TELEDYNE ISCO
Everywhereyoulook™

PUMPS

HIGH PERFORMANCE
HIGH PRECISION

Pumps
for Practically
Any Fluid

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

Teledyne ISCO pumps are built on a strong history of innovations. Since the initial development of the first high performance syringe pump nearly 40 years ago, our pump product line has become the leader in a number of industries.

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

Today, our line of pumps continues to expand. From our original line of D-Series syringe pumps, to Hazardous Location pumps, and Reciprocating pumps, our pump offerings can cover an array of applications.

Our customers depend on Teledyne ISCO pumps to provide unique solutions for their unique applications. With talented and responsive engineering resources, Teledyne ISCO provides custom solutions to meet these needs. Our customer satisfaction is unmatched for highly specialized applications. This ongoing tradition of innovation allows us to meet any pumping challenges now and well into the future.

PHARMACEUTICAL

Whether in the lab, through scale up, or in production where precision dosing is required, Teledyne ISCO 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 the experiment, the Teledyne ISCO line of pumps are an accurate and reliable option.

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

PLASTICS

Many Teledyne ISCO pumps can pump liquefied gases that are key in the research and development of foam structures. If you are dosing colors or materials into your extrusion process, we have a pump which can perform that. Additionally, the reciprocating line of Teledyne ISCO pumps can provide constant pressure to assist during rotational molding activities.

- **Research or Industrial Environments**—High Reliability in tough environments
- **Ability to Handle Liquified Gases**—CO^2, and other gasses can be pumped

PETROCHEMICAL

Teledyne ISCO 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 higher pressure abilities make Teledyne ISCO pumps the choice when designing your experiment or pilot process.

- **Continuous Constant Flow or Pressure**—Worry free operation for long periods
- **Computer Control or Standalone**—Varity of external interfaces for computer control or can operate with easy to use keypad input
- **Precision Dosing of Fluids**—Flow ranges from 0.00001 to 408 mL/min

D-Series
Syringe Pumps

When reliability & accuracy are critical

Teledyne ISCO D-Series precision syringe pumps give you flow and pressure control throughout a broad operating range. D-Series syringe pumps do not exhibit pulsation or flow anomalies typically associated with other pump types. They can handle a wide variety of fluids including:

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

All can be metered with great accuracy.

SEVEN PUMP CHOICES:

30D, 65D, 100D, 100DX, 260D, 500D, 1000D

These seven module sizes provide flow rates from:

- Sub-microliter/minute to over 400 ml/minute
- Pressures from atmospheric to 30,000 psi (2,068 Bar)

30D Pump

Four Pump System

D-Series
Custom Syringe Pumps

Pumps made to meet your special situation

For a perfect fit, you can customize your high precision pump to handle special flow rates, pressures, port sizes, and software. We can provide hardware and software interfaces to meet your specifications. Customized pump options include pressure transducers and large-bore valve packages (air or electric). The D-Series has many variations available to suit your unique needs:

- Higher viscosity materials (500HV)
- Higher pressure needs that are above the standard pressure range (260HP, 500HP, 65HP)
- Shorter pumps when space is a constraint (500SP)

500SP (Short Pump)

500SP (Short Pump) Dual Pump System

D-Series
Hazardous Locations

UL approved for Class I, Div 2 environments

100HLf Hazardous Location Syringe Pump

Teledyne ISCO HLf-Series pumps give you the same accurate, predictable flow and pressure control as our standard D-Series, while conforming to safety standards for use in UL Class I, Division 2, Groups A B C & D, T4 environments. The hazardous location rating is achieved through internal design modifications including the use of brushless DC motors. 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 fluids, liquefied gases, viscous fluids, or slurries and pastes. If needed, optional materials such as Hastelloy C-276 are available on request.

The HLf controller has a keypad and LCD, as well as built-in and optional interfaces for computer control and other devices. Programming is easy and flexible, with instant access to menu screens even when the pump is running. This allows you to change operating parameters on the fly.

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 pumps
- Continuous flow or pressure with dual pump
- Flow or pressure programming with single pump
- Dispense mode

External Interface

- RS232/485 serial interface
- Analog voltage inputs
- Digital inputs and outputs
- Ethernet/USB

HLf pumps are not available in Europe

D-Series
Pump Specifications

	Capacity	Flow* Range (mL/min)	Flow** Accuracy	Pressure Range (psi, bar)	Standard Pressure Accuracy	Standard Plumbing Ports	Dimensions	Continuous Flow Range (mL/min)	Higher Viscosity Materials	Higher Pressure	Shorter Pumps	Hazardous Locations
1000D	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	0.001–265				X
500D	507 mL	0.001–204	0.5% of Setpoint	10–3,750 0.7–258.6	0.5% FS	1/8" NPT		0.001–132	X	X	X	X
260D	266 mL	0.001–107	0.5% of Setpoint	10–7,500 0.7–517.1	0.5% FS	1/8" Valco	39.8x10.7x18.4 in 101x27x47 cm	0.001–70				X
100DX	103 mL	0.00001–50	0.3% of Setpoint	10–10,000 0.7–689.5	0.5% FS	1/8" Valco		0.001–32				X
65DM	68 mL	0.00001–25	0.3% of Setpoint	10–10,000 0.7–689.5	0.5% FS	1/8" Valco	40.6x10.7x18.4 in 103x27x47 cm	0.00001–16		X		
65D	68 mL	0.00001–25	0.3% of Setpoint	10–20,000 0.7–1,379	0.1% FS	1/4" F250C	39.8x10.7x18.4 in 101x27x47 cm	0.00001–16		X		
30D	30 mL	0.00001–22	0.5% of Setpoint	30–30,000 0.7–2,068.4	0.2% FS	1/4" F250C	39.4x10.7x18.4 in 100x27x47 cm	0.00001–14				

c UL us LISTED CE

All D-Series 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 RS485, USB, Ethernet.

Each Teledyne ISCO D-Series syringe pump is bench tested at the factory, prior to delivery. All D-Series pumps are UL certified to UL 3101 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.*

D-Series
Controller

Precision control that you demand

ONE CONTROLLER OPERATION

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

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

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

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

Four pump—independent constant flow or pressure with two dual pump systems or four pump independent modes

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 D-Series pumps, regardless of configuration or operating mode, utilize the same controller, which can be operated up to 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 accessability, 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

D-Series Controller

COMPUTER CONTROL

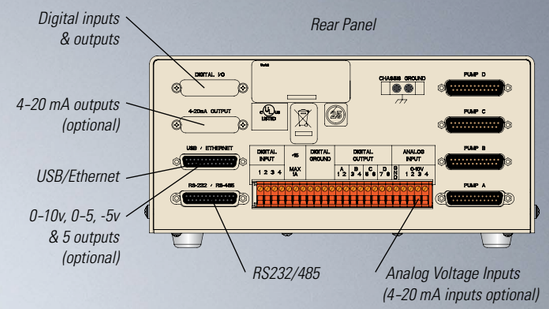
Pump operation by computer control is available to access Start/Stop and set point for pressure or flow.

Standard control interfaces include:

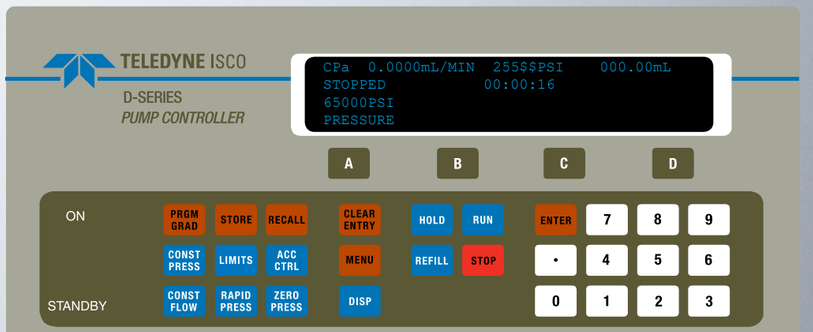
- USB/RS232 Serial
- 0–10Vdc, 0–5Vdc & -5 to +5Vdc Inputs
- RS485/Ethernet—Modbus RTU

Optional interfaces include:

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



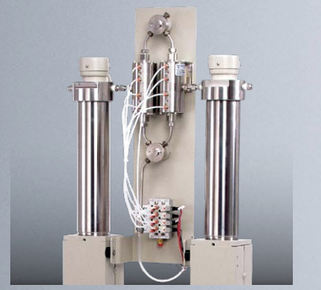
KEY CONTROLLER FUNCTIONS



- **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.
- **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

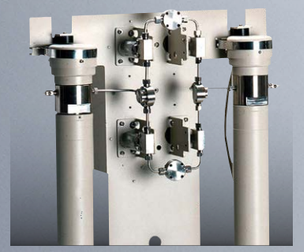
D-Series
Accessories

AUTOMATION
Teledyne ISCO's continuous flow systems couple two pump modules to a single controller and utilize an active or passive valve manifold to provide non-stop, continuous feed of almost any fluid. The controller uses special algorithms to equalize pressure and flow of both pumps during switchover. This allows virtually pulseless transition while maintaining accurate fluid injection to the process. Automatically program your flow or pressure set point, refill speed, and any parameter limits if necessary. Then, fill the pumps and you are set to go. Our valve packages can accommodate a wide variety of fluids in most applications. With our controller, you can run continuous flow systems from one controller. You can also control any valve system that requires +15V DC directly from the pump.



Air powered valves for continuous flow

AIR-POWERED VALVES
Dual-pump systems, with actively controlled pneumatic valves, work reliably with almost any fluid, including viscous and/or corrosive solutions. Air valves are constant volume; there is no fluid movement when they open and close. Valves can be heated up to 200 °C with optional high temperature package.



Electric valves for continuous flow

ELECTRIC VALVES
Electric valves are driven by the pump controller and require no outside air source or other power supply. Valves are stem-and-ball type, very reliable, and feature a unique one-way flow path design, which offers added protection against catastrophic back flow. This valve is capable of handling a wide range of corrosive fluids, liquefied gasses, volatile fluids, and viscous solutions. Valves can be heated to 150 °C.

Wetted package for corrosion resistance

CORROSION RESISTANCE
For applications requiring delivery of highly corrosive fluids, optional wetted materials in Hastelloy or special seals such as virgin Teflon are available. Other options may be available on request.

TEMPERATURE CONTROL
Regardless of the temperature of your environment, the right tranducers are available. These accessories are easily installed and can be added at any time to your pump.

CYLINDER INSULATING COVER
Reduces ambient temperature effects for best flow stability at low flow rates (below about 0.05% of the maximum flow on any pump model).

Note: Not compatible with dual pump continuous flow systems or the other temperature control jacket.

TEMPERATURE CONTROL JACKET
Controls cylinder temperature by circulating heated or cooled fluid. Cylinder cooling allows fast, complete filling with a liquefied gas and is recommended when a continuous flow system is used for rapid delivery of such fluids. Temperatures range from -30 °C to 100 °C.

HIGH-TEMPERATURE TRANSDUCER
Suitable for operation to 200 °C, this package includes a Honeywell/ Sensotec TJE high-temperature transducer, a new cap assembly, and special high-temperature seals.

SPECIAL MATERIAL HANDLING
If your application needs special methods to accommodate the material being used, additional accessories are available to accommodate this. Whether the material is aggressive or contains particulates, we have many seal options. A mixer is also available to keep the material in suspension or moving in order to facilitate better movement.

PISTON SEALS
Teledyne ISCO carries a wide variety of seals to fit almost any application; virgin Teflon for corrosive fluids, heavy-duty reinforced for slurries and viscous fluids, high temperature, and UHMW polyethylene.

PARR MIXER
Pump mounted mixer used for moving slurries or viscous fluids along with keeping fluids in suspension.

- Powered by an air driven motor with speeds up to 1700 rpm
- Designed for the 500D and 1000D syringe pumps
- Impeller specifically designed to work with Teledyne ISCO Pumps

ReaXus Series
Reciprocating Pumps

The right pump for the right job

The ReaXus reciprocating pump product line provides many options to meet your application needs. If space is tight, constant pressure is required, continuous flow is a key part of your application, or you just need to move material, any of these pumps will meet your 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. The ReaXus line of pumps comes in either single piston or dual piston versions along with multiple material choices.

PISTON CONFIGURATION

Single-Piston pumps offer an economical option for metering, dispensing, and general fluid-transfer applications. 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.

Pump Classes: M1, MX, LS

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 analytical chromatography applications. Dual pistons are also preferred for higher flow pumps (typically above 100 mL/min).

Pump Classes: 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: LD, LS, PR

ReaXus LS-Class

ReaXus PR-Class

FLOW/PRESSURE CONTROL ALGORITHMS

Reciprocating piston pumps have the ability to produce consistent volumetric fluid flow under very high pressure conditions. However, they do not produce pressure. System pressure results from flowing liquid through a resistive circuit (column, tubing, reactor vessel, etc.).

The pump's firmware either contains constant-flow or constant-pressure control algorithms. Construction is similar between pumps with flow or pressure control, but component options (e.g. pulse dampeners) are limited when a constant-pressure algorithm is required.

Constant-Flow pumps produce precise and predictable fluid flow dependent on system resistive pressure and the fluid being pumped. Flow accuracy is specified for typical application parameters. Improved accuracy across a larger range of conditions is achieved for pumps with pressure monitoring capabilities by integrated automatic pressure compensation and solvent selection features.

Pump Classes: LD, LS, M1, MX, PR

Constant-Pressure pumps monitor system pressure and use an internal PID feedback loop to modulate fluid flow in order to maintain constant pressure. Default PID parameters are suitable for many applications, but may be set by the user to optimize pump response for unique system conditions.

Pump Class: LS, LD

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, 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.

Hastelloy pumps are used for highly-corrosive applications where stainless steel is not chemically compatible.

Other materials available on request

"Jacketed" pumps are available in stainless steel, titanium, or Hastelloy. 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. Cooling the head allows for readily pumping liquid CO_2 in chromatography and extraction applications.

ReaXus Series
Reciprocating Pumps

SINGLE HEAD

DUAL HEAD

	FLOW RANGE (ML/MIN)	FLOW ACCURACY	PRESSURE LIMIT (PSI)	STROKE VOLUME (µL)	WITH TEMP JACKET	CONSTANT FLOW/PRESSURE	PRESSURE MONITORING	RS232 CONTROL	REMOTE RUN/STOP	ANALOG INPUT (0-10V; 4-20mA)	DRIP TRAY AND SENSOR	DIMENSIONS AND WEIGHT
 **M1 CLASS** 3 MODELS Material: Stainless Steel 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. The flow rate capabilities and pressure limits are typical of the majority of laboratory experiment needs. Overall, the M1 is a great all-purpose pump that will satisfy many of your requirements.	0.0–10.0 0.0–40.0 0.0–100.0	2% 5% 5%	2,000 500 250	25.1 100.5 226.2	No No No	Flow Flow Flow	No	Yes	Yes	No	No	5.5”H x 3”W x 10.5”D (14 x 7.6 x 14.7 cm) 3.5 lbs. (1.6 kg)
 **MX CLASS** 3 MODELS 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. The footprint of the MX Series is catered toward minimizing the space it takes up without sacrificing functionality. The optional fluid path material allows you the flexibility you need for to move more harsh material.	0.0–10.0 0.0–40.0 0.0–200.0	2% 5% 5%	5,000 900 200	25.1 100.5 339.4	No No No	Flow Flow Flow	Yes	Yes	Yes	Yes	Yes	6.5”H x 7”W x 16”D (16.5 x 17.8 x 40.6 cm) 15.3 lbs. (6.9 kg)
LS CLASS 20 MODELS Material: Stainless Steel, Hastelloy A high pressure capable, single piston pump that out performs the more expensive pumps on the market. The LS Series is designed to minimize pulsation during fluid movement, something that many experiments require to be successful. Similar to other models in the product offering, the footprint of the pump is meant to maximize output and without taking up a large amount of space.	0.0–10.0 0.0–40.0 0.0–100.0 0.0–10.0 0.0–40.0	2% 2% 4% 2% 2%	6,000 1,600 600 6,000 1,600	50.3 201.1 452.5 50.3 201.1	No No No Yes Yes	Flow/Pressure Flow/Pressure Flow/Pressure Flow/Pressure Flow/Pressure	Yes	Yes	Yes	Yes	Yes	6.5”H x 7”W x 16”D (16.5 x 17.8 x 40.6 cm) 15.3 lbs. (6.9 kg)
 **LD CLASS** 24 MODELS Material: Stainless Steel, Hastelloy A dual piston pump perfectly aligned for continuous processing applications. The LD Series offers a high pressure capability and virtually pulse free operation. It is a versatile pump that has multiple fluid path options for your toughest applications.	0.0–12.0 0.0–36.0 0.0–100.0	2% 2% 2%	10,000 6,000 1,000	30.0 62.7 251.0	Yes/No Yes/No Yes/No	Flow/Pressure Flow/Pressure Flow/Pressure	Yes	Yes	Yes	Yes	Yes	6.3”H x 10”W x 17”D (16 x 25.4 x 43.2 cm) 30.0 lbs. (13.6 kg)
 **PR CLASS** 2 MODELS Material: Stainless Steel A dual headed pump that provides higher flow rates and high pressure capability. The PR Series is well suited for the tougher reaction chemistry applications across many markets. The addition of optional fluid path materials and different seal choices, lays the groundwork for the PR Series to be a very versatile pump.	0.0–100.0 0.0–300.0	3% 4%	4,000 1,000	251.0 564.7	Yes Yes	Flow Flow	Yes	Yes	Yes	Yes	Yes	6.3”H x 10”W x 17”D (16 x 25.4 x 43.2 cm) 30.0 lbs. (13.6 kg)

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