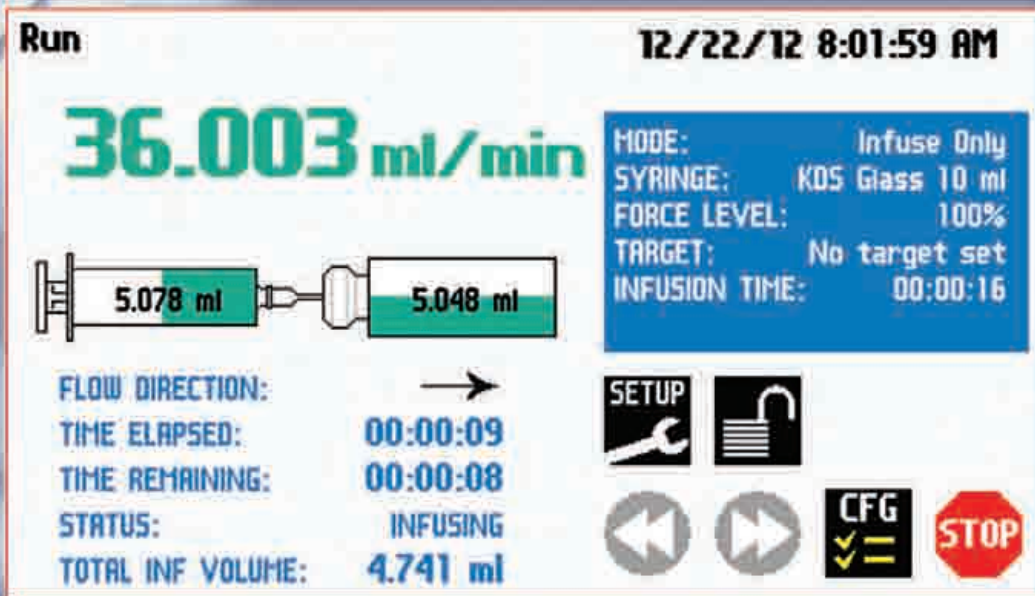


LegatoTM 200 SERIES



WHEN IS A
SYRINGE PUMP
NOT JUST A SYRINGE PUMP...
WHEN IT CAN OFFER
THIS & SO MUCH

MORE

- EASE OF CONFIGURATION
- UNPARALLELED EASE OF USE
- SUPERIOR RELIABILITY & FLOW PERFORMANCE
- DESIGNED FOR A WIDE VARIETY OF APPLICATIONS
- WORLDWIDE REGULATORY COMPLIANCE

kdScientific



NEW Legato™ Designed to Meet Today's Challenges

KD Scientific pumps are acknowledged as the industry's highest valued solution worldwide for:

- Delivering precise and smooth flow in research applications
- Quality and reliability at an economical price
- 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. Quality & reliability is built into every product.

Why the Legato?

The new Legato™ 200 Series is the next generation of syringe pumps. Since 1991, KD Scientific has built quality and reliability into every product.

Legato Inherits KD Scientific's Legendary Reliability

Our experience in pumps and fluidics was used to create the Legato™ 200 Series. Over the years, customers have asked to:

- Display more information simultaneously
- Make it easier to configure and run complicated multi-step programs

Legato's Design Advantages

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

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



Legato™ 200

Engineered to Meet Global Regulatory Compliance

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



WEEE

RoHS

CB
Scheme

The Legato 200 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.

The New Benchmark for Ease of Use

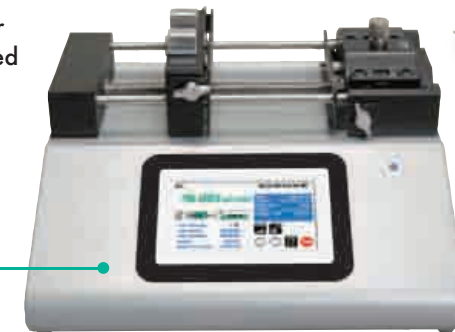
- Displays More Information Simultaneously
- Easy to use and set up different Configurations
- Intuitive Graphic Interface and Touch screen
- International Icons easy to use in any language
- Alarm Indication and Messages
- Pump Diagnostic/Information

Ease of Use

Optimize Bench Space

The Legato Series optimizes the bench space in your lab. For limited laboratory space the Legato 200 Series can be placed on its side to reduce the footprint by 4 Times. The display also tilts with the change to allow the user operate the pump vertically.

Horizontal
Orientation



Vertical
Orientation
Display
Rotates 90°



Intuitive Run Screen

Combining multiple parameters simultaneously with internationally recognizable icons allow the Legato 200 Series to provide a new level of intuitive syringe pump operation.



Using gloves is no problem with Legato's resistive touch screen

Graphic indication of the syringes filling indicating the volume

Flow Rate is easy to read

All Program settings are indicated on the display

Current time and date is shown

Dead Volume can be quickly eliminated with a fast forward feature

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

Total Volume Delivered

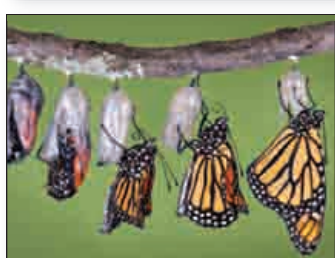
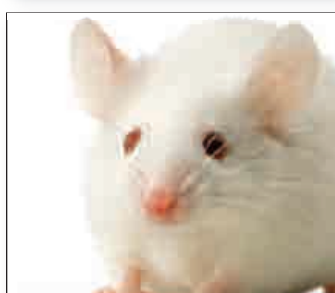
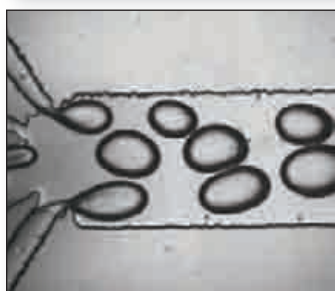
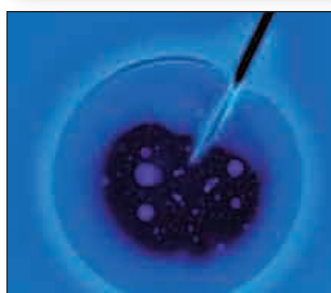
Current status of the Pump

Total Remaining Time of the Program

Total Elapsed Time of the Program

Flow Direction with arrow indicator

Extensive Applications



Uses of Syringe Pumps

- 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
 - Chemical Development
 - Pilot Plant Reactor Dosing
 - Continuous Flow
 - Dye Dilution
 - Dye/Isotope Injection
 - Electrospinning
 - Emulsification
 - Emulsion Polymerization
 - Entomology
 - Geological Sampling
- Isotope Injections
 - Liquid Chromatography Injections
 - Metered Dispensing
 - Microdialysis
 - Micro-Filtration
 - Perfusion
 - Pharmaceutical Development
 - Polymer Research
 - Post Column Addition
 - Electrospray (ESI-MS)
 - HPLC Mass Spec
 - Lock Mass Infusion/Calibration
 - MALDI-TOF Matrix Addition
 - Nano Flow Rates
 - Precision Mass Spec
 - Capillary Electrophoresis
 - Cell Manipulation
 - Cell Patterning
 - Cell Separation
 - Chemical Binding Coefficients
 - Chemical Gradient Formation
 - Enzyme Reaction Kinetics
 - Flow Cytometry
 - Fluid Viscosity
 - Immunoassays
 - Reactor Injections
 - Toxicology Studies
 - Viscosity/Viscometer Systems
 - Weather Research

The following is an extensive list of application areas in which syringe pumps are utilized. The superior performance of KDS 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

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

Flow performance is optimized with a small step angle microstepping motor that drives a precision lead screw and pusher block. Advanced microstepping techniques are employed to further reduce the step angle to eliminate flow pulsation. Legato's accuracy is +/- 0.35% and has 0.05% reproducibility. A wide dynamic flow range from 5 pl/min to 220.97 ml/min can be programmed into the pump. Flow rates are selectable with user selected engineering units from ml, ul, nl pl, and hours, minutes and seconds.

A Rugged Design with

- 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, >30ml to 140 ml, or simply flip the syringe clamp to hold smaller syringes, <30ml 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, up to 34 kg (75 lbs), ensures the right force is applied for the various syringe sizes.

Maximum Performance & Reliability



No other syringe pump performs; like the Legato 200 Series. It offers a broad flow rate range along with superior accuracy and repeatability.

Advanced Mechanical Design for Superior Flow Performance

- Broad Dynamic flow range from pl/min to ml/min
- Accuracy to 0.35%
- Repeatability to 0.05%
- Adjustable Linear Force to 75 lbs (35 Kg)
- Welded Steel Chassis – the Ultimate in EMI/RFI protection
- Selectable Force for Optimum Stall Detection
- Chemically Resistant, Anti-Glare Cover with Gasketed Bezel to protect the display
- Antisiphon Brackets Prevent Backflow
- Solvent Spill Dam Protects Unit from Fluid Spills



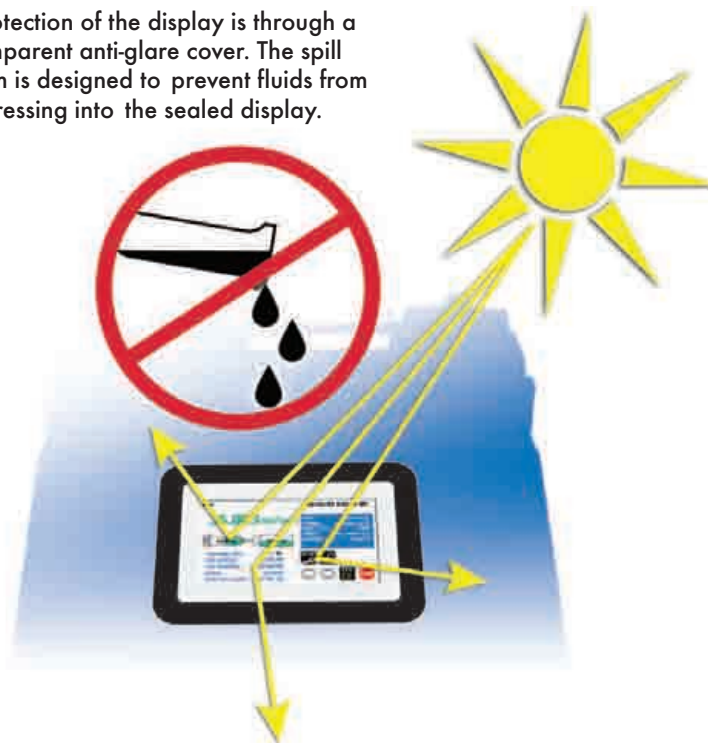
Optimal EMI/RFI Shielding with Welded Steel Chassis

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 Resistant 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.



Less Vibration & Deformation

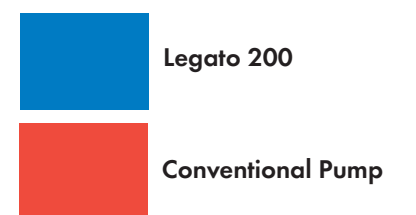
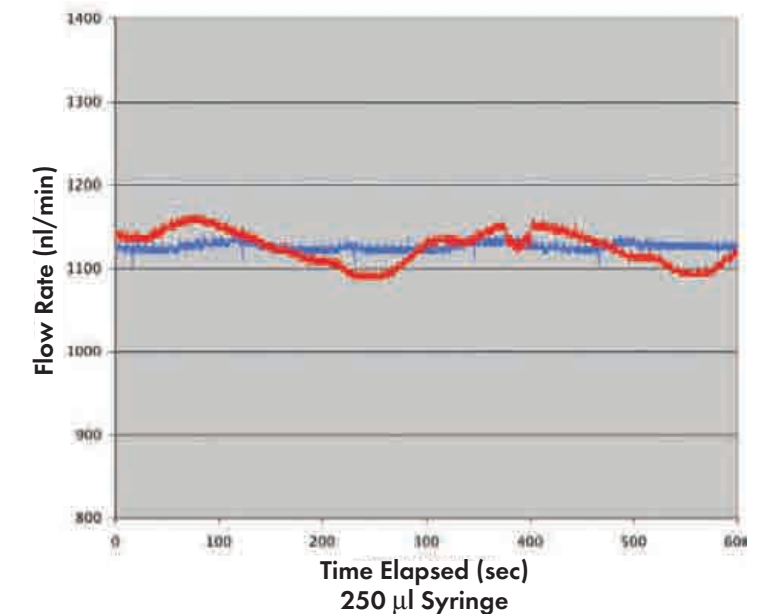
The welded steel chassis out-performs the conventional plastic chassis. The chassis provides a rigid platform without deformation under high pressure. Operation of the pump is quieter and there is less vibration transferred to the syringes because of this unique design.



Legato'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 microstepping techniques are employed to further reduce the step angle to eliminate flow pulsation. Legato's accuracy is +/- 0.35% and has 0.05% reproducibility. A wide dynamic flow range from 5 pl/min to 220.97 ml/min can be programmed into the pump. Additionally, flow rates are selectable with user selected engineering units from ml, ul, nl pl, and hours, minutes and seconds.

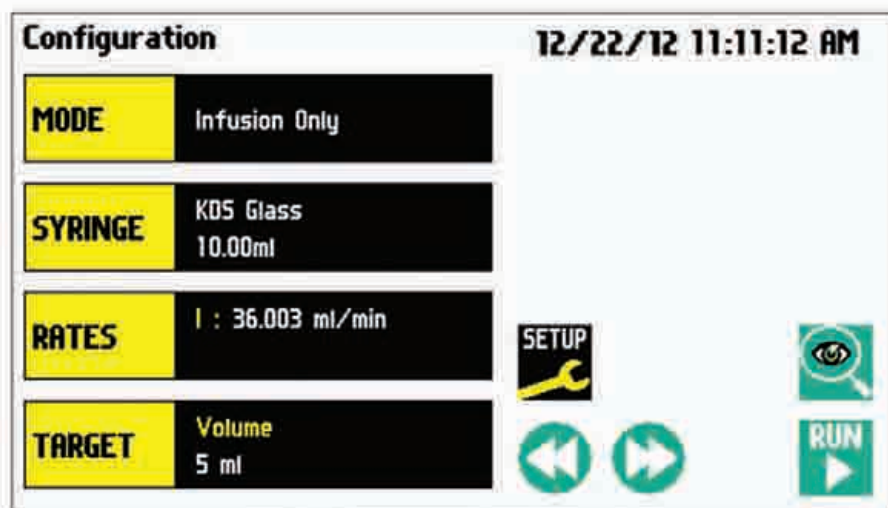
Legato 200 vs Conventional Syringe Pump



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

Fast Experimental Setup and Execution

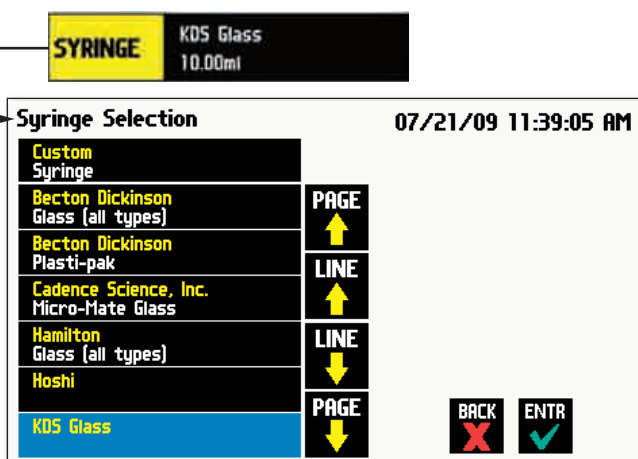


The interface Configuration Screen with simultaneous display of parameters makes experimental set-up and execution as simple as a touch of the screen.



Step 2: Wide Range of Syringes

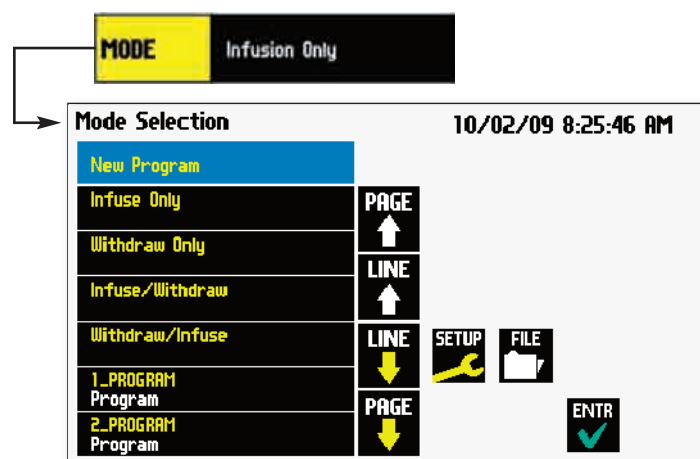
Use any manufacturers' syringe, from 0.5 ul to 140 ml. Any type of syringe including glass, plastic and stainless steel syringes.



Step 1: Mode Selection

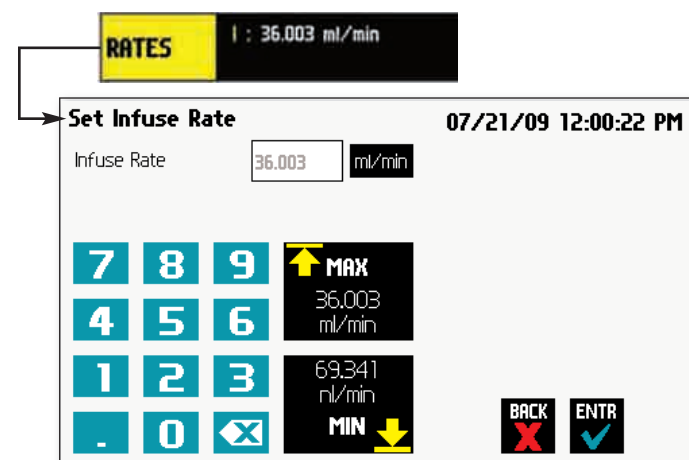
Depending on the model of pump, the unit can be configured to:

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



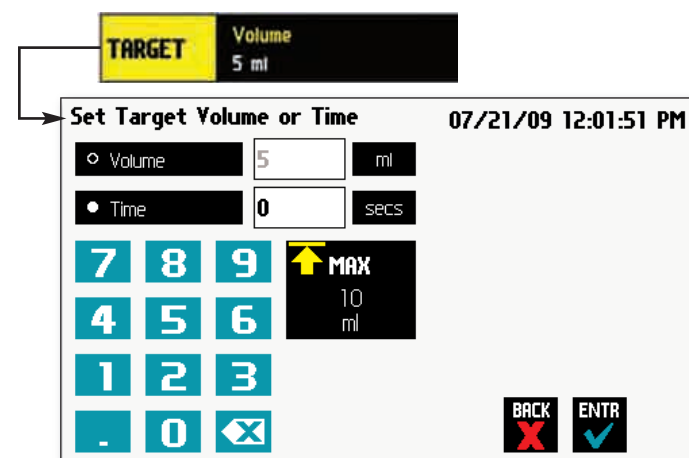
Step 3: Wide Flow Rate Range

Minimum and Maximum flow shown for each size of syringe.



Step 4: Selectable Target Volume and Time

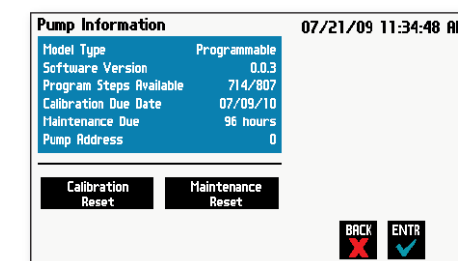
Select the total volume from nl to ml. Units are selectable - or for infuse only, select the time.



Set-Up is Easy with Diagnostics and Pump Information

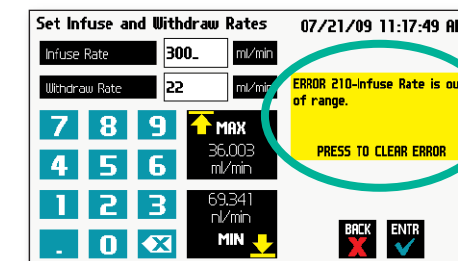
Select the parameters for the configuration and display the pump information. The Diagnostic Pump Information screen shows:

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



Notifications and Error Messages

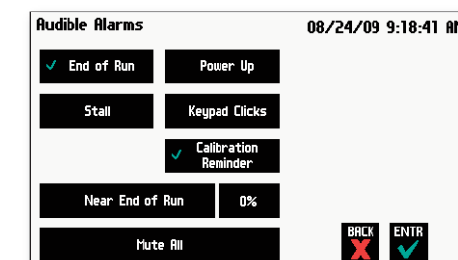
Notifications and error messages are displayed for the user to acknowledge, eliminating any guesswork about problems.



Legato Features 5 Different Alarms:

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

- End of Run
- Near End of Run
- Power Up
- Stalled condition
- Calibration Reminder



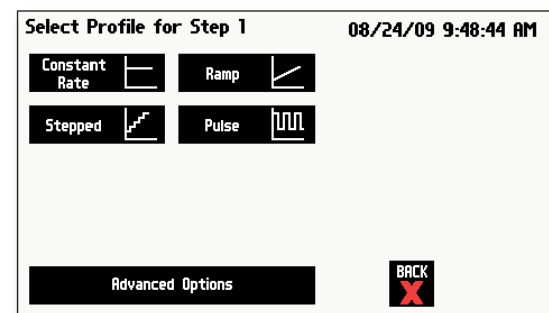
Multiple users can use the programmable pump saving their specific configurations and recalling them with a touch of a button. Also, different tests can be set up and stored for quick operation. The programmable models offer maximum flexibility and capability for configuring and running different programs/recipes.

Simple Configuration for Routine & Complex Applications

Configure Custom Programs Quickly

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

- Constant Rate
- Ramp
- Stepped
- Pulse

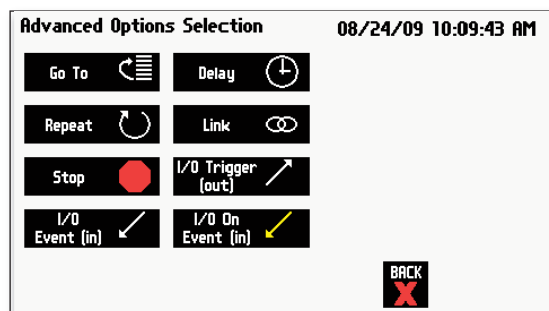


Pre-defined profiles for easy configuration.

- 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
- Up to 40 programs of 20 steps each can be configured and stored in the unit; quickly recalling programs with the touch of a button.
- 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

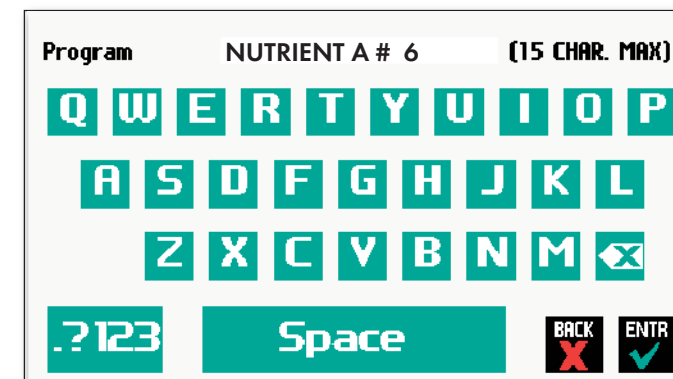
Linking and activating steps is easy with:



Trigger programs with pre-defined options.

- Go-To statements
- Time Delays
- Repeating steps
- Linking different programs
- Stopping the pump
- Triggering the pumps using TTL output
- Accepting an event input, such as a user touch or motor stall

In addition, events can trigger the pump to withdraw or infuse.

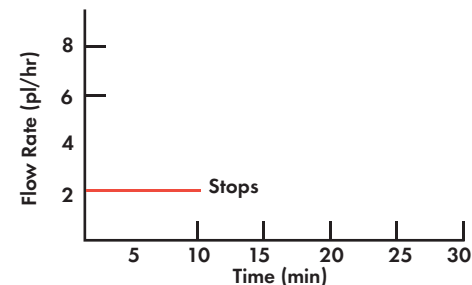


Unique labeling for each program.

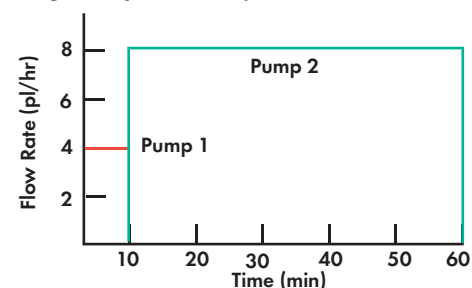
NAME: ORGANIC SYN 12

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

Organic Syn 12 - Pump 1



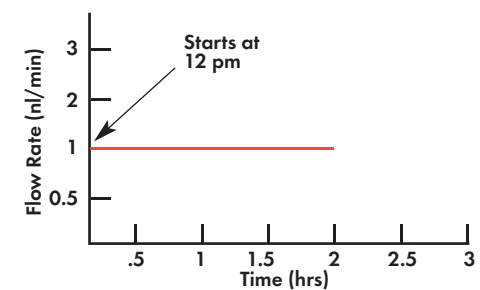
Organic Syn 12 - Pump 2



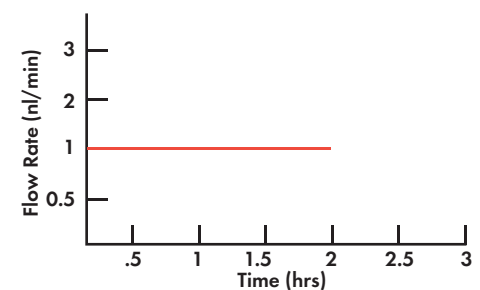
RECIPE NAME: DRUG 8302

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

Drug 8302 - Day 1



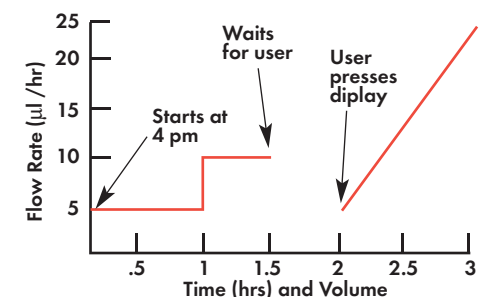
Drug 8302 - Day 2



RECIPE NAME: NUTRIENT A #6

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

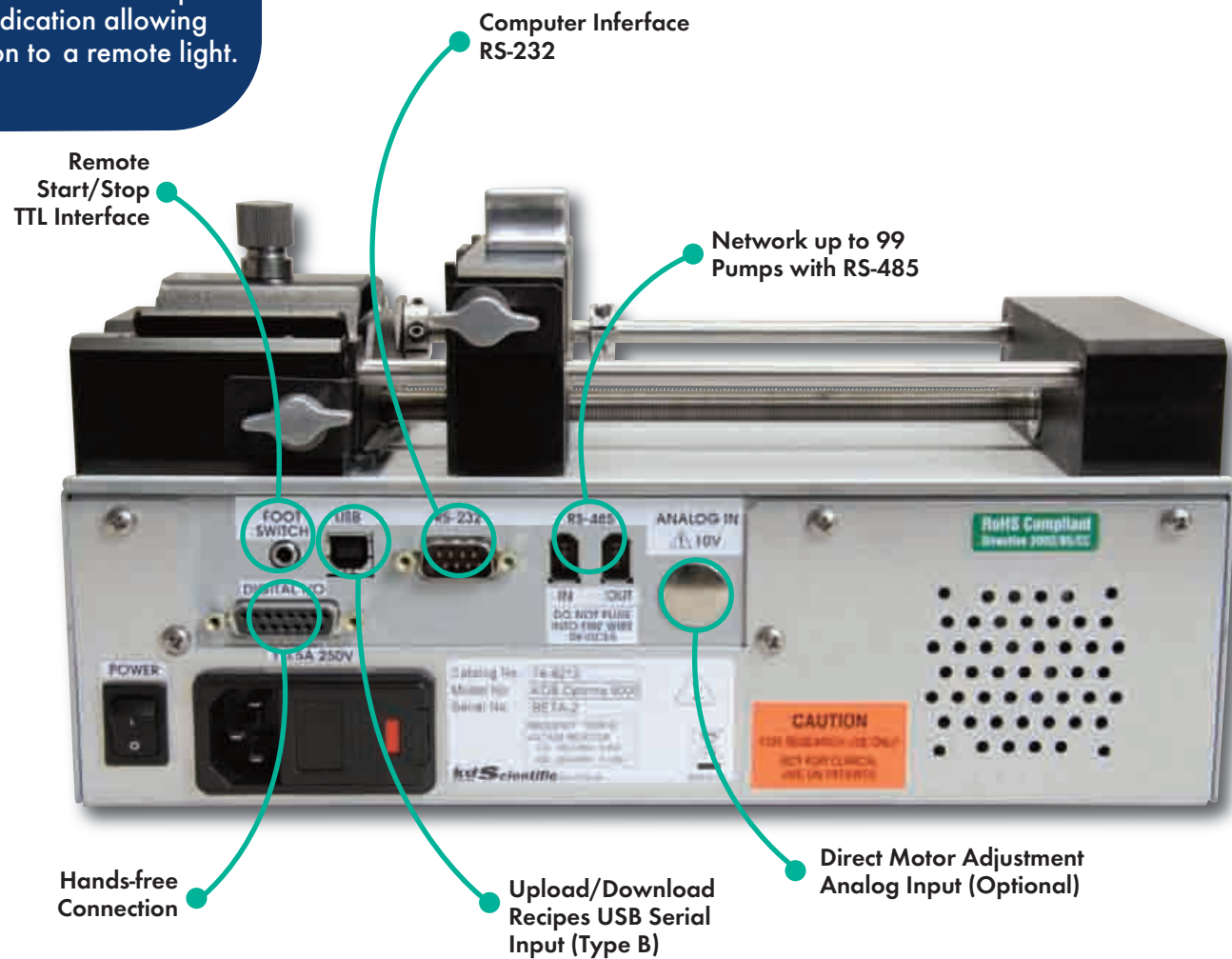
Nutrient A #6



Easy external connections to a computer or other control devices are through USB interface or RS232 (9 pin Dsub). Simple ASCII commands make communication with the pump easy. For direct control of the pump the user can use the I/O interface. (15pin Dsub) Pump direction can be changed. Two trigger outputs and a trigger input for external events such as a process parameter is met. The footswitch input will allow the control of the pump through an external device. The unit also has an output for run indication allowing connection to a remote light.

The Legato's Versatility is In Communication – Multi Pump Mode of Operation

The pumps are versatile and can be interconnected through the RS 485 interface. Legato™ 200 models can be mixed and matched in the daisy chain offering maximum flexibility. Up to 99 pumps can be linked together through the RS485 interface. This interface is easy to use and each pump has its own unique pump address.



Second to None

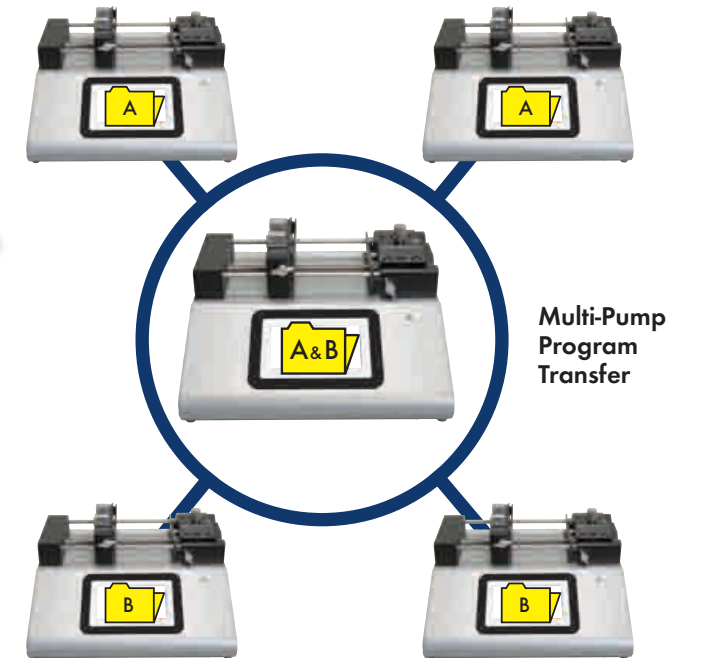
Ensure the consistency and accuracy of programs with the ability to:

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



The Legato 200 Series pump permits the daisy chaining up to 99 pumps. To facilitate operation in these modes, the Legato 200 Series application software includes a variety of commands designed to simplify the export/import of programs between the pump and external devices.

Multiple tests are easy to run and control, as well as gradients, by linking up to 99 pumps together through the RS485 interface. This interface is easy to use and each pump can be assigned its own unique pump address



Transfer programs to a computer

Rename Recipes

Store Configurations for easy recall

Program File Options 12/22/12 1:30:35 PM

T_PROGRAM

| | |
|------------------------|----------------|
| Save As | Append |
| Rename Program | Delete Program |
| Export Program to PC | |
| Export Program to Pump | Pump I |

BACK

Manipulate programs quickly.

Ensure pump to pump program consistency

Add 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
- Push Pull

These 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 Models to Meet Your Requirements

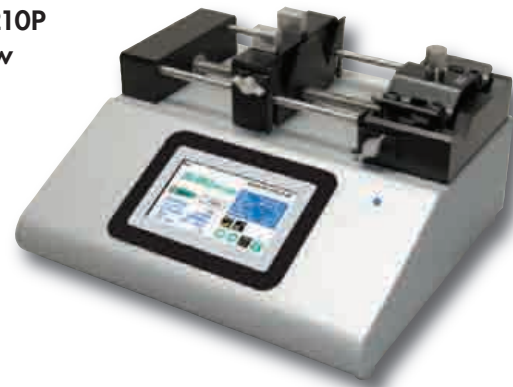
Legato™ 200
Infuse Only
Syringe Pump



Legato™ 270 & 272P
Push/Pull
Syringe Pump



Legato™ 210 & 210P
Infuse/Withdraw
Syringe Pump



Model Versions

| | |
|--------|---|
| 788200 | KDS Legato 200 Infuse Only |
| 788210 | KDS Legato 210 Infuse/Withdraw |
| 788212 | KDS Legato 212 Infuse/Withdraw Programmable |
| 788270 | KDS Legato 270 Push-Pull |
| 788272 | KDS Legato 272 Push-Pull Programmable |

Legato 200

Infuse only syringe pump. Accommodates 2 syringes 0.5 µl to 140 ml. User definable flow rates with selectable target volumes or time values to control the total infusion volume.

Legato 210

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

Legato 210P

This is a Programmable Legato 210 with user defined configurations/programs of up to 800 steps. Up to 40 programs of 20 steps each can be stored in memory.

Legato 270

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

Legato 272P

This is a Programmable Legato 272, Push Pull pump with user 40 custom programs of up to 20 steps each. Multiple programs can be stored in memory.

Large Syringe
Multi-Rack 4 x 140 ml



Small Syringe
Multi-Rack 6/10



Microliter
Syringe
Rack



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

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

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

Large Syringe Multi-Rack Option (78-8300)

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

Small Syringe Multi-Rack Option (78-8301)

The Small Syringe Multi-Rack option will accommodate up to six 30 to 60 ml syringes or up to ten 0.5 µl to 10 ml syringes. This rack will work with the Legato 200 or Legato 210.

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 or Legato 210.

Model Versions

| | |
|--------|---|
| 788300 | Infuse/Withdraw 6/10 Multi-Rack. (Six 30 to 60 ml syringes or ten 0.5 µl to 20 ml syringes) (can be sold for Infuse Only as well) |
| 788301 | Infuse/Withdraw 4 x 140 Multi-Rack (Four 60 to 140 ml syringes) (can be sold for Infuse Only as well) |
| 788302 | Infuse/Withdraw Microliter Rack (Four 0.5 µl to 10 ml syringes) (can be sold for Infuse Only as well) |

A premier line of stainless steel syringes is now offered by KD Scientific. These syringes are a perfect compliment for the NEW Legato™ 200 Series. Rugged stainless steel syringes are an ideal solution when the pressures and the force are high, completely eliminating the problem of breaking glass syringes.

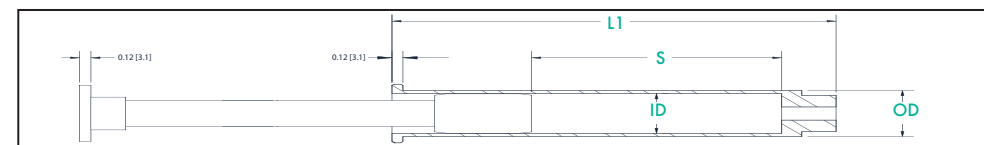
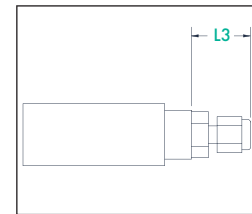
Stainless steel offers good resistance to most aggressive liquids. Wetted parts are #316 stainless steel and Viton or Perfluorelastomer. Syringes are available in 2.5, 8, 20, 50 and 100 ml sizes with removable, replaceable tips. Genuine SWAGelok™ syringe to tube fittings are available in 1/16, 1/8 and 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.

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

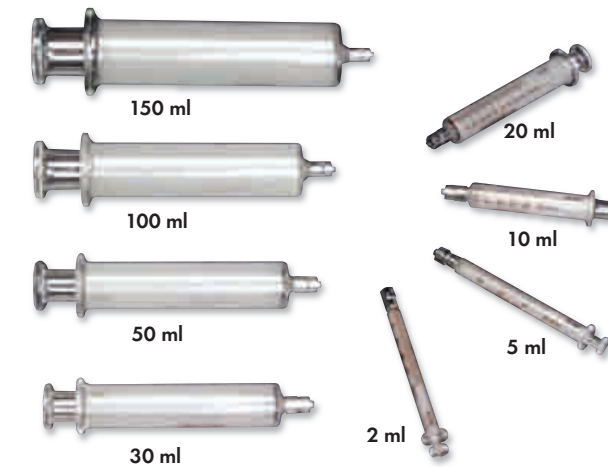
| Syringe | Fitting | L3 in (mm) |
|--------------|---------|---------------|
| 2.5 to 8 ml | 1/16 | 0.74 (18.8) |
| 2.5 to 8 ml | 1/8 | 0.91 (23.1) |
| 20 to 200 ml | 1/16 | 0.67 (17.0) |
| 20 to 200 ml | 1/8 | 0.84 (21.3) |
| 20 to 200 ml | 1/4 | 0.94 (23.9) |
| 20 to 200 ml | Luer | 1.34 (34.0) |



Glass Syringes

Premium Line of Glass Syringes

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

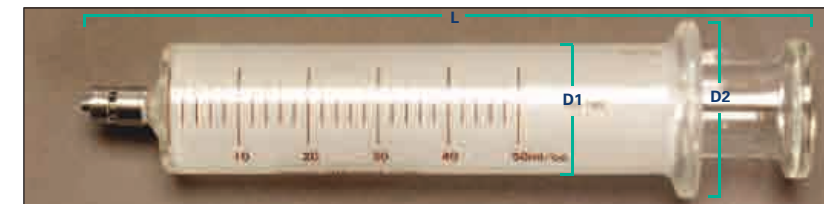


KD Scientific offers a new line of glass syringes to meet scientific applications in the laboratory environment. Over ten different sizes of glass syringes ranging from 1.0 ml to 150 ml are available.

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

Specifications

| Min. Order Qty. | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 1 | 1 |
|---------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| Volume* | 1.0 ml | 2.0 ml | 5.0 ml | 10.0 ml | 20.0 ml | 30.0 ml | 50.0 ml | 100.0 ml | 150.0 ml |
| Piston Outside 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 | 35.90 ±0.25 | 34.20 ±0.25 |
| 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 | 1.413 ±0.010 | 1.346 ±0.010 |
| 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 | 41.20 ±0.75 | 39.60 ±0.75 |
| 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 | 1.622 ±0.030 | 1.559 ±0.030 |
| 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 | 55.50 ±0.75 | 52.00 ±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 | 2.185 ±0.030 | 2.047 ±0.030 |
| Piston Collar Diameter (mm) D3 | 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 | 42.05 ±0.65 | 42.00 ±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 | 1.656 ±0.026 | 1.654 ±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 | 215.00 ±0.65 | 275.00 ±0.65 |
| 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 | 8.465 ±0.026 | 10.827 ±0.026 |
| Increment (ml) | 0.02 | 0.05 | 0.2 | 0.2 | 1.0 | 1.0 | 2.0 | 5.0 | 5.0 |
| Order Code | 78-0871 | 78-0872 | 78-0873 | 78-0874 | 78-0875 | 78-0876 | 78-0877 | 78-0878 | 78-0879 |



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 |

Specifications

| Volume | 2.5 ml | 8 ml | 20 ml | 50 ml | 100 ml |
|---|----------------|--------------------|--------------------|--------------------|--------------------|
| Dimensions: | in (mm) | in (mm) | in (mm) | in (mm) | in (mm) |
| Overall Length of 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 |
| Order Code Syringe with Swagelok™ 1/16" | 78-0801 | 78-0802 | 78-0803 | 780804 | 78-0805 |
| Order Code Syringe with Swagelok™ 1/8" | N/A | 78-0807 | 78-0808 | 780809 | 78-0810 |
| Order Code Syringe with Swagelok™ 1/4" | N/A | N/A | 78-0812 | 780813 | 78-0814 |
| Order Code Syringe with Luer Lock | N/A | N/A | 78-0816 | 780817 | 78-0818 |
| O-Ring Material Standard | Balseal | Perfluoroelastomer | Viton | Viton | Viton |
| O-Ring Specials (optional) | N/A | N/A | Perfluoroelastomer | Perfluoroelastomer | Perfluoroelastomer |

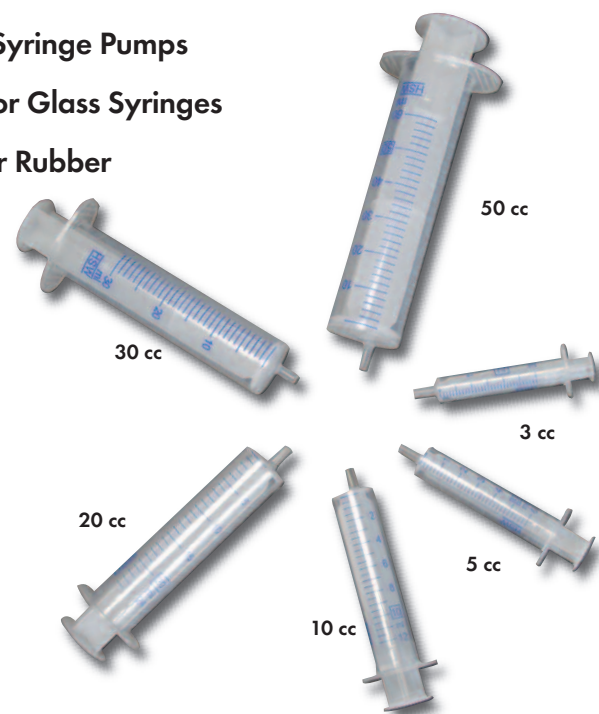
KD Scientific offers a new line of disposable Plastic Sterile Syringes for all scientific applications. Available in sizes ranging from 1 ml to 50ml with Luer Lock (LL) or Luer Slip (LS) Tip. Norm-ject syringes are the ideal solution for any situation. Their unique two-part system is latex free and contains no silicone lubricant or rubber.

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

Plastic Syringes

Premium Line of Glass Syringes

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



Specifications

Luer Lock (Pkg. of 25)

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

Legato™ 200 Specifications

| | |
|---|--|
| Accuracy | ± 0.35% |
| Reproducibility | ± 0.05% |
| Syringes (Min./Max.) | 0.5 µl / 140 ml |
| Flow Rate: | |
| Minimum (0.5 µl syringe) | 5 pl/min |
| Maximum (140 ml syringe) | 220.97 ml/min |
| Display | 4.3" WQVGA TFT Color Display with Touchpad |
| Non-Volatile Memory | Stores all settings |
| Connectors: | |
| RS-232 | 9 pin D-Sub Connector |
| RS-485 | IEEE-1394, 6 pos |
| USB | Type B |
| I/O & TTL | 15 pin D-Sub Connector |
| Linear Force (Max) | 34 kg (75 lbs) @ 100% Force Selection |
| Drive Motor | 1.8° Stepper Motor |
| Motor Drive Control | Microprocessor with 1/16 microstepping |
| Number of Microsteps per one rev. of Lead Screw | 6,400 |
| Step Rate: | |
| Minimum | 27.5 sec/µstep |
| Maximum | 26 µsec/µstep |
| Pusher Travel Rate: | |
| Minimum | 0.36 µm/min |
| Maximum | 190.80 mm/min |
| Power | 100-240 VAC:50/60 Hz, 50 W, 0.5 A fuse |
| Dimensions | 8.89 x 25.4 x 27.94 cm (3.5 x 10 x 11 in) |
| Weight | 4.9 Kg (10.75 lb) |

Atmospheric Specifications:

| | |
|---------------------------|--|
| Operating Temperature | 4 °C to 40 °C (40 °F to 104 °F) |
| Storage Temperature | -10 °C to 70 °C (14 °F to 158 °F) |
| Humidity | 20% to 80% RH, non condensing |
| Mode of Operation | Continuous |
| Classification | Class I |
| Pollution Degree | 1 |
| Installation Category | II |
| Supplier Name | KDScientific |
| Supplier Address | 84 October Hill Rd., Holliston, MA 01746 |
| Supplier Phone Number | 508.429.6809 |
| Regulatory Certifications | CE, UL, CSA, CB Scheme, EU RoHS |

Legato™ 200 Accessories

Item No. Description

| | |
|--------|--|
| 788320 | Auto Fill Valve Box Low Pressure |
| 788321 | Auto Fill Valve Box High Pressure |
| 788303 | Anti-Siphon Kit |
| 788304 | RS485 Pump to Pump Communication, .5 m |
| 788305 | RS485 Pump to Pump Communication, 2 m |
| 788306 | USB Cable PC to Pump Communication, 2 m |
| 788307 | USB Cable PC to Pump Communication, 5 m |
| 788308 | RS232 Cable (9 pin d-sub), 2m |
| 788309 | Line Cord US 115 V |
| 788310 | Line Cord European |
| 788311 | Line Cord UK |
| 788312 | Adapter Digital I/O (15 pin to 9 pin) |
| 788313 | Adapter D Sub 15 to Terminal Block |
| 780225 | Footswitch with Phono Jack Plug |
| 788314 | Adapter for 25 ml, 50 ml, 100 ml Hamilton Gastight Syringe |
| 788315 | Hex Key |
| 788316 | Lubricant SuperLube, 1 cc |
| 788324 | Protective Shield for display |

Item No. Description

| | |
|--------|---|
| 788317 | Upgrade Infuse Only to Infuse/Withdraw |
| 788318 | Upgrade Infuse Only to Programmable |
| 788319 | Upgrade Infuse/Withdraw to Programmable |

Option

| | |
|----|--|
| FN | Internal Fan Option |
| AI | Analog Control Input Option (0 to 10 VDC)* |

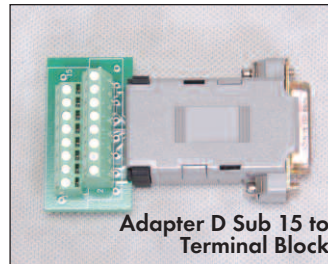
788322 Analog Control Connector

788323 Analog Control Cable

5146037 Replacement Fuse

5155288 Replacement Battery

* Only available with 788212, 788272



Adapter D Sub 15 to Terminal Block



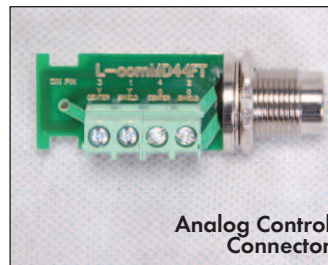
Adapter Digital I/O (15 pin to 9 pin)



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



Analog Control Cable



Analog Control Connector



Footswitch with Phono Jack Plug



Lubricant SuperLube, 1 cc



Replacement Battery



USB Cable PC to Pump Communication



RS232 Cable (9 pin d-sub), 2m



RS485 Pump to Pump Communication



Line Cord UK



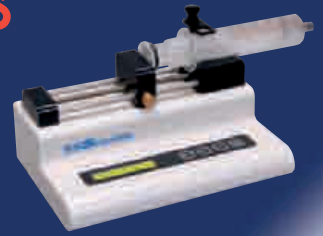
Line Cord US 115 V

KD Scientific Family of Pumps

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KDS 100
Single-Syringe
Infusion Pump



KDS 200
Two-Syringe
Infusion Pump



KDS 900
µl OEM Module



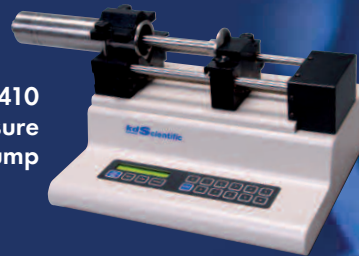
KDS UltraSpense
2000



KDS 330
Emulsifier
Pump



KDS 910
Milliliter
OEM Module



KDS 410
High Pressure
Syringe Pump

KDS EZflow Product Line



KDS 520
Volume
Dispense
System



KDS Gemini 88



KDS Pico Pump



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

Specifications subject to change at any time.
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