél : 02.31.34.50.74
fax : 02.31.34.55.17

Agence Est:
Parc Club des Tanneries
2 Rue de la Faisanderie
67380 Lingolsheim
tél : 03.88.04.01.81
fax : 03.68.93.01.52

Agence Sud:
Bât Le Venango. 392 Rue Jean Dausset
AGROPARC - BP11575
84916 Avignon Cédex 9
tél : 04.90.27.17.95 fax : 04.90.27.17.52

DELTA LABO

www.deltalabo.fr
info@deltalabo.fr

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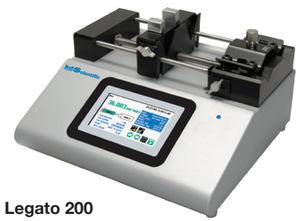
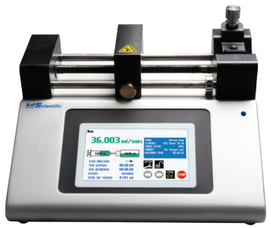


Legato 200

Hamilton®
GASTIGHT® Syringes

Legato
950 OEM Module



Legato 100

Gemini 88 Plus

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
- Considerability 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
- Worldwide 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.

Legacy Series,
See pages 28-32

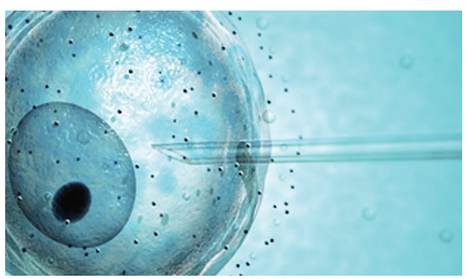
Legato® Series
See pages 6-21

KD Scientific syringe pumps are for research purposes only. Not for use on humans.

Extensive Applications

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**

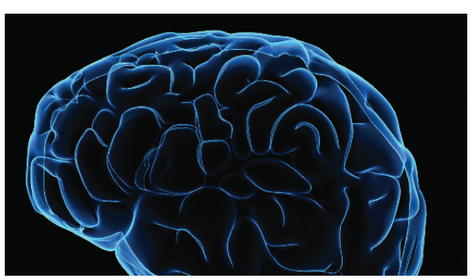
- Calibration
- Diluting
- Dispensing
- Dosing
- Emulsification
- Fluid Transfer
- Infusion of Fluids
- Mixing
- Perfusion
- Timed Delivery
- Slow Infusion
- Withdrawal of Fluids
- Volumetric Dispensing
- MS Calibration
- Microfluidics/ Microfluidic Channel Injections
- Surface Plasma Resonance
- Biotech Research and Development
- Drug Discovery
- Neuroscience
- Organic Synthesis
- Aerosol Injection/Nebulization
- Agriculture
- Animal Drug/Nutrient Injections
- Automotive Research
- Cell Injections
- Chemical Development
- Pilot Plant Reactor Dosing
- Continuous Flow
- Dye Dilution
- Dye/Isotope Injection
- Electrospinning
- Emulsion Polymerization
- Entomology
- Epoxy & Adhesive Dispensing
- Geological Sampling
- Isotope Injections
- Liquid Chromatography Injections

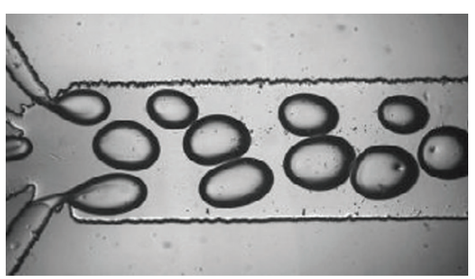


Extensive Applications, cont.

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**

- 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
- Flow Chemistry
- Reagent Addition
- Thermogravimetric Analysis
- Humidity Tests
- Water Moisture Tests
- Catalyst Addition
- Homogenizers
- Organic Synthesis
- Auto Titrator





Legato® Series: The Newest Benchmark for Ease of Use

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

- 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.

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 want the flexibility of changing syringe mechanisms 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.

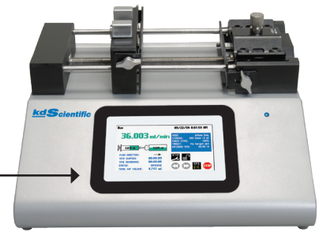
Engineered to Meet Global Regulatory Compliance

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 · CE · ETL LISTED · Underwriters Laboratories · RoHS · CB Scheme

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 four times. The display orientation changes automatically with the Legato Series.

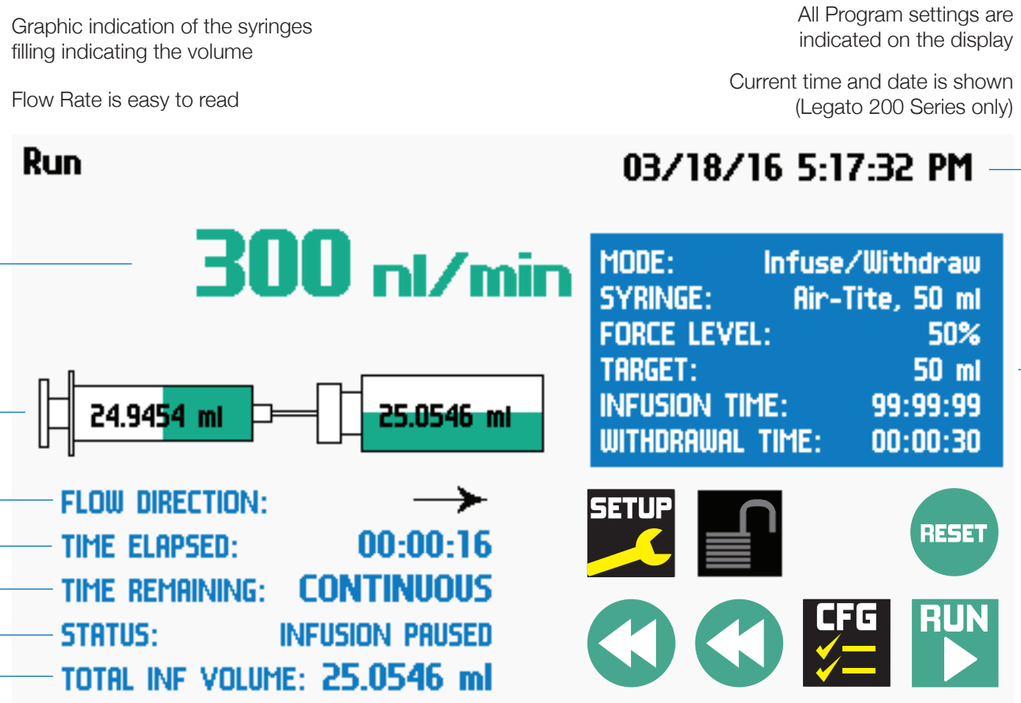


Horizontal Orientation

Vertical Orientation
Display Rotates 90°

Intuitive Run Screen

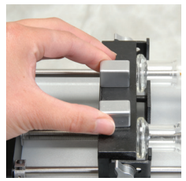
Combining multiple parameters simultaneously with internationally recognizable icons allow the Legato Series to provide a new level of intuitive syringe pump operation.



A Rugged Design, Maximum Performance and Reliability

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.

- Displays more information simultaneously
- Easy to use and set up different configurations
- Intuitive Graphic Interface and Touch Screen
- International Icons, make it easy to use in any language
- Alarm Indication and Messages
- Pump Diagnostic/Information
- USB Interface
- Graphic Software to configure and monitor the pumps



Quick Release Pusher Block

No Stick Metal Guide Rods

Clamp Flips Multi-Size Syringes

Transparent Cover and sealed to Protect Display

Quick Release Pusher Block

Spill Dams to Contain Leaks

Easy-to-Use Graphic Icons

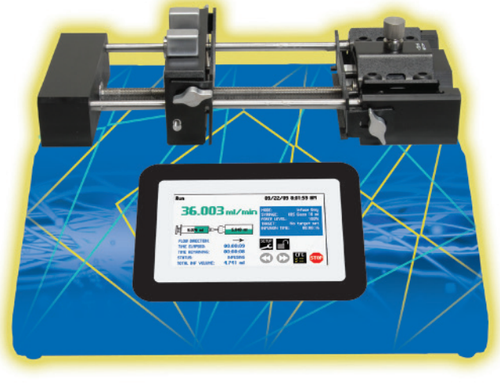
Durable Construction with Welded Metal Chassis

Less Vibration & Deformation

The welded steel chassis outperform 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.

Advanced KDS Mechanical Design for Superior Flow Performance

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

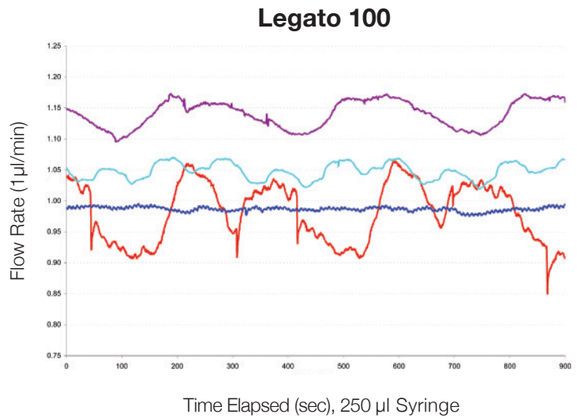
Legato® Superior Flow Performance

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 +/-0.35%. A wide dynamic flow range from 3.06 pl/min to 215.8 ml/min can be programmed into the pump. The Legato 100 Series has 0.5% accuracy. Additionally, flow rates are user selectable with engineering units from ml, µl, nl, pl, and hours, minutes and seconds. The Legato 180 is the ultimate picoliter pump and is ideal for microfluidic applications.

Legato 100 versus Conventional Syringe Pumps

Legato 100, 101, 110, 111

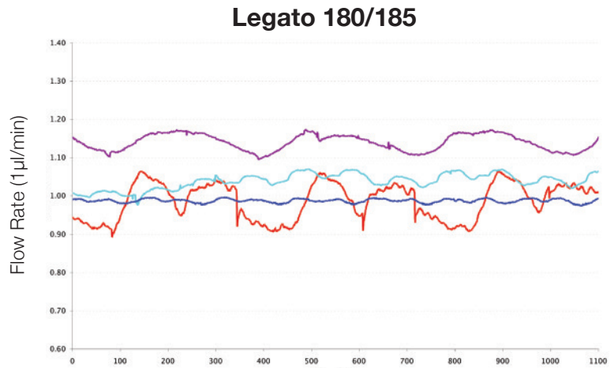
Conventional Pumps



Legato 180/185 versus Conventional Syringe Pumps

Legato 180/185

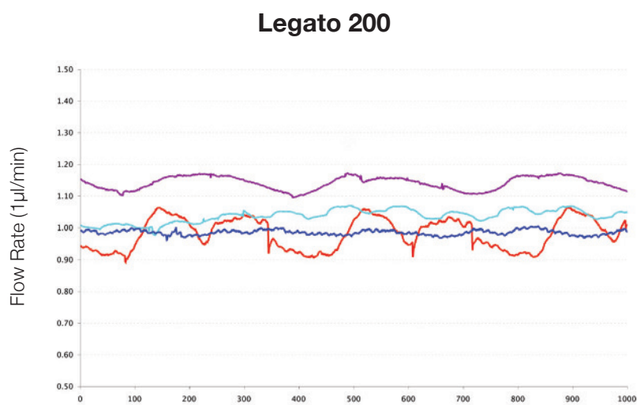
Conventional Pumps



Legato 200 versus Conventional Syringe Pumps

Legato 200, 210, 210P, 270, 270P

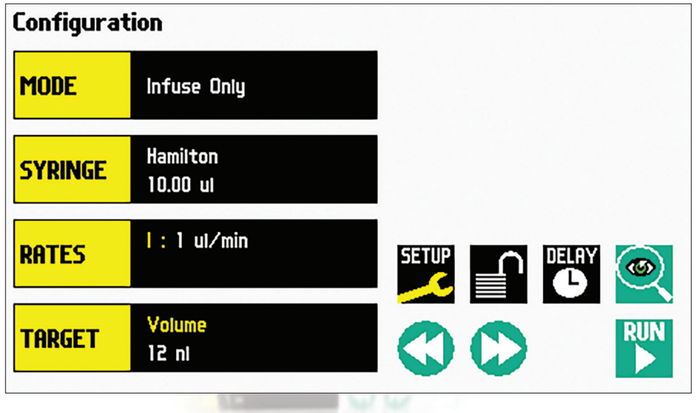
Conventional Pumps



A Fast Experimental Setup and Execution

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

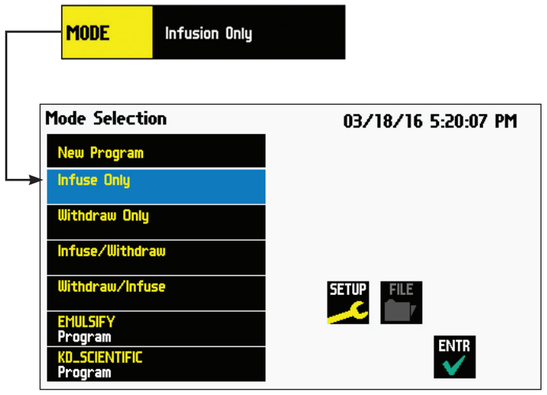


The interface Configuration Screen with simultaneous display of parameters makes experimental setup and execution as simple as a touch of the screen.

Step 1: Mode Selection

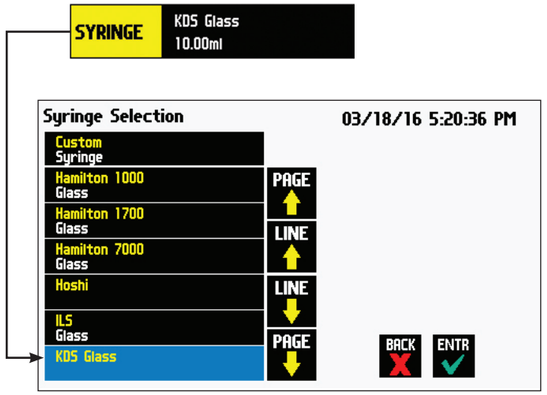
Depending on the model of pump, the unit can be configured to:

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



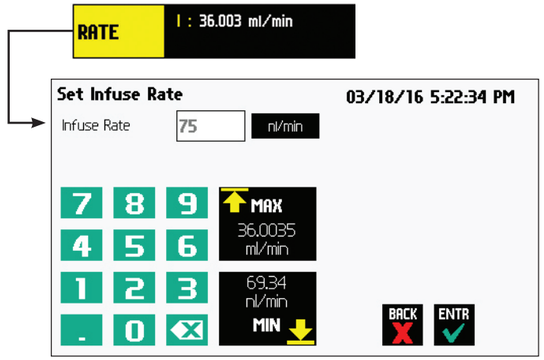
Step 2: Wide Range of Syringes

Most manufacturers' syringes, from 0.5 µl to 140 ml. Any type of syringe including glass, plastic and stainless steel syringes.



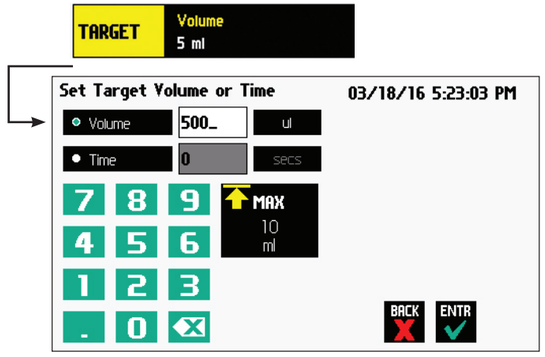
Step 3: Wide Flow Rate Range

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.

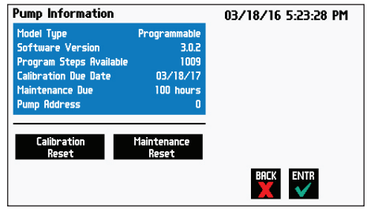


***All screens shown for the Legato 200 Series**

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:

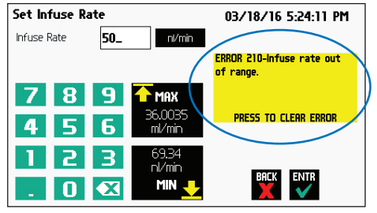
- The pump's parameters, including the calibration and maintenance dates.
- Messages indicating when it is time to recalibrate the unit or when it is time for regular maintenance.
- Pump software version, calibration and lubrication intervals.



Legato 200 Series

Notifications and Error Messages

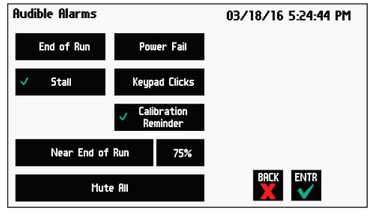
Notifications and error messages are displayed for the user to acknowledge, eliminating any guesswork about problems.



Legato Features 5 Different Alarms:

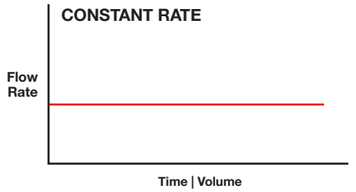
The pump's alarm configurability includes alarms for near-end of run (user selectable), completion of run, power-up, keypad clicks, stall detection and calibration reminder.

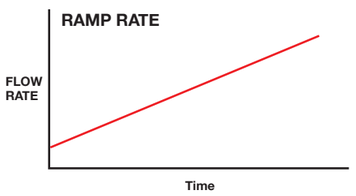
- End of Run
- Near End of Run
- Power Fail
- Stalled Condition
- Calibration Reminder
  (Only available on the Legato 200 Series)

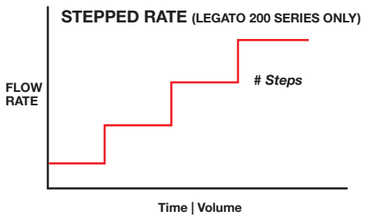


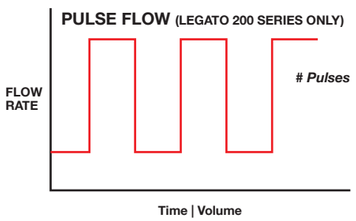
Simple Configurations for Routine & Complex Applications

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 multistep program models offer maximum flexibility and capability for configuring and running different programs/recipes.





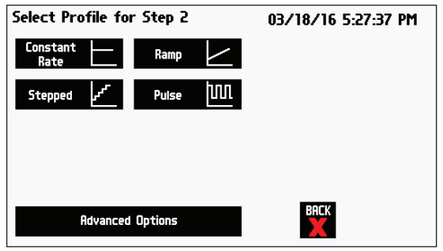




Configure Custom Programs Quickly

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)

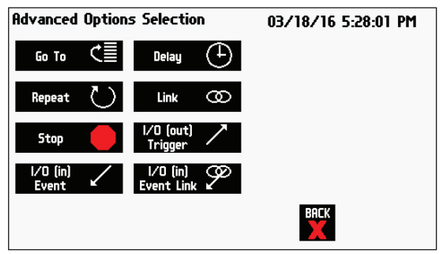


Pre-defined profiles for easy configuration.

- 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.
- Easy retrieval of multiple programs with labels.

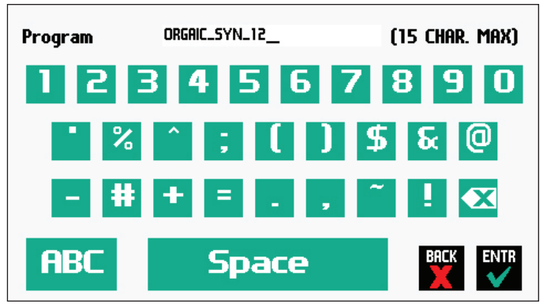
- Easy flow configuration with predefined functions such as ramp, constant rate, pulse, link, start, stop, and elapsed time.
- Control the programs through real and relative clock.
- Legato 200 Series Programmable has up to 40 programs of 20 steps each that can be configured and stored in the unit; quickly recalling programs with the touch of a button.
- Legato 110, 111, 180 and 185 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.

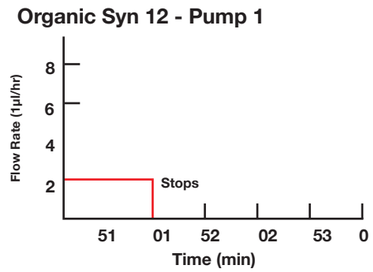
- Go-To statements*
- Time Delays
- Repeating steps
- Linking different programs*
- Stopping the pump
- Triggering external devices using TTL output
- Accepting an event input, such as a user touch or motor stall or TTL input
- In addition, events can trigger the pump to withdraw or infuse

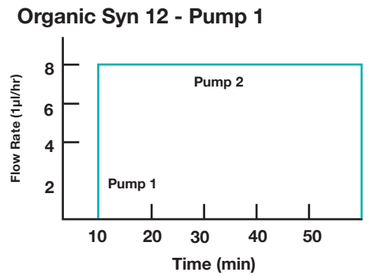


Unique labeling for each program.

NAME: ORGANIC SYN 12

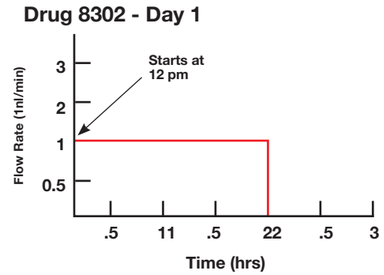
Infuse for 10 minutes at 2 pl/hr. Stop, then toggle Pump 2 to start infusing and pump at 8 pl/hr for 50 minutes.

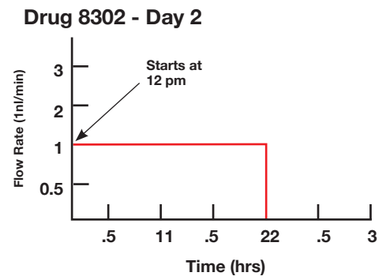




RECIPE NAME: DRUG 8302

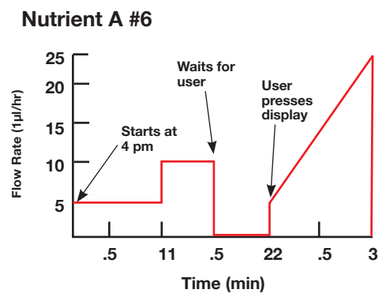
Start on December 30 at 12:00 pm. Infuse at 1 nl/min for 2 hours every day at 12:00 pm for 2 days. Then stop.





RECIPE NAME: NUTRIENT A #6

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



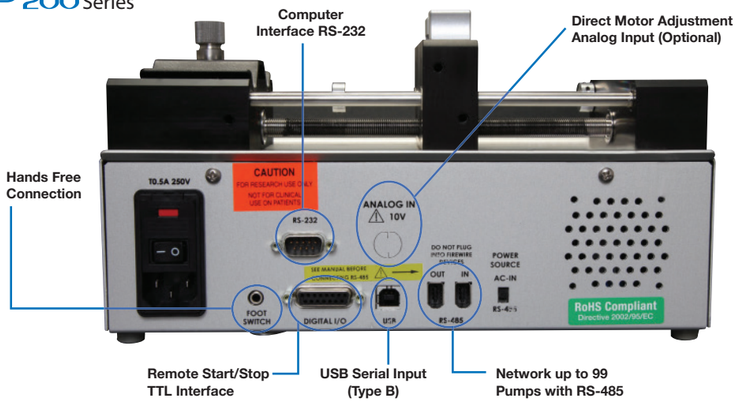
The Legato's Versatility is Second to None

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 are 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.

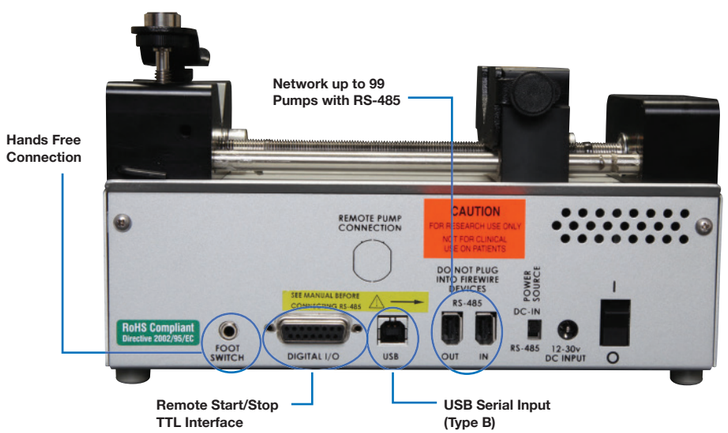
In Communication — Multi-Pump Mode of Operation

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.

Legato® 200 Series



Legato® 100 Series



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.

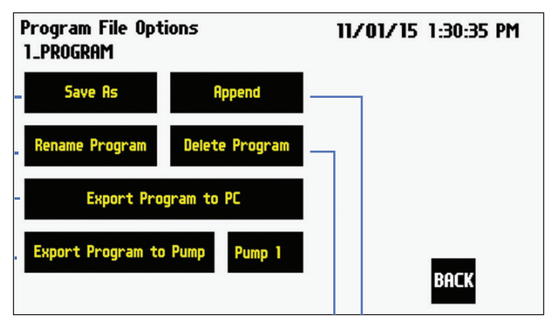
The Legato Series pumps permit the daisy chaining of up to 99 pumps. To facilitate operation in these modes, the Legato Series application software includes a variety of commands designed to simplify the export/import of programs between the pump and external devices.

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

A Variety of Legato® 200 Series to Meet Your Needs

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.

Legato® 200 Dual Syringe Infusion Pump

Infuse Only Syringe Pump. Accommodates 2 syringes 0.5 µl 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 µl 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 1000 steps. Up to 40 programs of 25 steps each can be stored in memory.

Legato® 270 & 270P Continuous Syringe Pump & Multi-Step Programming

Push/Pull Syringe Pump. Accommodates 2 syringes 0.5 µl 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.

The Legato 270P Push/Pull Pump features multi-step programming with 40 custom programs of up to 25 steps each. Multiple programs can be stored in memory.

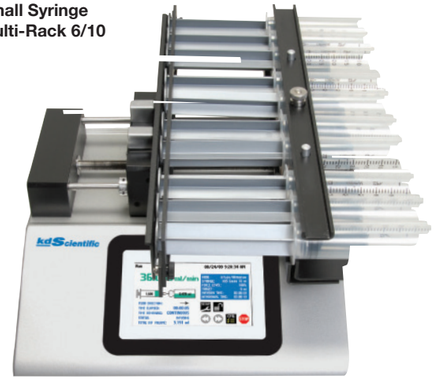
Legato® 200
Infuse Only
Syringe Pump

Legato® 210 & 210P
Infuse/Withdraw
Syringe Pump

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

Syringe mechanism expands for full syringe stroke length.

Small Syringe
Multi-Rack 6/10



Large Plastic Syringe
Multi-Rack 4 x 140 ml

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.

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 to control

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 ml to 140 ml plastic 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

A Variety of Legato® 100 Series to Meet Your Needs

The Legato 100 series is the latest generation of pumps from KD Scientific. The 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 pump's current running conditions, including instantaneous flow rate, elapsed time, time remaining and 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.

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 electrospinning, nutrient feeding, mass spec calibration and other applications where a single syringe is used.

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

Legato® 101 Dual Syringe Nanoliter Pump

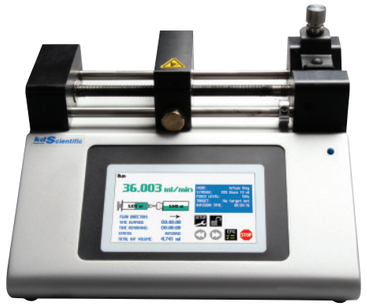
This infusion only pump is ideal for surface plasma resonance, organic synthesis, and other applications where dual syringes are required with small volumes under 10 ml.

- Two syringes 0.5 µl to 10 ml
- Minimum flow rate 1.26 pl/min for a 0.5 µl syringe

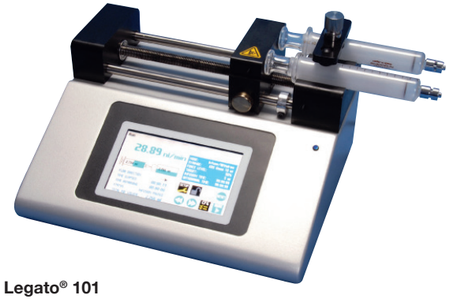
Legato® 110 Single Syringe Infusion/Withdraw Pump

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 µl to 60 ml
- Two multi-step Programs
- Multi-mode operation

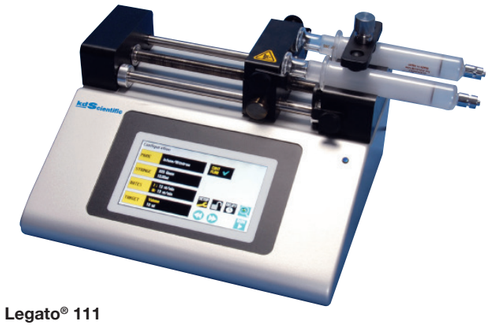


Legato® 100 Single Syringe Infusion Pump

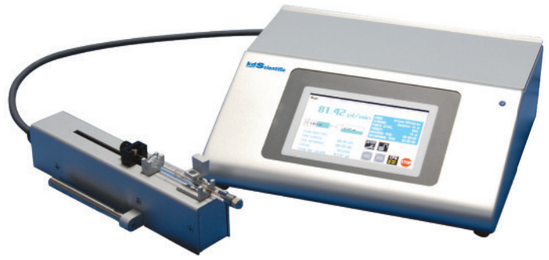


Legato® 101 Dual Syringe Nanoliter Pump

Legato® 110 Single Syringe Infuse/Withdraw Pump



Legato® 111 Dual Syringe Nanoliter Infuse/Withdraw Pump



Legato® 130 Single Syringe Nanoliter Infuse/Withdraw Pump

Legato® 180 & 185 Single & Dual Syringe Picoliter Infuse/Withdraw Pump

Legato® 111 Dual Syringe Nanoliter Infuse/Withdraw Pump

The Legato 111/130/180/185 offer the smoothest flow of all the Legato Pumps. They all 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.

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

- Two syringes 0.5 µl to 10 ml
- Minimum flow rate 1.26 pl/min for a 0.5 µl 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 µl to 1000 µl. 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 µl to 1000 µl syringes
- Minimum flow 3.66 pl/min (0.5 µl syringe)
- Maximum flow 3.818 ml/min (1000 µl syringe)

Legato® 180 & 185 Single & 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 and 185 have a finer lead screw and a different pulley ratio than the Legato 101/111. The Legato 180 and 185 offer multi-mode capability and two multi-step programs, each with 50 steps. The Legato 180 and 185 are the ideal pumps for flow chemistry and small volume infusions or withdrawals of <10 ml.

- Legato 185: One Syringe 0.5 µl to 60 ml
- Legato 180: Two Syringes 0.5 µl to 10 ml
- Minimum flow rate 0.540 pl/min for a 0.5 µl syringe
- +/-0.35% Accuracy
- Two multi-step programs
- Multi-mode operation

LEGATO® SERIES

	Infuse Only			Infuse/ Withdraw Pumps						Continuous Cycle Pump	
Legato Model	**Legato 100**	**Legato 101**	**Legato 200**	**Legato 110**	**Legato 111**	**Legato 180/185**	**Legato 130**	**Legato 210**	**Legato 210P**	**Legato 270**	**Legato 270P**
Order code	78-8100	78-8101	78-8200	78-8110	78-8111	78-8180/78-8180SGL	78-8130	78-8210	788212	78-8270	78-8272
Mode	Infuse Only	Infuse Only	Infuse Only	Infuse/Withdraw	Infuse/Withdraw	Infuse/Withdraw	Infuse/Withdraw	Infuse/Withdraw	Infuse/Withdraw	Infuse/Withdraw/Continuous	Infuse/Withdraw/Continuous
# Syringes	One	Two	Two	One	Two	Two/One	One	Two	Two	Two and Two (Four total)	Two and Two (Four total)
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	0.5 µl to 10 ml/0.5 ul to 60 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
User Interface	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen	Touchscreen	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	4.3" QVGA 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%	+/-0.35%	+/-0.5%	+/-0.35%	+/-0.35%	+/-0.35%	+/-0.35%
Linear Force	30 lb (13.6 kg)	30 lb (13.6 kg)	75 lb (34 kg)	30 lb (13.6 kg)	30 lb (13.6 kg)	30 lb (13.6 kg)	11 lb (5 kg)	75 lb (34 kg)	75 lb (34 kg)	75 lb (34 kg)	75 lb (34 kg)
Force Adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Minimum Flow Rate 0.5 µl Syringe	1.26 pl/min	1.26 pl/min	3.06 pl/min	1.26 pl/min	1.26 pl/min	0.540 pl/min	3.66 pl/min	3.06 pl/min	3.06 pl/min	3.06 pl/min	3.06 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	11.7 ml/min	3.818 ml/min (1 ml syringe)	31.190 ml/min	31.190 ml/min	31.190 ml/min	31.190 ml/min
Maximum Flow Rate 60 ml Syringe	88.28 ml/min	-	105 ml/min	88.28 ml/min	N/A	39 ml/min	N/A	105 ml/min	105 ml/min	105 ml/min	105 ml/min
Drive Motor	0.9" Stepper Motor	0.9" Stepper Motor	1.8" Stepper Motor	0.9" Stepper Motor	0.9" Stepper Motor	0.9" Stepper Motor	1.8" Stepper Motor	1.8" Stepper Motor	1.8" Stepper Motor	1.8" Stepper Motor	1.8" Stepper Motor
Control	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping
One Revolution of Lead Screw	15360	15360	6400	15360	15360	20480	3200	6400	6400	6400	6400
Advance/Microstep	0.069 µm/µstep	0.069 µm/µstep	0.1656 µm/µstep	0.069 µm/µstep	0.069 µm/µstep	0.031 µm/µstep	0.198 µm/µstep	0.1656 µm/µstep	0.1656 µm/µstep	0.1656 µm/µstep	0.1656 µm/µstep
Minimum Step Rate	27.5 sec/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	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep
Maximum Step Rate	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	52 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	0.02 µm/min	0.433 µm/min	0.36 µm/min	0.36 µm/min	0.36 µm/min	0.36 µm/min
Maximum	159 mm/min	159 mm/min	190.8 mm/min	159 mm/min	159 mm/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
Multi-step Programming	N/A	N/A	N/A	2 Programs/50 steps each	2 Programs/50 steps each	2 Programs/50 steps each	2 Programs/50 steps each	1 Program/100 steps	40 Programs/25 steps	1 Program/100 steps	40 Programs/25 steps
Constant Rate				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ramp				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pulsed				No	No	No	No	Yes	Yes	Yes	Yes
Stepped				No	No	No	No	Yes	Yes	Yes	Yes
Program Export/Import				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pusher Block Stall Detection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Computer Interface	USB	USB	USB/RS-232	USB	USB	USB	USB	USB/RS-232	USB/RS-232	USB/RS-232	USB/RS-232
TTL	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Networking	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485	RS-485
Real Time Clock	No	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes
External Triggers	One	One	Two	One	One	One	One	Two	Two	Two	Two
Analog Input	No	No	No	No	No	No	No	Yes (option)	Yes (option)	Yes (option)	Yes (option)
Footswitch Interface	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maintenance Reminder	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calibration Reminder	No	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Password Lock	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Audible Alarm Indication	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Display Rotation	Automatic	Automatic	Automatic	Automatic	Automatic	Automatic	Automatic	Automatic	Automatic	Automatic	Automatic
Multisyringe Rack Accessories	No	Yes	No	No	No	No	No	Yes	Yes	No	No
Run LED	Blue	Blue	Blue	Blue	Blue	Green	Blue	Blue	Blue	Blue	Blue
Power	12 to 32 VDC	12 to 32 VDC	100 to 240 VAC 50/60 Hz	12 to 32 VDC	12 to 32 VDC	12 to 32 VDC	12 to 32 VDC	100 to 240 VAC 50/60 Hz	100 to 240 VAC 50/60 Hz	100 to 240 VAC 50/60 Hz	100 to 240 VAC 50/60 Hz
Weight	5.9 lb (2.66 kg)	5.9 lb (2.66 kg)	10.75 lb (4.9 kg)	5.9 lb (2.66 kg)	5.9 lb (2.66 kg)	5.9 lb (2.66 kg)	4.32 lb (2.05 kg)	10.75 lb (4.9 kg)	10.75 lb (4.9 kg)	10.75 lb (4.9 kg)	10.75 lb (4.9 kg)
Dimensions, H x W x L (in)	9 x 7.5 x 5	9 x 7.5 x 5	6.5 x 10 x 11	9 x 7.5 x 5	9 x 7.5 x 5	9 x 7.5 x 5	9 x 7.5 x 3.67	6.5 x 10 x 11	6.5 x 10 x 11	6.5 x 10 x 11	6.5 x 10 x 11
Dimensions, H x W x L (cm)	22.6 x 19.05 x 12.7	22.6 x 19.05 x 12.7	8.89 x 25.4 x 27.94	22.6 x 19.05 x 15	22.6 x 19.05 x 15	22.6 x 19.05 x 15	22.6 x 19.05 x 9.32	16.5 x 25.4 x 27.94	16.5 x 25.4 x 27.94	16.5 x 25.4 x 27.94	16.5 x 25.4 x 27.94
Certifications											
CE, ETL, UL, CSA, CB Scheme	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EN 61010, EN 61326	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WEEE, EU RoHS	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant

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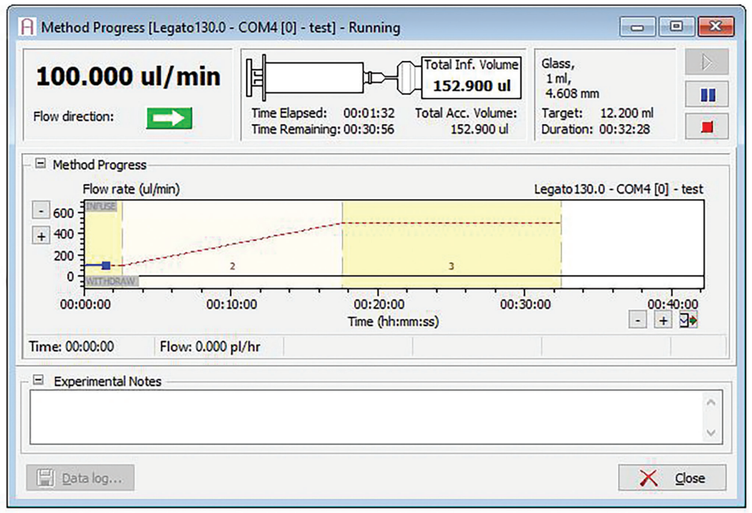
Adagio® Syringe Pump Software

Adagio® is easy to use with an Automatic Configuration Assistant

The Adagio Graphic Software adds a new dimension to pump control. Issue manual pump commands or run the pumps automatically with multi-step programs. Works with the entire Legato 200 and 100 pump series. Adagio Pump Software – Enhances the Legato pump's 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 and matched.

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

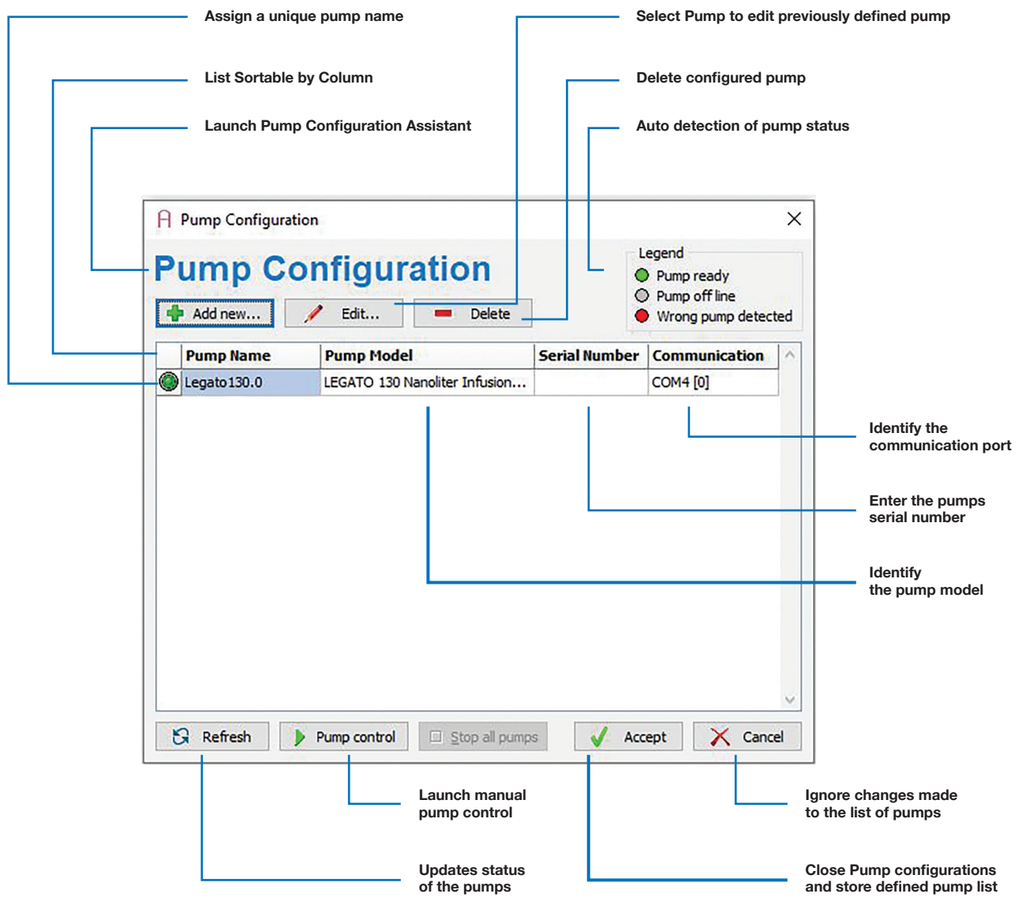


Adagio's versatile functionality will allow you to:

- 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

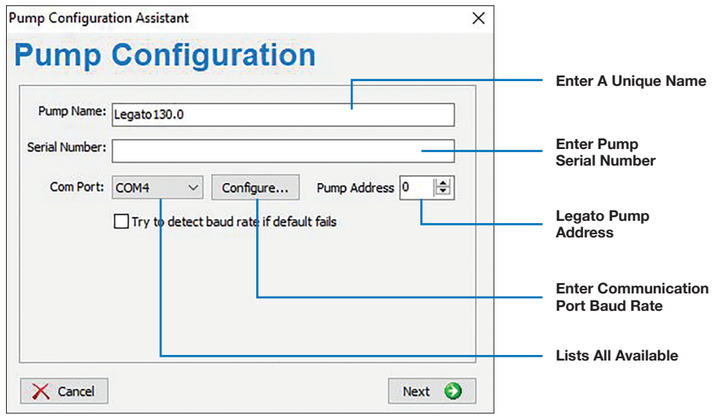
Minimum computer requirements include:

- 2 Ghz Pentium processor or higher
- 512 MB of RAM (2 GB recommended)
- Windows 10/8/7/XP
- Free RS-232 or USB 2.0 ports



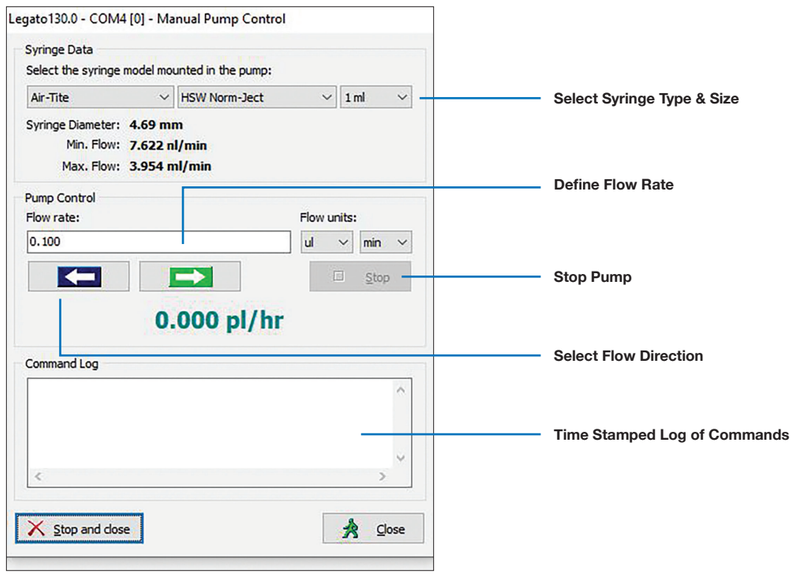
Define the Pump Configuration

Connect the pumps to the computer.

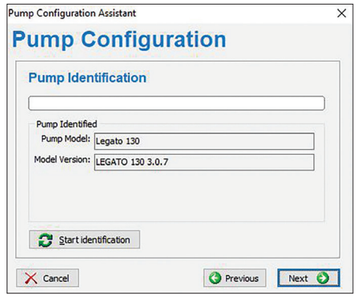


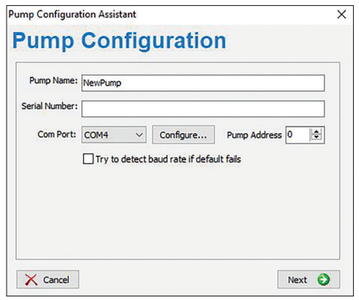
Quick & Easy Manual Pump Control

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



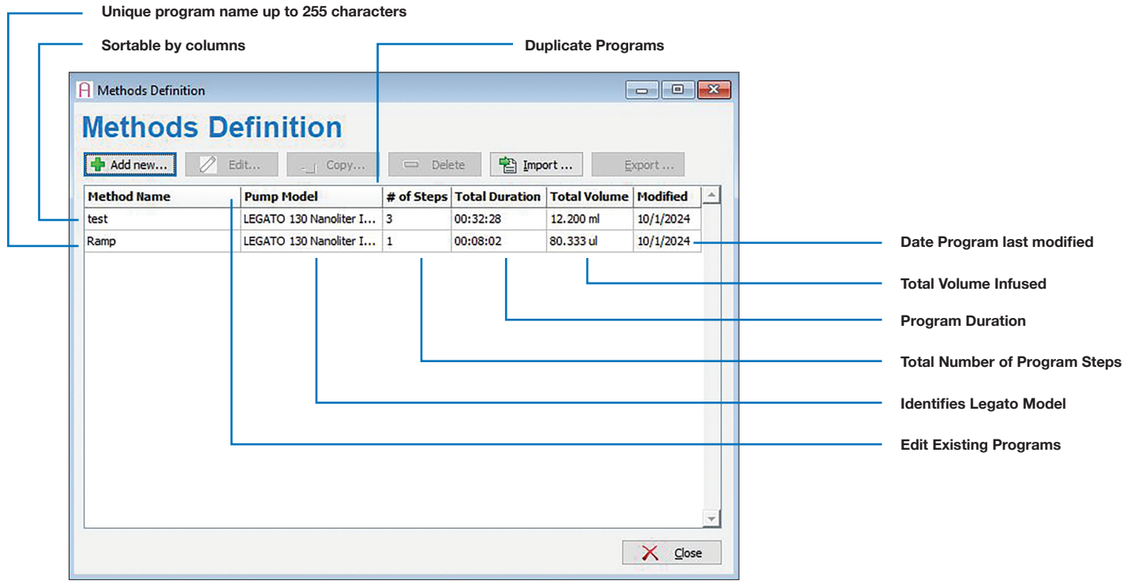
Auto Checks the Pump Model & Identification





Easily Accessible Programs List

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



Easily Accessible Programs List

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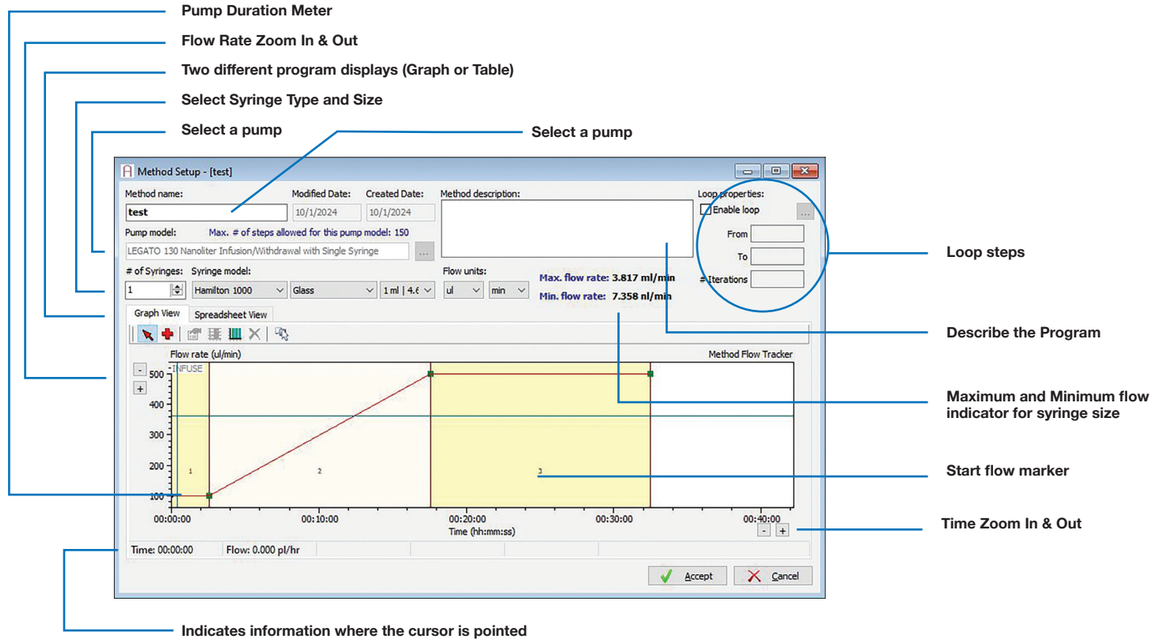
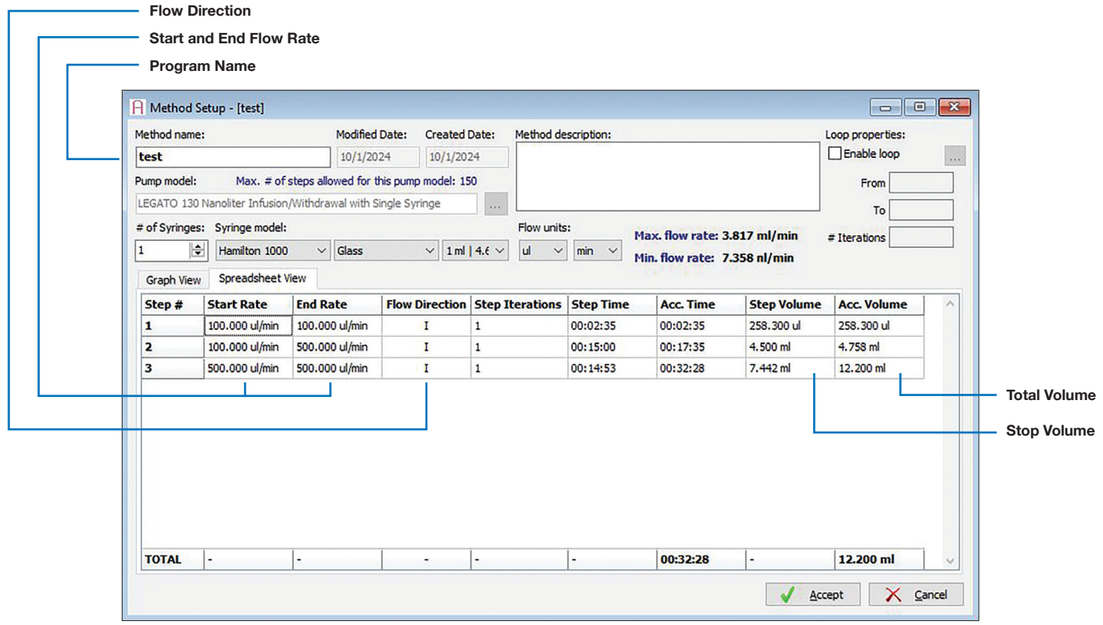


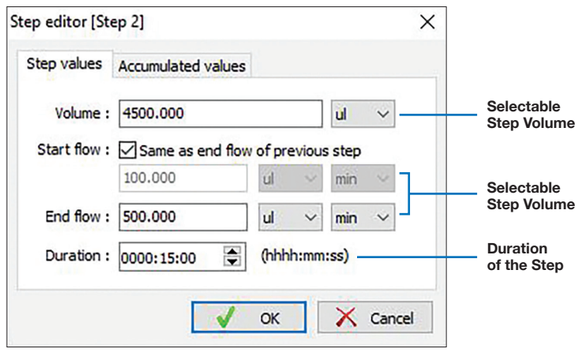
Spreadsheet View to See Program in a Table Format

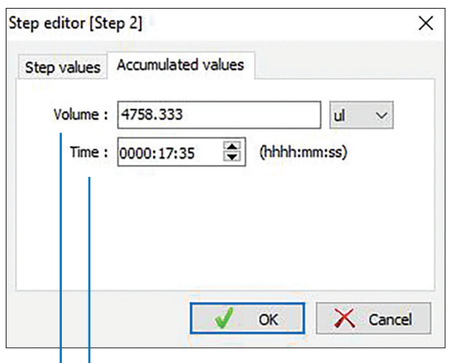
Enter Paramaters in a table format.



Adding Step is Easy

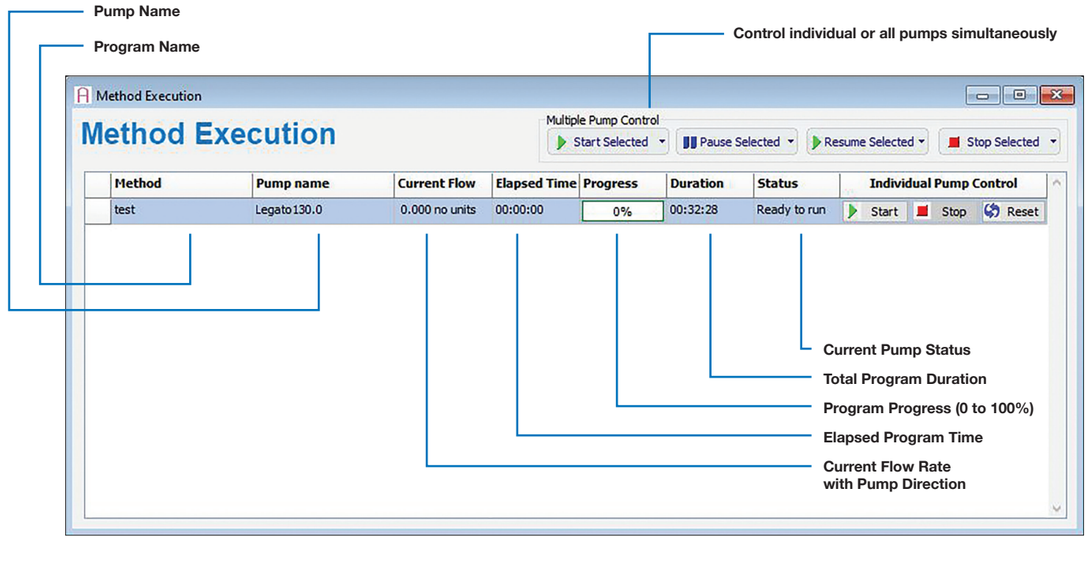
Manually enter the step information or drag and drop the duration marker on the graph.





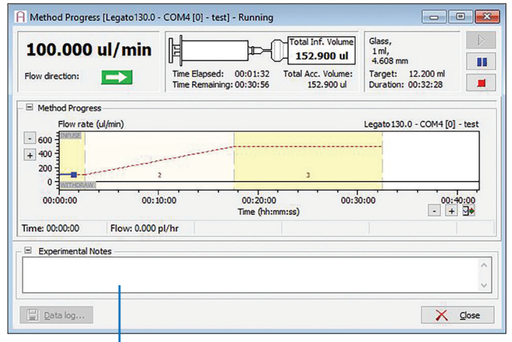
Multiple Pump Control

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



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.



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.

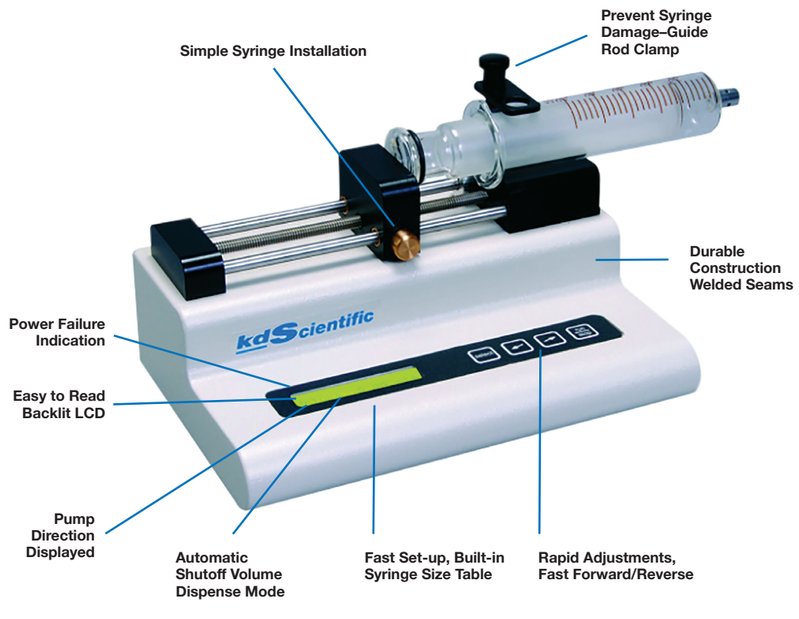
Pump Parameters

- 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

The KDS Legacy 100

The Legacy series is the foundation for all KD Scientific Pumps. The Legacy pumps are acknowledged as the industry's highest valued solution for delivering precise and smooth flow in research, pilot plants and production applications. Simple and easy to use, these pumps are the favorite of research scientists and engineers. They use the KDS 100 syringe pump more than any other for the their outstanding reliability and performance. The KDS 100 series pumps give customers the most cost effective solution for infusing fluids.

Alternatively, the KDS 400 series give the customer advanced features with RS232 and TTL interfaces. All KDS 400 series pumps can be daisy chained together to create a pumping network.



General Features Available on All Legacy pumps:

- Vibration Elimination System
- Flow Direction Indicator
- Fast Forward/Reverse
- Antisiphon Clamp (I/W Models only)
- Power Recovery Diagnostics
- NIST Certificate Option
- CE Approved Models

Basic Programming

- Syringe Library
- Flow Rate Selection
- Volume Dispense Mode
- Direct Entry Syringe Diameter

Standard on KDS 400 Pumps

- Daisy Chain Connection
- RS-232
- TTL
- Foot Switch Interface Standard
- Stall Detection
- Numeric Keypad
- Engineering Unit Selection

Network Multiple Pumps

Network up to 100 Pumps–Mix and Match any KDS Series Pump!

All KDS 400 series pumps can be networked together. Each pump has a unique address to control its rate and volume remotely from a computer. Pump start/stop activation can be easily controlled.

National Instruments certified Labview drivers are available at no charge.

Advanced Programmable Pumps

Keypad programmable option now available with all KDS 400 Series syringe pumps. Lets you program right from the keypad with software program on computer.

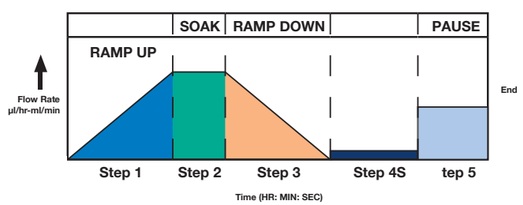
Simply follow a few menu-driven prompts and in just minutes you can customize a program to: control the pump from seconds to days, change flow rates, pause, ramp rates up or down automatically, control outputs and respond to external TTL signals.

Unlike other programmable pumps, there's no need to enter time increments or decrements between start and end flow rates. KDS pumps provide a smooth, linear transition automatically.

A program is divided into eight variable time periods called steps. A step can be up to 12 hours long and may be changed without affecting other steps.

Each step offers these options

- Time duration, from one second up to 12 hours.
- Travel direction – Infuse or withdraw (where available).
- Beginning flow rate (µl/hr to ml/min range).
- End flow rate (µl/hr to ml/min range).
- Pause — Waits for an external trigger to start.
- Status of output TTL pins.
- Loop option — Loops back to any previous step and repeats the intermediate steps. Two separate loops available.
- Set the count in the loop cycle. Steps may be repeated up to 100 times.
- Program stored in non volatile memory.



Infusion Pumps

KD Scientific infusion pumps are ideal for delivering accurate and precise amounts of fluids for a multitude of applications, including injection of calibrant into a mass spectrometer or reaction chamber, long term drug delivery to animals and general infusion applications.

KDS 100
Single-Syringe
Infusion Pump

KDS 100 Single-Syringe Infusion Pump

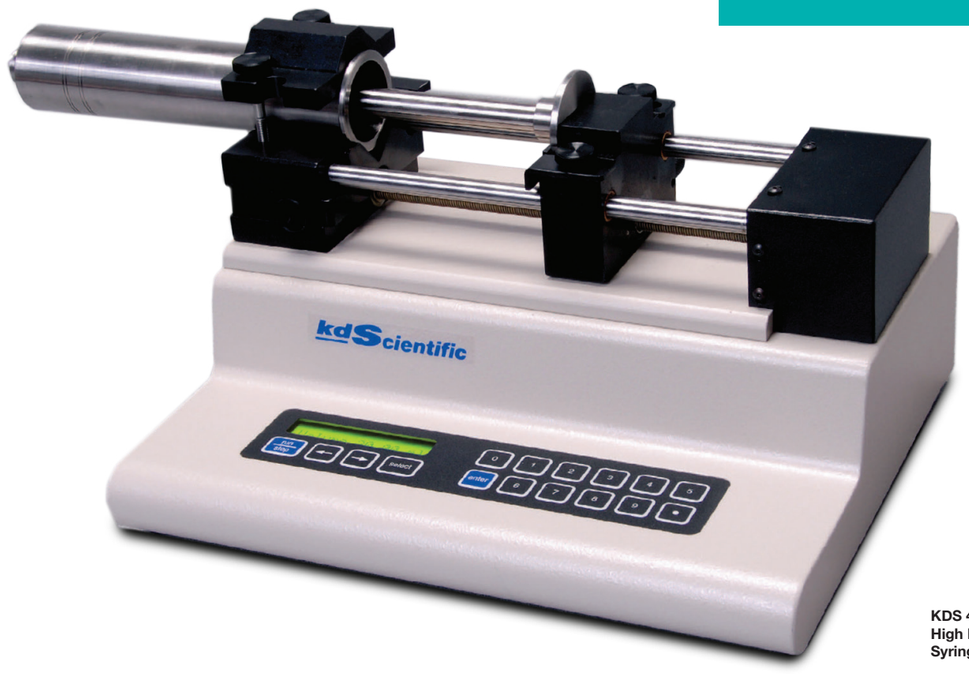
This economical Single Syringe Infusion Pump combines precision flow with outstanding ease-of-use and exceptional durability.

- Single syringe 10 µl to 60 ml
- Wide flow range up to 423 ml/hr (60 ml syringe)

LEGACY SERIES

Infusion Pumps

KD Scientific infusion pumps are ideal for delivering accurate and precise amounts of fluids for a multitude of applications, including injection of calibrant into a mass spectrometer or reaction chamber, long term drug delivery to animals and general infusion applications.



KDS 410
High Pressure
Syringe Pump

KDS 410 High Pressure Syringe Pump

The KDS 410 is ideal for delivering fluid to reactors in chemical applications or for working with viscous fluids. The robust design ensures the syringe is kept level during delivery of the fluid. The KDS 410 more than doubles the linear force available in the KDS 200 series.

- Single syringe 10 µl to 140 ml
- Minimum flow 0.001 µl/hr with a 10 µl syringe
- > 100 lb (45 kg) linear force

Legacy Series Specifications

	Infuse Only Pumps	High Pressure Pump
Legacy Model	**KDS 100**	**KDS 410**
Order Code 110 VAC	78-0100	78-0410
Order Code 220 VAC with CE Mark	78-9100	78-9410
Mode	Infuse	Infuse/Withdraw
# Syringes	One	One
Syringe Size	10 µl to 60 ml	10 µl to 140 ml
User Interface	Keypad	Keypad with numerics
Display	Backlit LCD	Backlit LCD
Accuracy	+/-<1%	+/-<1%
Linear Force	20 lb (9 kg)	>100 lb (45 kg)
Force Adjustment	-	-
Minimum Flow Rate 10 µl syringe	.1 µl/hr	-
Maximum Flow Rate 10 ml syringe	127 ml/hr	1270 ml/hr
Maximum Flow Rate 60 ml syringe	423 ml/hr	4235 ml/hr
Maximum Flow Rate 140 ml syringe	-	8824 ml/hr
Drive Motor	7.5' Stepper Motor	1.8' Stepper Motor
Motor Gearbox	25:1	N/A
Microprocessor Motor Drive Control	1/2 microstepping	1/16 microstepping
# microsteps/one revolution of lead screw	2400	6400
Advance per Microstep	0.529 µl	0.1654 µl
Minimum Step Rate	30 sec/µstep	120 sec/µstep
Maximum Step Rate	0.0025 sec/µstep	0.000625 sec/µstep
Pusher Travel Rate		
Minimum	0.10583 µl/min	0.10583 µl/min
Maximum	12700 µl/min	126900 µl/min
Multi-step Programming	No	Programmable Model
Pusher Block Stall Detection	No	Yes
Computer Interface	No	RS-232
TTL	No	Yes
Network (Daisy-chain)	No	Yes
Audible Alarm Indication		
End of Urn	Optional	Optional
Run LED	No	No
Power Domestic	100 to 120 VAC 50/60Hz	100 to 120 VAC 50/60Hz
Power CE and International	200 to 240 VAC 50/60Hz	200 to 240 VAC 50/60Hz
Weight	4.5 lb (2kg)	14.1 lb (6.4kg)
Dimensions (in)	9 x 6 x 5	6 x 11 x 9.5
Dimensions (cm)	23 x 15.25 x 13	15 x 28 x 24
Certifications		
CE, ETL, UL, CSA, CB Scheme	CE Model	CE Only (no ETL)
EN 61010, EN 61326		
WEEE (just WEEE - not RoHS)	Compliant	Compliant
Programmable Model	N/A	**KDS 410P**
Order Code 110 VAC	-	**78-0412**
Order Code 220 VAC with CE Mark	-	**78-9412**

Special Pumps Specifications

Model	Legato® 110 Module	Gemini 88 Plus	Legato 380 Emulsifier	Legato® 110 DRS
Order Code	**78-8950**	**78-8088**	**78-8380**	**78-8110DRS**
Mode	Infusion/Withdraw	Infuse/Withdraw/Continuous	Infuse/Withdraw/ Push-Pull Emulsify	-
# Syringes	One	Two Independent mechanisms	Four	-
Syringe Size	0.5 µl to 60 ml	0.5 µl to 60 ml	0.5 µl to 140 ml	0.5 µl to 60 ml
User Interface	Computer	Touch Screen	Touch Screen	-
Syringe Size	N/A	7" WQVGA Color Display	4.3 QVGA	4.3 WQVGA TFT Color Display with Touchpad
Display	+/-<0.5%	Keypad with numerics	Keypad	Keypad with numerics
Accuracy	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD
Linear Force	30 lb (13.6 kg) @ 100% Force Selection	70 lb (31.75 kg) (1.02 pl/min to 90 ml/min) 50 lb (22.6 kg) (90 ml/min to 106 ml/min)	75 lb (34 kg) @ 100% Force Selection	13.6 kg (30 lb) @ 100% Force Selection
Force Adjustment	20 lb (9 kg)	>100 lb (45 kg)	20 lb (9 kg)	>100 lb (45 kg)
Minimum Flow Rate 10 µl syringe	28.26 pl/min	1.02 pl/min	-	(0.5 µl syringe): 1.28 pl/min
Maximum Flow Rate 10 ml syringe	25.99 ml/min	20 ml/min	31.190 ml/min	25.99 ml/min
Maximum Flow Rate 60 ml syringe	88.28 ml/min	106 ml/min	105 ml/min	88.28 ml/min
Maximum Flow Rate 140 ml syringe	-	0.055118 µm/µstep	0.1656 µm/µstep	0.069 µm/step
Drive Motor	0.9' Stepper Motor	0.9' Stepper Motor	1.8' Stepper Motor	0.9 Stepper Motor
Microprocessor Motor Drive Control	1/16 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping
# Microsteps/ One Revolution of Lead Screw	15,360	19,200	6,400	15,360
Advance per Microstep	-	0.055118 µm/µstep	0.1656 µm/µstep	0.069 µm/step
Minimum Step Rate	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep	27.5 sec/µstep
Maximum Step Rate	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep	26 µsec/µstep
Pusher Travel Rate				
Minimum	0.15 µm/min	0.1225 µm/min	0.36 µm/min	0.15 µm/min
Maximum	159 mm/min	127.2 mm/min	190.80 mm/min	159 mm/min
Multi-step Programming	No	No	Custom Emulsifying Program	-
Constant Rate	-	-	Yes	-
Ramp	-	-	Yes	-
Pulsed	-	-	Yes	-
Stepped	-	-	Yes	-
Program Export/Import	No	-	Yes	-
Pusher Block Stall Detection	Yes	Yes	Yes	-
Computer Interface	USB	USB	USB/RS-232	-
TTL	YES	Yes	YES	-
Networking	RS-485	RS-485	RS-485	-
Real Time Clock	No	Yes	Yes	-
External Triggers	One	Yes	Two	-
Analog Output	No	No	Yes (Optional)	-
Footswitch Interference	Yes	Yes	Yes	-
Maintenance Reminder	Yes	Yes	Yes	-
Calibration Reminder	Yes	Yes	Yes	-
Password Lock	Yes	Yes	Yes	-
Audible Alarm Indication	-	Yes	Yes	-
End of Run	Optional	Yes	Yes	-
Near end of run	-	Yes	Yes	-
Stall detection	-	Yes	Yes	-
Power-up	-	Yes	Yes	-
Keypad Clicks	-	Yes	Yes	-
Calibration Reminder	-	Yes	Yes	-
Display Rotation	No	No	Automatic	-
Multisyringe Rack Accessories	No	No	No	-
Run LED	No	No	Yes	-
Power Domestic	12 to 32 VDC	100 to 240 VAC 50/60 Hz	100 to 240 VAC 50/60 Hz	-
Power CE and International	-	100 to 240 VAC 50/60 Hz	-	100-240 VAC: 50/60 Hz, 50 W, 0.5 A fuse
Weight	8 lb (3.62 kg)	21 lb (9.09 kg)	21.5 lb (9.8 kg)	2.66 kg (5.9 lb)
Dimensions (in)	6 x 4 x 9.5	8 x 15 x 11	Dependent on syringe size	9 x 7.5 x 5 in
Dimensions (cm)	15.25 x 10.16 x 24.13	21 x 39 x 28	Dependent on syringe size	22.6 x 19.05 x 15 cm
Certifications				
CE, ETL, UL, CSA, CB Scheme	Yes	Yes	Yes	Yes
EN 61010, EN 61326	Yes	Yes	Yes	Yes
WEEE, RoHS	Yes	Yes	Yes	Yes

Specialty Pumps

For Custom & Unique Applications

Pump customization is now easier with the new KDS OEM module. Integrate the module into your systems or work with our KDS engineering staff to design different syringe mechanisms or controllers. KDS offers the technology and engineering expertise to meet your demanding applications.

KD Scientific can customize modules to meet your application requirements. With our technical expertise in syringe pump design, we can meet even the most demanding applications at an affordable price. OEM pumps can be modified with different mechanisms and configurations. The basic models are shown below:

Legato® 110 Single Syringe Infuse/Withdraw OEM Module

Legato® 110 Single Syringe Infuse/Withdraw OEM Module

Based on the Legato 100 series syringe pump design, the Legato is ideal for applications interfacing to a computer. Accommodates syringes 0.5 µl to 60 ml. User-definable flow rates with selectable target volume or time values to control the total infusion volume.

- ±0.5% Accuracy
- 0.5 µl to 60 ml syringes
- Continuous mode of operation
- Programmable with ASCII commands
- Encoder stall detection
- USB Interface
- TTL Interface
- Customizable syringe mechanisms available
- Customizable chassis designs available
- Advanced micostepping techniques
- Linear force 30 lb (13.6 kg)
- CE, CB Scheme, EU RoHS compliant

Gemini 88 Plus Dual Rate Syringe Pump

Gemini 88 Plus
Dual Rate Syringe Pump

Key Features

- Two independently controlled syringe pumps in one instrument
- High accuracy ±0.25%
- Accommodates syringe sizes 0.5 µl to 60 ml
- Smooth flow down to 1.02 pl/min (syringe dependent)

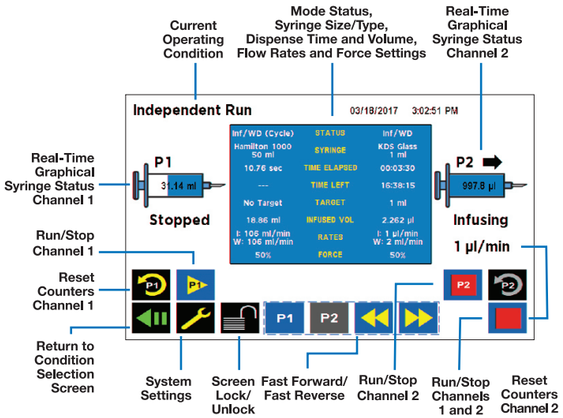
The Harvard Apparatus Gemini 88 Plus is a leap forward in syringe pump capability. The Gemini 88 Plus has two independent pumping channels controlled by an intuitive touch screen interface.

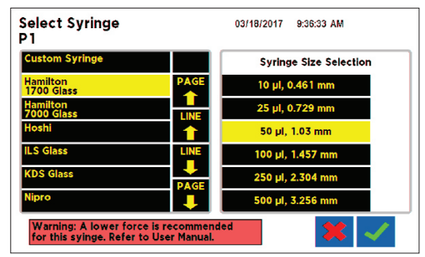
Graphical User Interface

The intuitive Gemini 88 Plus graphical user interface controlled with a large 7” LCD color touchscreen display allows quick and easy setup. The display run screen presents the user with all key dispensing parameters in real time. Syringe tables containing all major syringe manufacturers allow simple selection of any compatible syringe size. Audible Alarms, Adjustable Force and Screen Lock are all features that are available with a touch of the screen.

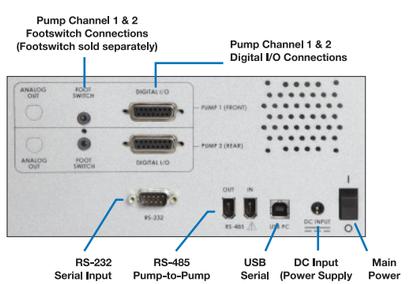
Advanced Connectivity

The Gemini 88 Plus comes standard with USB and RS-232 for PC communication and RS-485 for pump-to-pump communication. An entire suite of ASCII commands is available to control the pump remotely with a PC. The pump contains a footswitch input and digital input/output for each independent pumping channel.





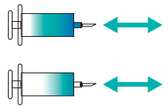
Gemini 88 Plus Syringe Selection Screen



Specialty Pumps

Independent Condition

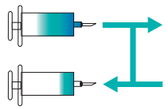
Independent Condition allows the Gemini 88 Plus to operate as two separate syringe pumps named P1 & P2. Each syringe will operate independently with different syringe types, size, force, target (volume or time, mode dependent).



	Mode	Syringe	Rate	Target Volume/ Time
P1	Infuse, Withdraw, Infuse/Withdraw, Withdraw/Infuse	Any size/type 0.5 µl – 60 ml	Any within syringe capability	Any (Mode Dependent)
P2	Same as P1	Same as P1	Same as P1	Same as P1

Reciprocating Condition

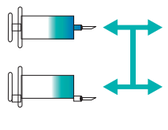
In reciprocating condition, both syringe channels move in opposite directions at the same rate using the same syringe size and type. When combined with a valve box, the reciprocating condition can provide the continuous fluidic delivery of a peristaltic pump with the accurate, low flow rates provided by a syringe pump



	Mode	Syringe	Rate	Target Volume/ Time
P1	Infuse, Withdraw, Infuse/Withdraw, Withdraw/Infuse	Any size/type 0.5 µl – 60 ml	Any within syringe capability	Any
P2	Same as P1	Same as P1	Same as P1	Same as P1

Twin Condition

Twin Condition allows both syringes to operate in the same mode using the exact same syringe type, syringe size, force, target (volume or time) and flow rate settings. The pump also allows the user to combine both flows for higher speed and volume infusion applications.



	Mode	Syringe	Rate	Target Volume/ Time
P1	Infuse, Withdraw, Infuse/Withdraw, Withdraw/Infuse	Any size/type 0.5 µl – 60 ml	Any within syringe capability	Any (Mode Dependent)
P2	Same as P1	Same as P1	Same as P1	Same as P1

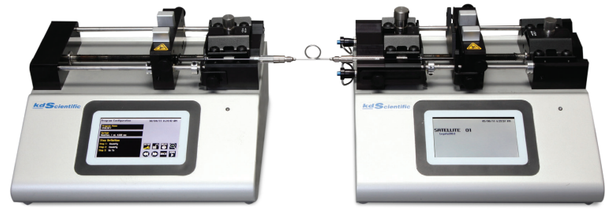
Specifications

Type	Microprocessor dual independent infuse/withdraw/continuous syringe pump
Accuracy	±0.25%
Syringe:	
Type	Glass, plastic and stainless steel
Size Minimum	0.5 µl (0.103 mm minimum inner diameter)
Size Maximum	60 ml (32.573 mm maximum inner diameter)*
Flow Rate:	Microprocessor dual independent infuse/withdraw/continuous syringe pump
Minimum	1.02 pl/min (0.5 µl syringe, 0.103 mm inner diameter)
Maximum	106 ml/min (60 ml syringe, 32.573 mm diameter)
Display	7” color display with touchscreen
Connectors	
USB	Type B
RS-232	9-Pin D-sub connector

RS-485	IEEE-1394, 6 pos for pump-pump communication
TTL Input Output	Two 15-pin D-sub connectors, one for each pump mechanism
Footswitch	Two phono plug inputs, one for each pump mechanism
Average Linear Force	70 lb (31.75 kg) at 100% force setting up to a flow rate of 90 ml/min using up to a 60 ml syringe with a 32.573 mm inner diameter 50 lb (22.6 kg) at 100% force setting for flow rates 90 ml/min to 106 ml/min using the same size syringe
Power Supply	Input 100 to 240 VAC, 50/60 Hz, Output 30 V 1.66 A 50 W
Weight	21 lb (9.09 kg)
Dimensions (L x D x H)	1 x 15 x 8” (28 x 39 x 21 cm)
Classification	Class 1
Pollution	Degree 1
Installation	Category 2
Regulatory Certification	CE, ETL (UL & CSA), CB Scheme, Eu RoHS, WEE

Order No.	Description
78-8088	Gemini 88 Plus Dual Independent Syringe Pump

Order No.	Description
78-0225	Footswitch (with phone plug)
78-8188	RS-232 Cable



Legato® 380 Emulsifier/Homogenizer

The Legato 380 emulsifying system is based on the Legato Series of syringe pumps. It utilizes a modified Legato 210P and Legato 270P. All the standard features of the Legato products are still available, but a custom emulsification program has been added to the software. This program is only available with the Legato 380 system. The Legato 210P and Legato 270P can also be used as stand alone syringe pumps.

The emulsifying system mimics the same action as in manually pushing fluid back and forth between syringes, but does it automatically. You select the volume and the emulsifying rate. The pumps will automatically move the fluid back and forth between the syringes for a user determined time or number of cycles.

Key Features

- Eliminate fatigue associated with manual emulsification
- Automatically move solutions between two syringes
- Multiple functionality – use as independent syringe pump units
- Selectable emulsifying rates
- Selectable volumes
- Adjustable duration — Enter the number of cycles or the total time
- Adjustable force makes it ideal for viscous fluids — up to 75 lbs (34 kg) of linear force
- Flexible syringe sizes and types

KDS Legato® 110 DRS* Dual Rate System

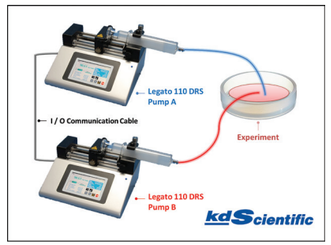
The Legato 110 Dual Rate Syringe Pump System (Legato 110 DRS) offers researchers complete flexibility to start two pumps simultaneously for delivery of two independent flow rates. The pumps are synchronized through a special input/ output cable included with the system. The Legato 110 DRS comes complete with two programmable infuse / withdraw syringe pumps along with an input / output communications cable to synchronously operate the pumps.

This innovative syringe pump system allows the user to easily configure two different pumps with independent flow rates using the built in multistep programming and input / output signal communication. All control is set through the innovative Legato touch screen user interface. No external programming or computer is required.

Both syringe pumps in the system have a wide flow rate range from 1.28 pl/min to 88.28 ml/min. Each pump can be individually set for whatever the experiment requires.

Any type of syringe can be used in the unit including stainless steel, plastic or glass. The syringes are held in place by KD Scientific’s new clamping mechanism designed to hold the syringes securely in place.

Syringes from 0.5 µl to 60 ml can be used. The Legato 110 Dual Rate Syringe Pump System has an accuracy of ±0.5%.



Premium Steel Syringes

A premium line of stainless steel syringes is now offered by KD Scientific. Rugged stainless steel syringes are an ideal solution when the pressures and the force are high, completely eliminating the problem of breaking glass syringes.

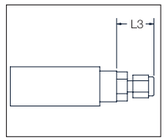
Stainless steel offers good resistance to most aggressive liquids. Wetted parts are #316 stainless steel and Viton or Perfluoroelastomer. Syringes are available in 2.5, 8, 20, 50 and 100 ml sizes with removable, replaceable tips. Genuine SWAGELOK syringe to tube fittings are available in 1/16", 1/8" and 1/4" sizes. A Luer lock end fitting is also available. Tips are interchangeable with all syringes from 20 to 100 ml in size.

Stainless Steel Syringes

Premium Line of Stainless Steel Syringes

- Compatible with Most Syringe Pumps
- Eliminate Hazards of Glass Syringe Breakage
- Adaptable to Luer Lock or Swagelok Fittings
- Rugged Construction #316 Stainless Steel
- Reuseable and Fully Autoclavable
- Resistance to Most Chemicals

Syringe	Fitting	L3 in (mm)
2.5 to 8 ml	1/16	0.74 (18.8)
2.5 to 8 ml	1/8	0.91 (23.1)
20 to 200 ml	1/16	0.67 (17.0)
20 to 200 ml	1/8	0.84 (21.3)
20 to 200 ml	1/4	0.94 (23..9)
20 to 200 ml	Luer	1.34 (34.0)



Specifications

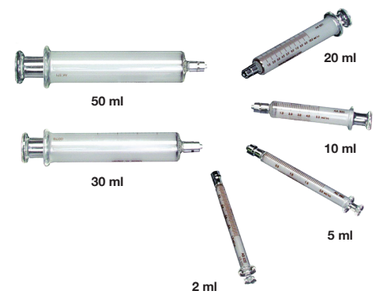
Volume	2.5 ml	8 ml	20 ml	50 ml	100 ml
Dimensions	**in (mm)**	**in (mm)**	**in (mm**	**in (mm)**	**in (mm)**
Overall Length of Barrell - (L1)	6.64 (168.7)	6.73 (170.8)	4.73 (120.0)	5.49 (139.3)	6.73 (170.9)
Stroke - (S)	5.41 (137.4)	4.42 (112.4)	2.74 (69.6)	3.06 (77.83)	4.12 (104.5)
Outside Diameter - (OD)	0.50 (12.7)	0.50 (12.7)	0.88 (22.2)	1.25 (31.8)	1.50 (38.1)
Inside Diameter - (ID)	0.191 (4.85)	0.375 (9.525)	0.753 (19.13)	1.126 (28.60)	1.374 (34.90)
Maximum Test Pressure	9000 psi	4000 psi	1500 psi	1500 psi	1500 psi
Working Pressure	7000 psi	1500 psi	700 psi	700 psi	700 psi
O-Ring Material Standard	Perfluoroelastomer	Perfluoroelastomer	Viton	Viton	Viton
O-Ring Specials (optional)	N/A	N/A	Perfluoroelastomer	Perfluoroelastomer	Perfluoroelastomer
Order Code Syringe with Swagelok 1/16"	78-0801	78-0802	78-0803	78-0804	78-0805
Order Code Syringe with Swagelok 1/8"	N/A	78-0807	78-0808	78-0809	78-0810
Order Code Syringe with Swagelok 1/4" N	N/A	N/A	78-0812	78-0813	78-0814
Order Code Syringe with Luer Lock	N/A	N/A	78-0816	78-0817	78-0818

Premium Steel Syringes

Glass Syringes

Premium Line of Glass Syringes

- Easy to clean and maintain
- Accurate dispensing
- Reusable
- Economical
- Durable
- Chemically resistant
- Resistant to thermal shock



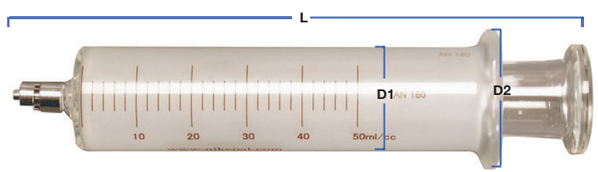
KD Scientific offers a new line of glass syringes to meet scientific applications in the laboratory environment. Over ten different sizes of glass syringes ranging from 1.0 ml to 50 ml are available.

All syringes are made from heat resistant borosilicate glass. The material and construction are resistant to breakage from shock and sudden temperature changes.They are all annealed and tested until free of internal strain to withstand repeated washing.

Specifications

Min. Order Qty.	6	6	6	6	6	6	6
Volume	**1.0 ml**	**2.0 ml**	**5.0 ml**	**10.0 ml**	**20.0 ml**	**30.0 ml**	**50.0 ml**
Barrel Inside Diameter (mm)	4.80 ± 0.10	6.45 ± 0.10	12.60 ± 0.10	15.15 ± 0.15	20.40 ± 0.20	22.9 ± 0.20	27.45 ± 0.20
Piston Outside Diameter (in)	0.189 ± 0.004	0.254 ± 0.004	0.496 ± 0.004	0.596 ± 0.006	0.80 3 ± 0.008	0.902 ± 0.008	1.081 ± 0.008
Barrel Diameter Outside (mm) D1	8.30 ± 0.20	9.95 ± 0.20	15.4 ± 0.30	18.35 ± 0.35	24.20 ± 0.40	27.30 ± 0.40	32.35 ± 0.55
Barrel Diameter Outside (in) D1	0.327 ± 0.008	0.392 ± 0.008	0.606 ± 0.012	0.722 ± 0.014	0.953 ± 0.016	1.075 ± 0.016	1.274 ± 0.022
Barrel Collar Diameter (mm) D2	14.95 ± 0.50	16.40 ± 0.50	22.25 ± 0.75	26.20 ± 0.75	33.25 ± 0.75	37.55 ± 0.75	44.00 ± 0.75
Barrel Collar Diameter (in) D2	0.589 ± 0.020	0.646 ± 0.020	0.876 ± 0.030	1.031 ± 0.030	1.309 ± 0.030	1.478 ± 0.030	1.732 ± 0.030
Piston Collar Diameter (mm) D	11.5 ± 0.50	12.25 ± 0.75	17.25 ± 0.55	19.95 ± 0.60	24.65 ± 0.65	27.95 ± 0.65	34.05 ± 0.65
Piston Collar Diameter (in) D3	0.453 ± 0.020	0.482 ± 0.030	0.679 ± 0.022	0.785 ± 0.024	0.97 ± 0.026	1.10 ± 0.026	1.341± 0.026
Length (mm) L	115.00 ± 0.50	115.00 ± 0.50	105.00 ± 0.50	128.50 ± 0.50	145.50 ± 0.50	163.00 ± 0.50	178.00 ± 0.50
Length (in) L	4.528 ± 0.020	4.528 ± 0.020	4.134 ± 0.020	5.059 ± 0.020	5.728 ± 0.020	6.417 ± 0.020	7.008 ± 0.020
Major Gradations (ml)	0.20	0.50	1.0	1.0	5.0	5.0	10.0
Minor Gradations (ml)	0.02	0.05	0.20	0.20	1.0	1.0	2.0
Order Code	78-0871	78-0872	78-0873	78-0874	78-0875	78-0876	78-0877

Glass Properties



Volume	±1.5% of rated volume
Expansion Coefficient	52 x 10-7/°C
Density	2.36 g/cm3 ±0.03 g/cm3
Modulus of Elasticity	64 x 103 N/m2
Water Resistance	First Class
Acid Resistance	First Class
Alkali Resistance	First Class
Softening Point	785°C
Melting Temperature	1260°C
Strain Point	525°C
Annealing Point	570°C
Hardness	7
Color	Clear

State-of-the-Art GASTIGHT® Syringes

KD Scientific offers a selection of Hamilton microliter and specialty syringes. Please visit our website or contact our technical support department for the latest offerings.

Stainless Steel Syringes

Premium Line of Stainless Steel Syringes

Hamilton® syringes are considered the industry standard for precision fluid delivery. KD Scientific offers a selection of these precision syringes which, when combined with our syringe pumps, offer fluid delivery with unparalleled accuracy and precision.

The syringes are designed with reinforced syringe plungers, syringe barrels, and are GASTIGHT® syringes with syringe volumes from 50 µl to 100 ml.

All Hamilton glass syringes are autoclavable when disassembled.

1000 Series GASTIGHT® Syringes

Item No.	Description
72-1831	1 ml PTFE Luer Lock
72-1832	2.5 ml PTFE Luer Lock
72-1833	5 ml PTFE Luer Lock
72-1834	10 ml PTFE Luer Lock
72-1835	25 ml PTFE Luer Lock
72-1836	50 ml PTFE Luer Lock
72-1837	100 ml PTFE Luer Lock
78-8314	Syringe Barrel Plunger Adapter for 25 ml, 50 ml and 100 ml Hamilton Gastight® Syringe, required for withdraw function

1700 Series GASTIGHT® Syringes

Item No.	Description
72-1781	50 µl PTFE Luer Lock
72-1782	100 µl PTFE Luer Lock
72-1783	250 µl PTFE Luer Lock
72-1784	500 µl PTFE Luer Lock

Cost-Effective Plastic Syringes

Premium Line of Plastic Syringes

Premium Line of Glass Syringes

- Sterile Packed and Disposable
- Compatible with Most Syringe Pumps
- Disposable Substitute for Glass Syringes
- No Silicone Lubricant or Rubber
- Economical

Specifications

Luer Lock (Pkg. of 25)				
Volume (ml)	**3**	**5**	**10**	**20**
Total Length (mm)	74.9	87	98.5	115.1
Length of Cylinder (mm)	65.1	73.8	85.3	102.4
Outside Diameter (mm)	10.8	13.7	17.3	21.55
Inside Diameter (mm)	9.65	12.45	15.9	20.05
Nozzle Configuration	Centric	Centric	Centric	Centric
Order Code	78-0851	78-0852	78-0853	78-0854

Dose saver design with 0.025 low dead space plug on the piston to minimize waste.
The 5 ml has graduations to 6 ml, 10 ml has graduations to 12 ml, 20 ml has graduations to 24 ml and 50 ml has graduations to 60 ml.

Slip Lock (Pkg. of 25)					
Volume (ml)	**1**	**3**	**5**	**10**	**20**
Total Length (mm)	94.8	74.9	87	98.5	115.1
Length of Cylinder (mm)	84.7	65.1	73.8	85.3	102.4
Outside Diameter (mm)	6.4	10.8	13.7	17.3	21.55
Inside Diameter (mm)	4.69	9.65	12.45	15.9	20.05
Nozzle Configuration	Tuberculin	Eccentric	Eccentric	Eccentric	Eccentric
Order Code	78-0850	78-0857	78-0858	78-0859	78-0860

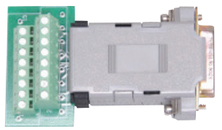
The 5 ml has graduations to 6 ml, 10 ml has graduations to 12 ml, 20 ml has graduations to 24 ml and 50 ml has graduations to 60 ml.
Total length is piston thumb rest to syringe tip on an assembled syringe. Cylinder Length is cylinder only, finger grip to tip.
The barrel is polypropylene, piston is high density polyethylene.

KD Scientific offers a new line of disposable plastic sterile syringes for all scientific applications. Available in sizes ranging from 3 ml to 50 ml with Luer Lock (LL) or Luer Slip (LS) Tip. Norm-ject syringes are the ideal solution for any situation. Their unique two-part system is latex free and contains no silicone lubricant or rubber.

Our syringes are made from laboratory grade polypropylene and polyethylene. There is no rubber tip on the plunger making them more chemically resistant than rubber-tipped syringes. These unique plastic syringes have a positive safety stop to prevent accidental spills.

Accessories

For Legacy and Legato Series Syringe Pumps



Adapter D Sub 15 to Terminal Block

Lubricant SuperLube, 1 cc

Adapter for 25 ml, 50 ml, 100 ml Hamilton Gastight Syringe

Footswitch with Phono Jack Plug

Replacement Battery

USB Cable PC to Pump Communication

RS-232 Cable (9 pin d-sub), 2 m

RS-485 Pump to Pump Communication

Line Cord UK

Line Cord US 115 V

Item No.	Description
78-8000	Adagio Software **(A)**
78-0223	RS-232 Cable with RJ11 **(B)**
78-0393	Daisy Chain Cable **(B,D)**
78-0392	Footswitch **(D)**
78-0338	Spare Emulsifier Needles for Legato 380
78-8131	Legato 130 Replacement Injector
78-8132	Legato 130 Replacement Controller
78-8188	RS-232 Gemini 88 Plus Cable 2m (6.6 ft) **(D)**
78-8354	BNC Connector Cable for Analog Control Option **(G)**
78-8303	Anti-Siphon Kit (F,G)
78-8304	RS-485 Pump to Pump Communication, 0.5 m (1.6 ft) **(A)**
78-8305	RS-485 Pump to Pump Communication, 2 m (6.6 ft) **(A)**
78-8306	USB Cable PC to Pump Communication, 2 m (6.6 ft) **(A)**
78-8307	USB Cable PC to Pump Communication, 5 m (16.4 ft) **(A)**
78-8308	RS-232 Cable (9 pin d-sub), 2 m (6.6 ft) **(A)**
78-8309	Line Cord US, 115 VAC **(A,B,C)**
78-8310	Line Cord European **(A,B,C)**
78-8311	Line Cord UK **(A,B,C)**
78-8313	Adapter D Sub 15 to Terminal Block **(A)**
78-0225	Footswitch with Phono Jack Plug **(A,C)**
78-0224	Footswitch with Phono Jack Plug **(B)**
78-8314	Adapter for 25 ml, 50 ml, 100 ml Hamilton Gastight Syringe
78-8315	Hex Key
78-8316	Lubricant SuperLube, 1 cc
78-8324	Protective Shield for display **(A)**
78-8326	Line Cord with Power Supply, 115V **(E)**
78-8327	Line Cord with Power Supply, European **(E)**
78-8328	Line Cord with Power Supply, UK **(E)**
78-8329	Upgrade Infuse Only to Infuse/Withdrawal **(E)**
78-8317	Upgrade Infuse Only to Infuse/Withdraw **(F)**
78-8318	Upgrade Infuse/Withdraw Only to Programmable **(F)**
78-8319	Upgrade Infuse/Withdraw to Programmable **(F)**
Optional AI	Analog Control Input Option (0 to 10 VDC)*
5146037	Replacement Fuse **(A)**
5155288	Replacement Battery **(F)**

* Only available with 78-8212, 78-8272, 78-8210, 78-8270

A Compatible with Legato
B Compatible with Legacy
C Compatible with KDS 310, KDS100Y
D Compatible with Gemini 88 Plus
E Compatible with Legato 100 Series
F Compatible with Legato 200 Series
G Compatible with Legato 200 Series Programmable Option

SYRINGES & ACCESSORIES

KD Scientific Offers a Wide Range of Products to Meet Different Application Needs

We can assist you with selecting a Syringe Pump or a Centrifan Evaporator. Simply fill out the questionnaire below and fax it to **1-508-893-0160** or send in an email to **info@kdscientific.com**. This form can also be accessed on our website **www.kdscientific.com/contacts**.

Syringe/Peristaltic Pump Questionnaire

1. How many syringes/channels will you use?

2. What is the size of the desired syringe(s)/tubing(s)?

3. Do you want to:

☐ Infuse Only ☐ Withdraw/Infuse

☐ Withdraw Only ☐ Multi-step Programming

☐ Infuse/Withdraw

4. Is there any back pressure in your application or are you dispensing
Indicate Backpressure _____

5. Required flow rate? _____

6. Volume to be dispensed? _____

7. Computer Interface:

☐ LabView Software ☐ KDS Adagio Software

☐ Custom Software

8. Please describe your application?_____

9. Describe any special requirements in your applications? _____

10. How many pumps do you need? _____

11. Do you need syringes?

Plastic (indicate size and quantity) _____

Glass (indicate size and quantity _____

Stainless Steel (indicate size and quantity _____

12. Do you need tubing Indicate size & quantity)? _____

C-Flex _____ Viton _____ Tygon _____

13. Next step:

☐ Send Quote ☐ Contact me via email ☐ Contact me via phone

Name _____ **Title** _____

Company/Organization _____

Address _____

City _____

State _____

Zip _____

Country _____

Email _____

Phone _____

Fax _____

Agence Nord:
ZA Object'Ifs Sud - Lot A3
6 Allée Emilie du Châtelet
14123 Ifs
tél : 02.31.34.50.74
fax : 02.31.34.55.17

Agence Est:
Parc Club des Tanneries
2 Rue de la Faisanderie
67380 Lingolsheim
tél : 03.88.04.01.81
fax : 03.68.93.01.52

Agence Sud:
Bât Le Venango. 392 Rue Jean Dausset
AGROPARC - BP11575
84916 Avignon Cédex 9
tél : 04.90.27.17.95 fax : 04.90.27.17.52

www.deltalabo.fr
info@deltalabo.fr