

# High Temperature and High Accuracy Options

## For Teledyne ISCO Syringe Pumps

### Overview

Teledyne ISCO syringe pumps can be customized for operation at high temperatures, and for applications requiring higher pressure accuracy.

Both options may be ordered and retrofitted on-site, or installed in the factory.

### High Temperature Option

For operation at temperatures above 100°C, the high temperature package, rated at 200°C, includes:

- Externally mounted high-temperature pressure transducer (**accuracy 0.1% of full scale**)
- Blank cylinder cap assembly
- Special high-temperature seals

### High Accuracy Option

For operation within normal temperatures, the high accuracy option provides an accuracy of 0.1% of full scale, and consists of:

- Externally mounted high-accuracy transducer
- Blank cylinder cap assembly

### Setup and Installation

Liquid and electrical connections are briefly discussed in the following sections.

### Plumbing and Electrical Connections

Either of the pump's two ports can serve as inlet or outlet. As shown below, one port can be plugged, allowing the other port to serve as both inlet and outlet.

Keep the tubing as straight as possible at the end so that ferrules can be fitted squarely. Push the tubing completely into the port before tightening the nut.

Connect the signal cable from the external transducer to the transducer connector on the rear panel of the pump, as shown below.

### High Temperature Seal Installation

#### **CAUTION**

Use great care when handling the pump seals; their surfaces are easily damaged.

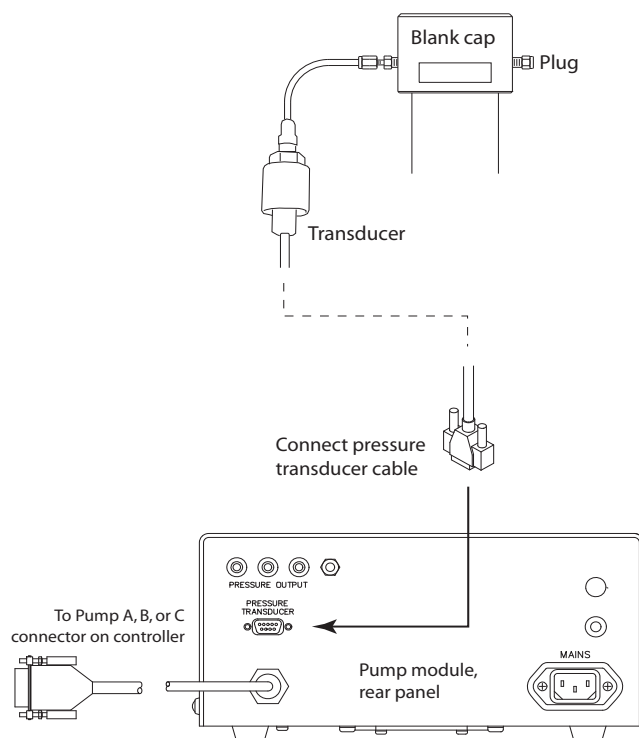
Before installing the seals and blank cylinder cap, run the pump at maximum flow rate until the cylinder is empty, then disconnect the power cord.

Remove the cylinder following the procedure provided in [TB22 Syringe Pump Maintenance](#).

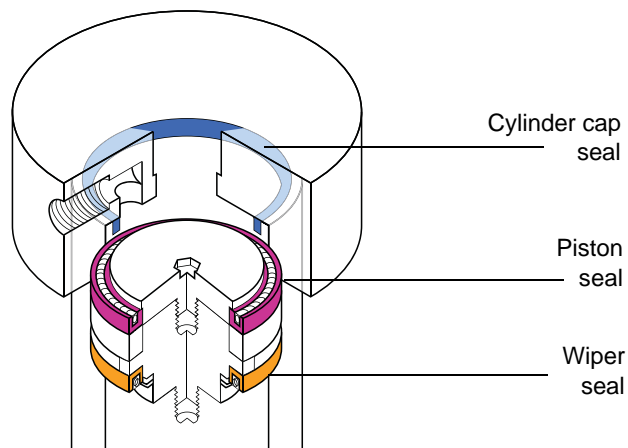
To access the seals, unscrew the piston seal retainer and remove the piston seal. Ensure that the seals, and

all surfaces that come into contact with them, are clean. Dirt or other solids on the seals can cause leakage.

Install the cylinder cap seal by placing it in the grooved lip of the cylinder. It will settle in place as the cylinder cap is screwed into place and tightened down.



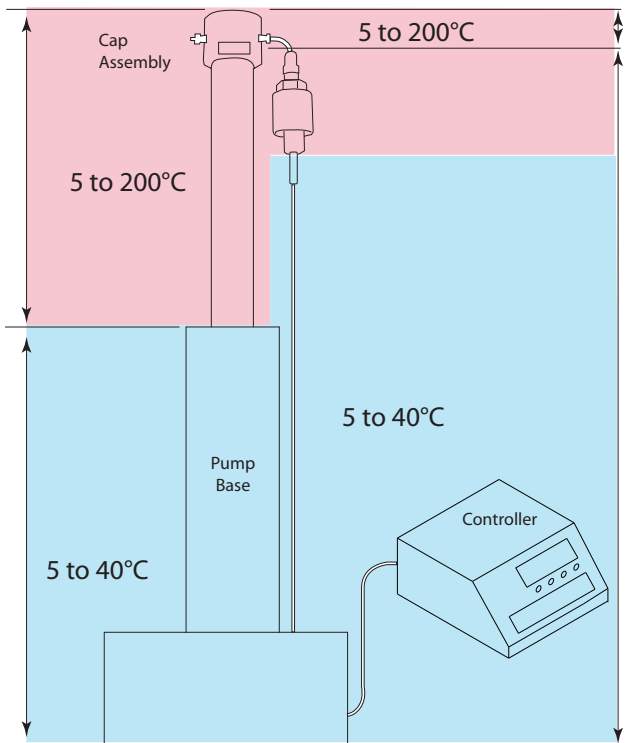
**Figure 1: Liquid and electrical connections**



**Figure 2: High temperature seals**  
(cutaway view of cylinder and cap)

### Installation Considerations and Cautions

When setting up a pump system for high-temperature operation, remember that only the heat-resistant system components—cylinder, cap, seals, and tubing—can be exposed to temperatures above 40°C. Other system components such as cables, controller, and pump base, must not be exposed to excessive temperatures (refer to Figure 3 below).



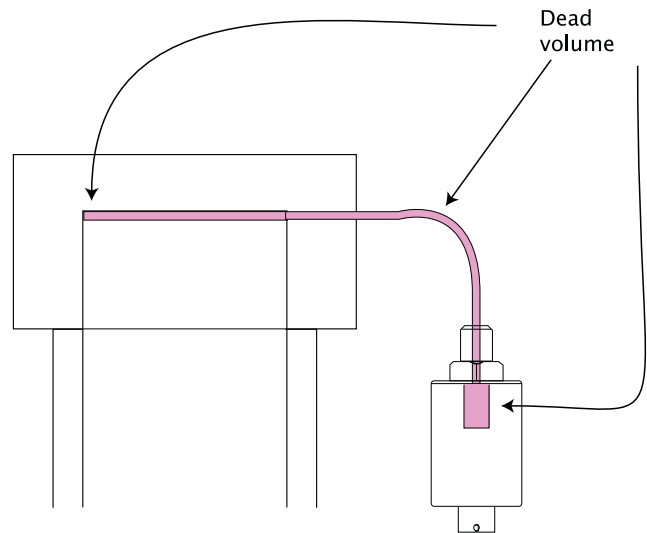
**Figure 3: System component heat tolerances**

#### Dead Volume

Some fluid will remain in the cylinder at the piston's topmost point of travel. A small amount of clearance prevents damage to moving parts. Additionally, some necessary voids allow pump disassembly and reassembly.

The non-pumped volume that remains is called the *dead volume*, or headspace volume (refer to Figure 4). Pumps with the high temperature or high accuracy package installed have slightly larger dead volume due to the small amount of pumped fluid entering the tubing and transducer body.

Teledyne ISCO syringe pumps are designed for minimal dead volume.



**Figure 4: Total dead volume**  
(Cylinder + tubing + transducer dead volume)

**Table 1: Total dead volumes in milliliters**

Model	Cylinder	+ Tubing & Transducer	= Total Dead Volume
1000D	11.00		16.01
500D	4.00		9.01
260D	2.10	5.01	7.11
100DX			
65D	1.30		6.31

#### High Viscosities

Ensure that temperature and other factors affecting viscosity are carefully maintained for highly viscous pumped substances. Densification inside the tubing can inhibit the pressure signal.

#### Wetted Materials

High temperature and high accuracy package materials in contact with pumped fluid include:

- Transducer
  - 17-4 PH/15-5 PH SST
  - SST 304
- Seals (high temperature only)
  - Graphite
  - PTFE
  - Hastelloy (1000D)

## Part Numbers

Part numbers for ordering systems with the high temperature or high accuracy package already installed, as well as the package by itself, are provided in the following tables.

For assistance with selecting the appropriate system or package for your application, contact Teledyne ISCO (see bottom of page for contact information).

**Table 2: High Temperature Systems and Packages**

Pump Model	Capacity	High Temperature Package
1000D	1015 mL	68-1247-113
500D	507 mL	60-5364-001
260D	266 mL	68-1247-096
100DM	103 mL	68-1247-095
100DX	103 mL	

**Table 3: High Accuracy Packages**

Pump Model	Capacity	High Accuracy Package
1000D	1015 mL	68-1247-114
500D	507 mL	68-1247-094
260D	266 mL	68-1247-093
100DM	103 mL	68-1247-092
100DX	103 mL	
65D	68 mL	68-1247-132

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