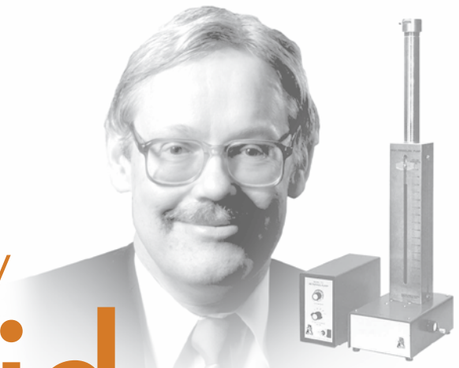
TELEDYNE | Teledyne LABS

Pumps

High Performance, High Precision

PUMPS

Pumps for Practically Any Fluid



Founder Dr. Robert Allington and one of his earliest syringe pumps.

Dr. Bob Allington built ISCO's first high-performance liquid chromatography (HPLC) pump in 1970 to improve his separation and purification techniques. The DNA from that first Model 314 is still present in the pumps Teledyne ISCO builds today.

From chemicals, to oil/gas, pharmaceutical, and plastics, we continue our tradition of producing quality pumps for ever growing markets.

Dr. Allington required durability and precision in the pumps which he built and used in his laboratory and we have never strayed from that directive.

The precision of the first ISCO pumps are is still the backbone of every ISCO syringe pumps.

Scientific Systems, Inc. (SSI) which was founded by the dreams and ambition of Andy Charney in State College Pennsylvania and became the leader in chromatography pumping systems. The precision machine shop and high-pressure fluid technology, which makes the SSI the premier reciprocating pump on the market today.

Teledyne has combined the history, reliability and robustness of both ISCO and SSI pumps under one umbrella. Now syringe pumps, reciprocating pumps and peristaltic pumps are all available for many applications.

Teledyne pumps are the industry standard for the research and development within chromatography, chemical/biochemical, and oil and gas industries. Our customers, demand the same precision and dependability, required by which was built by Dr. Allington and Mr. Charney years ago and Teledyne continues to required, and Teledyne ISCO deliver just that.

PHARMACEUTICAL

Drug production requires precision delivery of catalysts and reagents which can be reliably dispensed with Teledyne SyriXus, ReaXus or PeriXus pumps, through basic research, scale up, or in production, Teledyne pumps are the right choice for continuous flow pharmaceutical applications. In many chemical reactions that occur during research of new drugs. Flow rate is key to the success of many experiments, where Teledyne SyriXus syringe pumps are an accurate and reliable option

- Product Development—Precise fluid delivery (±0.5% or better) to produce high quality results
- Process Development/Pilot and Scale/Production—High repeatability with pulseless flow for trouble-shooting techniques and proof of concept
- GMP processed ReaXus pumps are also available

PLASTICS

Delivery of liquefied gases that are key in many research and development of foam structures. Polymer extrusions require zero pulsation to develop long capillaries and precise structural formation. Teledyne SyriXus syringe pumps can deliver liquefied nitrogen or CO_2 reliably and provide monomers with pulseless flow. If you are dosing colors or materials into your extrusion process, we have a pump which can perform just that. Additionally, the Teledyne ReaXus reciprocating pumps can provide constant pressure to assist during rotational molding activities.

- Research or Industrial Environments—High Reliability in tough environment applications
- Ability to Handle Liquefied Gases—CO_2, and other gasses can be delivered with high precision
- Pulseless delivery as low as 0.00001 mL/min

PETROCHEMICAL

Teledyne ISCO syringe pumps have a legacy of success throughout the years in the Petrochemical market with many types of applications including, but not limited to, core flooding and reaction feed. The precision flow capabilities coupled with the high pressure abilities that make Teledyne ISCO pumps the right choice when designing your experiment or pilot process.

	Peristaltic	Reciprocating	Syringe
Pulsation	High	Med	Low
Pressure	Low	Med	High
Flow Rate	Med–High	Low–Med	Very Low–Med
Viscosity	Med	Low	High
Price	Low	Med	High
Slurries	Yes	No	Yes
Check Valves	No	Yes	No

SyriXus
Syringe Pumps

Accuracy and reliability you can count on

1000x Pump

Controller is required to operate and are sold separately, see page 7

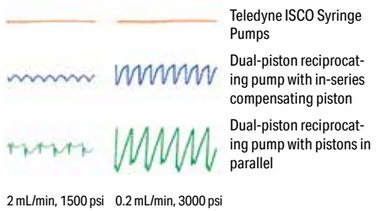
Teledyne ISCO SyriXus precision syringe pumps give you flow and pressure control throughout a broad operating range. SyriXus syringe pumps can be metered with great accuracy and do not exhibit pulsation or flow anomalies, typically associated with other pump types. The proven robust design lowers your down time and service costs to provide years of reliable and worry-free operation.

HANDLE A WIDE VARIETY OF FLUIDS INCLUDING:

- Aqueous and organic liquids
- Corrosive solutions
- Heated fluids
- Liquefied gases
- Viscous fluids
- Slurries and pastes
- Liquids with particulates

- **Versatile**—Teledyne ISCO pumps can meet more demands than ever before. SyriXus syringe pumps are now available in broader pressure ranges.
- **Continuous Constant Flow or Pressure**—Continuous Constant Flow or Pressure—SyriXus pumps operate in either constant fluid delivery or under constant pressure delivery. Operation can be change for different experiments with one key stroke.
- **Precision Dosing of Fluids**—Flow ranges from 0.00001 to 408 mL/min.
- **Broad Operating Temperature Range**—Normal operation 5–40 °C ambient. Temperature control jacket will allow you to heat up or cool-down any substance from -30 °C to 100 °C. A high temperature package will allow you to heat your pump up to 200 °C.
- **Zero Pulsation**—When pulsation cannot be tolerated in experiments, the SyriXus pump will deliver. Dual-pump operation offers continuous flow with no pulsation as low as 0.00001 mL/min and up to 20,000 psi of pressure.

PULSELESS FLOW



SYRIXUS 500xv FOR HIGH VISCOSITY MATERIALS

Pumping high viscosity fluids accurately is a challenge for many pumps. The SyirXus 500xv syringe pump is able to pump higher viscosity material by reducing the restriction within the pump. Specially designed ports with 3/8" openings at a 45 degree angle, will allow easy passage for all viscous materials and slurries. Air operated ball valves are used for automating refill and continuous flow process.

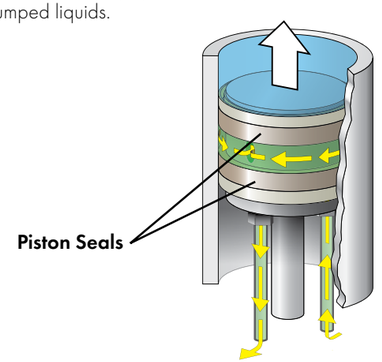
The 500xv syringe pump provides precise delivery of high viscosity material up to 204 mL/min. Pulse-less flow is delivered at up to 5,000 psi (345 bar) of pressure.

Reduce material viscosity by heating the pump chamber, will make it easier to pump viscose materials and slurries. A Temperature Control Jacket can be used to raise or lower the temperature inside pump cylinder from -30 to 100 °C. The High Temperature package will allow the pump cylinder to heat up to 200 °C.

The 500xv pump module has a single-ratio drive train with auto-lubricating gears, for long life and low maintenance. Special fittings are used to prevent leaks and ensure safety at maximum pressure.

1000x WASH GLAND

For additional corrosion protection, the wash gland allows for flushing cylinder of any residue from pumped liquids.



	Capacity	Flow* Range (mL/min)	Flow** Accuracy	Pressure Range (psi, bar)	Standard Pressure Accuracy	Standard Plumbing Ports	Dimensions	Continuous Flow Range (mL/min)	Wetted Materials
1000x	1015 mL	0.001–408	0.5% of Setpoint	10–2,000 0.7–137.9	0.5% FS	1/4" NPT	40.3x10.7x18.4 in 102x27x47 cm	0.01–265	N, H, PTFE
500x	507 mL	0.001–204	0.5% of Setpoint	10–5000 0.7–345	0.5% FS	1/8" NPT	40.3x10.7x18.4 in 102x27x47 cm	0.001–132	N, H, PTFE
500xv High Visocity	507 mL	0.001–204	0.5% of Setpoint	10–5000 0.7–345	0.5% FS	3/8" NPT	40.3x10.7x18.4 in 102x27x47 cm	0.001–132	N, H, PTFE
260x	266 mL	0.001–107	0.5% of Setpoint	10–9,500 0.7–655	0.5% FS	1/8" Valco	39.8x10.7x18.4 in 101x27x47 cm	0.001–70	N, H, PTFE, G, T
65x	68 mL	0.00001–25	0.3% of Setpoint	10–20,000 0.7–1,390	0.1% FS	1/4" F250	39.8x10.7x18.4 in 101x27x47 cm	0.00001–16	N, H, PTFE

Wetted Materials: N=Nitronic 50, H=Hastelloy C-276, PTFE= Polytetrafluoroethylene, G=Gold, T=Titanium

HLf-Series
Hazardous Locations

UL approved for Class I, Div 2 environments

100HLf Hazardous Location Syringe Pump

Teledyne ISCO HLf -Series syringe pumps conform to safety standards for use in UL Class I, Division 2, Groups A B C & D, T4 environments. The HLf syringe pumps give you the same accurate, predictable flow and pressure control while meeting the safety requirement. The hazardous location rating is achieved through internal design modifications including the use of brushless DC motors and non-contact switches. This approach eliminates the need for purge boxes or other additional safety devices.

Wetted materials are compatible with most aqueous and organic liquids, corrosive solutions, heated substances, liquefied gases, viscous fluids, or slurries and pastes.

APPLICATIONS

- Metering and dispensing in experiments and pilot plants where explosive conditions may occur
- Precision fluid addition in research and manufacturing processes
- Chemical/reactant feed in chemical process development, catalyst evaluation, plastic formulation
- Accurate metering of liquefied gases

STANDARD FEATURES

Operating Modes

- Constant flow or pressure with up to four single pumps
- Continuous flow or pressure with dual continuous pump system
- Flow or pressure programming with single pump
- Dispense mode

External Interface

- RS232 serial interface
- RS485 Modbus interface
- Analog voltage inputs
- Digital inputs and outputs
- Ethernet/USB

HLf pumps are not available in Europe

HLf PUMP MODELS:

	Capacity	Flow* Range (mL/min)	Flow** Accuracy	Pressure Range (psi, bar)	Standard Pressure Accuracy	Standard Plumbing Ports	Dimensions	Continuous Flow Range (mL/min)
1000HLf	1015 mL	1.0 µL–408	0.5% of Setpoint	10–2,000 0.7–137.9	0.5% FS	1/4" NPT	40.3x10.7x18.4 in 102x27x47 cm	0.01–265
500HLf	507 mL	1.0 µL–204	0.5% of Setpoint	10–3750 0.7–258.6	0.5% FS	1/8" NPT	40.3x10.7x18.4 in 102x27x47 cm	0.001–132
260HLf	266 mL	0.001–107	0.5% of Setpoint	10–7,500 0.7–517	0.5% FS	1/8" Valco	39.8x10.7x18.4 in 101x27x47 cm	0.001–70
100HLf	102 mL	0.01 µL–60	0.3% of Setpoint	10–10,000 0.7–689.5	0.5% FS	1/8" Valco	39.8x10.7x18.4 in 101x27x47 cm	0.00001–16

SYRINGE PUMP STANDARD INFORMATION:

All SyriXus and HLf pumps use 100 Vac, 117 Vac, 234 Vac, 50/60 Hz power supply.

External Interfacing: RS-232, analog voltage inputs, digital contact closure for RUN/STOP, REFILL/DELIVER 4–20 mA In/Out, and analog voltage output options available, USB, Ethernet.

Each Teledyne ISCO SyriXus and HLf syringe pump is bench tested at the factory, prior to delivery. All SyriXus and HLf pumps are UL certified to EN 61326 and EN 61010-1 standards. They are UL listed and CE compliant.

** Maximum and minimum flows are dependent on optimizing your pump system. Consult a Teledyne ISCO Product Specialist to determine the best method for your application. For additional information, please consult the factory. Teledyne ISCO is continuously improving its products and reserves the right to change specifications without notice. All brand or product names mentioned herein are trademarks or registered trademarks of their respective holders.*

*** Flow rate accuracy are based on select conditions of fluid type, pressure and leakage rate*

****Standard pressure accuracy typical at constant temperature.*

SyriXus Controller

Precision control that you demand

ONE CONTROLLER OPERATION

Up to four single pumps can be operated with one "Smart key" controller. The possible configurations, as displayed below, as such: single, dual, three, or four pump.

Single pump—constant flow, constant pressure, or dispensing mode

Dual pump—continuous constant flow or pressure or use as two pump independent modes

Three pump—independent constant flow or pressure and one dual pump mode

Four pump—independent constant flow, or pressure, control of up to four single pumps working independently or two dual continuous air pump systems

EASY TO USE

"Smart key" programming makes setting up and running your pump system easy and can be learned in just a few minutes. All SyriXus pumps, regardless of configuration or operating mode, utilize the same controller, which can be operated up to 15 meters (50 feet) from the pump modules with optional extension cables. Multiple pumps can be controlled with a single program, a configured program, or independently with varied programs. With complete front panel function and front panel accessibility, status, flow rate, and pressure parameters are continuously displayed.

One button access for:

- Start or Stop
- Dispense mode
- Operating parameters such as flow rate, pressure or refill
- Accessory function

User-selectable options for:

- Modes of operation
- Operating units
- Valve selection

Large selection of operating modes:

- Constant flow
- Constant pressure
- Flow or pressure gradients
- Dispensing
- Receiving
- Dual pump concentration gradients

SyriXus Controller

Operate up to four pumps with one controller

COMPUTER CONTROL

Pump operation by computer control is available to access Start/Stop and set point for pressure or flow.

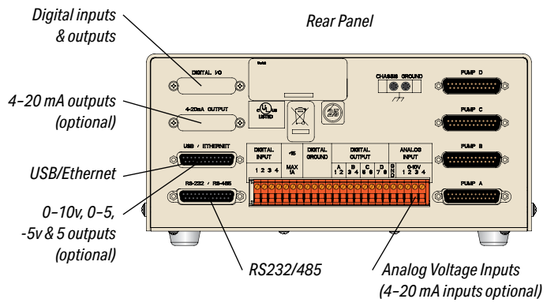
Standard control interfaces include:

- USB/RS232 Serial
- 0–10 Vdc, 0–5 Vdc & -5 to +5 Vdc Inputs

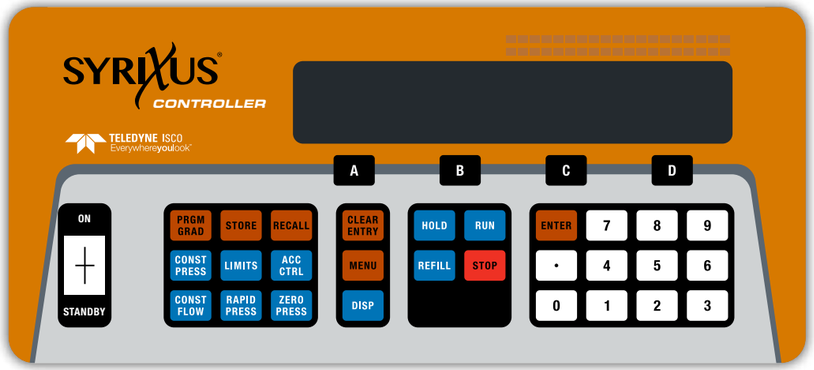
Optional interfaces include:

- 0–10 Vdc, 0–5 Vdc & -5 to +5 Vdc Outputs
- 4–20 mA inputs and outputs

LabVIEW drivers are available to control syringe pumps remotely in programmed experiments. Compatible with LabVIEW 15 or higher.



KEY CONTROLLER FUNCTIONS



PRGM GRAD Program Gradient: Puts pump in gradient mode and accesses gradient programming.

STORE Store: Stores current gradient program in nonvolatile memory.

RECALL Recall: Replaces current gradient program with one recalled from nonvolatile memory.

CONST PRESS Constant Pressure: Puts pump in constant pressure mode.

LIMITS Limits: Enables changes to maximum and minimum pressure and flow limits.

ACC CTRL Accessory Control: Manually operates accessories such as valves.

CONST FLOW Constant Flow: Puts pump in constant flow rate mode.

ZERO PRESS Zero Pressure: Sets pressure display to zero. Active only from -750 to +750 psi.

RAPID PRESS Rapid Pressure: Allows rapid pressurization to the stable pressure point.

CLEAR ENTRY Clear Entry: Clear the last digit entered from the numeric key.

MENU Menu: Provides access to operational modes, units, and optional parameters.

DISP Dispense Mode: Activates Dispense Mode.

HOLD Hold: Freezes the program clock. The unit will continue at the current gradient. parameters.

REFILL Refill: Pump drive motor moves piston downward at a programmed rate.

RUN Run: Turns on pump driver motor to move piston upward.

STOP Stop: Stops the drive motor.

A **B** **C** **D**

A, B, C, D: Soft keys used to select display options

SyriXus
Accessories

Do more with these accessories

Air powered valves for continuous flow

AIR-POWERED VALVES

For absolute pulse-less fluid delivery, pneumatic valves are reliable for any fluid, including viscous and/or corrosive solutions. Compatible with all types of solvents, the air valves and connections are 100% Hastelloy construction.

Pumps: 1000x, 500x, 500xv, 260x, 65x

Electric valves for continuous flow

ELECTRIC VALVES

Electric valves offer simple, automated actuation and are driven by the power from the pump controller. The valves prevent any back-flow of fluids with a unique one-way flow path design. The valves are reliable stem-and-needle and capable of handling a wide range of corrosive fluids, liquefied gasses, volatile fluids, and viscous solutions.

Pumps: 1000x, 500x, 260x

MANUAL VALVE KITS

Inlet and outlet kits are available for all pumps with simple shut off valves that can be manually operated during experiments.

Pumps: 1000x, 500x, 260x, 65x

TEMPERATURE CONTROL JACKET

Controls cylinder temperature by circulating heated or cooled fluid around the pump cylinder. Cylinder cooling allows fast, complete filling with a liquefied gas. Heating high viscosity material is recommended to lower the viscosity and make pump easier. Temperatures range from -30 °C to 100 °C.

Pumps: 1000x, 500x, 500xv, 260x

HIGH-TEMPERATURE & HIGH ACCURACY PACKAGE

All hardware needed to upgrade the pumps for operation up to 200 °C. Package includes an external side mounted high-temperature accuracy transducer, cap assembly, and high-temperature seals, and high-accuracy transducer, provides accuracy to 0.1% of full scale.

Pumps: 1000x, 500x, 500xv, 260x

HASTELLOY PACKAGE

500x and 260x pumps are available in Hastelloy, compatible with many corrosive fluids. ***Factory installed only.***

Pumps: 500x, 260x

PeriXus
Peristaltic Pump

Small footprint, but large capabilities

The PeriXus was developed with your lab or manufacturing plant in mind. With its compact and modular design, this space-saving pump uses peristaltic technology to help reduce the possibility of contamination making it a great pump to use when handling volatile materials. Also, the ability to quickly change hoses will allow you to switch from pumping one material to another in minutes, maximizing application flexibility and ensures zero carryover. Peristaltic pumps are designed without check valves to handle particulates or sticky fluids. The PeriXus needs minimal maintenance over the life of the pump, which will enhance your return on investment.

SPECIFICATIONS

RPM	0.1 to 300
Flow Rate	0.005–184 mL/min (L/S 16 tubing) 0.005–381 mL/min (L/S 25 tubing)
Speed Control (Repeatability)	±0.1%
Reversible Motor	Yes
IP Rating	IP33
Dimensions	9.4" x 5.5" x 6.2" (23.9 x 14.0 x 15.7 cm)
Power	90 to 260, 50/60 Hz
Amps	0.34 at 115 VAC, 0.2 at 230 VAC

KEY MARKETS:

- Pharmaceutical/Biotechnology
- Research and Development
- Petrochemical
- Reaction Chemistry

ReaXus Series
Reciprocating Pumps

The right pump for the right job

The ReaXus reciprocating pump product line provides broad pumping specifications to meet your application needs. Maintenance is minimal and the quality is high, which over the life of the product, saves you money. The availability of many options allows you to select the exact pump you need to optimize the results of your application. All ReaXus pumps are designed with unique automatic back flush ports that wash the seal and increase the life of your pump.

PISTON CONFIGURATION

Single-Piston pumps offer an economical option for metering, dispensing, and general fluid-transfer applications where pulsation is tolerated. Single-piston pumps have a 'rapid-refill' feature drawing liquid into the pumping chamber quickly regardless of the metered dispensing rate. This helps minimize flow pulsation. Often, these pumps are configured with a secondary pulse dampener to further smooth fluid flow delivery.

Pump Classes: LS, M1, MX

Dual-Piston pumps have two pistons operating in parallel, fully out-of-phase with each other, to produce naturally-smooth fluid flow. This is critical for many applications where pulsation can impact an experiment or chromatography results.

Pump Classes: CP, HF, LD, PR

DRIVE TYPE

ReaXus pumps can be further categorized by the mechanics translating rotation of the pump motor into the reciprocating (back-and-forth) motion of the piston(s).

Direct-Drive mechanisms produce linear piston motion by use of a bearing mounted eccentrically to a rotating motor shaft. This simple arrangement is cost effective, but has limited pressure capabilities.

Pump Classes: M1, MX

Belt-Drive mechanisms produce linear piston motion through a cam mounted on a shaft. A belt-and-pulley configuration connects the pump motor to this cam shaft. The provided mechanical advantage allows for higher pressure capabilities.

Pump Classes: CP, HF, LD, LS, PR

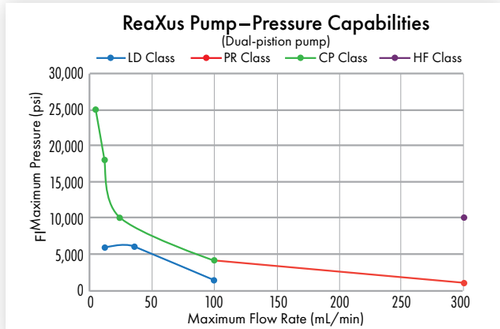
ReaXus LS-Class

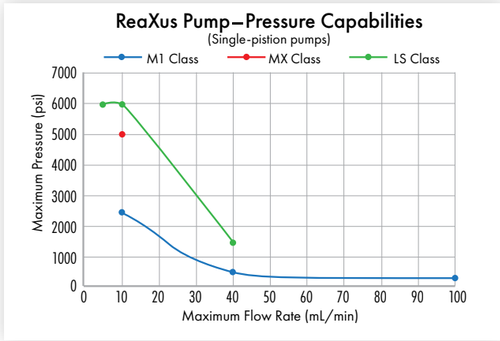
REAXUS®

CONSTANT PRESSURE PUMP

The ReaXus CP Pump utilizes a constant pressure algorithm that produces consistent volumetric fluid flow under very high-pressure conditions. An internal PID feedback loop monitors system pressure and modulate fluid flow in order to maintain constant pressure. CP pumps are often utilized for HPLC column packing or reactor vessels.

Constant pressure mode is also available at the time of purchase on the PR and SC Class Pumps.





WETTED MATERIALS

ReaXus pumps are available in a variety of wetted materials. In addition to the primary fluid path material, other wetted materials may include: synthetic ruby, synthetic sapphire, alumina, zirconia, fluoropolymers, and UHMWPE.

Stainless Steel fluid paths are most common with broad acceptance in HPLC, processing, and metering applications. Corrosion resistance, high-pressure capability, and general ruggedness make stainless steel the primary choice of materials.

PEEK fluid paths offer broad chemical compatibility and are typically used in applications where a metal-free fluid path is desired.

Hastelloy pumps are used for highly-corrosive applications where stainless steel is not chemically compatible. "Jacketed" heads are included on all Hastelloy pumps.

The pump head is machined with a secondary fluid cavity in close thermal proximity to the main pumping chamber. An external circulating bath can be connected to this secondary cavity to heat or cool the pump head. Heating the head allows for pumping of fluids normally too viscous for operation at room temperature.

ReaXus Series
Reciprocating Pumps

M1 CLASS
Material: Stainless Steel, PEEK

An economical, compact single piston pump designed to provide great performance at a competitive price. The M1 Series is perfect for transferring material, and day-to-day fluid movement.

Flow Range (mL/min)	Flow Accuracy	Pressure Limits (psi)
0.0–10.0	5%	2,500
0.0–40.0	5%	500
0.0–100.0	5%	250

MX CLASS
Material: Stainless Steel

A single piston pump that is designed for more challenging applications. The higher pressure capability and increased flow rate makes this a pump that can stand up to a tougher workload.

Flow Range (mL/min)	Flow Accuracy	Pressure Limits (psi)
0.0–10.0	2%	5,000

LS CLASS
Material: Stainless Steel, PEEK

A high pressure capable, single piston pump that out performs the more expensive pumps on the market. The LS Class is designed to minimize pulsation during fluid movement, something that many experiments require to be successful.

Flow Range (mL/min)	Flow Accuracy	Pressure Limits (psi)
0.0–5.0	2%	5,000 Peek, 6,000 SS
0.0–10.0	2%	5,000 Peek, 6,000 SS
0.0–40.0	2%	1,500

SC CLASS
Material: Stainless Steel

The SC Class reciprocating pump provides reliable, accurate and reproducible pumping of liquid CO_2 for SFC, SFE, and other applications. The SC Class is available in either Constant Pressure or Constant Flow configurations. The pump's constant pressure mode features a selectable pressure set point. The flow rate autoadjusts to maintain pressure—ideal for extraction applications. Constant flow configuration provides precise CO_2 flow rates for supercritical fluid chromatography.

Flow Range (mL/min)	Flow Accuracy	Pressure Limits (psi)
0.01–24.00	2%	10,000 SS

LD CLASS
Material: Stainless Steel, PEEK, Hastelloy

A dual piston pump perfectly aligned for continuous processing applications offering high pressure capability and virtually pulse free operation.

Flow Range (mL/min)	Flow Accuracy	Pressure Limits (psi)
0.0–12.0	2%	5,000 Peek, 6,000 SS
0.0–36.0	2%	5,000 Peek, 6,000 SS/Hastelloy
0.0–100.0	2%	1,500

PR CLASS
Material: Stainless Steel, PEEK, Hastelloy

A dual headed pump that provides higher flow rates and high pressure capability. The PR Class is well suited for the tougher reaction chemistry applications across many markets.

Flow Range (mL/min)	Flow Accuracy	Pressure Limits (psi)
0.0–100.0	3%	4,000
0.0–300.0	3%	1,000

CP CLASS
Material: Stainless Steel, Hastelloy

A dual-headed, positive displacement piston pump with constant pressure control, covering a wide range of flows. Used for LC Column packing, as well as many process applications.

Flow Range (mL/min)	Flow Accuracy	Pressure Limits (psi)
0.0–12.0	2%	18,000
0.0–24.0	2%	10,000
0.0–100.0	2%	4,000

HF CLASS
Material: Stainless Steel

A dual-headed piston pump with servo motors, belt drives, and reliable eccentric cams. It can operate at constant flow or constant pressure mode. Widely used for Column packing, as well as many process applications.

Flow Range (mL/min)	Flow Accuracy	Pressure Limits (psi)
0.0–300.0	2%	10,000

Teledyne LABS enhances the visibility for our brands, products, and services, aiding customers in finding solutions that meet their current and future needs. The existing Teledyne brands will remain, providing ongoing value to customers.