Datrend Systems Inc.

APPLICATION NOTE

INFUTEST
Series C & Series D

Brush Between Meals, FLUSH Between Tests

The START screen of the Infutest 2000 has a message which says:

> FLUSH channel to purge air bubbles!
> Set test. Push GO, then start pump.

What is that message telling you? If you have already primed your Infutest, and have run a flow test or two with no problems, why do you have to flush the channel *again*? Do you really have to flush the channel *every* time you run a flow test?

The simplest answer is this: ***YES!!!*** *Always* flush the Infutest channel before starting *any* flow test to purge air bubbles that may be in the channel, just like it tells you on the START screen. You only need to inject about 5 cc of water via the stopcock connected to the channel input to purge the channel. If you take a look at a syringe, you will see 5 cc is not a lot of water, so purging takes maybe two seconds, if that. The only exception to the purging rule is the **Occlusion Pressure Test**, since that test doesn't use the Infutest flow sensor.

It's important to purge bubbles from the channel at the start of a test because Infutest *uses* air bubbles to measure flow. As shown in FIG. 1, Infutest measures flow by injecting an air bubble into a glass capillary tube of calibrated volume. Optical sensors track the position of the bubble as it is pushed by the flowing water through the tube. Measurements displayed on the Infutest LCD are based on the time it takes for the bubble to move from one optical sensor to the next. So each time you hear Infutest go "clunk" during a test, a bubble has just been injected into the glass tube.

If the Infutest's optics can "see" a bubble from a previous test in the glass tube, it will *ignore* that bubble and "look" only for the bubble injected at the needle tip when you start a new flow test. That's a great feature just in case you "forget" to flush the channel.

This feature is also why you *don't* have to flush the Infutest every time you run either a **Dual-Rate Test** or a **PCA Pump Test**. This is also true if you are running Single Rate Tests at low flow rates on smooth-flowing pumps, like *syringe pumps.*

FIG. 1 shows a long section of the glass tube where there aren't any optical sensors. If there is a bubble from a previous test in this region of the tube, the Infutest can't "see" it when you start a new Single Rate Test. In some situations, a bogus bubble in that part of the tube can cause some problems in the Single Rate Test.

When the flow rate is higher than ***170 ml/hr***, or if the pump under test is generating ***pulsatile*** or "unsteady" flow, the Single Rate Test will default to using the optical sensor at the output of the tube, rather than the bank of 15 sensors at the needle-end of the tube (see FIG. 1). In this situation, you get a flow measurement on the Infutest LCD each time a bubble flies by that last sensor. If the bubble moving past the last sensor is a "bogus bubble" from a previous test, instead of the injected bubble, *the flow rate displayed on the Infutest LCD is going to be* ***wrong***. In fact, you could get Infutest readings which are a ***factor of two times*** greater than what your pump is set up to deliver (e.g. 400 ml/hr on the pump gets "multiplied" to 800 ml/hr or higher on the Infutest!)

So - purge the Infutest channel before every test?

Simple answer:
Yes. Every time.

Smart answer:
- Occlusion Pressure Test - no
- Dual-Rate & PCA Pump Tests - optional
- Single Rate Testing, *syringe pumps* - optional
- Single Rate Testing, all other cases - ***yes!***

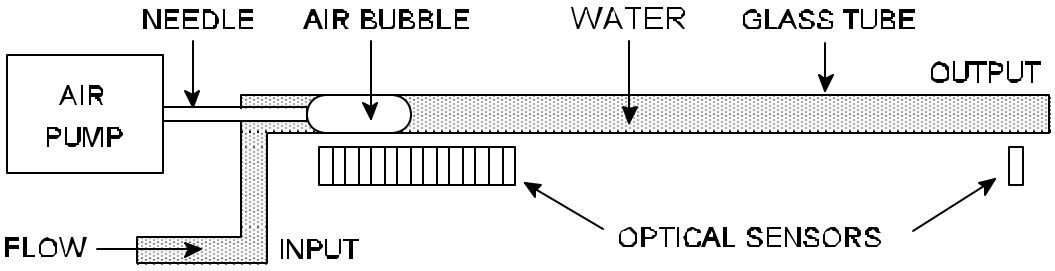

FIG. 1 - Schematic of Infutest flow sensor.

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