

Syringe Pumps & More...

So Advanced **They're**
Simple!



kdScientific

www.kdscientific.com

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NEW Centrifan™ Evaporator,
see pages 43-45

NEW Gastight
Syringes,
see page 51



NEW Legato® 950
OEM Module,
see page 39



NEW KDS Valve Boxes,
see pages 53-54

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
- 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.

COMPANY OVERVIEW



Legacy Series, see pages 30-37



Legato® Series, see pages 6-23



History of **kdScientific**



kdScientific
Established



KDS 100



KDS 101



KDS 120



KDS 250



KDS 310



KDS 410

1991

1992

1995

2000

2002

2005-06



KDS 200



KDS 260



KDS 210



KDS 270



KDS 220



Ultrasense
2000
Dispenser



KDS 330



2008

2009

2010

2011

2012 & Beyond



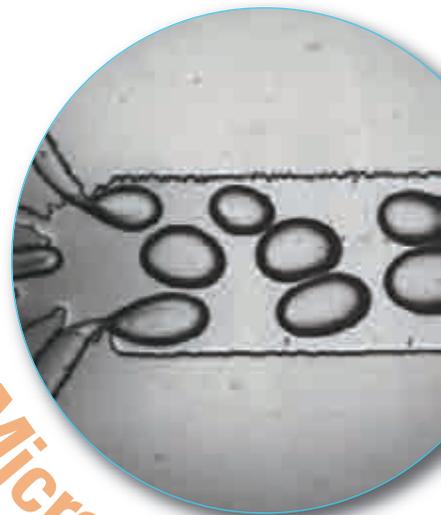
2012 VALVE BOXES

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

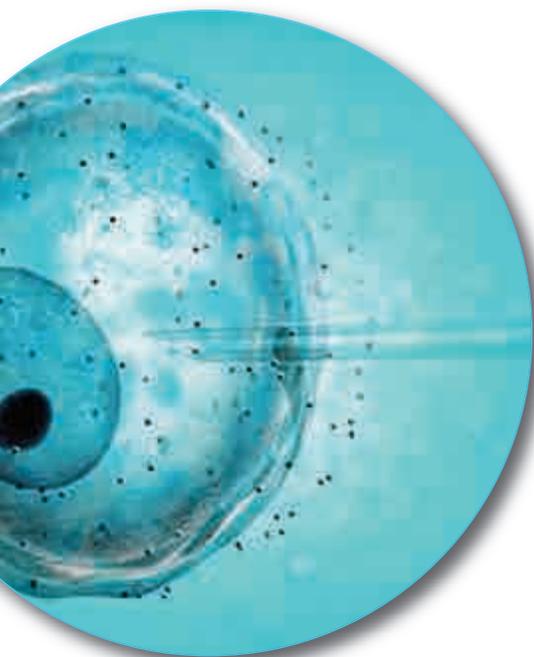
Extensive Applications

- 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

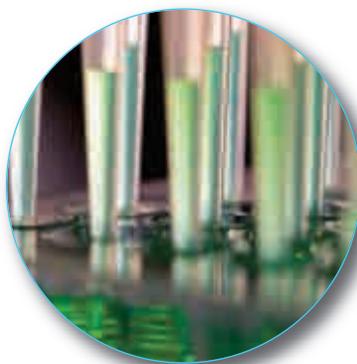
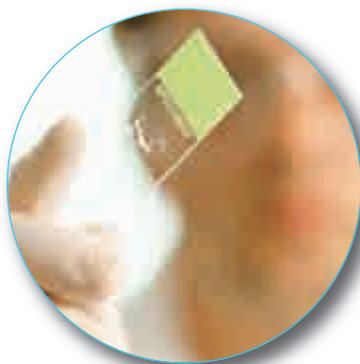


Microfluidics

Electrospraying



Electrospray



Mass Spec



- 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
- Metered Dispensing
- Microdialysis
- Micro-Filtration
- Perfusion
- Pharmaceutical Development
- Polymer Research
- Post Column Addition
- Electropray (ESI-MS)
- HPLC Mass Spec
- Lock Mass Infusion/Calibration
- MALDI-TOF Matrix Addition
- Nano Flow Rates
- Precision Mass Spec
- Capillary Electrophoresis

Continuous Flow

- 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

Organic Synthesis

Drug Infusions



Maldi-TOF



Emulsifier



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, 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



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 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.



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® Series.

Horizontal Orientation



Vertical Orientation Display Rotates 90°



LEGATO® SERIES

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.

Run **06/01/12 8:01:59 AM**

36.003 ml/min

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)

MODE: Infuse Only
 SYRINGE: KDS Glass 10 ml
 FORCE LEVEL: 50%
 TARGET: No target set
 INFUSION TIME: 00:00:16

5.078 ml 5.048 ml

FLOW DIRECTION: →

TIME ELAPSED: 00:00:08

TIME REMAINING: 00:00:08

STATUS: INFUSING

TOTAL INF VOLUME: 4.741 ml

SETUP [Lock Icon]

← → CFG STOP

Total Volume Delivered

Current status of the Pump

Total Remaining Time of the Program

Total Elapsed Time of the Program

Flow Direction with arrow indicator

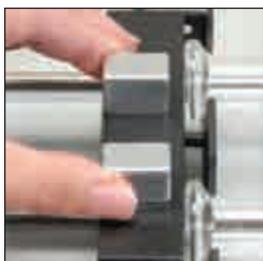
Dead Volume can be quickly eliminated with a fast forward feature

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

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

A Rugged Design, Maximum

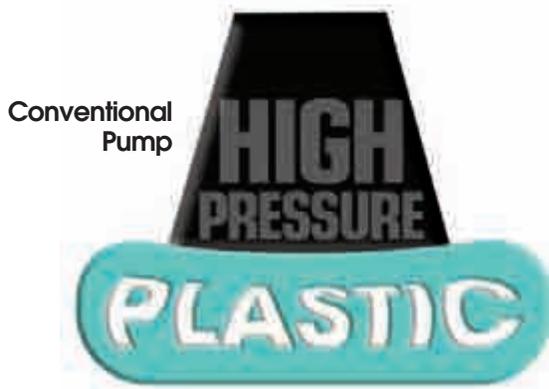
- One touch quick release pusher block is easy to use and is always engaged.
- Advanced mechanical syringe mechanism incorporates a dual purpose, syringe clamp for large syringes, >30 ml, or simply flip the syringe clamp to hold smaller syringes, <30 ml to 0.5 µl.
- Rubber pads retain syringe in place 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.



LEGATO®
SERIES

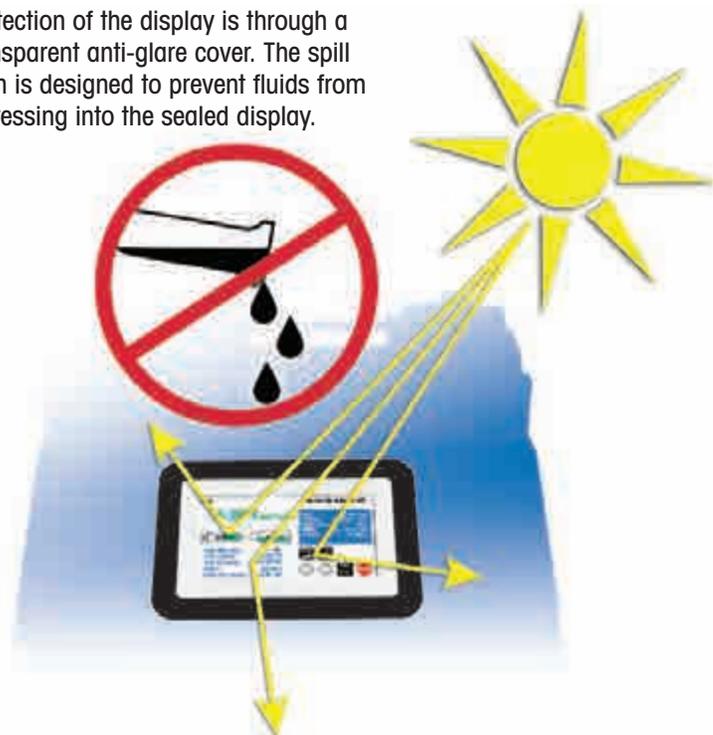
Optimal EMI/RFI Shielding with Welded Steel Chassis

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

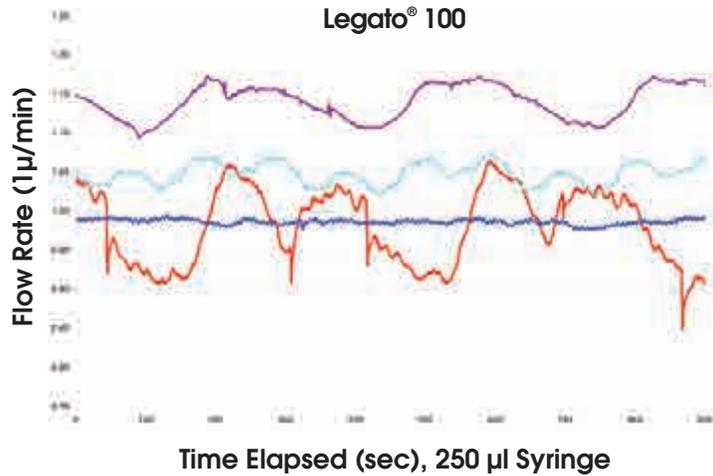
Legato's Superior Flow Performance

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 +/- 0.35% and has 0.05% reproducibility. A wide dynamic flow range from 3.06 pl/min to 215.803 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, μ l, nl, pl, and hours, minutes and seconds. The Legato 180 is the ultimate picoliter pump and is ideal for microfluidic applications.

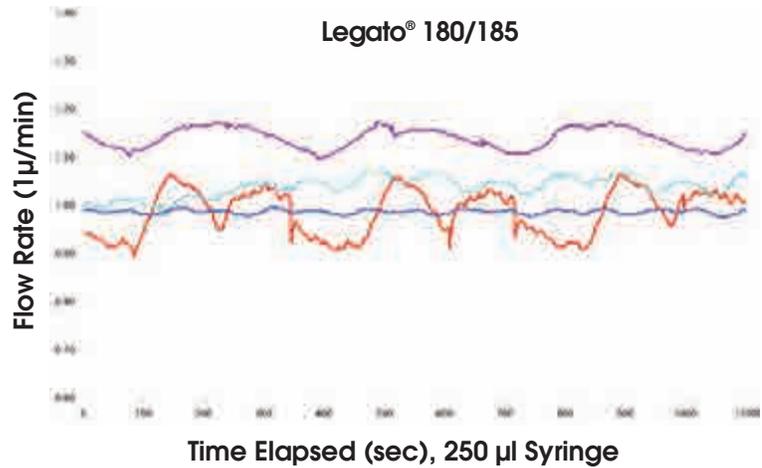


Design for Superior Flow Performance

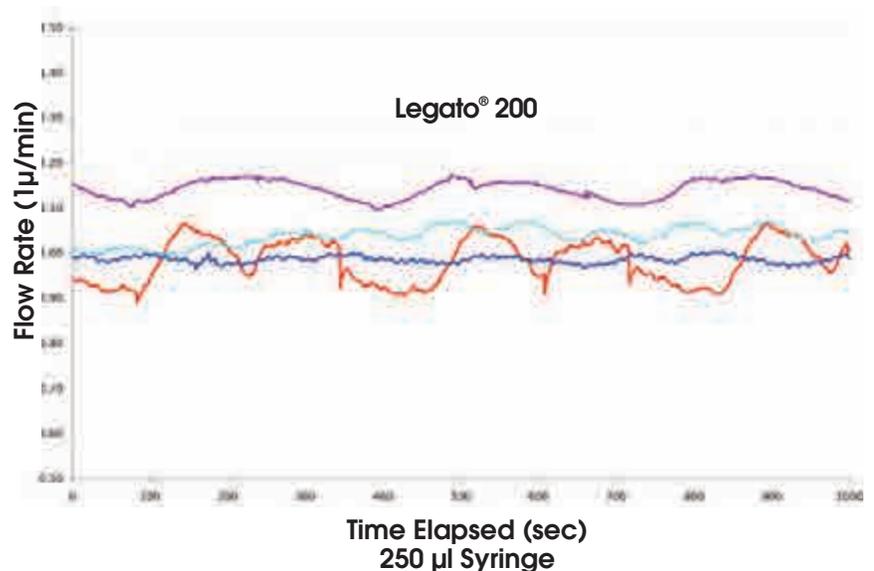
Legato® 100 versus Conventional Syringe Pumps



Legato® 180/185 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
- Withdraw/Infuse
- Withdraw/Infuse Continuous
- Define Your Own Custom Programs/Recipes

Step 2: Wide Range of Syringes

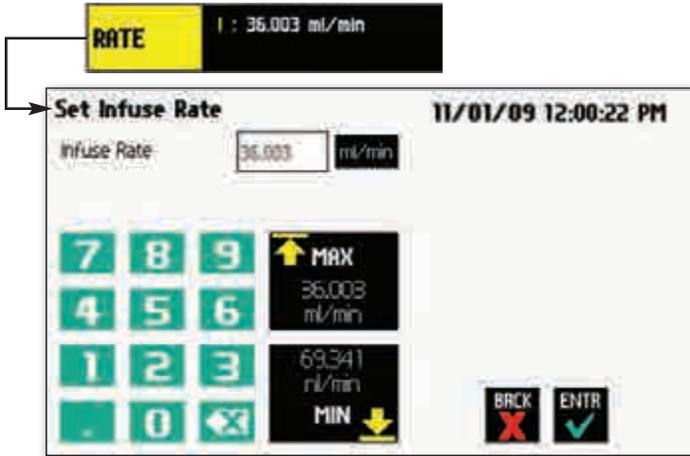
Most manufacturers' syringes, from 0.5 μ l to 140 ml. Any type of syringe including glass, plastic and stainless steel syringes.



and Execution

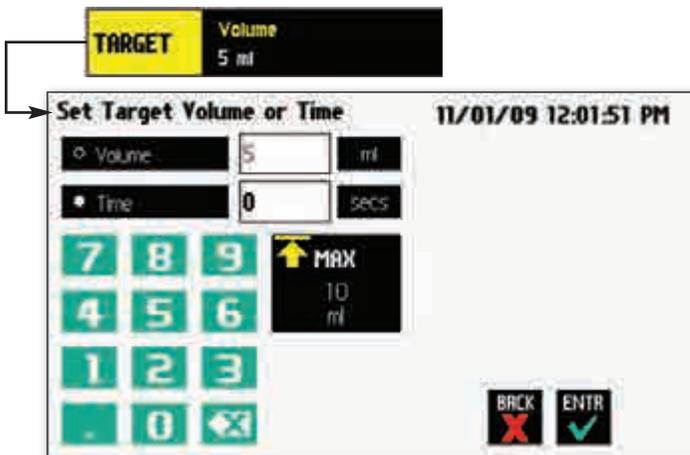
Step 3: Wide Flow Rate Range

Minimum and Maximum flow shown for each size of syringe.



Step 4: Selectable Target Volume & Time

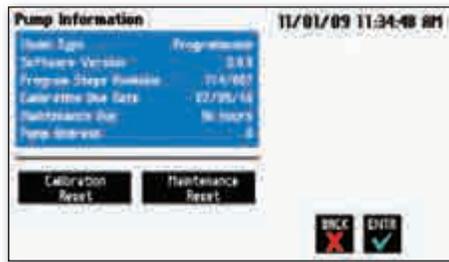
Select the total volume from nl to ml. Units are selectable - or for infuse only, select the time.



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:

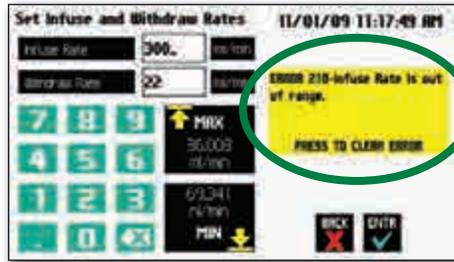
- The pump's parameters, including the calibration and maintenance dates.
- Messages indicating when it is time to recalibrate the unit or when it is time for regular maintenance.
- Pump software version, calibration & lubrication intervals.



(Legato® 200 Series Shown)

Notifications and Error Messages

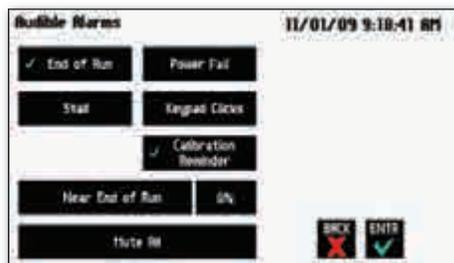
Notifications and error messages are displayed for the user to acknowledge, eliminating any guesswork about problems.



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 Fail
- Stalled Condition
- Calibration Reminder (Only available on the Legato® 200 Series)



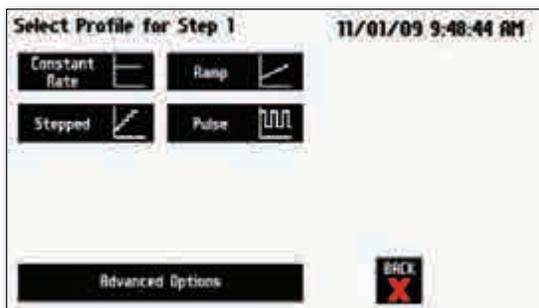
* All screens shown for the Legato® 200 Series

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

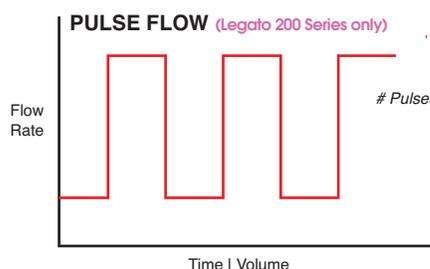
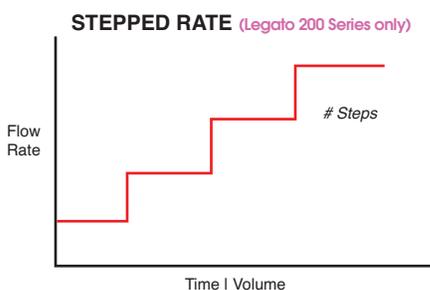
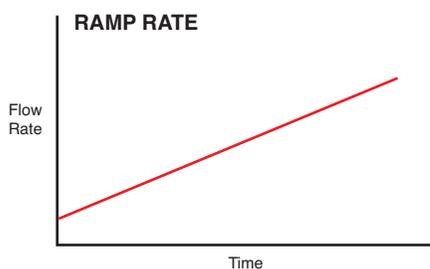
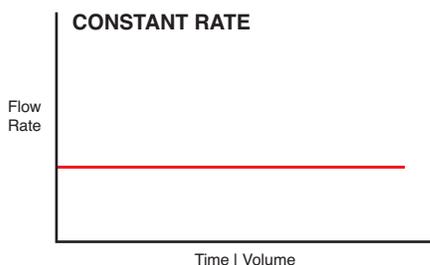
Standard profiles make custom programs easy to setup. If more complexity is needed the user can select from advanced preprogrammed functions including:

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



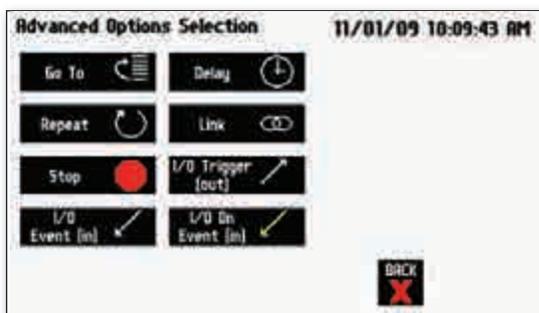
Pre-defined profiles for easy configuration.

- 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 & 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:

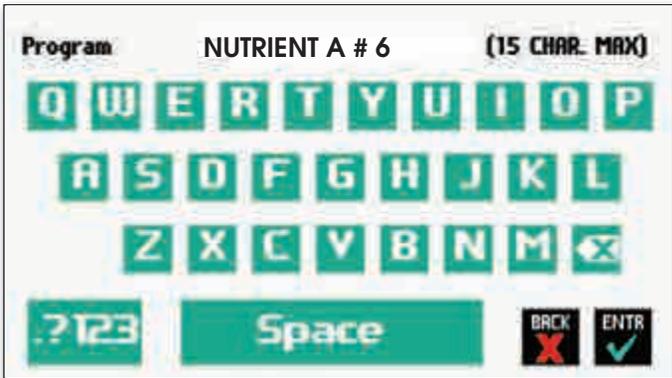


Trigger programs with pre-defined options.

- 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

*Note: Only available with Legato 200 Series.

Routine & Complex Applications

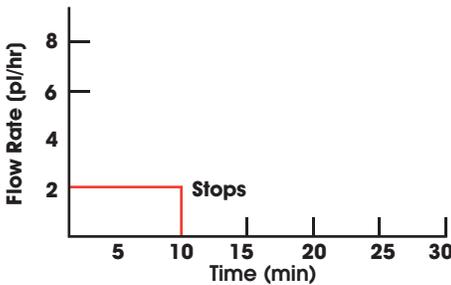


Unique labeling for each program.

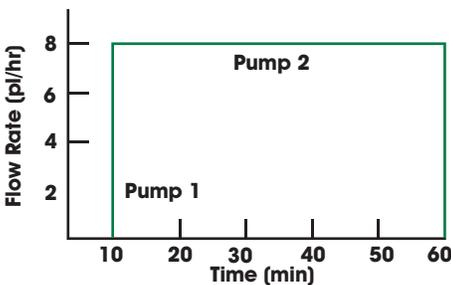
NAME: ORGANIC SYN 12

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



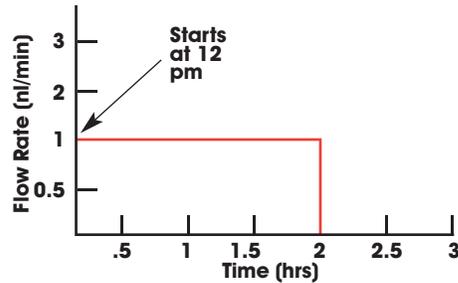
Organic Syn 12 - Pump 2



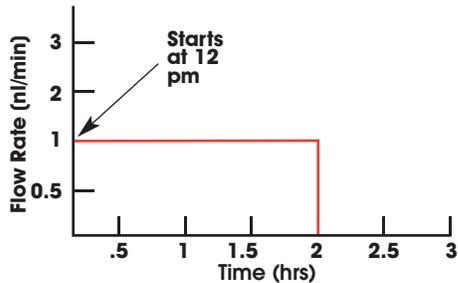
RECIPE NAME: DRUG 8302

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



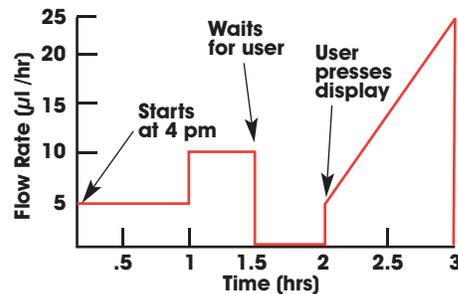
Drug 8302 - Day 2



RECIPE NAME: NUTRIENT A #6

A test begins at 4 pm and runs at a flow rate of 5 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.

Nutrient A #6



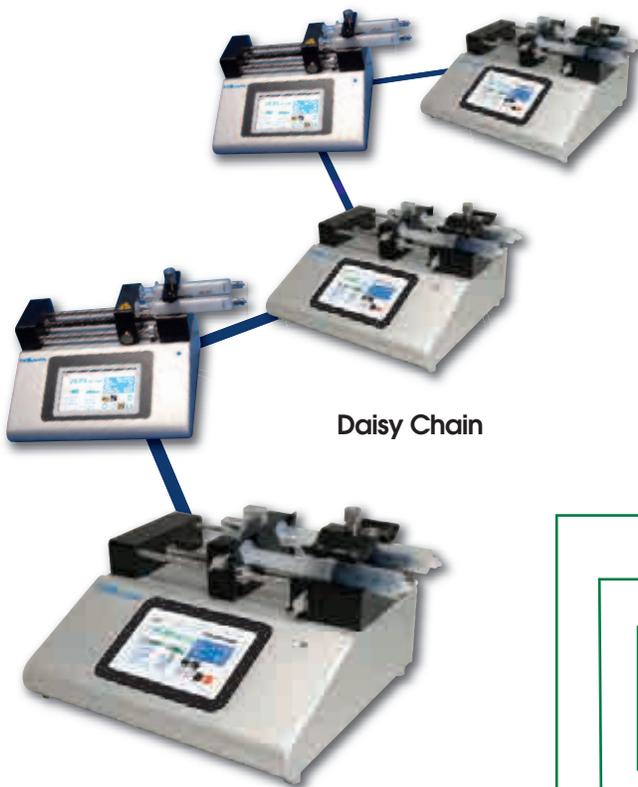
Second to None

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

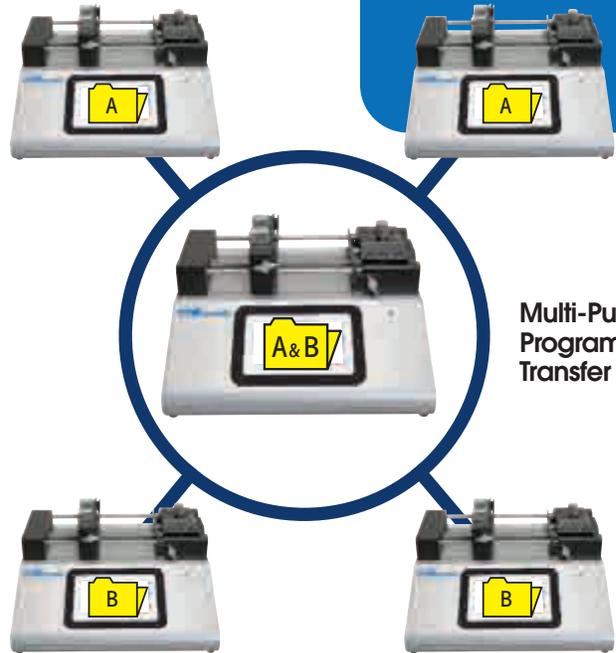
- export programs to a PC
- export a program to another pump
- duplicate programs
- append one program to another
- rename programs
- delete programs

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



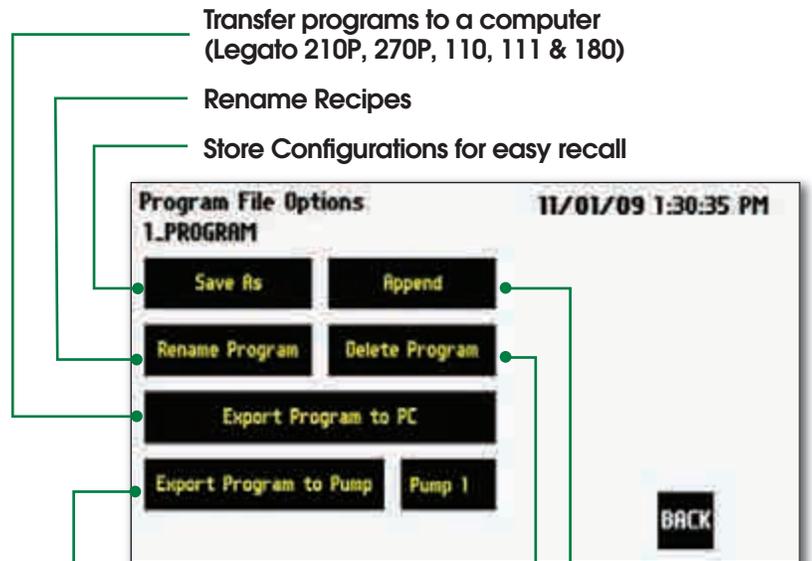
Daisy Chain



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® 210 & 210P
Infuse/Withdraw
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 1000 steps. Up to 40 programs of 25 steps each can be stored in memory.

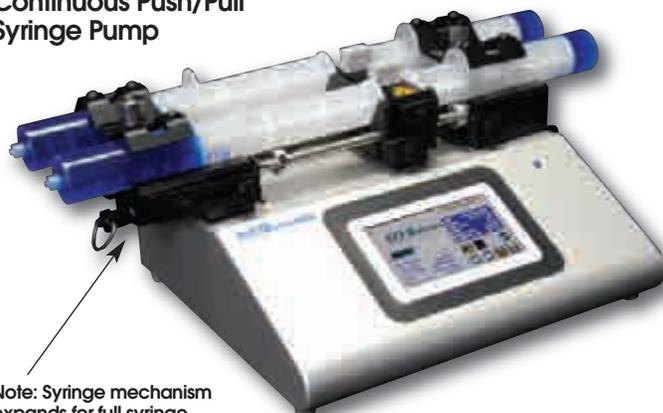
Legato® 270 & 270P

Continuous Syringe Pump & Multi-step Programming

Push/Pull Syringe Pump. Accommodates 2 syringes 0.5 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.

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® 270 & 270P
Continuous Push/Pull
Syringe Pump



Note: Syringe mechanism expands for full syringe stroke length.

Series to Meet Your Needs

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.

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 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.

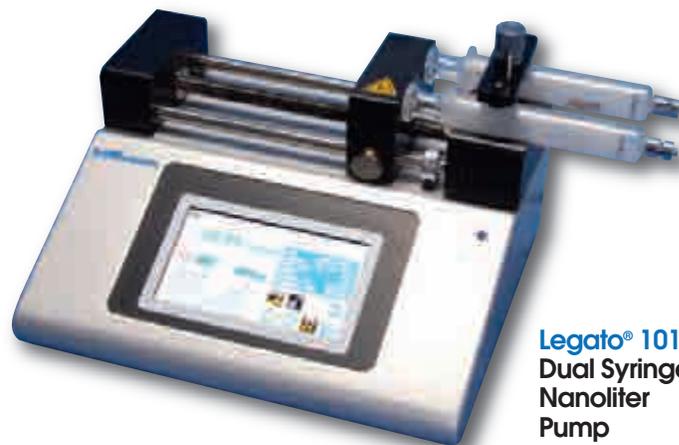
- Infuse/Withdraw Microliter Rack
- Four 0.5 µl to 10 ml syringes
- Can be sold for Infuse Only as well

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, 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.

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 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

Series to Meet Your Needs

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.

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 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® 130
Single Syringe Nanoliter
Infuse/Withdraw Pump

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 & 185 have a finer lead screw and a different pulley ratio from the Legato 101/111. The Legato® 180 & 185 offer multi-mode capability and 2 multi-step programs, each with 50 steps. The Legato® 180 & 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® 180 & 185
Single & Dual Syringe
Picoliter Infuse/Withdraw
Pump

Legato® Series Specifications

Legato Model	Infuse Only			Legato 110	Legato 111
	Legato 100	Legato 101	Legato 200		
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	1.26 pl/min	1.26 pl/min	3.06 pl/min	1.26 pl/min	1.26 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	-	105 ml/min	88.28 ml/min	N/A
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/µstep	0.069 µm/µstep	0.1656 µm/µstep	0.069 µm/µstep	0.069 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
Maximum 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
Multistep 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 Input	No	No	No	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	Automatic	Automatic	Automatic	Automatic	Automatic
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/10.75 lbs	2.66 kg/5.9 lbs	2.66 kg/5.9 lbs
Dimensions, H x W x L (in)	5 x 7.5 x 9	5 x 7.5 x 9	6.5 x 10 x 11	5 x 7.5 x 9	5 x 7.5 x 9
Dimensions, H x W x L (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

Infuse/ Withdraw Pumps					Continuous Cycle Pump	
Legato 180/185	Legato 130	Legato 210	Legato 210P	Legato 270	Legato 270P	
78-8180/78-8185	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	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	
0.540 pl/min	3.66 pl/min	3.06 pl/min	3.06 pl/min	3.06 pl/min	3.06 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	1 Program/100 steps	40 Programs/25 steps	1 Program/100 steps	40 Programs/25 steps	
Yes	Yes		Yes	Yes	Yes	
Yes	Yes		Yes	Yes	Yes	
No	No		Yes	Yes	Yes	
No	No		Yes	Yes	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	
Automatic	Automatic	Automatic	Automatic	Automatic	Automatic	
No	No	Yes	Yes	No	No	
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	2.05 kg/4.32 lbs	4.9 kg/10.75 lbs	4.9 kg/10.75 lbs	4.9 kg/10.75 lbs	4.9 kg/10.75 lbs	
5 x 7.5 x 9	3.67 x 7.5 x 9	5 x 10 x 11	5 x 10 x 11	6.5 x 10 x 11	6.5 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

Minimum computer requirements include:

- 2 Ghz Pentium processor or higher
- 512 MB of RAM (2 GB recommended)
- Windows XP SP3 or Vista (XP recommended)
- Free RS-232 or USB 2.0 ports
- Microsoft Excel 97 or higher.

Adagio® Syringe Pump Software

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

The screenshot shows the 'Pump Configuration' window. At the top, there are three buttons: 'Add new...' (with a plus sign), 'Edit...' (with a pencil), and 'Delete' (with a red minus sign). Below these is a table with the following data:

Pump Name	Pump Model	Serial Number	Communication
Legato 210	LEGATO 210 Infuse/Withdraw		COM9 [0]

At the bottom of the window, there are four buttons: 'Refresh' (with a circular arrow), 'Pump control' (with a play button), 'Accept' (with a green checkmark), and 'Cancel' (with a red X). A legend in the top right corner shows: a green circle for 'Pump ready', a grey circle for 'Pump off line', and a red circle for 'Wrong pump detected'.

Callout boxes provide the following descriptions:

- Assign a unique pump name
- List Sortable by Column
- Launch Pump Configuration Assistant
- Select Pump to edit previously defined pump
- Delete configured pump
- Auto detection of pump status
- Identify the communication port
- Enter the pumps serial number
- Identify the pump model
- Launch manual pump control
- Updates status of the pumps
- Ignore changes made to the list of pump
- Close Pump configurations and store defined pump list

ADAGIO® SOFTWARE

Define the Pump Configuration

Connect the pumps to the computer.

Auto Checks the Pump Model & Identification

Enter A Unique Name

Enter Pump Serial Number

Legato Pump Address

Enter Communication Port Baud Rate

Lists All Available Communication Ports

Quick & Easy Manual Pump Control

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

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 210	2	00:33:20	0.000 pl	8/3/2010
Ramp	LEGATO 210	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

ADAGIO® SOFTWARE

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 210 Infusion/Withdrawal with Dual Syringe

of Syringes: 1 Syringe model: Becton Dickinson Plasti-pak 50 ml | 2l 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

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.

Pump Name

Program Name

Control individual or all pumps simultaneously

Method	Pump name	Current Flow	Elapsed Time	Progress	Duration	Status	Individual Pump Control
<None >	Pump	0 no units	00:00:00	0%	00:00:00	Stopped	Start Stop Reset
<None >	Lab Pump	0 no units	00:00:00	0%	00:00:00	Stopped	Start Stop Reset

Current Pump Status

Total Program Duration

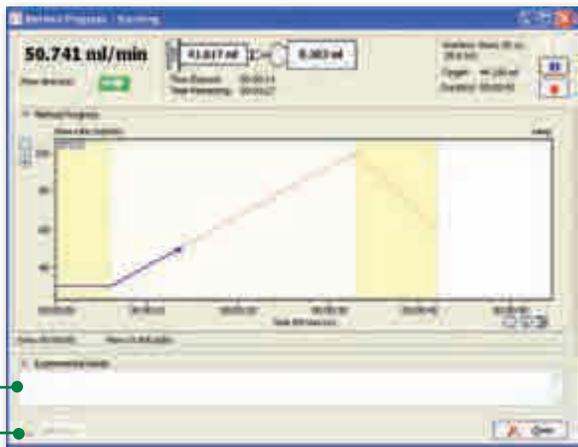
Program Progress (0 to 100%)

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.

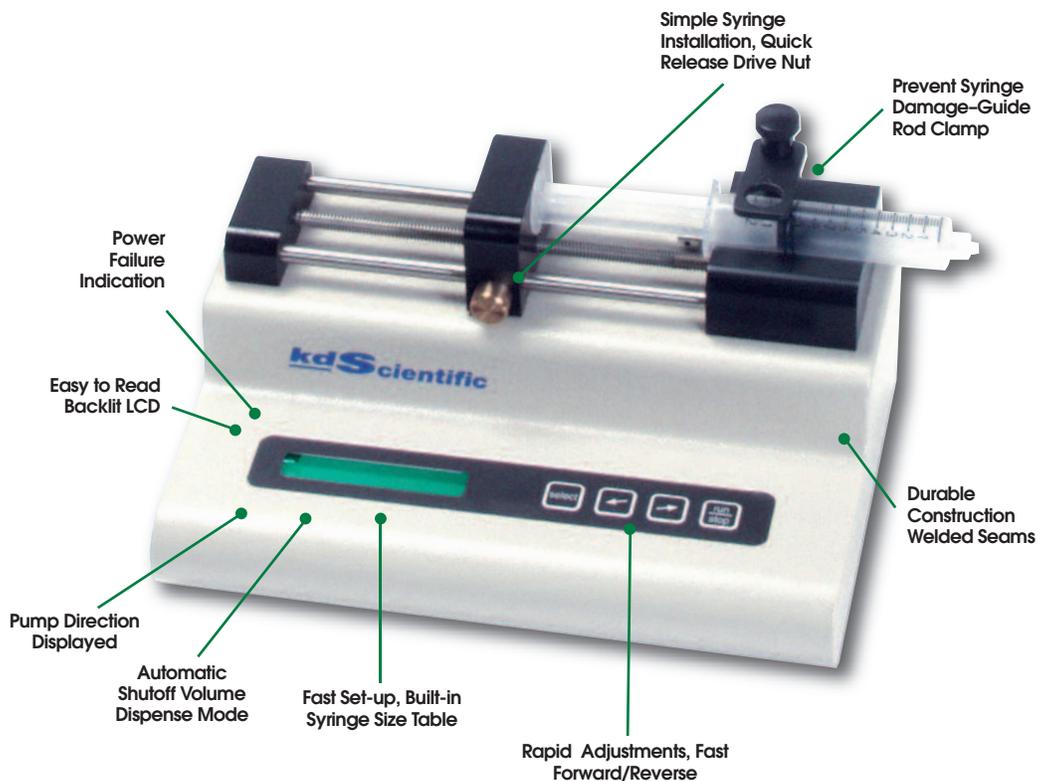
Pump parameters are stored as well as an event record table.

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

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/KDS 200 syringe pumps more than any other for their outstanding reliability and performance. The KDS 100 series pumps give customers the most cost effective solution for infusing fluids. Alternatively, the KDS 200/KDS 400 series give the customer advanced features with RS232 and TTL interfaces. All KDS 200/KDS 400 series pumps can be daisy chained together to create a pumping network.

The KDS Legacy Series



General Features Available on ALL Legacy pumps:

- Vibration Elimination System
- Flow Direction Indicator
- Fast Forward/Reverse
- Antisiphon Clamp (I/W Models only)
- CE Approved Model 100 series are ETL listed and conforms to ANSI/UL Standard 61010-1:2004 2ND ED. Certified to CAN/CSA STD C22.2NO.61010.1:2004 2ND ED
- Power Recovery Diagnostics
- Optional Foot Pedal Interface
- NIST Certificate Option
- Alarm Option
- CE Approved Models

Basic Programming

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

Standard on KDS 200/KDS 400 Pumps

- Daisy Chain Connection
- RS232
- TTL
- Foot Switch Interface Standard
- Stall Detection
- Numeric Keypad
- Engineering Unit Selection

Expanded Capabilities

Network Multiple Pumps

Network up to 100 Pumps—Mix and Match any KDS 200/400 Series Pump!

All KDS 200/400 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 200/KDS 400 Series syringe pumps. Lets you program right from the keypad with software program on computer.

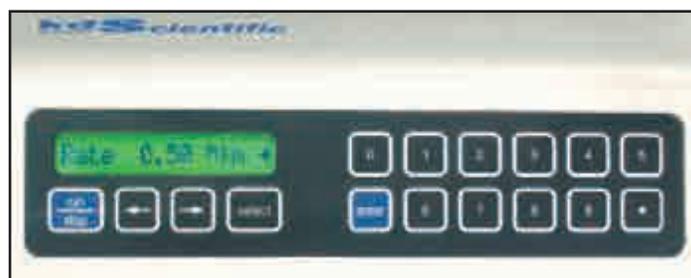
Simply follow a few menu-driven prompts and in just minutes you can customize a program to: control the pump from seconds to days, change flow rates, pause, ramp rates up or down automatically, control outputs and respond to external TTL signals.

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.

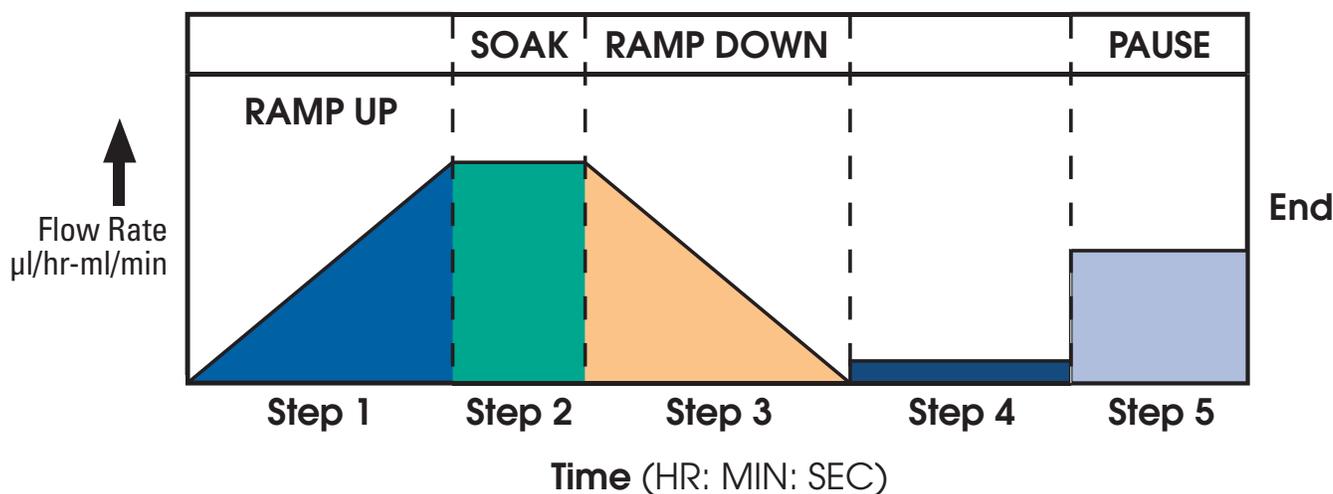
A program is divided into eight variable time periods called steps. A step can be up to 12 hours long and may be changed without affecting other steps.

Each step offers these options:

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



LEGACY SERIES



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.

Infusion Pumps



KDS 100
Single-Syringe
Infusion Pump



KDS 200
Two-Syringe
Infusion Pump



KDS 101
Two-Syringe
Nanoliter Pump



KDS 220
Multi-Syringe
Infusion Pump



KDS 250
Four-Syringe Microliter
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 μ l to 60 ml
- Wide flow range up to 423 ml/hr (60 ml syringe)

KDS 101

Two-Syringe Nanoliter Pump

The KDS 101 Two-Syringe Nanoliter Pump is ideal for microdialysis and similar applications which require virtually pulseless flow at very low flow rates.

- Holds 2 syringes, 10 μ l to 10 ml each
- Minimum flow 0.001 μ l/min (10 μ l syringe)

KDS 200

Two-Syringe Infusion Pump

This feature-laden Two-Syringe Infusion Pump combines a broad speed range and holds a wide range of syringe sizes to meet the requirements of virtually any laboratory application.

- Minimum flow 0.001 μ l/hr with 10 μ l syringe
- Holds one or two syringes, 10 μ l to 140 ml each

KDS 220

Multi-Syringe Infusion Pump

KDS 220 Multi-Syringe Infusion Pump is ideal for applications requiring multiple syringes. This pump has been modified to hold up to 10 syringes.

- **Multiple syringe holder:**
 - One to ten syringes, 10 μ l to 10 ml
 - One to six syringes, 20 ml to 60 ml
 - One to four syringes, 100 ml to 140 ml

KDS 250

Four-Syringe Microliter Infusion Pump

Each syringe can be sized differently and is clamped independently.

- **Multiple syringe holder**
 - Four syringes, 10 μ l to 10 ml each
- **Separate clamping accommodates various sizes**
- **Syringes may be positioned independently for sequential dispensing by the pusher block.**

Infusion/Withdrawal Pumps

Infuse and withdraw capabilities provide maximum flexibility for varied applications. This feature permits applications, such as automatic withdrawal of samples and unattended filling of syringes at very low flow rates. The unique KDS 310 offers a remote pump head, which is perfect when space is limited. The small size and exceptional low flow rate capability allows direct mounting of the KDS 310 on a stereotaxic manipulator without the need for long narrow tubing which is both difficult to use and requires larger volumes of valuable fluids.



KDS 210
Two-Syringe
Infusion/Withdrawal Pump



KDS 230
Multi-Syringe
Infusion/Withdrawal Pump



KDS 310
Single Syringe
Nanoliter Pump



Note: Stereotaxic frame for illustration only.

KDS 210

Two-Syringe Infusion/Withdrawal Pump

The KDS 210 offers you more advanced features than any other infusion/withdrawal pump in its price range- including five operating modes plus independent rate and volume settings for both infusion and withdrawal.

- Holds two syringes, 10 μ l to 140 ml each
- Multiple mode selection:
 - Infusion, Withdrawal, Infusion then withdrawal, Withdrawal then Infusion, Continuous Cycle

KDS 230

Multi-Syringe Infusion/Withdrawal Pump

Ideal for applications requiring multiple syringes, the KDS 230 is an adaptation of the KDS 210. The pump has been modified to hold up to 10 syringes.

- Multiple syringe holder:
 - One to ten syringes, 10 μ l to 10 ml
 - One to six syringes, 20 ml to 60 ml
 - One to four syringes, 100 ml to 140 ml
- Multiple mode selection:
 - Infusion, Withdrawal, Infusion then withdrawal, Withdrawal then Infusion, Continuous Cycle

KDS 310 Plus

Single-Syringe Nanoliter Pump

The KDS 310 Plus Single-Syringe Nanoliter Pump is used exclusively with micro syringes. Small size, remote pump head and a rugged mounting arm make it ideal for use with a micromanipulator, stereotaxic frame and other clamping devices.

- Mini size pump
- Remote pump head
- 0.5 μ l to 250 μ l syringe
- Minimum flow of 0.001 μ l/min (0.5 μ l syringe)

KD Scientific specialty pumps are engineered to meet the demands of specific applications. These pumps use the basic design of our standard pumps but are modified to provide specific functionality for any application.

The Legacy Series fits your

KDS 120
Two-Syringe
Push-Pull Pump



KDS 260
Four-Syringe
Push-Pull Pump



KDS 270
Continuous Cycle
Syringe Pump



KDS 410
High Pressure
Syringe Pump



KDS 120

Two-Syringe Nanoliter Push-Pull Pump

This pump provides simultaneous infusion and withdrawal at the same rate with opposing syringes on the same drive screw. The Push/Pull mode is designed for one cycle only.

- Holds two syringes 10 µl to 10 ml each
- Minimum flow 0.1 µl/hr (10 µl syringe)

KDS 260

Four-Syringe Push-Pull Pump

This KDS 260 pump provides simultaneous infusion and withdrawal with opposing syringes on a single drive. This is a single cycle pump (due to brackets).

Note: When not used in push/pull mode, the pump has all the features of KDS 210

- Holds up to four syringes, 10 µl to 60 ml each. With large syringes, the full volume may not be usable.

KDS 270

Continuous Cycle Syringe Pump

The KDS 270 can hold up to four syringes and can cycle continuously back and forth in a push-pull action. As two syringes are infusing, two syringes are withdrawing at the same rate. At the end of the set volume the direction is automatically reversed and the next cycle begins. With the use of 3-way valves, the pump can empty and refill syringes for a continuous dispense.

- Holds four syringes, 10 µl to 60 ml each. With large syringes the full volume may not be useable. (60 ml syringe - 40 ml useable, 30 ml syringe - full)

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 lbs (45 kg) linear force

Everyday Applications



KDS 520
Volume Dispense System



KDS 510
Dual Rate Pump System



KDS 100Y*
With Remote Operation

* Footswitch sold separately

KDS 100L
With LED Indication



KDS 520 Volume Dispense System

Sequential volume dispensing is easy with the new volume dispensing system. The system includes two KDS 100 pumps and the cable to link the pumps together. Set the same or different volume[s] in pump A and B; pump A will dispense the predetermined volume and start pump B automatically. Pump A and B can have unique flow rates. The two pumps can also be operated as standard independent KDS 100's.

KDS 510 Dual Rate Pump System

Activate two KDS 100 pumps simultaneously with one push of the start key. Set each pump with a different flow rate and the pumps will infuse at the same time. The system includes two KDS 100 pumps and the cable to link the pumps together. The two pumps can also be operated as standard independent KDS 100's.

KDS 100Y with Remote Operation

A new version of the rugged KDS 100 can now be remotely triggered with a footswitch or external switch. Starting and stopping dispense or infusion can be automated or remotely activated.

Also Available: 101Y, 120Y, 310Y

KDS 100L with LED Indication

The KDS 100 is now available with an optional LED to indicate the pump is on or running. This feature is ideal to get a quick indication if the pump is dispensing, especially if multiple pumps are in operation.

Also Available: 101L, 120L, 310L

The KDS 100 series has been modified with new hardware and software features for specific applications. Integrating multiple pumps in a system allows the individual pumps to interact with other ones. This will provide a system linked together based on information from one pump being transferred to another.

In addition, new features have been added to the KDS 100 Series including a new remote interface or an LED on the pump to indicate it is running. Contact KD Scientific for more information on other requirements you have for your specific applications.

LEGACY SERIES

Legacy Series Specifications

Legacy Model	Infuse Only Pumps						
	KDS 100	KDS 100L	KDS 100Y	KDS 101	KDS 200	KDS 220	KDS 250
Order Code 110 VAC	78-0100	78-0100ZZ	78-0100Y	78-0101	78-0200	78-0220	78-0250
Order Code 220 VAC	78-1100	78-1100ZZ	78-1100Y	78-1101	78-1200	78-1220	78-1250
Order Code 220 VAC with CE Mark	78-9100	78-9100ZZ	78-9100Y	78-9101	78-9200	78-9220	78-9250
Mode	Infuse	Infuse	Infuse	Infuse	Infuse	Infuse	Infuse
# Syringes	One	One	One	Two	Two	10 Maximum	Four
Syringe Size	10 µl to 60 ml	10 µl to 60 ml	10 µl to 60 ml	10 µl to 10 ml	10 µl to 140 ml	10 µl to 10 ml (up to 10) 40 ml to 60 ml (up to 6) 100 ml to 140 ml (up to 4)	10 µl to 10 ml
User Interface	Keypad	Keypad	Keypad	Keypad	Keypad with numerics	Keypad with numerics	Keypad with numerics
Display	Backlit LCD	Backlit LCD					
Accuracy	+/-<1%	+/-<1%	+/-<1%	+/-<1%	+/-<1%	+/-<1%	+/-<1%
Repeatability	+/-0.1%	+/-0.1%	+/-0.1%	+/-0.1%	+/-0.1%	+/-0.1%	+/-0.1%
Linear Force	20 lb/9 kg	20 lb/9 kg	20 lb/9 kg	40 lb/18 kg	40 lb/18 kg	40 lb/18 kg	40 lb/18 kg
Force Adjustment	-	-	-	-	-	-	-
Minimum Flow Rate 10 µl syringe	0.1 µl/hr	0.1 µl/hr	0.1 µl/hr	0.001 µl/min	0.001 µl/hr	0.001 µl/hr	0.001 µl/hr
Maximum Flow Rate 10 ml syringe	127 ml/hr	127 ml/hr	127 ml/hr	0.351 ml/min	1270 ml/hr	1270 ml/hr	1270 ml/hr
Maximum Flow Rate 60 ml syringe	423 ml/hr	423 ml/hr	423 ml/hr	-	4235 ml/hr	4235 ml/hr	-
Maximum Flow Rate 140 ml syringe	-	-	-	-	8824 ml/hr	8824 ml/hr	-
Drive Motor	7.5' Stepper Motor	7.5' Stepper Motor	7.5' Stepper Motor	7.5' Stepper Motor	1.8' Stepper Motor	1.8' Stepper Motor	1.8' Stepper Motor
Motor Gearbox	25:1	25:1	25:1	150:1	N/A	N/A	N/A
Microprocessor Motor Drive Control	1/2 microstepping	1/2 microstepping	1/2 microstepping	1/2 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping
# microsteps/one revolution of lead screw	2400	2400	2400	14400	6400	6400	6400
Advance per Microstep	0.529 µm	0.529 µm	0.529 µm	0.088 µm	0.1654 µm	0.1654 µm	0.1654 µm
Minimum Step Rate	30 sec/µstep	30 sec/µstep	30 sec/µstep	30 sec/µstep	120 sec/µstep	120 sec/µstep	120 sec/µstep
Maximum Step Rate	0.0025 sec/µstep	0.0025 sec/µstep	0.0025 sec/µstep	0.0025 sec/µstep	0.000625 sec/µstep	0.000625 sec/µstep	0.000625 sec/µstep
Pusher Travel Rate							
Minimum	0.10583 µm/min	0.10583 µm/min	0.10583 µm/min	0.001767 µm/min	0.10583 µm/min	0.10583 µm/min	0.10583 µm/min
Maximum	12700 µm/min	12700 µm/min	12700 µm/min	2033 µm/min	126900 µm/min	126900 µm/min	126900 µm/min
Multi-step Programming	No	No	No	No	Programmable Model	Programmable Model	Programmable Model
Pusher Block Stall Detection	No	No	No	No	Yes	Yes	Yes
Computer Interface	No	No	No	No	RS-232	RS-232	RS-232
TTL	No	No	No	No	Yes	Yes	Yes
Networking (Daisy-chain)	No	No	No	No	Yes	Yes	Yes
Audible Alarm Indication							
End of Run	Optional	Yes	Optional	Optional	Optional	Optional	Optional
Run LED	No	Yes	No	No	No	No	No
Power Domestic	100 ~ 120 VAC 50/60Hz	100 ~ 120 VAC 50/60Hz					
Power CE and International	200 ~ 240 VAC, 50/60Hz	200 ~ 240 VAC, 50/60Hz					
Weight	4.5 lb/2 kg	4.5 lb/2 kg	4.5 lb/2 kg	4.5 lb/2 kg	9.5 lb/4 kg	9.5 lb/4 kg	9.5 lb/4 kg
Dimensions (in)	9 X 6 x 5	9 X 6 x 5	9 X 6 x 5	9 X 6 x 5	11 x 9 x 5.5	11 x 9 x 5.5	11 x 9 x 5.5
Dimensions (cm)	23 x 15.25 x 13	28 x 23.5 x 14	28 x 23.5 x 14	28 x 23.5 x 14			
Certifications							
CE, ETL, UL, CSA, CB Scheme	CE Model	CE Model	CE Model	CE Model	CE Only (no ETL)	CE Only (no ETL)	CE Only (no ETL)
EN 61010, EN 61326							
WEEE (just WEEE - not RoHS)	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
Programmable Model	N/A	N/A	N/A	N/A	KDS 200P	KDS 220P	KDS 250P
Order Code 110 VAC					78-0202	78-0222	78-0252
Order Code 220 VAC					78-1202	78-1222	78-1252
Order Code 220 VAC with CE Mark					78-9202	78-9222	78-9252

Infuse/Withdraw Pumps		Push/Pull Pumps		Continuous Pump	High Pressure Pump	Remote Injector Pump
KDS 210	KDS 230	KDS 120	KDS 260	KDS 270	KDS 410	KDS 310 Plus
78-0210	78-0230	78-0120	78-0260	78-0270	78-0410	78-0311
78-1210	78-1230	78-1120	78-1260	78-1270	78-1410	78-1311
78-9210	78-9230	78-9120	78-9260	78-9270	78-9410	78-9311
Infuse/Withdraw	Infuse/Withdraw	Push/Pull	Push/Pull	Infuse/Withdraw/Continuous	Infuse/Withdraw	Infuse/Withdraw
Two	10 Maximum	One and One	Two and Two	Two and Two (Four total)	One	One
10 µl to 140 ml	10 µl to 10 ml (up to 10) 40 ml to 60 ml (up to 6) 100 ml to 140 ml (up to 4)	10 µl 10 ml	10 µl to 60 ml	10 µl to 60 ml (up to 4)	10 µl to 140 ml	0.5 µl to 250 µl
Keypad with numerics	Keypad with numerics	Keypad	Keypad with numerics	Keypad with numerics	Keypad with numerics	Keypad
Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD
+/-<1%	+/-<1%	+/-<1%	+/-<1%	+/-<1%	+/-<1%	+/-<1%
+/-0.1%	+/-0.1%	+/-0.1%	+/-0.1%	+/-0.1%	+/-0.1%	+/-0.1%
40 lb/18 kg	40 lb/18 kg	20 lb/9 kg	40 lb/18 kg	40 lb/18 kg	>100 lb/45 kg	2 lb/ 0.9kg
-	-	-	-	-	-	-
0.001 µl/hr	0.001 µl/hr	0.1 µl/hr	0.001 µl/hr	0.001 µl/hr	-	145.6 µl/min (100 µl syr)
1270 ml/hr	1270 ml/hr	127 ml/hr	1270 ml/hr	1270 ml/hr	1270 ml/hr	-
4235 ml/hr	4235 ml/hr	423 ml/hr	4235 ml/hr	4235 ml/hr	4235 ml/hr	-
8824 ml/hr	8824 ml/hr	-	8824 ml/hr	8824 ml/hr	8824 ml/hr	-
1.8' Stepper Motor	1.8' Stepper Motor	7.5' Stepper Motor	1.8' Stepper Motor	1.8' Stepper Motor	1.8' Stepper Motor	-
n/a	n/a	25:1	N/A	N/A	N/A	N/A
1/16 microstepping	1/16 microstepping	1/2 microstepping	1/16 microstepping	1/16 microstepping	1/16 microstepping	-
6400	6400	2400	6400	6400	6400	-
0.1654 µm	0.1654 µm	0.529 µm	0.1654 µm	0.1654 µm	0.1654 µm	1.58 µm
120 sec/µstep	120 sec/µstep	30 sec/µstep	120 sec/µstep	120 sec/µstep	120 sec/µstep	-
0.000625 sec/µstep	0.000625 sec/µstep	0.0025 sec/µstep	0.000625 sec/µstep	0.000625 sec/µstep	0.000625 sec/µstep	-
-	-	-	-	-	-	-
0.10583 µm/min	0.10583 µm/min	0.10583 µm/min	0.10583 µm/min	0.10583 µm/min	0.10583 µm/min	-
126900 µm/min	126900 µm/min	12700 µm/min	126900 µm/min	126900 µm/min	126900 µm/min	-
Programmable Model	Programmable Model	No	Programmable Model	Programmable Model	Programmable Model	No
Yes	Yes	No	Yes	Yes	Yes	No
RS-232	RS-232	No	RS-232	RS-232	RS-232	No
Yes	Yes	No	Yes	Yes	Yes	No
Yes	Yes	No	Yes	Yes	Yes	No
Optional	Optional	Optional	Optional	Optional	Optional	Optional
No	No	No	No	No	No	No
100 ~ 120 VAC 50/60Hz	100 ~ 120 VAC 50/60Hz	100 ~ 120 VAC 50/60Hz	100 ~ 120 VAC 50/60Hz	100 ~ 120 VAC 50/60Hz	100 ~ 120 VAC 50/60Hz	100 ~ 120 VAC 50/60Hz
200 ~ 240 VAC, 50/60Hz	200 ~ 240 VAC, 50/60Hz	200 ~ 240 VAC, 50/60Hz	200 ~ 240 VAC, 50/60Hz	200 ~ 240 VAC, 50/60Hz	200 ~ 240 VAC, 50/60Hz	200 ~ 240 VAC, 50/60Hz
9.5 lb/4 kg	9.5 lb/4 kg	4.5 lb/2 kg	9.5 lb/4 kg	9.5 lb/4 kg	14.1 lb/6.4 kg	4.5 lb/2 kg
11 x 9 x 5.5	11 x 9 x 5.5	9 X 6 x 5	11 x 9 x 5.5	11 x 9 x 5.5	6 x 11 x 9.5	7 X 1.7 x 2
28 x 23.5 x 14	28 x 23.5 x 14	23 x 15.25 x 13	28 x 23.5 x 14	28 x 23.5 x 14	15 x 28 x 24	17.8 x 4.4 x 5.1
CE Only (no ETL)	CE Only (no ETL)	CE Model	CE Only (no ETL)	CE Only (no ETL)	CE Only (no ETL)	CE Model
Compliant	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
KDS 210P	KDS 230P	N/A	KDS 260P	KDS 270P	KDS 410 P	
78-0212	78-0232		78-0262	78-0272	78-0412	
78-1212	78-1232		78-1262	78-1272	78-1412	
78-9212	78-9232		78-9262	78-9272	78-9412	

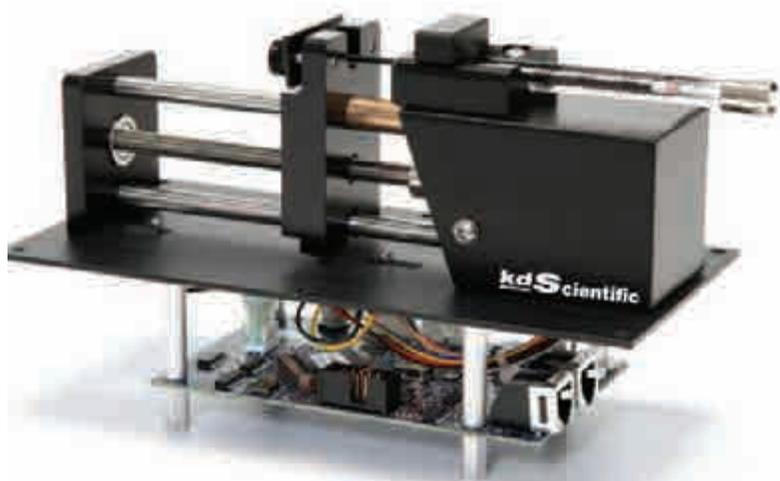
Pump customization is now easier with the new KDS OEM modules. Integrate these modules into your systems or work with our KDS engineering staff to design different syringe mechanisms or controllers. KDS offers the technology and engineering expertise to meet your demanding applications.

Specialty Pumps for Custom

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:

Microliter & Milliliter Syringe Pump Modules are Highly Precise

- Constant Current Drive offers more consistent force delivery over the entire dynamic flow rate range.
- Independent infuse and withdraw limit switches
- Emergency stop switch at pump
- Start/stop at pump
- Encoder for stall detection
- Power and run LED on the PC Board
- Supports external run LED
- Network multiple pumps
- Pump setting retained in NVRAM
- Adjustable force control
- Easily mounts to panel openings
- Customizable syringe mechanisms available
- Customizable chassis designs available
- Lead Free Design, RoHS compliant
- CE approved
- Advanced microstepping techniques



KDS 900

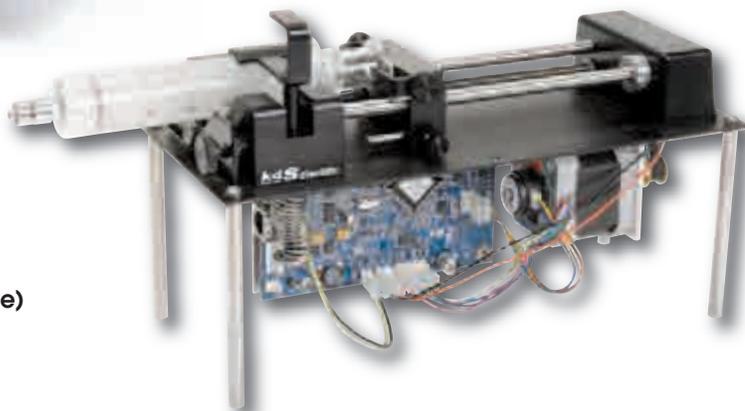
Customizable µl OEM Module

- 0.5 µl to 1 ml syringe
- Minimum flow rate 0.001 µl/hr (0.5 µl syringe)
- < ±0.35% Accuracy
- Maximum flow rate 1.330 ml/min (1 ml syringe)
- RS-232 Interface
- Linear Force 7 lbs

KDS 910

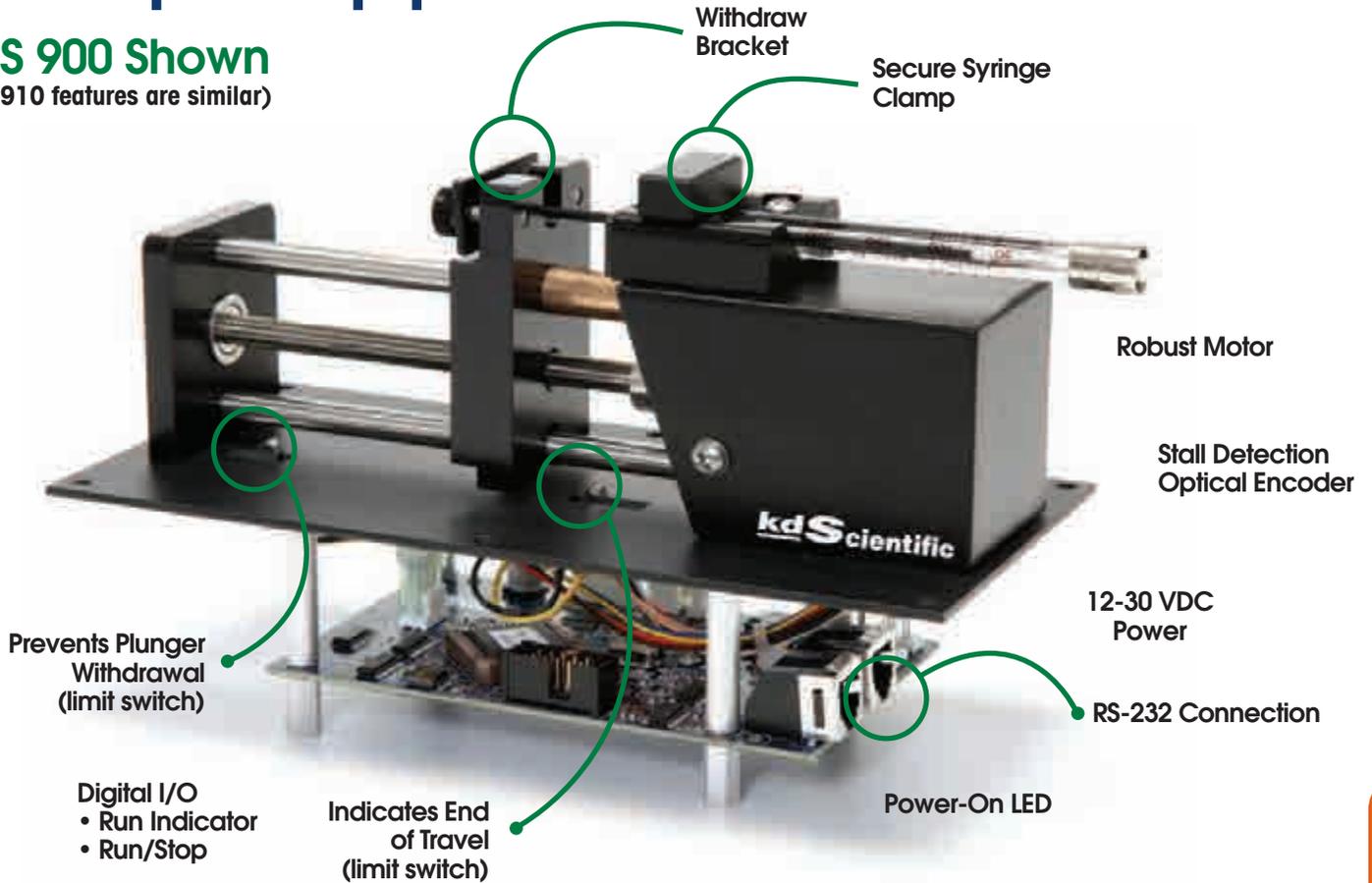
Customizable Milliliter OEM Module

- 0.5 µl to 50/60 ml syringes
- Minimum flow rate 0.001 µl/hr (0.5 µl syringe)
- < ±0.35% Accuracy
- Maximum flow rate 44.28 ml/min (50/60 ml syringe)
- RS-232 Interface
- Linear Force 25 lbs



& Unique Applications

KDS 900 Shown
(KDS 910 features are similar)



Legato® OEM 950

Single Syringe Infuse/Withdraw OEM Module

Based on the Legato® 100 series syringe pump design, the **NEW** Legato® 950 is ideal for applications interfacing to a computer. Accommodates syringes 0.5 μ l to 60 ml. User definable flow rates with selectable target volume or time values to control the total infusion volume.

- \pm 0.5% Accuracy
- 0.5 μ l 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 microstepping techniques
- Linear force 30 lbs (13.6 kg)
- CE, CB Scheme, EU RoHS compliant

SPECIALTY PRODUCTS

Specialty Pumps



Legato® 380

Emulsifier/Homogenizer

The **NEW** 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.

- 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 Gemini 88

Dual Rate Pump

This unique pump is really two pumps in one. Each side of the Gemini 88 has its own syringe rack, motor and leadscrew. The pump can infuse simultaneously at different rates, or infuse with one syringe and withdraw with the other. When combined with a valve box it provides continuous delivery. (Valve box description on page 54).

- Reciprocal/Parallel Mode - Syringe mechanisms can run in the same or opposite directions (i.e. both infusing/withdrawing at the same time or one infusing and the other withdrawing)
- Proportional Mode - Different flow rates and syringe diameters can be set for each syringe mechanism
- AutoStop Mode - Pump stops operation when a limit switch is activated.
- Continuous Run Mode - When a limit switch is activated each syringe mechanism reverses direction.
- 57 lbs (25.8 kg) of linear force

Note: Glass syringe > 100 ml consult factory.

Specialty Product Specifications

Description	KDS 900	KDS 910	Legato 950	Gemini 88	Legato 380
Model (110 VAC/220 VAC/CE MARKED 220 VAC)	Microliter OEM	Milliliter OEM	Legato OEM	Independent Rate Control	Emulsifier
Order Code	78-2900	78-2910	78-8950	78-0388	78-8380
Mode	Infuse/Withdraw	Infuse/Withdraw	Infusion/Withdraw	Infuse/Withdraw/Continuous	Infuse/Withdraw/ Push-Pull Emulsify
# syringes	One	One	One	Two Independent	Four
Syringe Size	0.5 µl to 1 ml max	0.5 µl to 60 ml	0.5 µl to 60 ml	0.5 µl to 140 ml	0.5 µl to 140 ml
User Interface	Computer	Computer	Computer	Keypad with Numerics	Touch Screen
Display	n/a	n/a	n/a	Backlit LCD	4.3 QVGA
Accuracy	+/-<0.35%	+/-<0.35%	+/-<0.5%	+/-<0.35%	+/-<0.35%
Repeatability	+/-0.1%	+/-0.1%	+/-0.05%	+/-0.1%	+/-0.05%
Linear Force (Max)	7 lbs Peak Min Adjustable	25 lbs Peak Min Adjustable	13.6 kg (30 lbs) @ 100% Force Selection	25.8 kg (57 lbs)	34 kg (75 lbs) @ 100% Force Selection
Minimum Flow Rate (10 µl syringe)	216 pl/hr	216 pl/hr	28.26 pl/min	6600 pl/hr	-
Maximum Flow Rate (10 ml syringe)	1330 µl/min (1 ml syringe)	13.286 ml/min	25.99 ml/min	15.733 ml/min	31.190 ml/min
Maximum Flow Rate (60 ml syringe)	-	44.283 ml/min	88.28 ml/min	53.346 ml/min	105 ml/min
Maximum Flow Rate (140 ml syringe)	-	-	-	106.6 ml/min	220.97 ml/min
Drive Motor	0.9" Stepper Motor	0.9" Stepper Motor	0.9" Stepper Motor	0.9" Stepper Motor	1.8" Stepper Motor
Microprocessor Motor Drive Control	1/4 and 1/16 Microstepping	1/4 and 1/16 Microstepping	1/16 Microstepping	1/2 to 1/4 Microstepping	1/16 Microstepping
# Microsteps/One Revolution of Lead Screw	-	-	15,360	1600 steps at 1/2 stepping or 3200 steps at 1/4 stepping	6,400
Advance per Microstep	-	-	-	0.33 µm/µstep	0.1656 µm/µstep
Minimum Step Rate	3.8 sec/µstep	3.8 sec/µstep	27.5 sec/µstep	27.3 sec/µstep	27.5 sec/µstep
Maximum Step Rate	250 µsec/µstep	250 µsec/µstep	26 µsec/µstep	416.7 µsec/µstep	26 µsec/µstep
Pusher Travel Rate					
Minimum	1.3 µm/min	1.3 µm/min	0.15 µm/min	0.726699 µm/min	0.36 µm/min
Maximum	83.4 mm/min	83.4 mm/min	159 mm/min	95.25 mm/min	190.80 mm/min
Multi-step Programming	No	No	No	No	Custom Emulsifying Program
Constant Rate	-	-	-	-	Yes
Ramp	-	-	-	-	Yes
Pulsed	-	-	-	-	Yes
Stepped	-	-	-	-	Yes
Program Export/Import	No	No	No	No	Yes
Pusher Block Stall Detection	No	Yes	Yes	Yes	Yes
Computer Interface	RS-232	RS-232	USB	RS-232	USB/RS-232
TTL	No	No	Yes	Yes	Yes
Networking	Yes	Yes	RS-485	Yes	RS-485
Real Time Clock	No	No	No	No	Yes
External Triggers	No	No	One	No	Two
Analog Output	No	No	No	No	Yes (optional)
Footswitch Interface	Yes	Yes	Yes	No	Yes
Maintenance Reminder	No	No	Yes	No	Yes
Calibration Reminder	No	No	Yes	No	Yes
Password Lock	No	No	Yes	No	Yes
Audible Alarm Indication	-	-	-	-	Yes
End of Run	-	-	Optional	Optional	Yes
Near end of run	-	-	-	-	Yes
Stall detection	-	-	-	-	Yes
Power-up	-	-	-	-	Yes
Keypad Clicks	-	-	-	-	Yes
Calibration Reminder	-	-	-	-	Yes
Display Rotation	N/A	N/A	No	No	Automatic
Multisyringe Rack Accessories	No	No	No	No	No
Run LED	No	No	No	No	Yes
Power Domestic	12 to 30 VDC 0.5 A max	12 to 30 VDC 0.5 A max	12-32 VDC	36 VDC 1.4 A	100/240 VAC 50/60 Hz
Power CE and International	-	-	-	-	-
Weight	0.8 kg (1.8 lbs)	1.23 kg (2.72 lbs)	3.62 kg (8 lbs)	9.8 kg (21.5 lbs)	9.8 kg (21.5 lbs) each
Dimensions (in)	7.25 x 3.63 x 4.5	9 x 6 x 5	6 x 4 x 9.5	12.5 x 11.25 x 6	Dependent on syringe size
Dimensions (cm)	18.4 x 9.2 x 11.4	23 x 15.25 x 13	15.25 x 10.16 x 24.13	31.75 x 28.57 x 15.25	Dependent on syringe size
Certifications	-	-	Yes	-	-
CE, ETL, UL, CSA, CB Scheme	CE	CE	Yes	CE	Yes
EN 61010, EN 61326	-	-	Yes	-	Yes
WEEE, RoHS	Compliant	Compliant	Yes	Exempt	Yes

SPECIALTY PRODUCTS

Fast & Flexible Dual Plate Dispenser



KDS UltraSpense 2000 Plate Dispenser

UltraSpense 2000 is the answer to the increasing demand for an automated yet affordable dispenser for 96 and 384 well microplates. High accuracy and precision dispensing into deep well or low profile microplates, coupled with low dead volume and easy programming makes UltraSpense 2000 the ideal solution for virtually all dispensing applications. Dispense a wide range of solvents, acids, bases and other aggressive liquids with confidence through the completely inert liquids path. Optimize performance for a wide viscosity range through the adjustable pump speed. UltraSpense is very fast and accurate; dispense 100 μ l into each well of a 96 well plate within 14 seconds with better than 0.5% C.V. precision.

Features

- Height-adjustable manifold
- Deep-well, standard & low-profile microplates can be used
- Pump-back capability and low dead volume
- User selectable volumes
- Programmable: flexible dispensing patterns, start and stop position, and omitted columns
- Automatic, repeatable, precise dispensing
- Long life piston pump
- No required calibration or maintenance intervals
- Easy operation and programming
- Completely inert liquid path - only PTFE, PVDF, glass and ceramic contact liquid
- Single and dual plate high speed dispensing: < 14 seconds for a 96-well plate; < 20 seconds for a 384-well plate
- User dialog in four languages

Benefits

- Accommodates low profile through deep well microplates
- Multiple formats with one system - 96 Well/384 Well Microplates
- Minimizes reagent loss
- Saves reagent waste
- Optimize expensive reagent usage
- Minimize assay errors; maximize reproducibility
- No required service or calibration intervals
- High precision over life time and low operating cost
- Repeated assays or dispensing profiles are only programmed once, saving time and money
- Compatible with a wide range of solvents, acids, bases and other aggressive liquids
- Maximize productivity and throughput
- Standardize on one piece of equipment in all your labs to produce consistent results everywhere

Applications

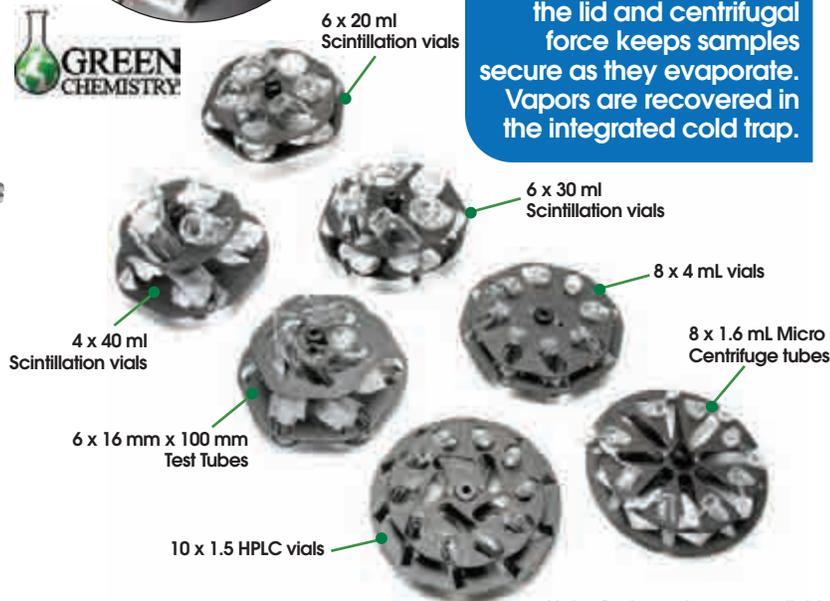
- Low Volume dispensing
- Protein Crystallizations
- Assay Development
- Primary Screening
- Secondary Screening
- Compound Storage

Specifications

Volume Range	5 μ l to 2.5 ml
Volume Increments	5 μ l standard, others selectable
Accuracy	+/- 1.5% (mean volume/column)
Precision	+/- 0.5%
Dead Volume	< 2.5 ml
Start/End Position	Programmable
Column Exclusion	Programmable by Column
Dispensing Speed 96 well plate	14 sec., 100 μ l/well
Dispensing Speed 384 well plate	20 sec., 20 μ l/well
Computer Interface	RS-232
Number of Plates	1 or 2
Plate Formats	96 and 384 well; Low profile to deep well
Number of Stored Programs	15
Dimensions (W x D x H)	11.0 x 16.1 x 10.6 in (440 x 550 x 220 mm)
Weight	24 lbs (11 kg)
Power Supply	85 - 260 VAC 47 - 440 Hz, 70 Watts max.
Environmental	Humidity 5 to 90% non-condensing
Maximum Altitude	2000 m
Temperature	5 to 40°C

The **NEW** Centrifan™

Quick and Easy Small Volume Evaporation



Note: Custom rotors are available.

KD Scientifics' new Centrifan™ is a novel lab scale evaporator that enables drying of solutions.

This easy to use evaporator has a small footprint, saving precious lab space. The Centrifan™ internally generates gas flow to accelerate sample evaporation. No external vacuum pump is required for operation. Just close the lid and centrifugal force keeps samples secure as they evaporate. Vapors are recovered in the integrated cold trap.

Features and Benefits

- Very Efficient – uses new self generating “blow down technology”
- Easy-to-Use – no monitoring
- Quick to Set-up – put the samples in and close the cover
- Green Chemistry – vapor is collected, low power, low noise
- Small Footprint – ideal for limited bench space
- Dry Directly in Vials – no transfer from flask to vials
- No Vacuum Pump – no cross contamination from bumping
- Cost Effective

Applications

- Organic Compound Evaporation
- Fraction Collecting from Flash L/C
- Sample Prep
- Cold Room Evaporator
- Toxic Compounds
- Radio labeled compounds
- Dichloromethane • Chloroform
- DMSO • Oil Polymers
- Medicinal and Synthetic Chemistry
- Protein Purification Evaporation
- Lyophilization • Dissolved Minerals
- Crystal Growth

Centrifan™ (continued)

Vacuum-Free, Closed System Drying

The Centrifan™ has a spinning rotor with fan blades that generate a high flow rate of drying gas which is directed onto the surface of the solvent in the scintillation vials. The rotor generates centrifugal force to keep 100% of the solute pressed in the scintillation vials, thus preventing compound loss and cross contamination. Solvent vapors from the trapped volume of gas are continuously flowed through a secondary loop with a dry ice cold trap to prevent release of toxic fumes. The unit may be purged of air with a nitrogen bleed to perform oxygen-free drying.

Reduces Operator Time for Rotary Evaporation

The Centrifan™ can be used to efficiently dry the last 10 mL of product solution in a 20 mL scintillation vial with confidence and unattended operation. After transferring the 10 mL aliquot from the rotovap round-bottom flask to the scintillation vial, the operator simply places the sample in the rotor of the Centrifan™ and closes the lid to start the unit. The solution in the scintillation vial dries securely in the Centrifan™ without further monitoring and frees lab workers for other tasks.

- Speeds compound finishing into 20 mL vials from a rotovap
- Allows risk-free drying and storage of final solution in convenient scintillation vials
- Enables completely unattended operation
- Frees lab associates for other tasks
- Increases overall evaporation process productivity

Completely self contained,
no vacuum pump!



Compact, Portable

With a small 8 in. x 12 in. (20.32 cm x 30.48 cm) footprint and only 18 in. (45.72 cm) high, the Centrifan™ is self-contained, requires little bench or hood space, and will even fit in a hotcell.

Eliminate Sample Drying Risk while Freeing Operator Time

The Centrifan™ employs a novel, recirculating evaporation technique that reuses a captured volume of gas and generates its own gas flow to efficiently evaporate samples in standard 20 mL scintillation vials. The technique eliminates the need for a vacuum pump or a large supply of blow down gas, significantly reducing cost, complexity, noise, and maintenance compared to rotary evaporators, vacuum centrifuges, and conventional blow-down equipment. Because it operates without vacuum, the Centrifan™ eliminates the potential for cross contamination and sample loss caused by solvent bumping.

Centrifan™ (continued)

New Proprietary Evaporation Technology you should know about

Possible Problems with Common Evaporation Systems	Vacuum Centrifuge	Rotary Evaporator	Nitrogen Blowdown	Freeze Dryer	Centrifan™ Advantages
Sample loss from bumping caused by vacuum	X	X		X	No vacuum pump eliminates bumping
Cross-contamination from splashing	X		X		Centrifugal force prevents splashing
Dry sample blown from vial; lost and contaminated			X		Centrifugal force ensures material retention
Sample lost from bumping when vacuum slow and sample melts				X	No vacuum pump eliminates bumping
Must freeze sample before loading				X	No pre-freeze required
Safety issues concerning glassware under vacuum		X		X	No vacuum, eliminates safety concern
No recovery of volatile extract compounds	X	X	X	X	Condenses all recirculating vapor
Solvent vapor lost through vacuum pump or vent	X	X	X	X	Closed green system condenses all vapor
Vacuum pump noise degrades lab work environment	X	X		X	Makes no noise
System complexity requires maintenance vigilance	X	X		X	One moving part 3-year warranty
Evaporator down because of vacuum pump rebuild	X	X		X	No vacuum pump minimizes maintenance
Consumes large quantities of electricity or drying gas	X	X	X	X	Low power and minimal inert gas usage
Relative speed of evaporation (MeOH, AcN, Ether)	3	1	3	4	4
Relative speed of evaporation (Water, DMF, DMSO)	3	3	1	3	2

Specifications

Temp Controller Range	Ambient to 55°C
Ambient Temperature	2°C to 40°C
Cold Finger Capacity	1 L non-freezing liquid plus dry ice nuggets
Power Requirements	115/230 VAC 50-60 Hz 200 watts
Fuse Ratings	3 A (115 V and 230 V) fast acting, 5 mm x 20 mm
Dimensions	12" (30.5 cm) w x 8" (20.3 cm) d x 18" (45.7 cm) h

Drying Rates for Typical Solvents in 20 mL Vials*

Solvent	Total Volume	Temp. in Rotor	Time to Dry °C
Methanol	6 X 10 mL	40	60 min
Water	6 X 5 mL	40	3 hrs
Hexane	6 X 10 mL	40	15 min
Acetone	6 X 10 mL	40	35 min
Isopropyl Alcohol	6 X 10 mL	40	70 min
DMSO	6 X 1 mL	40	12 hrs
Methylene Chloride	6 X 10 mL	40	25 min
AcN/H ₂ O (70/30)	6 X 10 mL	40	3 hrs

*Evaporation rates were obtained with ethanol and dry ice in the cold trap.

Step 1: Specify a Centrifan™ Model

Item No.	Model	Description
78-0070	Centrifan PE-T	Includes cold trap and timer 115 VAC
78-0071	Centrifan PE	Includes cold trap 115 VAC
78-0072	Centrifan Lite	No cold trap 115 VAC, vent to a hood or use with aqueous solutions
78-1070	Centrifan PE-T	Includes cold trap and timer 230 VAC
78-1071	Centrifan PE	Includes cold trap 230 VAC
78-1072	Centrifan Lite	No cold Trap 230 VAC, vent to a hood or use with aqueous solutions

Step 2: Specify a Rotor (Includes one splitter)

78-8400	Rotor 6 x 20 mL Scintillation Vials
78-8401	Rotor 8 x 1.6 mL Micro Centrifuge Tubes
78-8402	Rotor 6 x 16 mm x 100 mm Test Tubes
78-8403	Rotor 8 x 4 mL vials (1 dram)
78-8404	Rotor 6 x 30 mL Scintillation Vials
78-8405	Rotor 4 x 40 mL Scintillation Vials
78-8406	Rotor 10 x 1.5 mL HPLC Vials

Step 3: Spare Splitters

78-8408	5 pack splitters 6 x 20 mL Scintillation Vials
78-8409	100 pk splitters 6 x 20 mL Scintillation Vials
78-8410	1 pk splitter 8 x 1.6 mL micro Centrifuge Vials
78-8411	1 pk splitter 6 x 16 mm x 100 mm Test Tubes
78-8412	1 pk splitter 8 x 4 mL vials (1 dram)
78-8414	1 pk splitter 6 x 30 mL Scintillation Vials
78-8415	1 pk splitter 4 x 40 mL Scintillation Vials
78-8416	1 pk splitter 10 x 1.5 mL HPLC Vials

Step 4: Accessories

78-8417	Conversion Kit, Add Cold Trap to Centrifan PE - Lite
78-8418	Cold Trap Centrifan PE (replacement glassware)
78-8419	Circulator Coil and Tubing (provides extended concentration time with chilled Concentrator, water bath must be supplied.)
78-8420	Immersion Cooler for cold trap, fixed at -60 deg C, 1.5" rigid coil, 120 VAC, 60 Hz
78-8426	Immersion Cooler for cold trap, fixed at -60 deg C, 1.5" rigid coil, 240 VAC, 50Hz
78-8421	Flask, round 500 ml, 35/20 socket joint
78-8422	Flask, round 100 ml, 35/20 socket joint
78-8423	Adapter Kit, Cold Trap Socket to 20 ml Scintillation Vial (low loss distillate collection)
78-8424	Clamp pinch, locking, 35/20 Socket Joint

The new KD Scientific EZFlow Pump Series, is a line of economical pumps for simple infusions and dosing applications. The pumps are designed to combine high levels of performance together with ease of use and reliable operation. KD Scientific EZFlow products offer a complete line of pumps to meet many different applications. Micro-infusion pumps, volumetric infusion pumps, syringe pumps, portable pumps and disposable pumps are available at affordable prices.

EZFlow Series



EZFlow 2020/2021
Time Based
Syringe Pump



EZFlow 2010/2011
Flow Rate
Syringe Pump



KDS EZFlow 2020/2021

Time Based Syringe Pump

KDS EZFlow 2020/2021 is a durable syringe pump useful in high rate infusions. It is designed to enhance quick efficient operation while maintaining simplicity.

- Waterproof ergonomic touch control panel
- Broad infusion capability
- Typical accuracy ± 20 sec
- Set time indicator
- Set time button
- Fast purge feature
- Occlusion detection
- Wide range of plastic syringes
- 20/30 ml, 50/60 ml and 100 ml
- Audible & visual alarms
- Complete, occlusion detection,
- Low battery & near empty alarms
- Self test & self diagnostic

KDS EZFlow 2010/2011

Flow Rate Syringe Pump

KDS EZFlow 2010/2011 with **NEW** Advanced Features has user selected flow rates that are easy-to-use, with simple increment and decrement arrow keys. A rapid delivery key will allow the user to eliminate the dead volume and also eliminate excess air in the tubing prior to delivery of the fluids. The pump offers continuous mode of operation and reliable long-term fluid deliveries. The unit has occlusion detection from 5.0 kg to 5.5 kg.

- Large LED display for flow rate indication
- Wide flow rate range 0.1 – 500 ml/hr
- Typical accuracy $\pm 2.0\%$
- Quick flow rate selection
- Fast purge feature
- Visual run indicator
- Toggle to indicate total volume dispensed
- Occlusion detection alarm indicator
- Wide range of plastic syringes
- 10 ml, 20/30 ml, 50/60 ml and 100 ml
- Easy calibration for different syringes
- Audible & visual alarms
- Complete, occlusion detection
- Low battery & near empty
- Includes IV pole mount
- CE certification



EZFlow 2030
Portable Syringe Pump



EZFlow 2040
Infusion Pump



EZFlow 2050
Disposable
Infusion Pump

KDS EZFlow 2030

Portable Syringe Pump

KDS EZFlow 2030 with **NEW** Advanced features is a small, light and completely portable syringe pump. It is designed to deliver small volumes with a linear flow rate of 1 - 99 mm per/hr with $\pm 2\%$ accuracy and can be used in a wide variety of applications. It is cost effective and the most compact and lightest pump in its class.

This portable, user friendly syringe pump offers a new alternative for micro reliable infusions. It can use a wide variety of plastic syringes from 1 ml to 20 ml. Ergonomic, easy-to-use, horizontal design protects the syringe barrel and allows single-handed loading.

- Easy-to-use
- Linear flow rate 0.1 - 99 mm/hr
- Typical accuracy $\pm 2.0\%$
- Bolus feature 1/4 of syringe size
- Wide range of plastic syringes from 1 - 20 ml
- Audible & visual alarms
- Complete occlusion detection
- Low battery alarm
- Battery operation 30 days
- DC power supply 4.5V
- IPX1 enclosure
- 12 month warranty
- CE certification

KDS EZFlow 2040

Infusion Pump

The KDS EZFlow 2040 is a volumetric infusion pump designed to enhance quick efficient operation while maintaining simplicity. It meets the CE directive and is EC 93/42 EEC.

It is designed to deliver precise infusions at rates from 0.1 to 1200 ml/hr. It features a bright 2.7 inch OLED with separate display which shows volume delivered, volume rate, time and date. There are 5 preset languages and many other advanced features that make the KDS EZFlow 2040 one of the most outstanding infusion pumps in its class.

The KDS EZFlow 2040 is portable, user friendly and offers a new alternative for micro reliable infusions. The ergonomic touch screen panel offers ease of selection and programming.

- Dual infusion modes
- Set at ml/hr or drops/min
- Flow rate range 0.1 ml to 1200 ml/hr
- Typical accuracy $\pm 2.0\%$
- Audible & visual alarms
- Programmable infusion mode
- Store up to 10 memory settings
- Battery capacity 3 hours
- IPX1 enclosure
- CE 0197 certified
- 12 month warranty

KDS EZFlow 2050

Disposable Infusion Pump

The KDS EZFlow 2050 disposable infusion pump is simple, convenient, and affordable. It is designed to electronically deliver continuous, constant controlled infusions.

Simply dial to set infusion rate in seconds, with flow rates ranging from 2 to 10 ml/hr. Choice of 100 ml or 260 ml sterilized reservoir box. The pump can be used multiple times, the reservoir needs to be disposed of after each use.

The KDS EZFlow 2050 disposable infusion pump is portable and user friendly. It offers a new alternative for micro reliable infusions. It comes complete with a convenient carrying belt. The KDS EZFlow 2050 uses 2 AA batteries, up to 400 hours at 1 ml/hr. The pump is completely portable weighing less than 100 g (less than 0.5 lbs).

- Ergonomic touch buttons
- Simple operation
- Flow rate options 1 to 10 ml/hr
- Typical Accuracy $\pm 10\%$
- Audible & visual alarms
- Disposable pump and reservoir
- Convenient carrying belt
- CE 0197 certified
- 12 month warranty
- Weight 100 g (without battery)

EZFlow Series Specifications

	EZFLOW 2010	EZFLOW 2011	EZFLOW 2020	EZFLOW 2021	EZFLOW 2030	EZFLOW 2040	EZFLOW 2050
Model	78-0550	78-1550	78-0560	78-1560	78-0570	78-0580	78-0590
Syringe Size	10 ml, 20/30 ml; 50/60 ml; 100 ml	10 ml, 20/30 ml; 50/60 ml; 100 ml	20/30 ml; 50/60 ml; 100 ml	20/30 ml; 50/60 ml; 100 ml	1 ml to 20 ml	Infusion Pump	-
Syringe Type	Plastic Only	Plastic Only	Plastic Only	Plastic Only	Plastic Only	-	-
Reservoir Size	N/A	N/A	N/A	N/A	N/A	N/A	100 or 260 ml
Accuracy	+/-2%	+/-2%	+/-20 sec	+/-20 sec	<+/-2.0%	<+/-2.0% (pump only)	+/-10%
Linear Rate	-	-	-	-	0.1 mm/hr to 99 mm/hr	-	-
5 ml Syringe	-	-	-	-	-	-	Flow rate Option Purge 1,2,3,4,6,8, 10 ml/hr
20/30 ml Syringe	0.1 ml/hr to 500 ml/hr	0.1 ml/hr to 500 ml/hr	-	-	-	-	-
50/60 ml Syringe	0.1 ml/hr to 1200 ml/hr	0.1 ml/hr to 1200 ml/hr	-	-	-	-	-
100 ml Syringe	0.1 ml/hr to 1500 ml/hr	0.1 ml/hr to 1500 ml/hr	-	-	-	-	-
Flow Rate Increment	0.1 ml/hr increment	0.1 ml/hr increment	-	-	-	-	-
Time Settings	-	-	4, 8, 12, 16, 20 min	-	-	-	-
Alarms	-	-	-	-	Yes	-	-
Near Empty	Yes	Yes	Yes	Yes	Yes	-	No
Complete	Yes	Yes	Yes	Yes	Yes	-	Yes
Occlusion	Yes	Yes	Yes	Yes	Yes	-	Yes
Low Battery	Yes	Yes	Yes	Yes	Yes	-	Yes
Power Supply	50/60 Hz; 12 VDC	100-240 VAC	110 VAC 60 Hz 12 VDC	220 VAC 50 Hz 12 VDC	DC 4.5 V 3 AA Batteries	100 AC to 240 VAC or 12 VDC	2 AA Batteries
Enclosure	Drip Proof IPX1	Drip Proof IPX1	Drip Proof IPX1	Drip Proof IPX1	-	-	-
Battery Operation	4 Hours Continuously Operation at 50 ml/hr	4 Hours Continuously Operation at 50 ml/hr	-	-	-	-	-
Dimensions (mm)	120 x 335 x 142	120 x 335 x 142	120 x 366 x 115	-	60 x 166 x 30	240 x 105 x 172	140 x 95 x 35
Dimensions (in)	4.72 x 13.2 x 5.59	4.72 x 13.2 x 5.59	4.72 x 14.1 x 4.53	-	2.4 x 6.5 x 1.2	6.5 x 4 x 6.75	5.12 x 3.74 x 1.38
Weight	2.5 kg/5.5 lb	2.5 kg/5.5 lb	1.8 kg/3.96 lb	-	180 g/0.55 lb (without batteries)	2.9 kg/6.4 lb	100 g (without battery)
Certifications	-	-	-	-	-	-	-
CE 0197	Yes	Yes	No	No	Yes	-	-
EC Directive 93/42/EEC, Annex II Article 3	Yes	Yes	No	No	-	-	-

Premier Steel Syringes

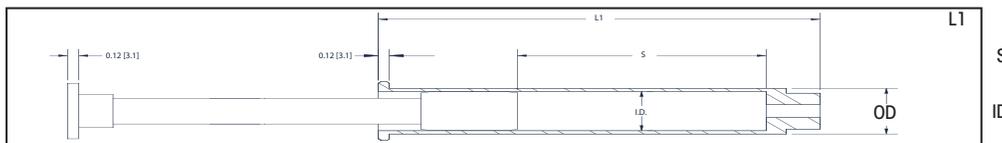
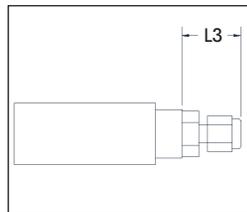
Stainless Steel Syringes

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 - 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)								
Overall Length of Barrel - (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/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	

A premier 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 inch sizes. A luer lock end fitting is also available. Tips are interchangeable with all syringes from 20 to 100 ml in size.

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.

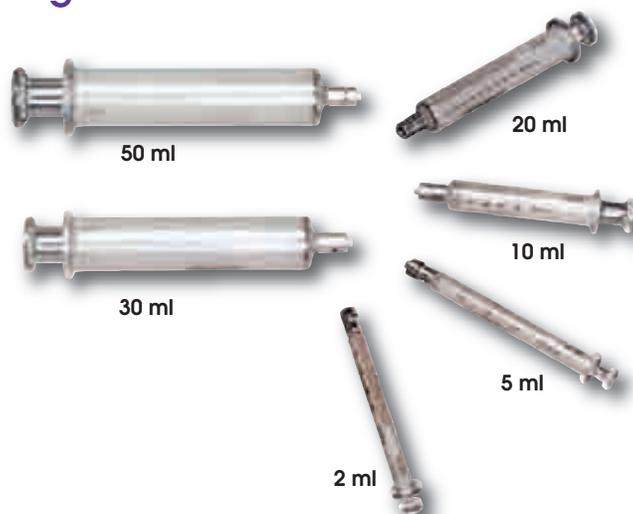
All syringes are made from heat resistant borosilicate glass. The material and construction are resistant to breakage from shock and sudden temperature changes. They are all annealed and tested until free of internal strain to withstand repeated washing.

Premier Glass Syringes

Glass Syringes

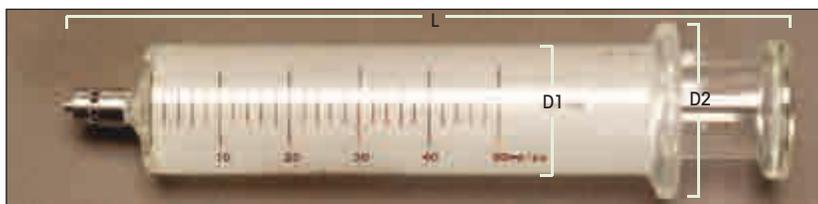
Premium Line of Glass Syringes

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



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	0.803 ±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
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/cm ³ ±0.03 g/cm ³
Modulus of Elasticity	64 x 10 ³ N/m ²
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

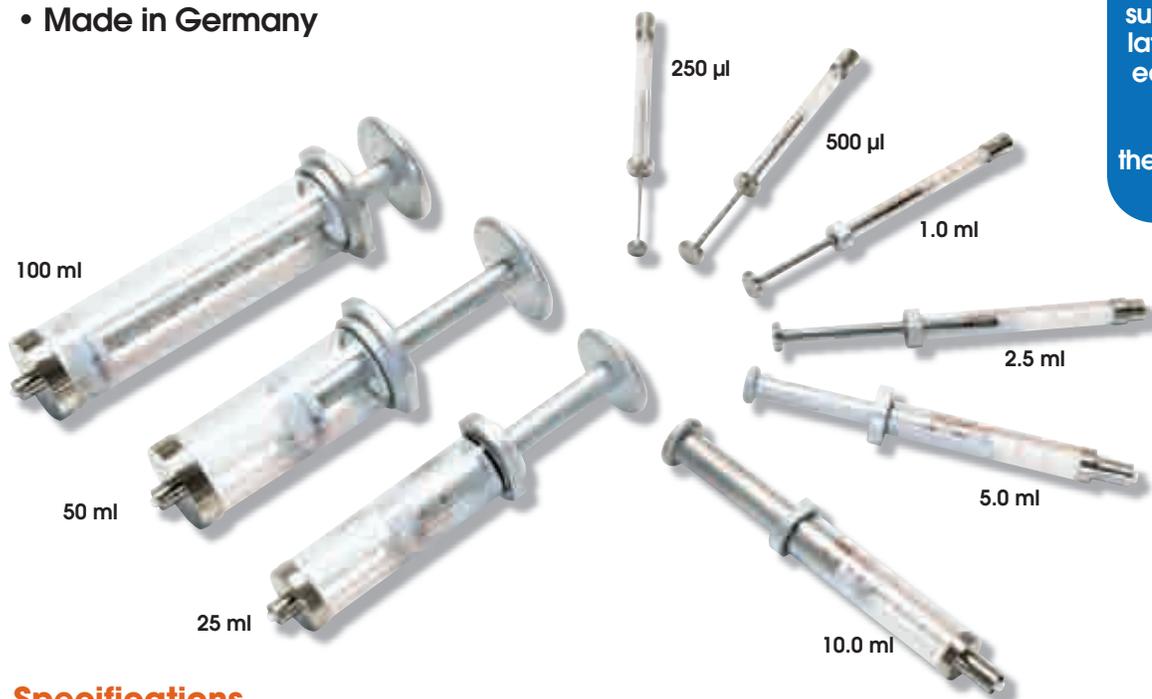
State-of-the-Art Gas Tight Syringes

Premium Line of Gas Tight Syringes

- Borosilicate glass $3.3 \times 10^{-6}K^{-1}$
- Precision Machined Polymer Plunger Tip
- Compatible with gas or liquids
- Highly chemical resistant
- Leak Free PTFE Seal
- Stainless Steel Plunger
- Syringes > 2.5 ml have metal flange with threaded screw
- Made in Germany

A new line of Gas Tight Syringes range from 0.5 μ l to 100 ml for precision sampling and dosage in synthesis, spectroscopy, preparation of standard solutions, for manual application, and for use in syringe pumps, autosamplers, diluters, dispensers & other liquid handling instruments.

Precision bore tubing from 3.3 borosilicate a highly resistant glass are used with this syringes and all metal parts and PTFE-seals are made in-house. State of the art computer controlled equipment such as milling machines, lathes and glass shrinking equipment, together with years of glass working experience, guarantee the optimum quality of the products.



Specifications

Volume	250 μ l	500 μ l	1.0 ml	2.5 ml	5.0 ml	10.0 ml	25 ml	50 ml	100 ml
Barrell Inside Diameter Nominal (mm)	2.303	3.26	4.606	7.28	10.3	14.567	23.032	32.573	32.573
Barrell Inside Diameter Nominal (in)	0.0907	0.1283	0.1813	0.2866	0.4055	0.5735	0.9068	1.284	1.284
Total Length (mm)	117	120	119	119	123	119	131	132	179
Total Length (in)	4.6063	4.7244	4.685	4.685	4.8425	4.685	5.1575	5.1969	7.0472
Scale Length (mm)	60	60	60	60	60	60	60	60	60
Major Graduations	50 μ l	100 μ l	100 μ l	0.5 ml	1 ml	1 ml	5 ml	10 ml	10 ml
Minor Graduations	10 μ l	10 μ l	10 μ l	50 μ l	10 μ l	10 μ l	50 μ l	1 ml	1 ml
Maximum Temperature (°C)	120	120	120	120	120	120	120	120	120
Maximum Temperature (°F)	248	248	248	248	248	248	248	248	248
Minimum Temperature (°C)	10	10	10	10	10	10	10	10	10
Minimum Temperature (°F)	50	50	50	50	50	50	50	50	50
Maximum Pressure Rating (psi)	1,100	800	500	300	200	180	150	115	115
Order Code	78-0882	78-0883	78-0884	78-0885	78-0886	78-0887	78-0888	78-0889	78-0890

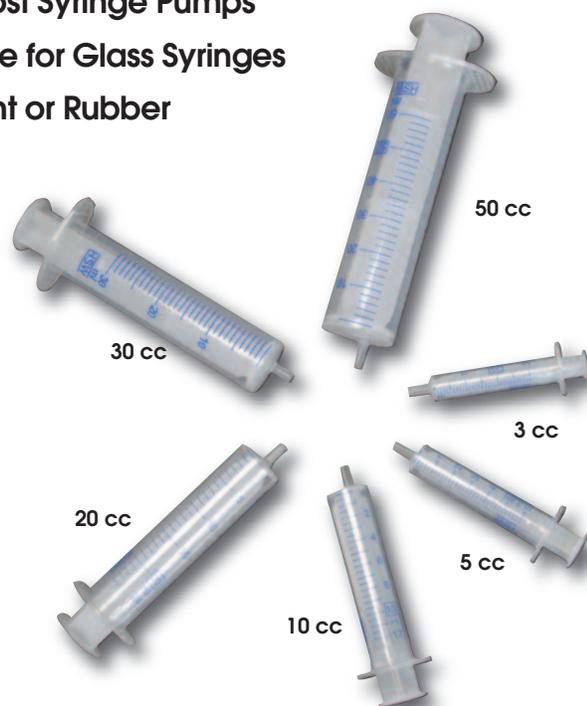
KD Scientific offers a new line of disposable Plastic Sterile Syringes for all scientific applications. Available in sizes ranging from 3 ml to 50 ml with Luer Lock (LL) or Luer Slip (LS) Tip. Norm-ject syringes are the ideal solution for any situation. Their unique two-part system is latex free and 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.

Cost Effective Plastic Syringes

Premium Line of Plastic 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 (cc)	3	5	10	20	30	50
Total Length (mm)	74.9	87	98.5	115.1	132.5	150.0
Length of Cylinder (mm)	65.1	73.8	85.3	102.4	105.2	120.3
Outside Diameter (mm)	10.8	13.7	17.3	21.55	24.1	30.9
Inside Diameter (mm)	9.65	12.45	15.9	20.05	22.9	29.2
Nozzle Configuration	Centric	Centric	Centric	Centric	Centric	Centric
Order Code	78-0851	78-0852	78-0853	78-0854	78-0855	78-0856

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

Slip Lock (Pkg. of 25)

Volume (cc)	1	3	5	10	20	30	50
Total Length (mm)	94.8	74.9	87	98.5	115.1	132.5	150.0
Length of Cylinder (mm)	84.7	65.1	73.8	85.3	102.4	105.2	120.3
Outside Diameter (mm)	6.4	10.8	13.7	17.3	21.55	24.1	30.9
Inside Diameter (mm)	4.69	9.65	12.45	15.9	20.05	22.9	29.2
Nozzle Configuration	Tuberculin	Centric	Centric	Eccentric	Eccentric	Eccentric	Eccentric
Order Code	78-0850	78-0857	78-0858	78-0859	78-0860	78-0861	78-0862

The 5 cc has graduations to 6 cc, 10ml has graduations to 12 cc, 20 cc has graduations to 24 cc and 50 cc has graduations to 60 cc.
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.

Valve Boxes

For Legacy and Legato® Series Syringe Pumps

Low Pressure

< 25 psi (1.7 bar)

- Pinch valves
- C-flex tubing supplied
- 1/16" ID x 1/8" OD



Medium Pressure

< 100 psi (6.8 bar)

- PTFE valves
- All wetted parts PTFE
- 3 port (1/4-28 with 1/16" OD tube fittings for plastic tubing)



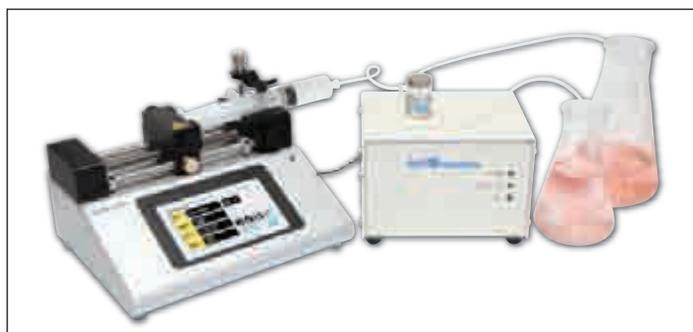
High Pressure

< 200 psi (13.8 bar)

- 303 stainless steel
- Wetted seals perfluoroelastomer and PTFE
- 3 port (1/8" NTP with 1/4" OD swagelok fitting for stainless steel tubing (not supplied))



KD Scientific offers two types of valve boxes; autofill and continuous. The autofill valve has a single valve, which is used to reload the syringe once it is empty or partially empty. This type of valve box will work with any infusion/withdrawal pump. Each syringe must have its own valve box. The continuous valve box has 2 valves mounted. The continuous valve box can be used with the push/pull pumps and our continuous flow pumps or a continuous flow setup using 2 separate pumps to create continuous flow. As one syringe is filling, the other syringe is dispensing.



Example of Medium Pressure. Autofill valve box with Legato 110 Barb Connection Kit (78-8349)

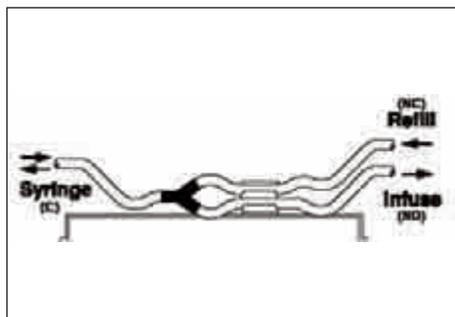


Example of Medium Pressure Continuous Valve Box with Legato 270 Barb Kit (78-8351)

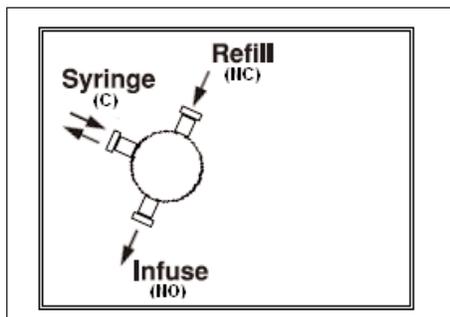
Valve Boxes (continued)

Valve Box Diagrams

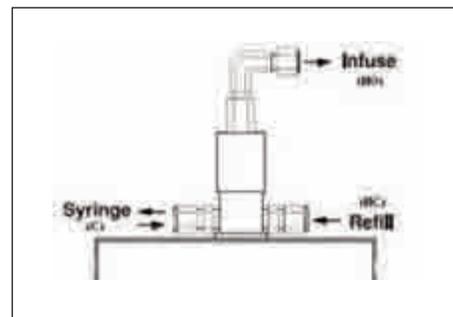
Auto Fill Valve Boxes: Single Valve - Commonly used to reload syringe once it is empty or partially empty.



Low Pressure Auto Fill

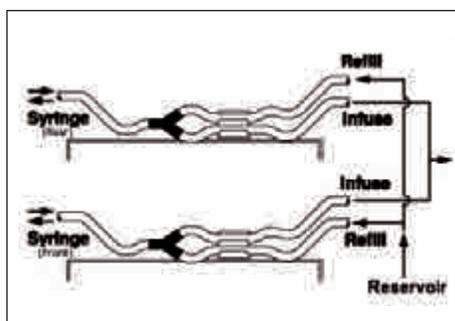


Medium Pressure Auto Fill

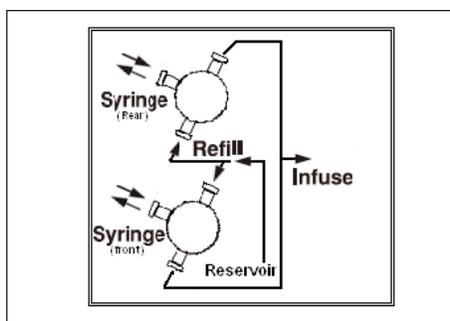


High Pressure Auto Fill

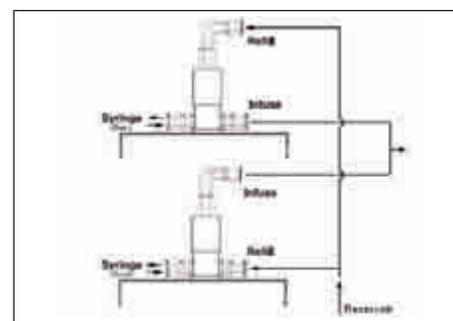
Continuous Delivery Valve Boxes: Dual mounted valves - Commonly used with a Legato 270 Continuous Pump or KDS 270.



Low Pressure Continuous



Medium Pressure Continuous



High Pressure Continuous

Item No. Description

Standard Version

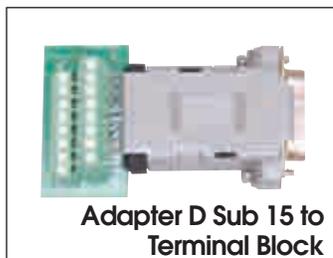
78-8333	Auto Fill Valve Box, Low Pressure
78-8336	Auto Fill Valve Box, Medium Pressure
78-8338	Auto Fill Valve Box, High Pressure
78-8332	Continuous Delivery Valve Box, Low Pressure
78-8335	Continuous Delivery Valve Box, Medium Pressure
78-8337	Continuous Delivery Valve Box, High Pressure

Item No. Description

Valve Kits

78-8345	Low Pressure Auto Fill Kit
78-8346	Low Pressure Continuous Delivery Kit - (2x autofill kit)
78-8347	Medium Pressure Nut / Ferrule Auto Fill Kit Nut PEEK 1/16, 1/4-28 (3 pcs), Ferrule, flangeless 1/16 (3 pcs) & PTFE tubing (5 ft)
78-8348	Medium Pressure Nut / Ferrule Continuous Delivery Kit - (2x autofill kit)
78-8349	Medium Pressure Barb Auto Fill Kit Barb 1/16 (3 pcs) & C-flex tubing (10 ft)
78-8351	Medium Pressure Luer Auto Fill Kit Female to male luer lock 1/4-28 (1 pc), Male to female luer lock 1/4-28 (2 pcs)
78-8352	Medium Pressure Luer Continuous Delivery Kit - (2x autofill kit)
78-8353	Medium Pressure Barb Continuous Delivery Kit - (2x autofill kit)

Accessories



Adapter D Sub 15 to Terminal Block



Adapter Digital I/O (15 pin to 9 pin)



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



Footswitch with Phono Jack Plug



Lubricant SuperLube, 1 cc



USB Cable PC to Pump Communication



Replacement Battery



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
78-0394	RS-232 Cable (D)
78-8354	BNC Connector Cable for Analog Out (G)
78-8339	RS-485 Adapter Cable (A)
78-8303	Anti-Siphon Kit (F,G)
78-8325	Anti-Siphon Kit (E)
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)
78-8312	Adapter Digital I/O (15 pin to 9 pin) (A)
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

FN	Internal Fan Option (F,G)
AI	Analog Control Input Option (0 to 10 VDC)* (G)
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, KDS 100Y
- D Compatible with Gemini 88
- E Compatible with Legato 100 Series
- F Compatible with Legato 200 Series
- G Compatible with Legato 200 Series Programmable Option

KD Scientific Offers a Wide Range of Products to Meet Different Applications

We can assist you with selecting a Syringe Pump or a Centrifan™.

Simply fill out the questionnaire below and fax it to 1-508-893-0160 or send us the answers in an email to info@kdscientific.com

Syringe Pump Questionnaire

1. How many syringes will you use? _____
2. What is the size of syringe(s)? _____
3. Do you want to:
Infuse only _____
Withdraw only _____
Infuse/withdraw _____
Withdraw/Infuse _____
Multi-step Programming _____
4. Is there any back pressure in your application or are you dispensing into ambient?
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. Next step:
 Send quote
 Contact me via email
 Contact me via phone

Centrifan™ Questionnaire

1. What is volume of sample to evaporate? _____
2. What type of container is currently used?
Microcentrifuge tube _____
Scintillation vial _____
HPLC Vial _____
Other _____
3. How many samples are run/processed at the same time? _____
4. What are the solvent(s)? _____

5. Would you like to condense the vapors in a cold trap? Yes No
6. Do you need oxygen free drying? Yes No
7. Do you need timer to stop the drying process? Yes No
8. Do you want auto shut off? Yes No
9. Next Step:
 Send quote
 Contact me via email
 Contact me via phone

Name _____
Title _____
Company/Organization _____
Address _____
City _____
State _____
Zip _____
Country _____

Email _____
Phone _____
Fax _____



Worldwide Sales and Support

KD Scientific is recognized worldwide for their technical expertise & high performance products with unmatched reliability. KD Scientific is committed to delivering the highest level of customer satisfaction, as well as technical support for all their products.



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- Factory trained distribution channels to help you solve your application problems
- Largest selection of products to meet your demanding applications



phone **508.429.6809** fax **508.893.0160** e-mail info@kdscientific.com

www.kdscientific.com

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Specifications subject to change at any time.

5620-001-REV-B