Field Verification Procedures

For Teledyne ISCO Syringe Pumps

TELEDYNE ISCO Everywhereyoulook™

Technical Bulletin TB05

Overview

The following procedures are **recommended** for incorporation into your particular system tests. In the event that a problem is suspected in the operation or performance of an ISCO syringe pump, following these steps can often help to isolate and correct a problem in the field, eliminating the time and expense of returning the unit to the factory for servicing.

Syringe pump users who regularly pump caustic or viscous substances should perform these procedures periodically to ensure uninterrupted operation.

Pressure Check

Setup

Connect a fill line to the pump inlet with an on/off valve and calibrated external pressure gauge. With the valve open, fill the cylinder (REFILL) to at least 50ml with at least 95% distilled and degassed water, and 5% Isopropyl alcohol.

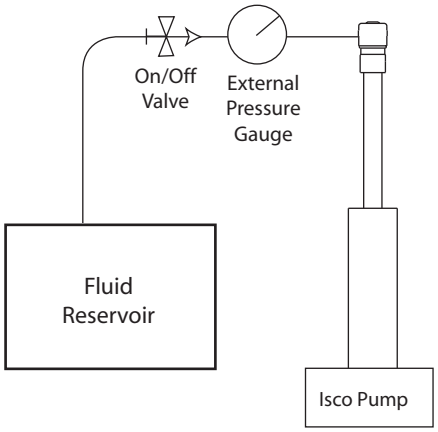

Figure 1: Setup for Pressure Check

Perform the following steps to verify proper operation of the pressure transducer:

1. Press CONST PRESS.
2. Enter a pressure setpoint of 1,000 psi (500 psi for 1000D pumps).
3. Purge air from the system by opening the fill line and running the pump.
4. Press STOP.
5. Zero the transducer by pressing ZERO PRESS > A.
6. Close the valve and press RUN (RUN).

Table 1: Pressure Check Specifications

65DM	1000 ±100 psi
100DM/DX	1000 ±50 psi
260D	1000 ±37.50 psi
500D/SP	1000 ±18.75 psi
1000D	500 ±10 psi

7. Relieve the pressure by pressing REFILL until the pressure is at 0 psi.

Leak Check

Perform the following steps to verify that the cylinder is in satisfactory condition.

1. Close the refill valve and pressurize the pump to the maximum pressure by pressing:

   CONST PRESS > PRESSURE (A) > MAX (C) > RUN .
2. Allow the pump to stabilize for 15 minutes. Then record an initial reading of the remaining volume.
3. After a minimum run time of 30 minutes, record a second reading of the volume.
4. Calculate the flow rate using the following formula:

$$FlowRate = \frac{Volume2 - Volume1}{Time}$$

Table 2: Leak Check Specifications

65D/DM, 100DM/DX	≤ 0.25 µl/minute
260D	≤ 0.5 µl/minute
500D/SP	≤ 1 µl/minute
1000D	≤ 1.5 µl/minute

Relieve the pressure by pressing REFILL until the pressure is at 0 psi.

☑ *Note*

If you are installing seals for the first time and the seals are leaking, follow the "Seal Break-In Procedure" included in this bulletin.

Flow Rate Check

The following sections provide steps to verify proper operation of the cylinder drive mechanism. This procedure differs depending on whether your system has a legacy controller or current controller. To determine which controller you are using, refer to Technical Bulletin TB28 D-Series Pump Controller Versions.

Place a metric beaker or burette under the refill tube, and program the controller to fill the beaker at a flow rate of 25ml/min for 1 minute.

Table 3: Flow Rate Check Specifications

65D 100DM/DX 260D 500D/SP 1000D	Volume in the beaker after one minute should be: 25 ml ±0.25 ml. (Use a scale for greater accuracy).

Tips:

- Dry the beaker or burette between runs.
- To minimize drips, the outlet tubing should be 0.020" to 0.031" inside diameter.

—Flow Rate Check for Legacy Controller—

If using the legacy controller, use the following key sequence:

1. Press PRGM GRAD.
2. Press (3). (Single pump programming)
3. Press CONTINUE (C).
4. Press PROGRAM (A).
5. The screen will display: ENTER FILE# [X].
   a. Select any number from **1** to **99** to name the program file, then press ENTER.
6. Press FLOWRATE (A), **27.76**, and ENTER.
7. Press STEP FWD (B) to enter program step 1.
   a. Press **1** > **0** > ENTER.
   b. Press **2** > **100** > ENTER.
   c. Press **4** > **.1** > ENTER.
8. Press INSERT (C) to enter program step 2.
   a. Press **2** > **100** > ENTER.
   b. Press **4** > **.8** > ENTER.
9. Press INSERT (C) to enter program step 3.
   a. Press **2** > **0** > ENTER.
   b. Press **4** > **.1** > ENTER.
10. Press STORE (STOP).
11. Press OPTION (D).
12. Press NEXT ACTION (A) repeatedly until the screen displays: RETURN TO INITIAL AND HOLD (top line).
13. Press PREVIOUS (D) to return to the main menu.
14. Press RUN two times.
15. If necessary, press RUN again to repeat this sequence.

—Flow Rate Check for New Controller—

If using the new controller, use the following key sequence:

1. Press DISPENSE (DISP) to enter the dispense mode.
2. Press FLOWRATE (A) and enter 25.0ml (ENTER).
3. Press CONTINUE (C) and enter 25.0ml (ENTER).
4. Press RUN to dispense.

High-Temperature Seal Break-In Procedure

The following procedure applies only to high-temperature pump cylinder seals.

Preparing the Pump

1. Refill the pump with DI water and purge all air from the pump.
2. Place plug fittings into both ports of the pump or close the inlet and outlet valves.
   This is called dead ending the pump. Using plugs in the ports eliminates any possibility of leaks from valves and other fittings. This will be important during the leak test later in this procedure.

Programming Pressure Gradient

1. Press PRGM GRAD.
2. Press ONE PUMP PRESSURE GRADIENT (2).
3. Press CONTINUE (C).
4. Press PROGRAM (A).
5. When "Enter File# [1] screen appears, press ENTER.
6. Press INIT= (1).
7. Enter 50 (to set the initial pressure to 50 psi) and press ENTER.
8. Press FINAL= (2).
9. Type in the max. pressure limit of the pump you are using and press ENTER.
   a. 65D=20,000 psi max
   b. 100DX/DM=10,000 psi max
   c. 260D=7,500 psi max
   d. 500D=3,750 psi max
   e. 1000D= 2,000 psi max
10. Press INSERT (C) to access the second pressure setting screen.
11. Press FINAL= (2).
12. Enter a Min Pressure limit of 50 and press ENTER.
13. Press STORE.
14. Press RUN. The pump runs at 50 psi.
15. Press OPTION (D).
16. Press NEXT ACTION (A) three times until "Gradient Action + Return To Initial & Run" is displayed on the screen.
17. Press PREVIOUS (D).
18. Press RUN. The pump goes to max. pressure, then goes to 50 psi and then starts over, cycling between max. pressure and 50 psi.
19. Press HOLD. The program should pause.
20. Press RUN. The program continues to cycle the pump.
21. Cycle the pump for 5 hours.
22. Press STOP to end the cycle test.

Dead End Leak Test

1. Using the same DI water in the pump from the seal break procedure, dead end and pressurized the pump to the max. pressure by pressing the following keys: CONST PRESS, PRESSURE (A), MAX (C), and RUN.
2. Allow 30 minutes for the pump to stabilize.
3. Record the beginning volume remaining in the cylinder.
4. After 60 minutes, record the ending cylinder volume.
5. Subtract the starting volume from the ending volume and then divide by 60 minutes to determine the per minute leak rate of the pump.
6. The leak rate should be µl/min:

65D/DM/HP,	0.25 µl/minute
100DM/DX	0.25 µl/minute
260D/HP	0.5 µl/minute
500D/SP	1 µl/minute
1000D/DX	≤ 1.5 µl/minute

7. Relieve the pressure by pressing REFILL until the pressure is at or near zero.
8. Press STOP.
9. Remove the dead end fittings and return the pump to normal operation.

☑ *Note*

If the pump exceeds the leak limit, further investigation or repairs are required.

Field Verification Checklist

For Teledyne ISCO Syringe Pumps

Print a hard copy of this checklist. For each Field Verification check, record the date and time, test results, whether or not the pump passed the test, and your initials.

Pressure Check

verify Pressure Transducer

Pass = 1000 ±50 psi (500 ±50 psi for 1000D)

Date/ Time	Gauge (Actual psi)	Pump (Display psi)	Diff (< ± 50psi)	pass / fail	Initials

Flow Rate Check

verify Cylinder Drive Mechanism

Pass = 25ml ± 0.25ml

Date/ Time	Actual Volume (ml)	pass / fail	Initials

Leak Check

verify Cylinder Condition

Calculation: Flow rate (µl/min) = (Volume2 - Volume1)/60
Pass = 1 µl/minute (1.5 µl/minute for 1000D)

Date/ Time	Flow rate (µl/min)	pass/ fail	Initials

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