

# **Ansur IDA-4 Plus**

Software Plug-In

Users Manual



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# **Chapter 1**

## **Introduction**

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## About This Manual

This Users Manual is designed to assist in using the Ansur IDA-4 Plus Plug-In (hereafter referred to as the Plug-In) with Ansur software. The manual covers all features specific to the Plug-In. Familiarity with both Ansur software and Microsoft Windows and their features will help in the design and use of tests for the Ansur IDA-4 Plus Analyzer. The manual is divided into the following chapters

Chapter 1 “Introduction” provides information on Ansur software and the Plug-In.

Chapter 2 “Getting Started” provides information on how to install and configure the Plug-In.

Chapter 3 “IDA-4 Plus Tests” provides step-by-step descriptions on how to perform the basic tasks of the Plug-In.

Chapter 4 “Advanced Features” contains information on creating highly efficient safety test procedures using the Plug-In features.

Chapter 5 “Reference” contains details about every Plug-In feature.

## Ansur Software

Ansur Test Automation software is the foundation for all Fluke Biomedical test systems. Ansur manages test procedures by allowing both manual and visual automated test sequences.

The software works hand-in-hand with Fluke Biomedical analyzers and simulators, creating a seamless integration for:

- Visual inspections
- Preventive maintenance
- Work procedures
- Performance tests
- Electrical safety tests

## Ansur Plug-Ins

Ansur Test Executive software utilizes Plug-In modules that work with a wide array of Fluke Biomedical instruments. The Plug-In module is a software interface that provides test elements to the Ansur Test Executive program. This scheme allows the use of a similar user interface for all analyzers and simulators supported by Ansur.

Each Plug-In module allows users to work with only the options and capabilities needed for the instrument under test. It is recommended you update the Ansur Test Executive and Plug-Ins on a regular basis from the Fluke Biomedical web site.

### IDA-4 Plus Plug-In

The Plug-In provides remote access to the IDA-4 Plus Infusion Pump Analyzer, referred to throughout this document as the “Analyzer.” In addition to the general test Plug-Ins, specialized Plug-Ins address all test requirements for specific instruments.

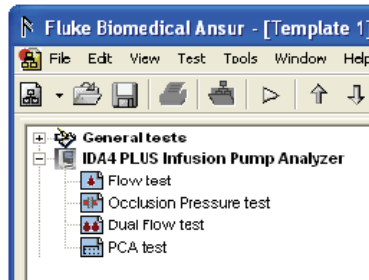
#### *Note*

*The IDA-4 Plus Infusion Pump Analyzer Users Manual explains the Analyzer’s capabilities and use.*

Create and use Ansur test procedures with Plug-In test elements to incorporate the capabilities of an Analyzer into automated testing. Users can customize tests to analyze specific performance requirements. There are unique test elements for each of the tests, and simulations typically run on the Analyzer.

**Test Elements**

The IDA-4 Plus infusion pump tests shown in Figure 1-1 are installed to Ansur's test explorer during the Plug-In installation.



**Figure 1-1. Infusion Pump Tests in Ansur's Test Explorer**

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**Table 1-1. IDA-4 Plus Plug-In Infusion Pump Tests**

Performance Test	Measurements	Unit	Default High Limit	Default Low Limit
Flow Test	Avg flow	ml/hr	+25%	-25%
	Min Inst flow	ml/hr		-25%
	Max Inst flow	ml/hr	+25%	
	Volume	ml	NA	NA
Occlusion Test	Peak pressure	mmHg		
	Time of Peak	hh:mm:ss		
Dual Flow Test	Primary Flow	ml/hr	+25%	-25%
	Secondary Flow	ml/hr	+25%	-25%
	Primary Volume	ml	NA	
	Secondary Volume	ml	NA	
PCA Test	Basal Flow Rate	ml/hr	+25%	-25%
	Volume	ml	NA	NA
	Average bolus flow rate	ml/hr	NA	NA
	Average bolus duration	hh:mm:ss	NA	NA
	Average bolus volume	ml	NA	NA

The Flow Test measures the achieved flow rate and performance of an infusion pump at a set flow rate.

The Occlusion Pressure Test performs a test of the infusion pump occlusion pressure alarm. In order to protect the patient, an alarm should activate when pressure inside the administration set exceeds preset levels.

The Dual Flow Rate Test performs a test for secondary flow rate, secondary volume, primary flow rate, and primary volume.

The PCA (Patient Control Analgesia) Test provides automated testing for the PCA pump control. The test can be set up by technicians and run unsupervised. A setting on the infusion pump controls the Bolus Volume delivered according to patient demand.

**Additional References**

In addition to this manual, answers to questions using the Analyzer or PC may be found in the following sources:

- Fluke Biomedical *IDA-4 Plus Operators Manual*
- Fluke Biomedical *Ansur Test Executive Users Manual*
- Microsoft Windows Help and Support Center

Software Updates

Updates for Ansur are published on the Fluke Biomedical website, <http://www.flukebiomedical.com>

**Terms and Abbreviations**

Table 1-2 lists terms and abbreviations used in this manual.

**Table 1-2. Terms and Abbreviations**

Term	Description
Ansur	Ansur is a software suite using Plug-Ins to perform test and inspection procedures using a great number of Fluke Biomedical test instruments.
DUT	Device Under Test – the equipment subjected to a performance test using the IDA-4 Plus.
DUT Info	Information used to identify one particular DUT. DUT info usually consists of serial number, manufacturer, device type and model. Ansur also adds a few extra data fields such as location and status.
IDA-4 Plus	Fluke Biomedical Infusion Pump Analyzer.
Field user	The person using Ansur to perform a test on a DUT.
Plug-In	In the context of Ansur, a Plug-In is a software application that will extend Ansur so that it can perform tests using specific Fluke Biomedical test instruments.
Test Element	A test element is an Ansur construct that encapsulates test results. A test template is built from several test elements.
Test Guide	A test guide is a window displayed by Ansur or any of its Plug-Ins when a test element is being performed.
Test Template	A test template is an Ansur file containing a set of test elements together defining how a particular DUT is to be tested. A test template can also contain instructions on how to perform service, preventive maintenance, repair and other tasks on a DUT.
Test Record	A test record is an Ansur file containing the results of a performed test template. The test record can be printed as a test report.





# **Chapter 2**

## **Getting Started**

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## Introduction

This chapter describes installation of the IDA-4 Plus Plug-In and its use together with the Ansur Test Automation software and the Analyzer.

### Note

*An Analyzer is not necessary to create test templates and experiment with the functionality available in Ansur and the IDA-4 Plus Plug-In. However, actual tests cannot be performed unless the Analyzer is connected to the computer*

## System Requirements

The following are recommended minimum requirements for installation:

- Pentium 2.0 GHz FSB @400 MHz or faster processor
- 512 MB of RAM or higher
- Microsoft Windows operating system (XP/Vista/Windows 7)
- Fluke Biomedical Ansur V2.9.0 or newer
- 50 MB of available hard drive for software
- Hard drive space (from 100 K to several megabytes) for result and template files

## Installing the IDA-4 Plus Plug-In

The Plug-In must be installed on the computer before the features described in this user manual can be implemented. For information on obtaining the Ansur software and the Plug-In, contact the local Fluke Biomedical representative or visit the Fluke Biomedical website (<http://www.flukebiomedical.com>).

### Note

*Ansur version 2.9.0 or newer must be installed before the Plug-In can be installed and used.*

Download the Plug-In from the Fluke Biomedical website and follow the steps below:

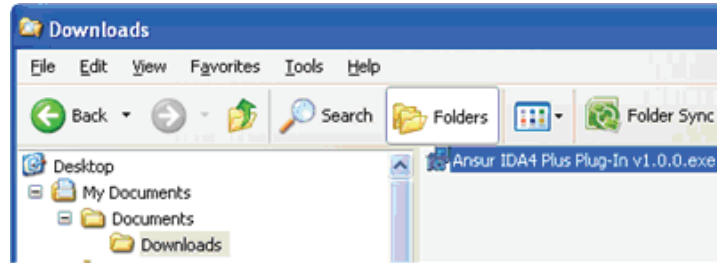
### Note

*When downloading the Plug-In from the Fluke Biomedical web site, it is possible to run the installation without first downloading.*

### Note

*When installing Ansur or any of its components/Plug-Ins on computers running Microsoft Vista or Windows 7, it is important to perform the installation as the Administrator for that computer. Otherwise the registry will not be properly updated and Ansur will not work properly. For installing on Windows Vista or Windows 7, you must first download the file to your local computer, then locate the installation file, right click and select "Run as Administrator."*

1. Open Windows Explorer and browse to the saved Ansur IDA-4 Plus Plug-In installation program file, usually named Ansur IDA4 Plus Plug-In Vn.n.n.exe, where n.n.n is the Plug-In version number. See Figure 2-1.



gjb03.bmp

Figure 2-1. IDA-4 Plus Plug-In Installation File

2. Double-click the installation program. The installation extracts the Plug-In elements and displays the Welcome dialog box.
3. Click **Next** to display the license agreement.
4. Select the checkbox for “**I accept the terms in the license agreement,**” and click **Next** to display the default destination folder.
5. Choose one of the following options:
  - Click **Next** to accept the default destination folder in which Ansur was installed.
  - Click **Change** if Ansur has been installed in a different folder. In this case, the destination folder for the Plug-In is changed so that it resides in the same directory as the Ansur program.

*Note*

*If Ansur has been installed in a different destination folder from the default, be sure to use the same folder for the Plug-In.*

6. Click **Install** to begin the installation. A progress bar indicates the status of the Plug-In installation.

After a few minutes, the installation concludes, and the window displays the dialog box and the **Finish** button.
7. Click **Finish**. The Plug-In will load when Ansur is started.

### Entering License Key

When using the Plug-In for the first time, the user is prompted to enter a software license key provided by Fluke Biomedical at the time of purchase.

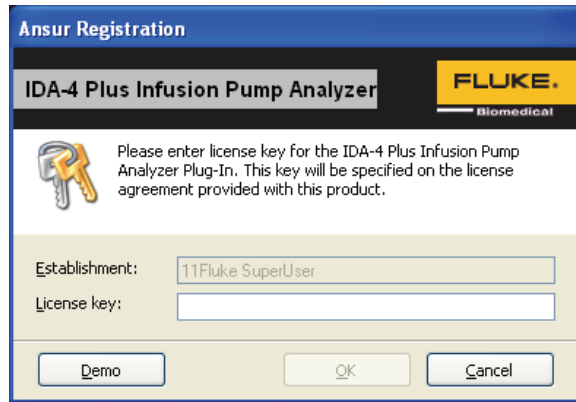
*Note*

*Test templates can be created without a license key by using the demonstration mode. Demonstration mode allows many of the tasks described in this user manual. However, a user may not save or print without licensing the Plug-In.*

1. Start Ansur by doing one of the following:
  - Double-click the **Ansur** icon on the desktop.
  - From the **Start** menu, select **Start | Programs | Fluke | Ansur**.

*Note*

*The license key dialog box shown in Figure 2-2 appears at startup if a license key has not yet been entered for the Plug-In*



gjb04.bmp

**Figure 2-2. Ansur Registration Screen - License Key**

2. Enter the **Establishment** name and the Plug-In License key. If a license key is not available, click the Demo button to start Ansur in demonstration mode.

*Note*

*Because the license key is derived from the establishment name, both strings must match the license information provided by Fluke Biomedical. This information is case sensitive and space sensitive. If the establishment name has been entered in the past, this field is already filled in.*

3. Click **OK** to start Ansur.
4. Click **Cancel** to prevent the Plug-In from being loaded.

**Uninstalling the Plug-In**

To uninstall the Plug-In:

1. Select **Start | Control Panel** and double-click **Add or Remove Programs**.
2. Locate and select the entry named **Ansur IDA4 Plus Plug-in**.



gjb02.bmp

**Figure 2-3. Removing IDA-4 Plus Plug-In**

3. With the entry highlighted, click the **Remove** button as shown in Figure 2-3.
4. When asked to verify the removal, click **Yes**. A dialog box with a progress bar displays while the Plug-In is being removed from the computer.

When the Plug-In is no longer listed in the **Add or Remove Programs** window, it has been completely removed.



# Chapter 3

## IDA-4 Plus Tests

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## Introduction

This chapter describes the operation of the Ansur IDA-4 Plus Plug-In program.

## Performing an Infusion Pump Test

This section gives a step-by-step process for performing an infusion pump test using a ready-to-use template. Several ready-to-use templates are copied to the Ansur Test Library folder when the Plug-In is installed.

### Note

*The supplied test templates can be used as a starting point when creating new customized test templates. Load a template, alter it by adding visual inspections and editing the safety test for the specific need and then use **Save As** to give it another name.*

## Load a Test Template

To load a test template:

1. Click **File | Open** on the menu bar or click on the Open Template toolbar button (📁) to open the dialog box shown in Figure 3-1.

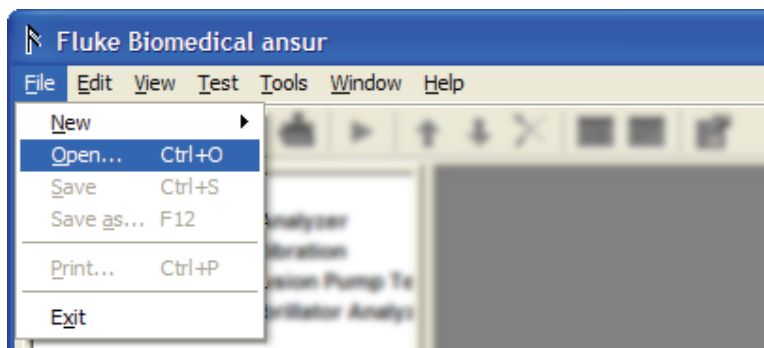


Figure 3-1. Open Dialog Box

gbv09.bmp

2. Browse to the folder where Ansur was installed and double-click the Ansur Test Library folder. See Figure 3-2. The normal location is C:\Program Files\Fluke but may have a different name depending on the operating system language.

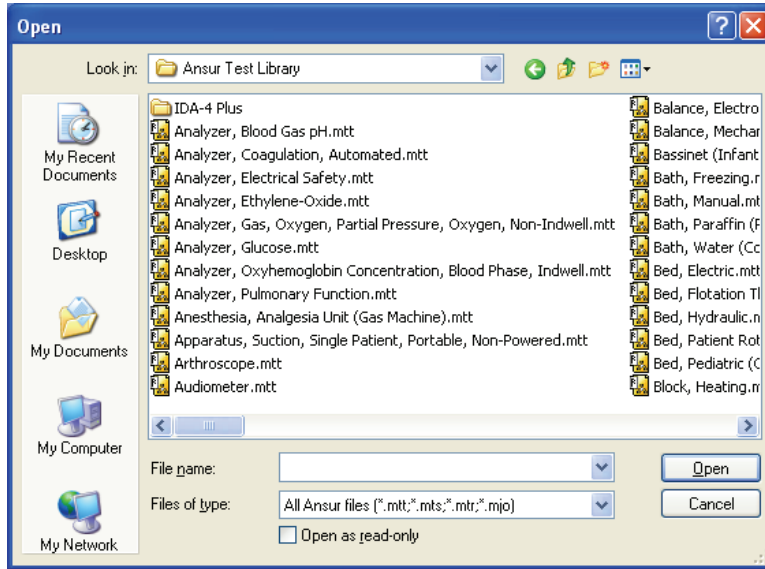


Figure 3-2. Browsing the Ansur Test Library

gjb05.bmp

3. Double-click the **IDA4 Plus** folder to open a dialog box as shown in Figure 3-3.

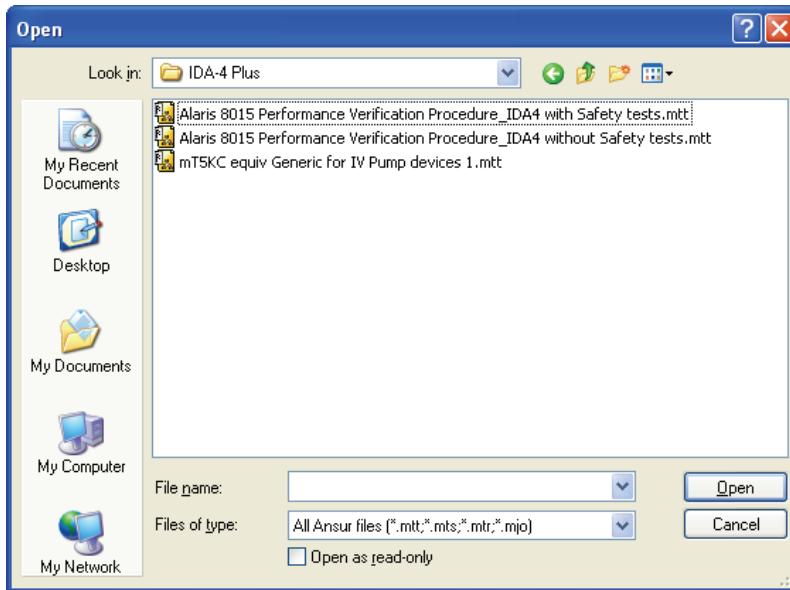


Figure 3-3. Selecting a Ready-Made Test Template

gjd06.bmp

4. Click a file name and then click the **Open** button, or double-click the file name to load the selected template and display its contents as shown in Figure 3-4.

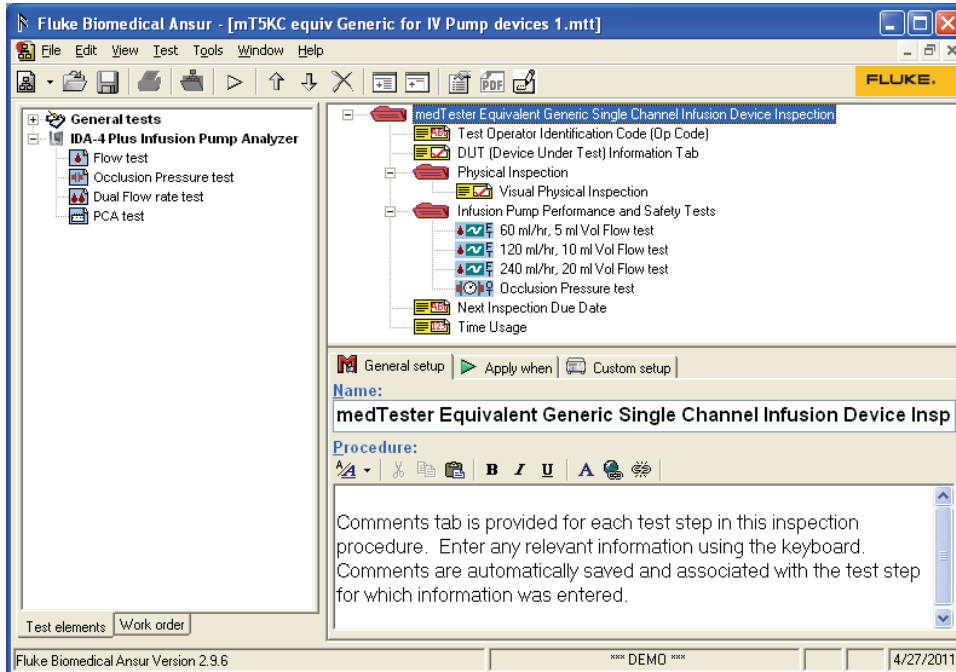


Figure 3-4. mT5KC Equivalent Generic Test Template

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### Connect the IDA-4 Plus

5. Connect the IDA-4 Plus using any of the COM ports located on the Plug-In back-panel.

### Start the Template

After loading the template, start a test by doing the following:

6. Click **Test | Start Test** or click the Start Test toolbar button (▶), or click F9 on the keyboard as shown in Figure 3-5.



Figure 3-5. Starting a Test Template

gjb09.bmp

#### Note

*When using Ansur version 2.9.0 or newer, the test initialization window will not be displayed, instead Ansur will automatically select the standards used in the template and go directly to the first test guide window.*

7. If applicable, select the standard from the list in the Test Initialization window shown in Figure 3-6 that corresponds with the selected test template. For example, if IEC 60601 test template is opened, then select 601.1 standard and deselect the Ansur User Defined standard that is selected by default.

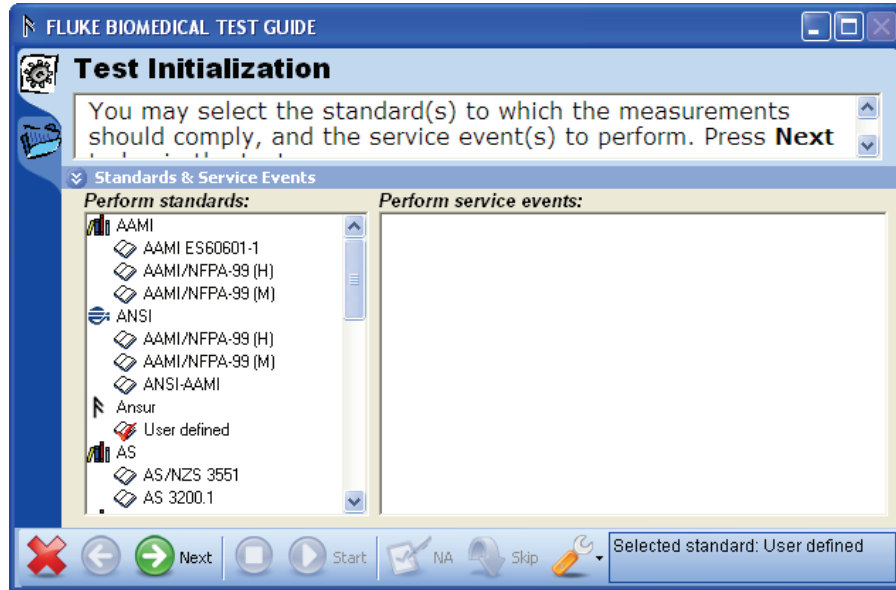


Figure 3-6. Test Initialization Window

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8. Click the **Next** toolbar button (➡) to go to the first Test Guide window shown in Figure 3-7.

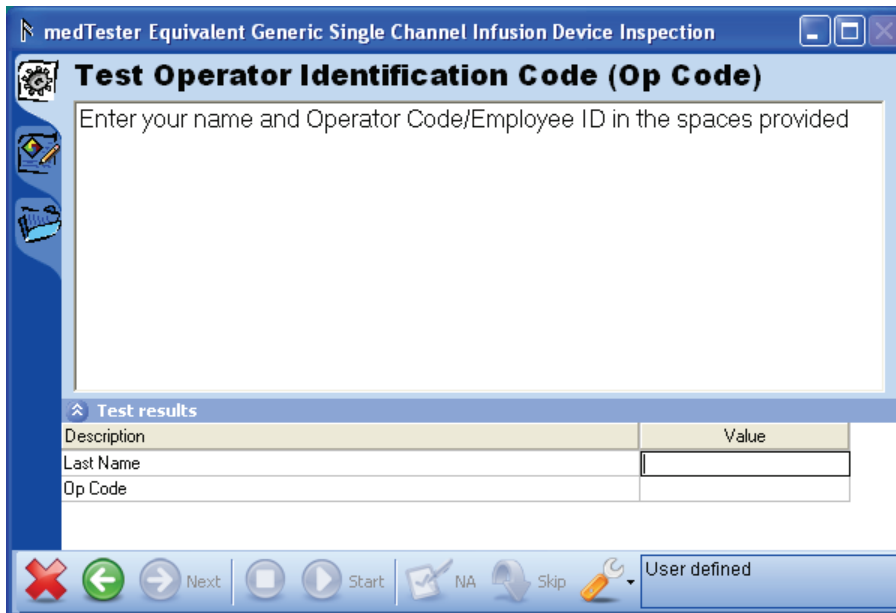
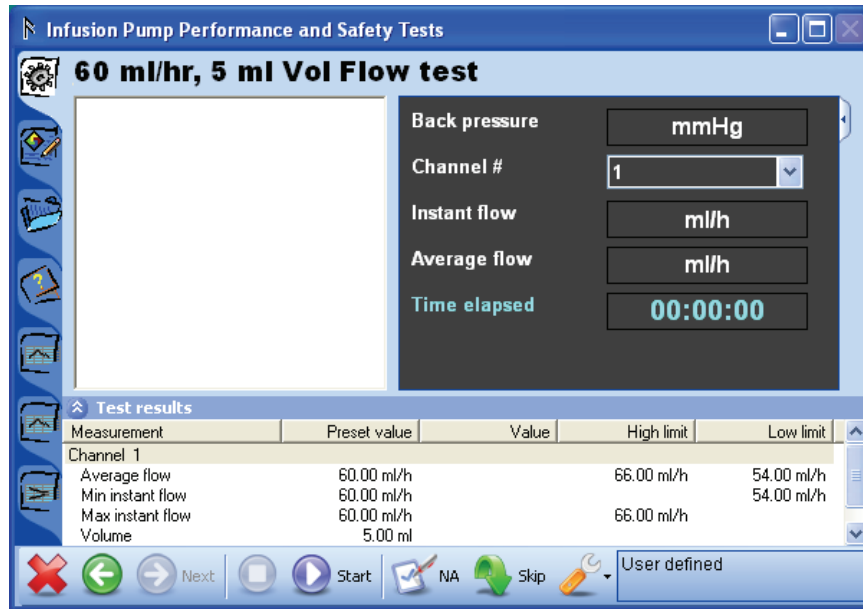


Figure 3-7. Test Guide Window

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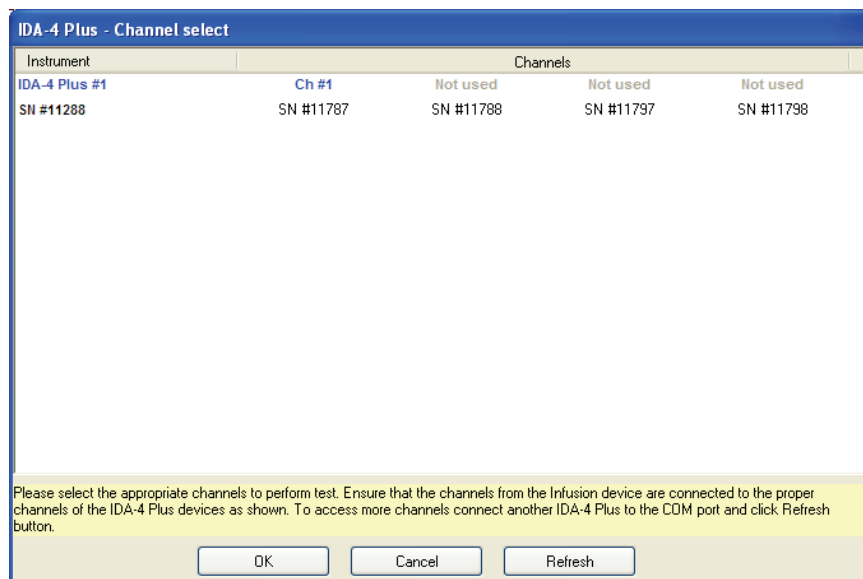
9. Fill in the values in the **Test results** pane of the test guide window.
10. Click (➡) to open the window in Figure 3-8.



gjb30.bmp

**Figure 3-8. Pump Performance and Safety Test Window**

- Click to show the **Channel select** window shown in Figure 3-9.

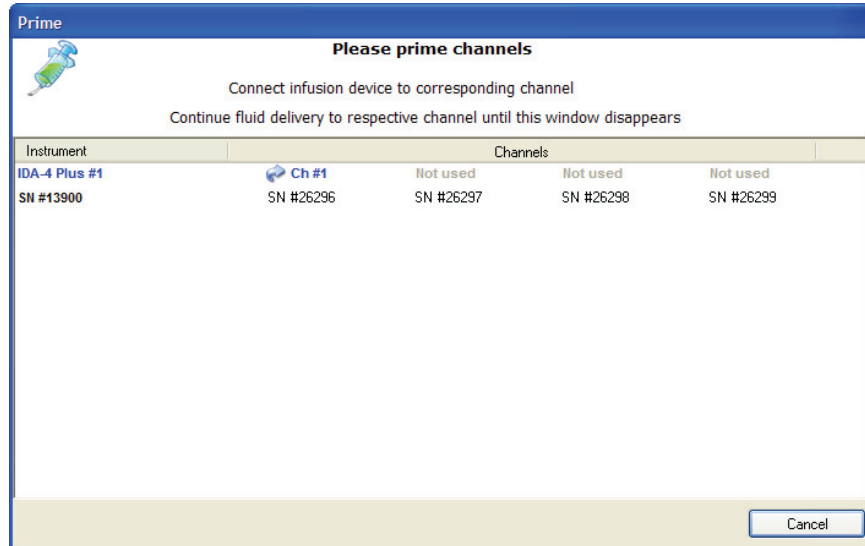


gjb26.bmp

**Figure 3-9. Channel Select Window**

### **Prime the Analyzer**

Before starting the measurements, the IDA-4 Plus must be primed, see Figure 3-10. The Test Guide settings will be loaded with the same number of channels selected in the Custom Setup tab.



gjb12.bmp

Figure 3-10. Prime Window

9. Connect the infusion device to one of the IDA-4 Plus channels.

*Note*

*If the IDA-4 Plus is not connected to COM1 on the computer, Ansur will display the Instrument Not Found window until the correct port is specified.*

*If the IDA-4 Plus is recognized as connected to another port, Ansur will remember the number of the port and use this as the default port for future tests.*

10. Inject the priming fluid, per the IDA-4 Plus Analyzer user instructions, until the Analyzer is primed and the Prime window disappears.

**Start the Test**

11. Click the **Start** button to start the test when the infusion pump is switched on and the flow begins. A progress bar appears as shown in Figure 3-11.



gjb13.bmp

Figure 3-11. Starting a Test

The test starts and measurements are recorded continuously and graphs are plotted.

### Complete the Test

When the test is completed, the status bar in the lower right corner of the Test Guide updates, the progress bar disappears, and the **Start** button (▶) is no longer highlighted. An example is shown in Figure 3-12.



Figure 3-12. Test Completed

gjb16.bmp

- Click the Next button (➡) or click **F9** on the keyboard to display the Test Summary window. An example is shown in Figure 3-13.

#### Note

To repeat the test, click the Back button (⬅) and repeat the instructions as described in the previous section. Click the **Start** button (▶) in Test guide to run **Flow test**.



Figure 3-13. Test Summary

gjb17.bmp

- Click the Next button (➡) or click F9 on the keyboard to create a test record. An example of a test record is shown in Figure 3-14.

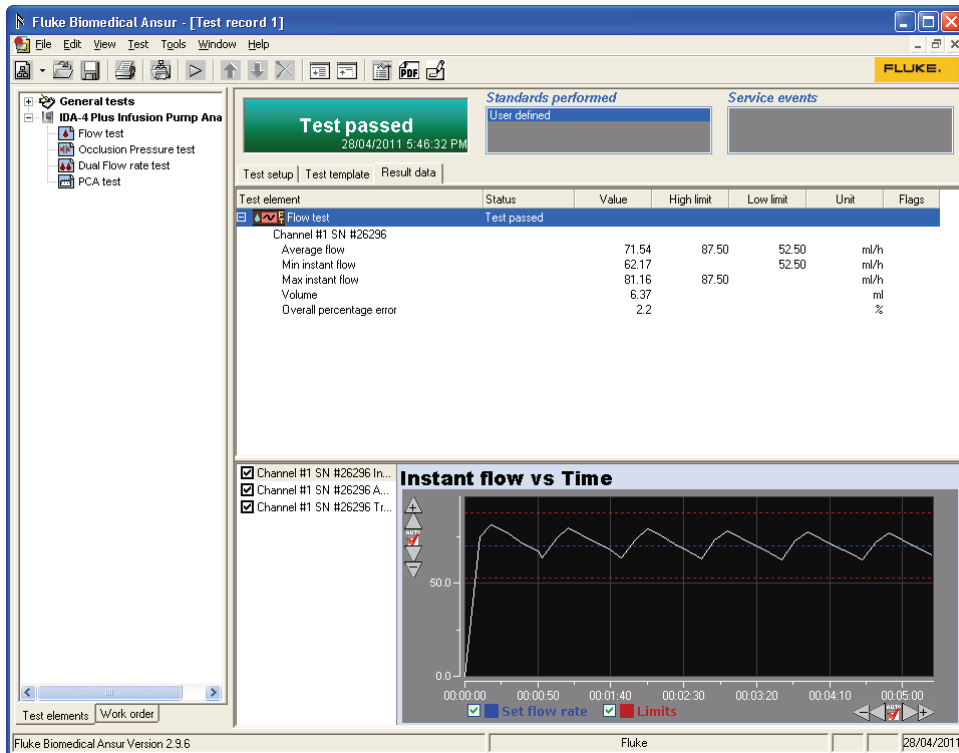


Figure 3-14. Test Record

gjb18.bmp

### Storing a Test Record or Template

In order to save the contents of a test record or template, the test record or a test template must be saved as a file on the computer.

To save as a file:

- Click **File | Save** on the main menu or click the Save toolbar button (💾) or press CTRL+S on the keyboard.
- Browse to the correct location and enter a filename for the test template in the file name field.
- Click the Save button (💾) or click the **Enter** key.

The file saves and the Ansur title bar updates displaying the new name.

### Printing a Test Report

Test reports can be printed from the test record in three different formats:

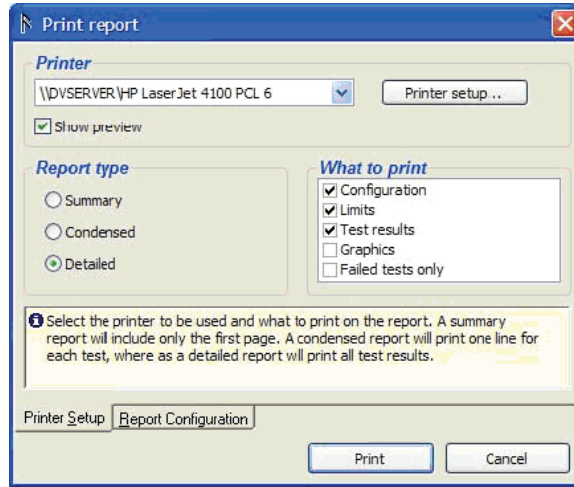
- Summary** – A report containing DUT information, module setup and the overall status of the test. Summary is used for one-page Pass or Fail reports.
- Condensed** – A report containing the summary report information and one line for each test element showing whether the test passed or failed.
- Detailed** – A report containing the summary page, and all test configuration and result data for each test element.

- With a test report open, click **File → Print** or click the Print button (🖨️) on the main toolbar to open the Print report window as shown in Figure 3-16.



*Note*

Check the **Show preview** button to view the Print preview window before printing the report or leave unchecked to print without previewing.



**Figure 3-15. Print Report Window**

gjb19.bmp

2. Select the Report type and click the Print button to display the report in the Print preview window as shown in Figure 3-16.

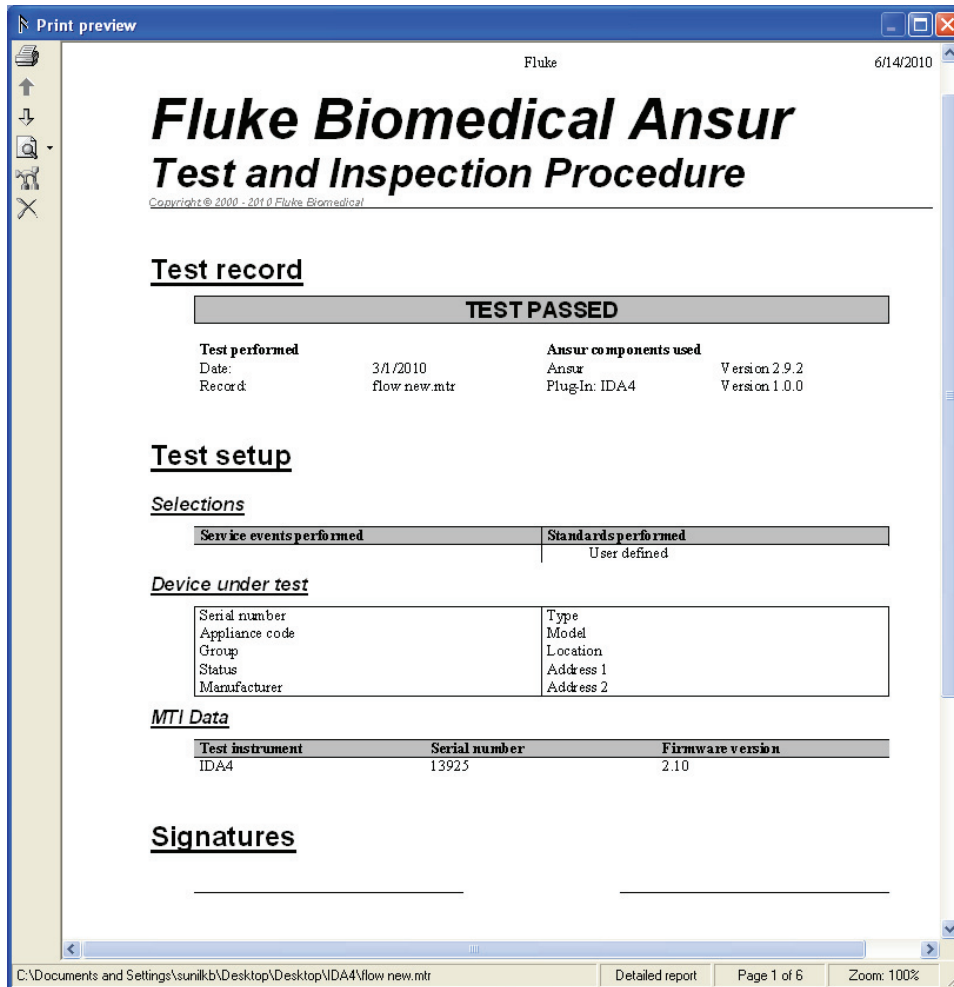


Figure 3-16. Print Preview Window

gjb20.bmp

3. In Print preview, print the report by clicking on the Print button (🖨️) in the left-hand window border.

## IDA-4 Plus Tests

The IDA-4 Plus Infusion Pump analyzer can perform a number of tests. Flow, Pressure, Dual Flow, and PCA tests. This section describes how to use the Ansur Plug-In to perform these Analyzer tests.

### Performing a Flow Test

A flow test can be set up to stop after a specified duration of time. This example demonstrates how to perform a flow test that will run for one hour.

1. Perform the steps described in “Perform an Infusion Pump Test”:
  - Load the **Flow test** to the template
  - Connect the Analyzer
  - Start the template
2. Set the infusion pump to deliver the flow rate preset in Flow test. In this example, the preset flow rate is 10 ml/h.

To start the test:

3. Click the Start button (▶️) on the Test Guide toolbar or press **F9** on the keyboard.

4. Select the channels in the channel select window and prime the channels you set.
5. Start the infusion pump.

The measurement starts and Ansur shows instantaneous flow, average flow, and trumpet curve graphs. The graph view for Flow vs. Time is shown in Figure 3-17.

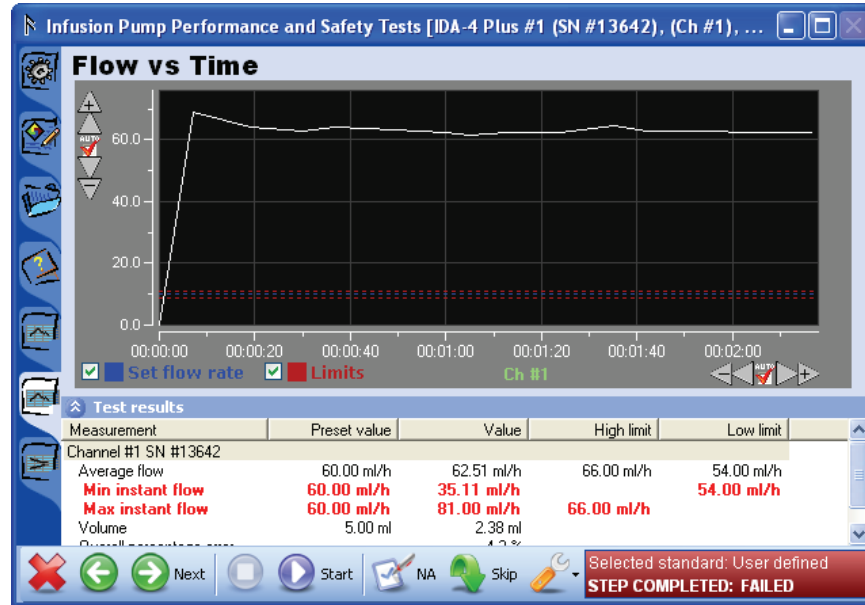


Figure 3-17. Flow Test

gjb21.bmp

When the test is completed:

6. Click the Next button (➡) or click F9 on the keyboard to display the Test Summary window.
7. Click the Next button (➡) or click F9 on the keyboard to create a test record.
8. Save the test record as a file on the computer, see “Storing a Test Template or Record” section under “Perform an Infusion Pump Test”
9. Print the test. See “Printing a Test Report” under “Perform an Infusion Pump Test.”

### Performing a Pressure Test

Occlusion Test Element tests the occlusion pressure alarm on an infusion pump device. In order to protect the patient, the alarm should activate if the pressure inside the administration set exceeds preset levels.

The IDA-4 Plus detects the alarm level and measures the Bolus Volume to ensure a safe level. The parameters to be tested and their acceptable performance criteria are defined within the Custom Setup and the Expected Results tabs.

1. Perform the steps described in “Perform an Infusion Pump Test”:
  - Load the **Occlusion Pressure** test to the template
  - Select the default pressure unit
  - Connect the Analyzer
  - Start the template

Note

According to the IEC, an occlusion test should be run with different flow rate settings. If the pump has a programmable occlusion pressure alarm, then IEC recommends configuring different alarm settings. In the Plug-In, different alarm settings can be configured by adding several occlusion tests to the template and configuring each test individually. See Setting Occlusion Test Parameters.

2. Set the infusion pump to deliver the flow rate preset in Occlusion Pressure test. In this example the preset flow rate is 100 ml/h.

To start the test:

3. Click the Start button (▶) on the Test Guide toolbar or press **F9** on the keyboard.
4. Select the channels in the channel select window.
5. Start the infusion pump.



Figure 3-18. Occlusion Test Screen

gjb23.bmp

6. When the test is completed, click the Next button (➡) or click **F9** on the keyboard to display the Test Summary window.
7. Click the Next button (➡) or click **F9** on the keyboard to create a test record.
8. Save the test record as a file on the computer, see “Storing a Test Template or Record” section under “Perform an Infusion Pump Test.”
9. Print the test. See “Printing a Test Report” under “Perform an Infusion Pump Test.”

### Performing a Dual Flow Rate Test

The following example demonstrates how to perform a dual flow rate test, and measures secondary rate, secondary volume, primary rate, and primary volume. The secondary rate changes into primary rate when flow reaches a preset volume.

1. Perform the steps described in “Perform an Infusion Pump Test”:

- Load the Dual Flow Rate test to the template
- Connect the Analyzer
- Start the template

The Test Guide settings will load with the same number of channels selected in the Custom Setup tab.

To start the test:

2. Click the Start button (▶) on the Test Guide toolbar or press F9 on the keyboard.

When a connection is established, the test begins and the time elapsed/remaining counter starts as shown in Figure 3-19.

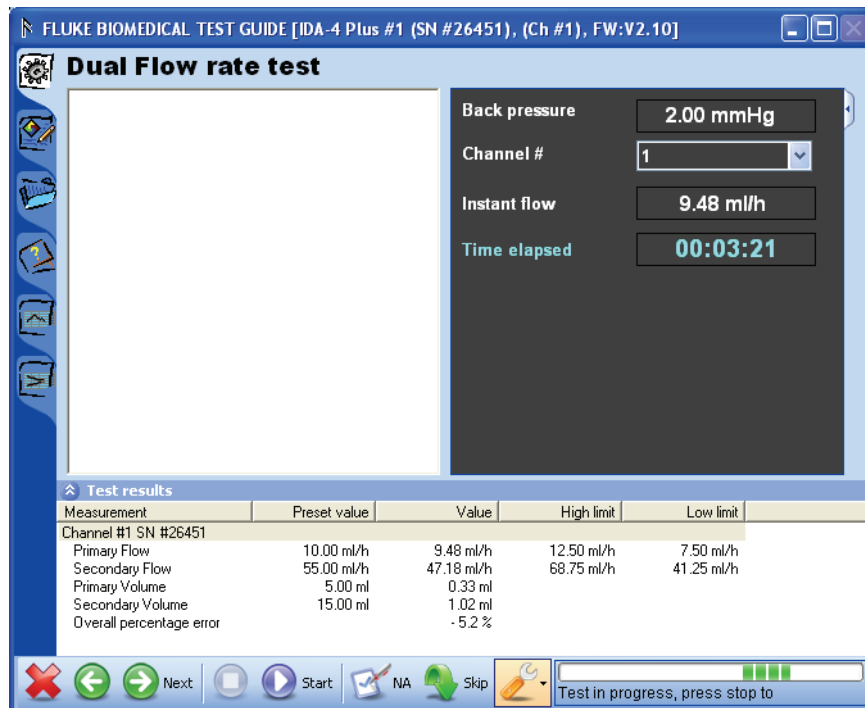


Figure 3-19. Dual Flow Rate Test in Progress

gjb24.bmp

3. Select the channels in the channel select window and prime the channels you set.
4. Start the infusion pump.

The measurement starts and Ansur shows flow, and trumpet curve graphs.

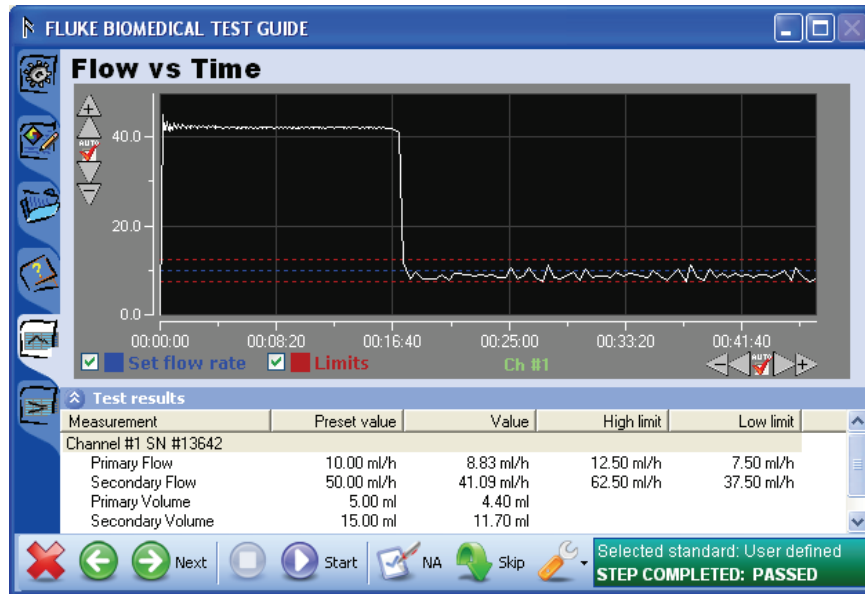


Figure 3-20. Dual Flow Rate Test

gjb25.bmp

When the test is completed:

5. Click the Next button (➡) or click **F9** on the keyboard to display the Test Summary window.
6. Click the Next button (➡) or click **F9** on the keyboard to create a test record.
7. Save the test record as a file on the computer, see “Storing a Test Template or Record” section under “Perform an Infusion Pump Test.”
8. Print the test. See “Printing a Test Report” under “Perform an Infusion Pump Test.”

### Performing a PCA Test

The following example demonstrates how to perform a PCA test. The Bolus Volume is delivered to the patient demand as set on the infusion pump. PCA test can be set up to run unmonitored.

1. Perform the steps described in “Perform an Infusion Pump Test”:
  - Load the PCA test to the template
  - Connect the Analyzer
  - Start the template

The Test Guide settings will load with the same number of channels selected in the Custom Setup tab.

To start the test:

2. Click the Start button (▶) on the Test Guide toolbar or press **F9** on the keyboard.

The Plug-In searches for an infusion pump analyzer. A progress bar displays in the lower right corner of the test guide while the test is in progress.

3. Select the channels in the channel select window and prime the channels you set.
4. Start the PCA pump.

The measurement starts and Ansur shows basal flow graph.

5. If the PCA pump (Device Under Test or DUT) is a manual triggered device, click on the PCA trigger button that is connected to the DUT. If the DUT is an automatic

triggered device, click on the **PCA Trigger** in the Tools drop-down list in the Test Guide toolbar. See Figure 3-21.

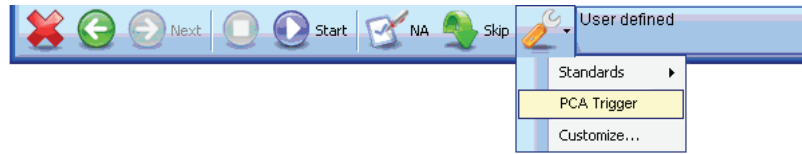


Figure 3-21. Toolbar PCA Trigger

gjb27.bmp

- Click to stop the test. The PCA graph of the detected boluses are shown in Figure 3-22.

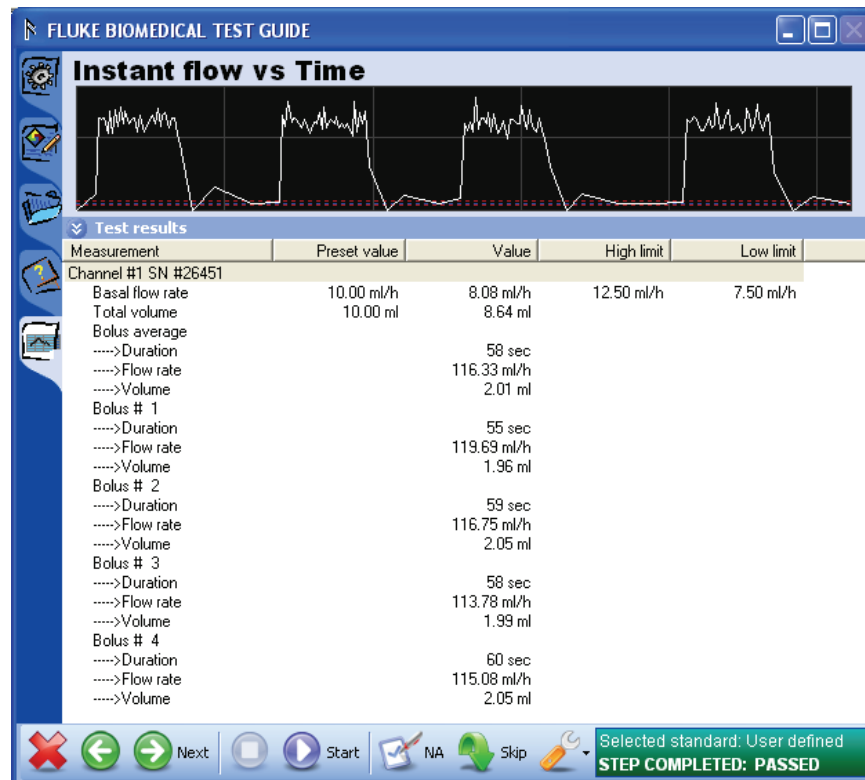


Figure 3-22. PCA Test

gjb28.bmp

*Note*

To repeat the test, click the Back button and repeat the instructions as described in the previous section.

When the test is completed:

- Click the Next button or click **F9** on the keyboard to display the Test Summary window.
- Click the Next button or click **F9** on the keyboard to create a test record.
- Save the test record as a file on the computer, see “Storing a Test Template or Record” section under “Perform an Infusion Pump Test.”
- Print the test. See “Printing a Test Report” under “Perform an Infusion Pump Test.”

## Performing a Lockout Time Test

A lockout time on an infusion pump prevents a patient from over medicating by preventing the pump from injecting medications during the lockout time. The lockout time test checks this lockout feature. To perform a lockout time test:

1. Perform the steps in the Performing an Infusion Pump Test section.
  - Load the PCA test into the template
  - Connect the Analyzer
  - Start the template
2. Click the start button (🎯) on the Test Guide toolbar or press F9 on the keyboard.
3. The Plug-In searches for an infusion pump analyzer. A progress bar displays in the lower right corner of the test guide while the test is in progress.
4. Select the channels in the channel select window and prime the channels you set.
5. Start the PCA pump.
6. If the PCA pump (Device Under Test or DUT) is a manual triggered device, click on the PCA trigger button that is connected to the DUT. If the DUT is an automatic triggered device, click on the PCA Trigger in the Tools drop-down list in the Test Guide toolbar. See Figure 3-23.

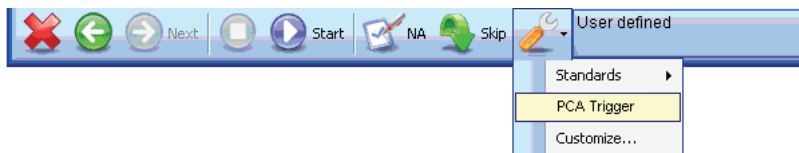


Figure 3-23. Toolbar PCA Trigger

gjb27.bmp

When the lockout time starts in the DUT:

1. If you use an automatically triggered PCA pump, click the PCA Trigger option in the tools drop-down list.
2. If you use a manually triggered PCA pump, push the PCA trigger button on the DUT repeatedly.

The test fails if the pump injects fluid within the lockout time. The message box in Figure 3-24 shows in the display.

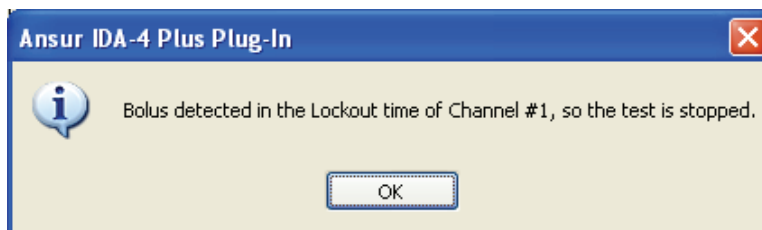


Figure 3-24. Bolus Detected in Lockout Time

gjb76.bmp

Figure 3-25 shows the test guide screen when the lockout time test fails.



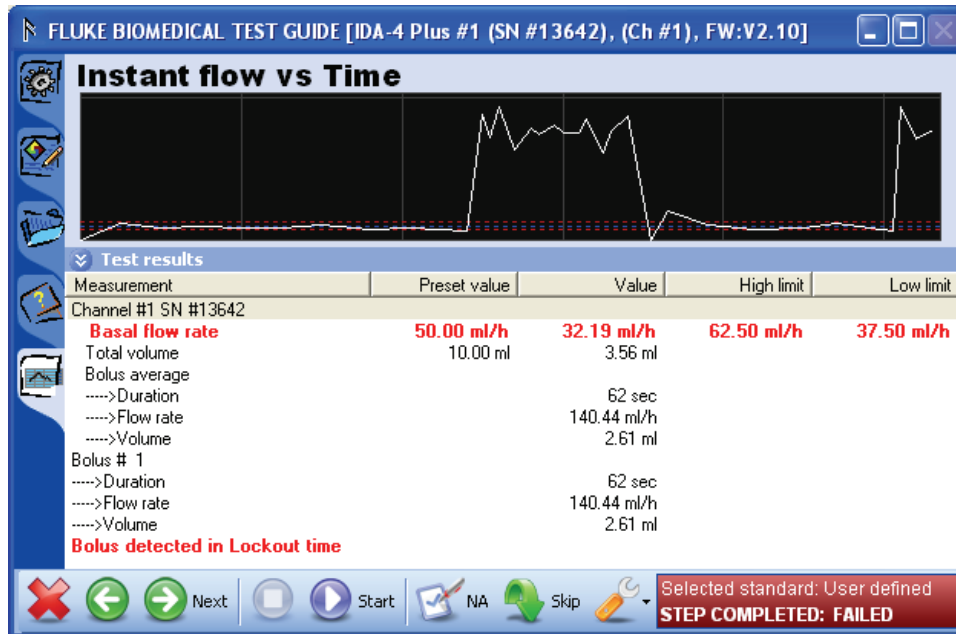


Figure 3-25. Lockout Time Test Failed

gjb77.bmp

## Setting Dual Flow Test Parameters

### Primary Flow

1. Select the Dual Flow rate test in the template window and click the Custom setup tab. The subheading **Pri. flow** is located under **Dual Flow rate test settings**, as shown in Figure 3-26.

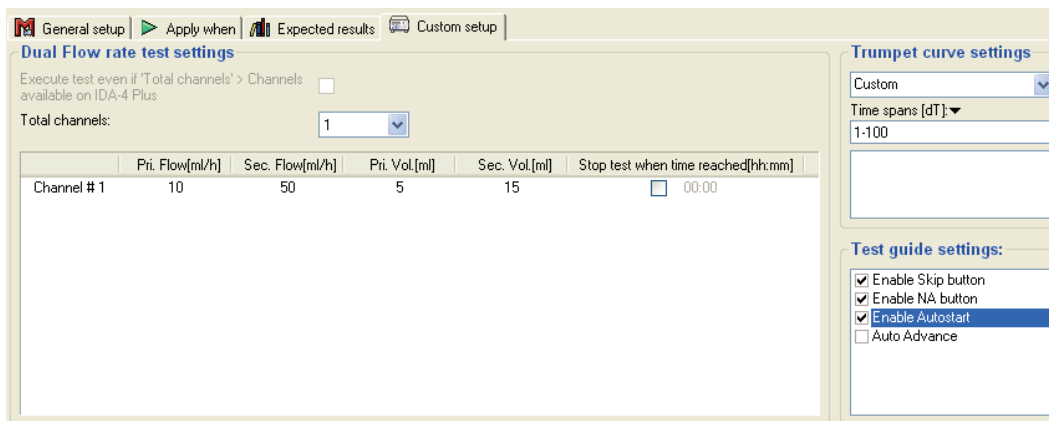


Figure 3-26. Dual Flow Test Configuration

gjb29.bmp

2. Click the text box next to the heading **Pri. flow** and enter the primary flow rate to be tested. The entered value displays in the text box.

### Secondary Flow

1. Select the **Dual Flow rate test settings** in the template window and click the **Custom setup** tab. Test element, Custom setup appears. The subheading **Sec. flow** is located under **Dual Flow rate test settings** as shown in Figure 3-26.

2. Click the text box next to the heading **Sec. flow** and enter the flow rate to be tested. The entered value displays in the text box.

### Primary Volume

1. Select the Dual Flow test in the template window and click the **Custom setup** tab. The subheading **Pri. Vol.** is located under **Dual Flow rate test settings** as shown in Figure 3-27.

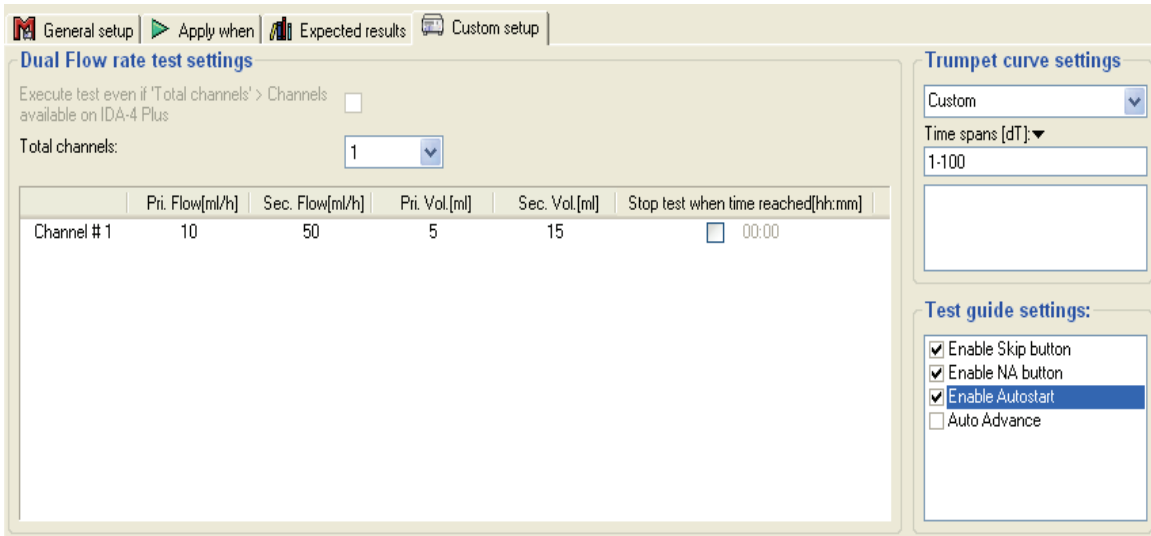


Figure 3-27. Setting Primary Volume

2. Click the text box next to the heading **Pri. Vol.** and enter the volume to be tested. The entered value displays in the text box.

### Secondary Volume

1. Select the Dual Flow test in the template window and click the **Custom setup** tab. The subheading **Sec. Vol.** is located under **Dual Flow rate test settings** as shown in Figure 3-26.
2. Click the text box next to the heading **Sec. Vol.** and enter the volume to be tested. The entered value is displayed in the text box.

### Channel Selection

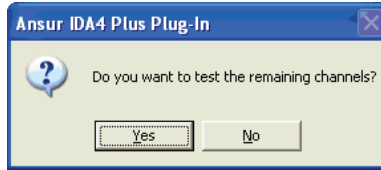
1. Select the **Dual Flow rate test settings** in the template window and click the **Custom setup** tab. The subheading **Total Channels** is located under **Dual Flow rate test settings** as shown in Figure 3-26.
2. Click the text box next to the heading **Total Channels** and click the drop down arrow (▾) to select a channel. Up to twelve channels are available with this Plug-In.

### Other Options

1. Choose from the following options:
  - Click OK on the message box to continue the test with the selected channels
  - Click Cancel to return to Plug-In Channel select window to select more channels or connect another IDA-4 Plus instrument.
  - Click the Cancel button to close the Channel select window.
2. When connecting a new device during the course of the testing, click the Refresh

button to add the new device to the Channel select window.

After completion of the test, the remaining channels can be tested using the selected channels, as shown in Figure 3-28.



**Figure 3-28. Testing Remaining Channels**

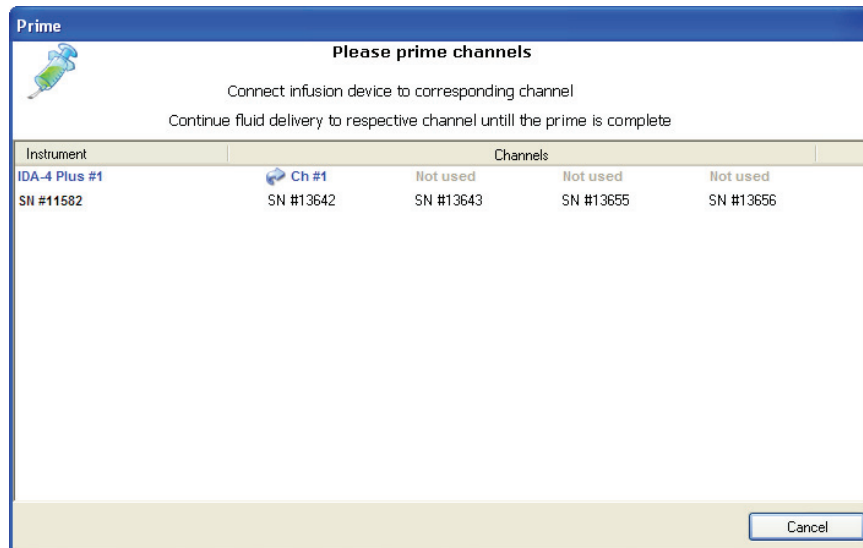
gjb34.bmp

If the total number of channels selected in the **Custom setup** is 3, select any 3 channels from the **Channel select** window.

When a connection is established, the test begins.

### Priming the Analyzer

Before starting the measurements, the internal volume of the IDA-4 Plus must be filled with liquid. See Figure 3-29.



**Figure 3-29. Prime Window**

gjb78.bmp

Prime each channel:

- The right sign (✓) indicates that the channel is primed.
- The (🔄) sign signifies that the channel is priming.
- “Not used” indicates that the channel is not selected for testing.

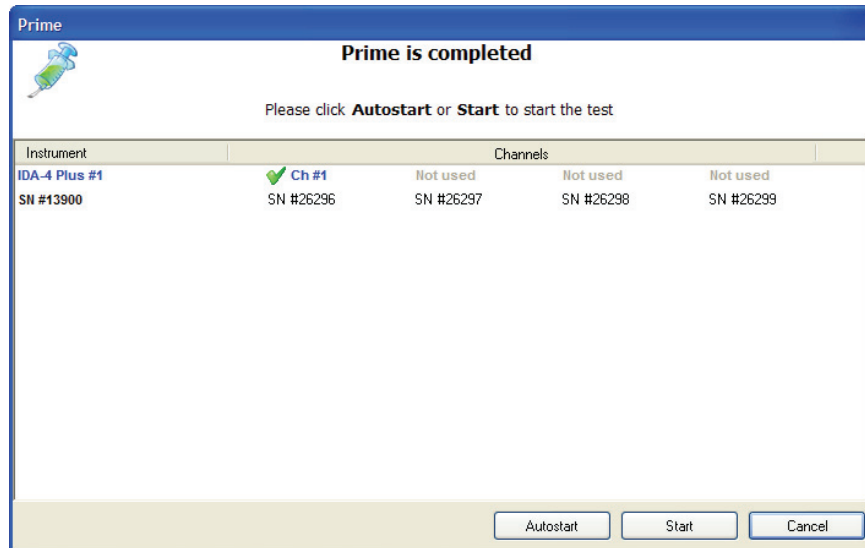
*Note*

*If the IDA-4 Plus is not connected to COM1 on the computer, Ansur will display the Instrument Not Found window until the correct port is specified.*

*If the IDA-4 Plus is recognized as connected to another port, Ansur will remember the number of the port and use this as the default port for future Plug-In tests.*

1. Continue injecting fluid to each channel until it is primed.

- Click the Autostart or Start button as shown in Figure 3-30 and start the infusion device for the measurements to start.



**Figure 3-30. Toolbar AutoStart Feature**

gjb35.bmp

AutoStart option is visible only if the AutoStart checkbox is checked in the Test Guide settings Custom setup tab.

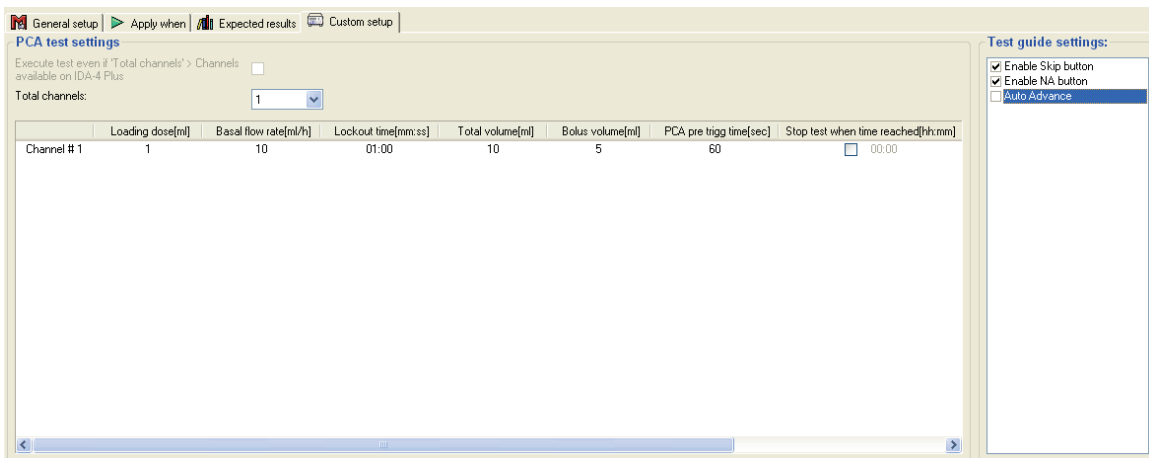
### **Stop Test when Time Reached**

- Select the Dual Flow test in the Template window and click the Custom setup tab.
- Click the checkbox in the “Stop test when time reached” column as shown in Figure 3-26 and set the desired time.

A check mark indicates that the **Dual flow test** will stop when the entered amount of time has elapsed.

### **Setting PCA Test Parameters**

The custom setup for the PCA test is shown in Figure 3-31.



**Figure 3-31. Setting Loading Dose in PCA Test**

gjb37.bmp

To set PCA Test parameters:

- Select the total channels from the drop-down list of the **Total Channels** combo

box. You can select up to 12 channels.

- The grid shown in Figure 3-32 shows the selected channel numbers in each row with the default values for **loading dose**, **basal flow rate**, **lockout time**, **total volume**, **bolus volume**, and **PCA pre trigg time**.

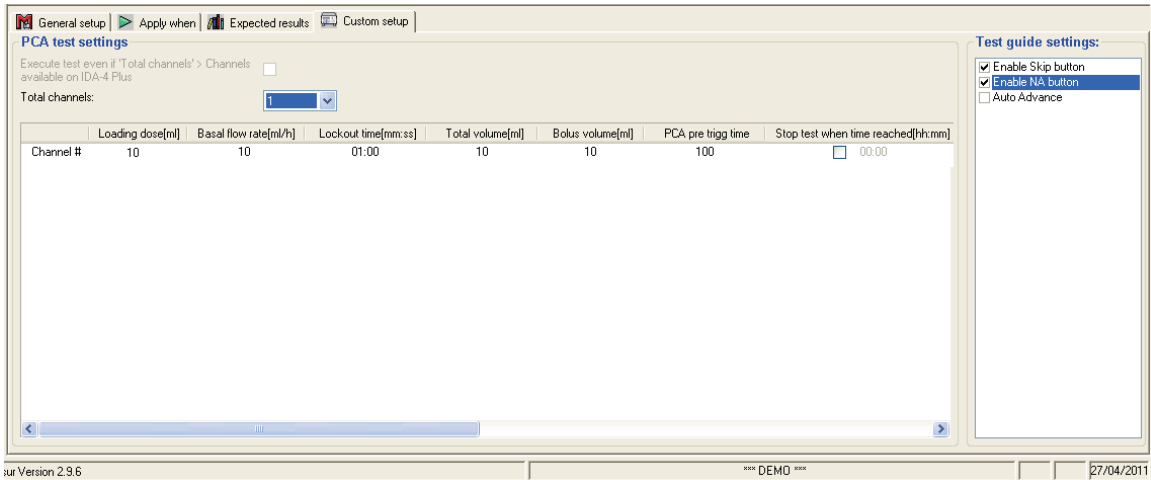


Figure 3-32. Custom Setup of PCA Test

- Click on the respective column to change the value with respect to the channel number.
- Check the checkbox under the **Stop test when time reached** and set the time for the test to stop when the selected time is reached.

**Stop the Test**

- Click the stop button (⏹) to stop the test while running. A selection box displaying prompting the user is to select which channels to stop as shown in Figure 3-33.

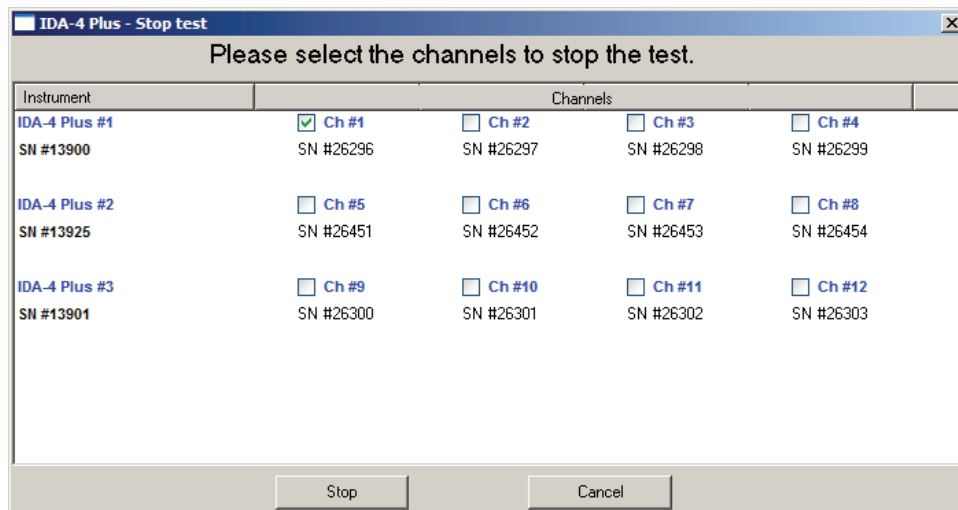


Figure 3-33. Stopping the Test

- Save the test record as a file on the computer, see “Storing a Test Template or Record.”
- Print the test. See “Printing a Test Report.”

## Setting Test Limits

When creating a test template, select which limits to use for the infusion pump performance tests.

1. Select a test in the template window and click the Expected Results tab below the list of test elements.

The default limits display as shown in Figure 3-34.

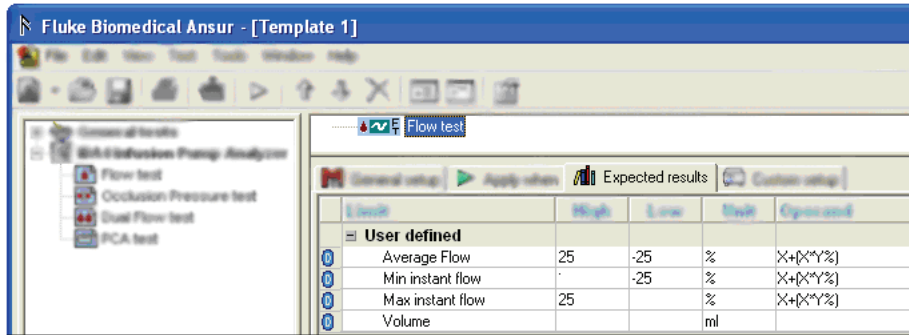


Figure 3-34. Editing Limit Values in the Expected Results Tab

gjb45.bmp

2. Click the High or Low cell for the measurement limits to be entered.  
The selected row is highlighted and a cursor displays in the clicked cell.
3. Enter the proper limit value for the selected measurement.  
The value entered displays in the selected cell.

### Note

To enter an absolute value instead of a percentage deviation from the set flow rate, click the equation in the Operand column and select entry Y from the operand menu.

## Creating an IDA-4 Plus Test Template

By default, Ansur opens to a blank test template. If the blank template is closed, the main window displays a gray frame. To create a new test template:

1. Open a blank test template by clicking on **File | New | Template** or click the new template button (📄) on the main toolbar.

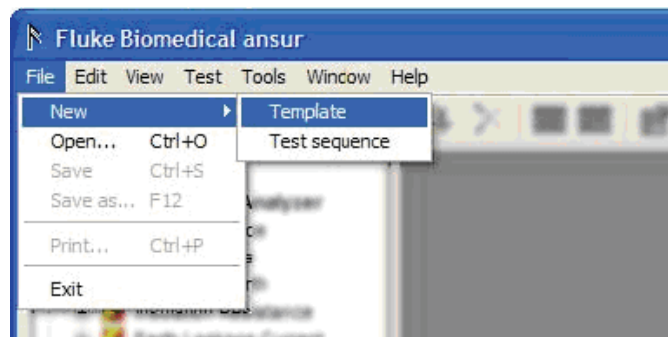


Figure 3-35. Creating a New Test Template

gjb11.bmp

2. In Ansur test explorer, click the plus (+) button next to **IDA4 Plus Infusion Pump Analyzer**.

3. Click and hold the left mouse button over the test name.
4. Without releasing the mouse button, drag the test element into the blank area of the test template as shown in Figure 3-36.

The test highlights and the mouse pointer changes to a drop cursor.

5. Release the left mouse button.

A copy of the test appears in the test template window.

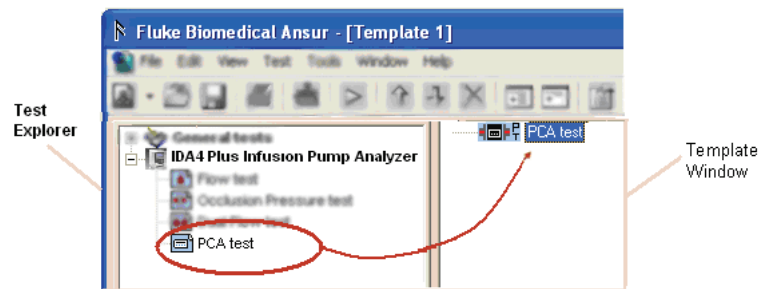


Figure 3-36. Creating a Test

gjb46.bmp





# Chapter 4

## Advanced Features

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## Introduction

This chapter describes some of the advanced features of the IDA-4 Plus Plug-In. Before reading the instructions in this chapter, the user must be familiar with the basic tasks described in Chapter 3.

## How to Change Plug-In Preferences

The Plug-In preferences contain default settings for the Plug-In. You can set pressure units, PCA pre-trigger time and trumpet curve time span. To change one of the Plug-In preferences:

1. Click **Tools | Options** on the Ansur main menu to open the preferences window.
2. Click the **IDA-4 Plus Infusion Pump Analyzer** icon to show the preferences as shown in Figure 4-1.

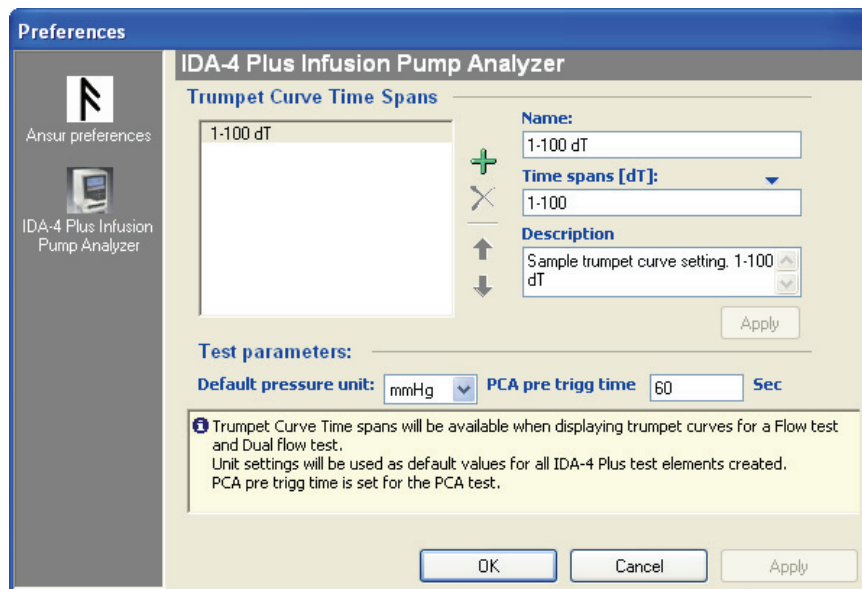


Figure 4-1. Preferences Window

gjb22.bmp

## Test Parameters

To change the default pressure units, click the down arrow at the right end of the Default pressure units combo box. Then click one of the pressure units in the dropdown list. When you configure tests and view or print test results, the Plug-In uses mmHg as the default pressure unit. The choices are mmHg, PSI, or kPa.

The PCA pre-trigger time is used for lockout time tests on PCA pumps. This is the time allowed before the Analyzer attempts to trigger the pump. To change the PCA pre-trigger time, highlight the existing time value and type in the new value. The default time is 60 seconds.

## Trumpet Curve Time Span

The default Trumpet curve settings to be used in the tests are configured in the preferences. The custom name, time span and description can be configured here and can be used in the custom setups. The time span can be selected either of the options shown (Figure-4b). You can add (+), delete (X), move up (↑), and down (↓) the custom names.

## How to Define Trumpet Curves According to IEC 601.2.24

The IEC 601.2.24 standard specifies several different trumpet curves to be used for different types of infusion pumps.

The following describes how to define and print a report with a trumpet curve in accordance with IEC 601.2.24 sub-clause 55.102, see Table 4-1.

Table 4-1. Trumpet Curve Information

Description	Observation windows <sup>[1]</sup> [minutes]	IEC 601.2.24 sub clause
Infusion Pump Analyzer	2, 5, 11, 19, and 31	50.102
[1] The trumpet curve should be calculated from the flow data sampled during the second hour of the test period.		

### Configure the Test

1. Create a test template and add a flow test. Configure the flow test with the appropriate flow rate and set test time to more than two hours.
2. Select the flow test in the template window and click the **Custom setup** tab.

The trumpet curve is defined in Trumpet curve settings as shown in Figure 4-2.

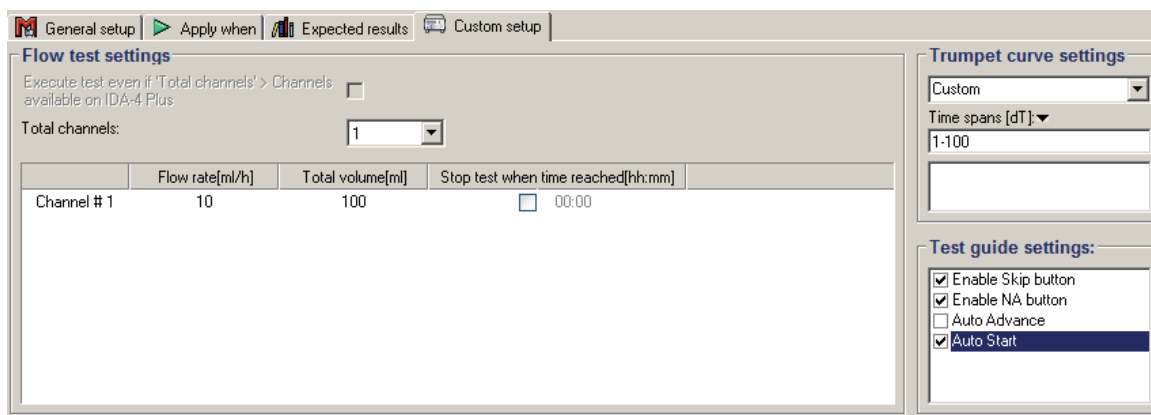


Figure 4-2. Trumpet Curve Settings

3. Click inside the drop down box containing the text and enter a name for the trumpet curve. In the example the entered name is IEC 601.2.24 §55.102.

The name entered is displayed in custom setup.

4. Click the drop down arrow next to the sub heading **Time spans [dT]** and select **[minutes]** from the unit menu.

The sub heading updates to read **Time spans [minutes]** as shown in Figure 4-3.

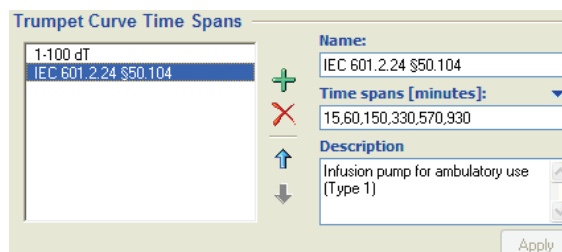


Figure 4-3. Time Spans [Minutes]

- Click inside the Time spans text box and enter the time spans (observation windows) for the trumpet curve, in this example the time spans are 2, 5, 11, 19, 31 as defined in the standard. Each entry must be separated by a comma. See Figure 4-3.

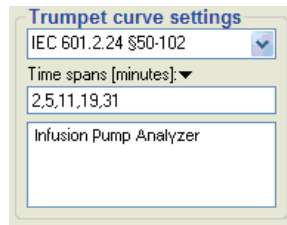
Time spans display as they are entered. When the test is performed, these time spans are used to calculate the trumpet curve.

*Note*

*An invalid time span string displays in red as it is typed, but displays in black when completed.*

An optional comment may be included in the text box below the time spans.

Correct trumpet curve settings display as shown in Figure 4-4.



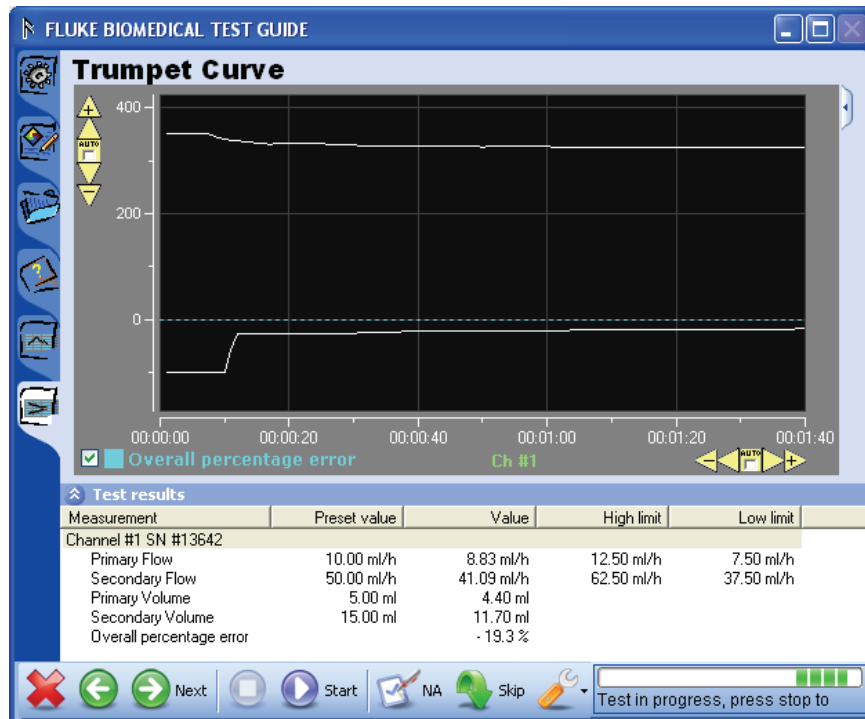
**Figure 4-4. Trumpet Curve Settings for IEC 601.2.24 § 50.102**

gjb50.bmp

The trumpet curve is configured.

**How to View a Trumpet Curve**

Click the **Trumpet Curve** tab along the left hand border of the Test Guide to inspect the trumpet curve while the test is running, as shown in Figure 4-5.



**Figure 4-5. Inspecting the Trumpet Curve While Running Ansur**

gjb15.bmp

### Selecting the Range

The trumpet curve displayed in the Test Guide is based on all the data sampled during the entire test period, and not only the second hour as defined in the standard. Change the range to get a trumpet curve based only on data from the second hour.

1. Click the Trumpet Curve tab (icon) along the left hand border of the Test Guide to display the trumpet curve.
2. Click the Details button (icon) found along the right hand side of the graph frame.

Trumpet curve settings display next to the graph as shown in Figure 4-6.

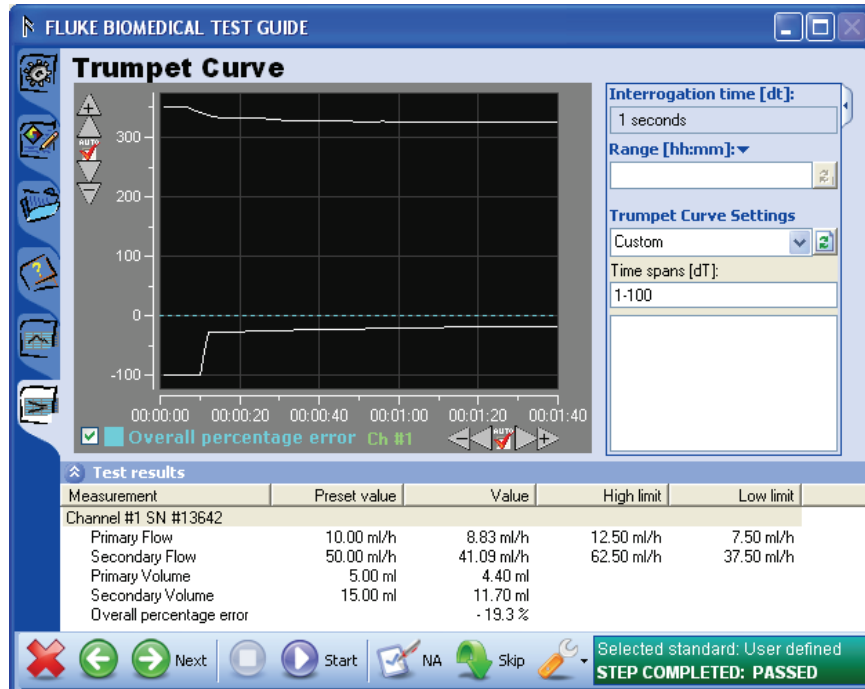


Figure 4-6. Trumpet Curve Settings in Test Guide

gjb51.bmp

3. Click the Range text box and enter the trumpet curve range. To select the second hour, enter "01:00-02:00".

Trumpet curve settings display next to the graph.

#### Note

*An invalid time span string displays in red as it is typed, but displays in black when completed.*

4. Click the Refresh button (🔄) next to the range text box to update the curve.

The trumpet curve is redrawn based on the range 00:00:00 – 00:00:20 as shown in Figure 4-7.

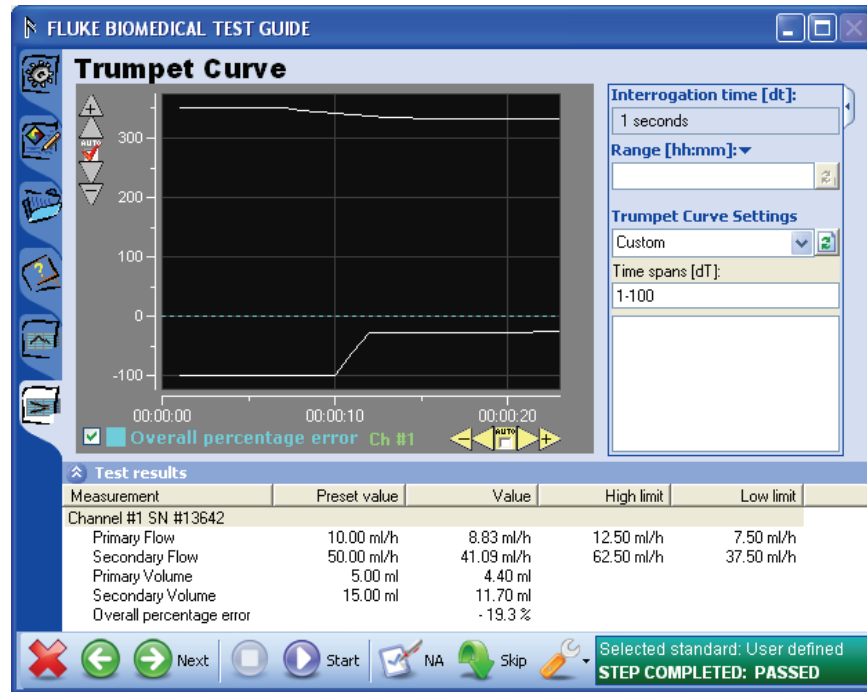


Figure 4-7. Redrawn Trumpet Curve

gjb52.bmp

*Note*

The X axis indicating time does not change when the range is refreshed. The trumpet curve's X axis contains the time spans used to generate the curve and not the time for the flow data samples in which the range selection was made.

*Note*

The range does not have to be configured while the test is running. All trumpet curve settings can be configured while viewing a completed test in Ansur test record window, **Detailed result** view.

The trumpet curve is now configured as defined by IEC 601.2.24 sub-clause 50.102. Run the test and store the test results. The test report will be in accordance with the IEC standard for Infusion pumps analyzer.

*Note*

The IEC standard also requires conducting other testing in addition to the flow test with a trumpet curve.

**Defining Default Trumpet Curve Settings**

The Plug-In provides features for creating default trumpet curve settings that can be re-used for every test template.

In this example, the default trumpet curve is set in accordance with IEC 601.2.24 sub-clause 50.104 as shown in Table 4-2.

Table 4-2. Trumpet Curve Settings

Description	Observation windows [minutes]	IEC 601.2.24 sub clause
Infusion Pump Analyzer for ambulatory use	15, 60, 150, 330, 570 and 930	50.104
The trumpet curve should be calculated from the end of the stabilization period to the end of the test.		

Open the Plug-In **Preferences** menu:

1. Select **Tools | Options** from the Ansur main menu.
2. Click **IDA-4 PLUS Infusion Pump Analyzer**.

Plug-In preferences display as shown in Figure 4-8.

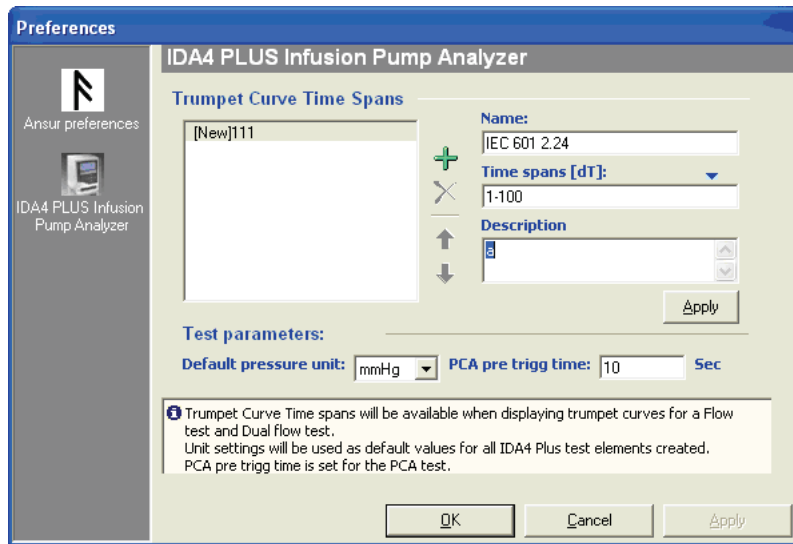


Figure 4-8. Plug-In Preferences

gjb07.bmp

Add a new trumpet curve setting.

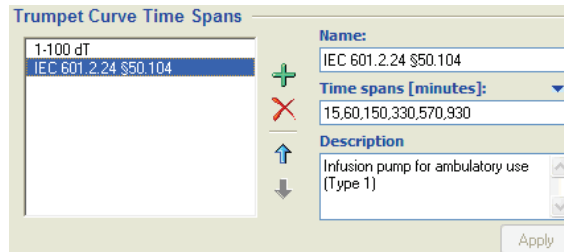
1. Click the Add button (+) next to the list of trumpet curve settings.  
An entry name **[New]** is added to the list and the **Name** text box now contains the text **[New]**.
2. Click inside the **Name** text box and enter a descriptive name for the trumpet curve, for example, "IEC 601.2.24 §50.104".  
The name in the text box appears while configuring the flow test.
3. Click the drop down arrow next to the sub heading **Time spans [dT]** and select **[minutes]** from the unit menu.  
The sub heading updates to read **Time spans [minutes]**.
4. Click inside the **Time spans [dT]** text box and enter the time spans, observation windows, for the trumpet curve. In this example, "15, 60, 150, 330, 570, 930" as defined in the standard. The numbers entered must be separated by a comma.  
Time spans display as they are entered. When the test is performed, these time spans will be used to calculate the trumpet curve.



An optional comment may be included in the text box below the time spans.

5. Click the **Apply** button.

Correct trumpet curve settings display as shown in Figure 4-9.



**Figure 4-9. Trumpet Curve Settings for IEC 601.2.24 § 50.102**

gjb48.bmp

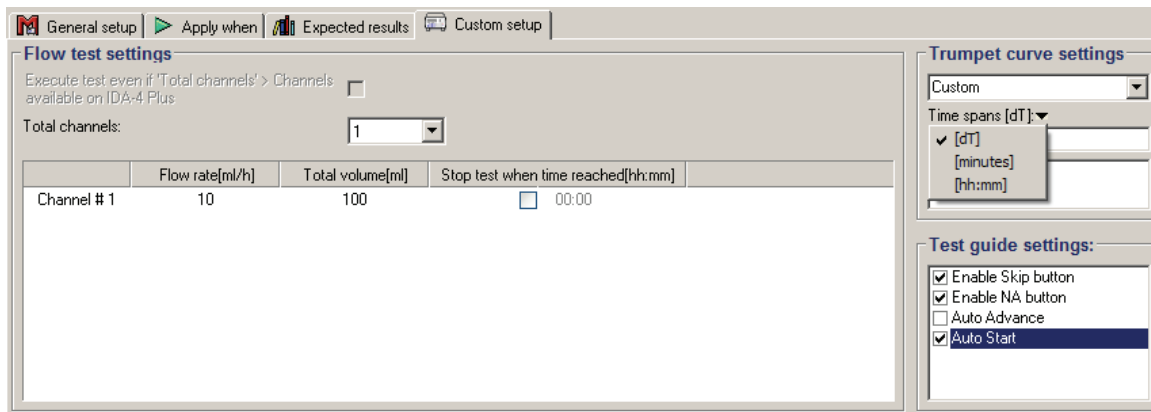
Create a flow test using the default trumpet curve.

6. Create a new test template and add a flow test

A flow test has been added to the test template.

7. Select the flow test in the template window and click the **Custom Setup** tab.
8. Click the drop down button located just below the header **Trumpet curve settings**.

A list containing all default trumpet curve settings displays as shown in Figure 4-10.



**Figure 4-10. Selecting a Default Trumpet Curve Setting**

gjb49.bmp

9. In the drop down list, select the trumpet curve setting IEC 601.2.24 § 50.104. The list closes and the window displays the settings defined according to the selection. The previous settings are now disabled.

*Note*

*The largest observation window for the selected trumpet curve is 930 minutes (15 hours and 30 minutes). Consequently, the flow test must run for at least the same period of time to get a valid trumpet curve.*

*Note*

*Sub-clause 50.104 also specifies that the range of the trumpet curve should be from the end of the stabilization period to the end of the test. To accomplish the first part, specify a delay time high enough for the pump to stabilize.*

## Testing Two Infusion Pumps Simultaneously

The IDA-4 Plus Plug-In can test up to twelve infusion pumps or channels simultaneously. Each IDA-4 Plus Analyzer can be equipped with up to four channels to test four pumps at once. Up to three IDA-4 Plus Analyzers can be connected to Plug-In at once. The example below illustrates how to test two channels simultaneously with an IDA-4 Plus equipped with two channels.

Before testing two pumps, connect both pumps to channels on the IDA-4 Plus. See “Connect the Analyzer” in the *IDA-4 Plus Users Manual* for detailed instructions on how to connect the infusion pumps to the IDA-4 Plus.

This tutorial explains how to run two flow tests simultaneously:

1. Start Ansur and create a test template with a flow test.
2. Save the test template.
3. Start another instance of Ansur and load the template created in step 2.

Two Ansur windows display on the screen, displaying the same test template as shown in Figure 4-11.

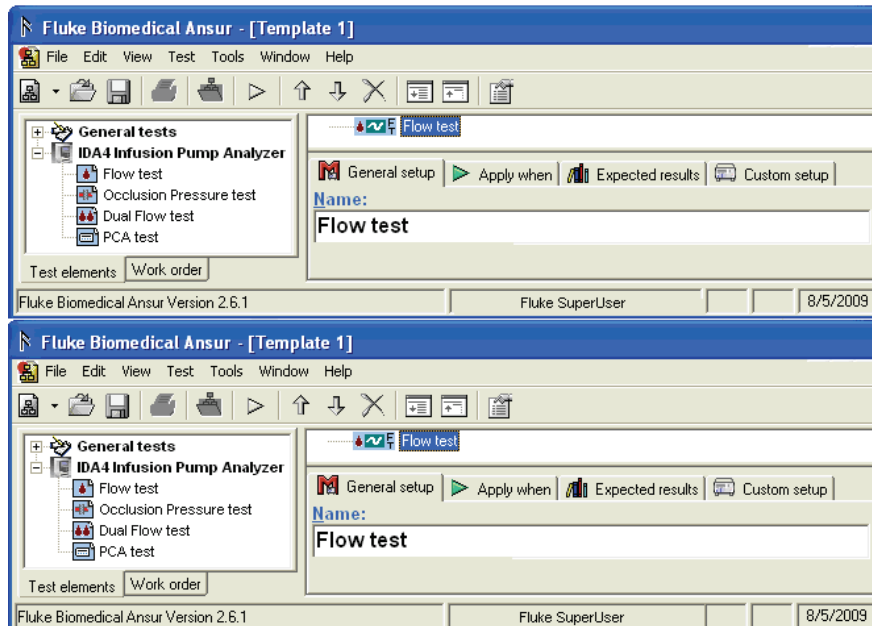


Figure 4-11. Running Two Instances of Ansur

gjb53.bmp

### Note

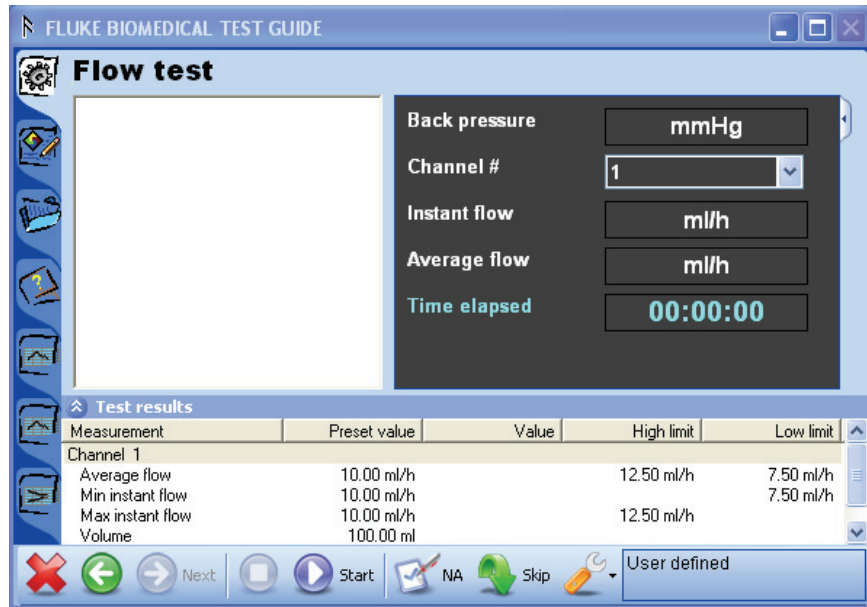
*In order to see the two test guides at the same time when performing the test, organize the two Ansur windows as displayed in Figure 4-11.*

### Note.

*In Microsoft Windows XP, right click the task bar and select **Tile Windows Horizontally** to have Windows align the Ansur windows automatically.*



4. Click **Test | Start Test** or click the Start Test button (▶) on the main toolbar in the Ansur window, or click **F9** on the keyboard.

Two Test Guide windows for **Flow test** show side by side in the display. Both windows have the same view as the one shown in Figure 4-12.

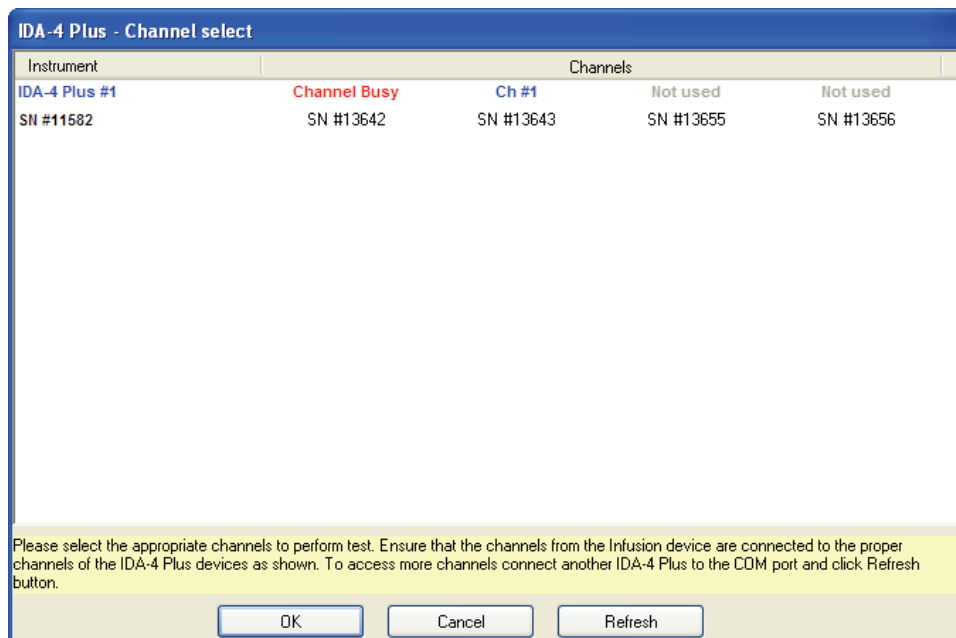


gjb86.bmp

**Figure 4-12. Flow Test Test Guide Window**



5. Position the Test Guide so that it does not obstruct the second Ansur Test Guide window.
6. Click  on the first Ansur Test Guide window.
7. Select the channel where the first infusion pump is connected.
8. Prime the first infusion pump. See the Prime the Analyzer section in chapter 3.
9. Click  on the second Ansur Test Guide window.

The channel that was selected in the first Ansur Test Guide window cannot be selected. This channel is shown as **Channel Busy** in the channel select window shown in Figure 4-13.



gjb80.bmp

**Figure 4-13. Channel Select Window with a Busy Channel**

10. Select the channel of the second infusion pump in the second Test Guide window.
11. Click  to start the test.
12. Click  to stop the test after completion or wait for the test to stop automatically when total volume is reached.

Two separate test reports are generated for two infusion pumps.

## Printing Graphs and Trumpet Curves

In order to print flow graphs and trumpet curves, Ansur must be set to include graphics when printing a test report. Before printing the report, the user can specify which of the flow graphs to include and to change the scale of the graphs or trumpet curves.

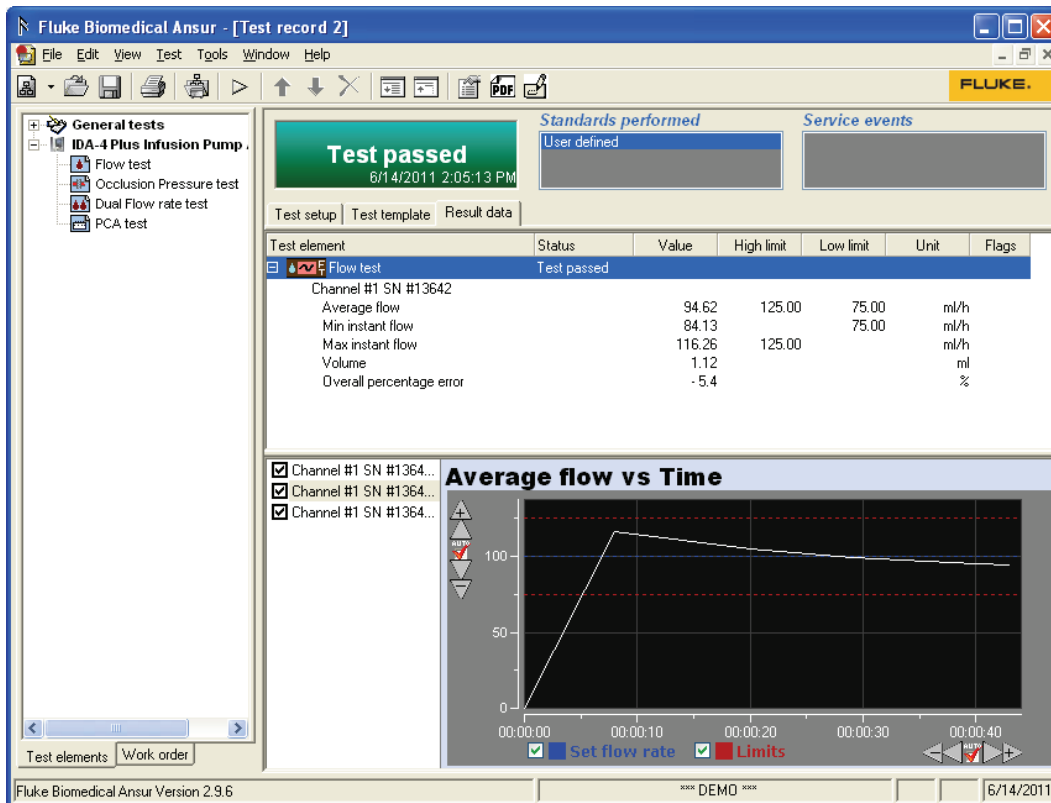
### Configuring Flow Graphs

1. Run a flow test to get a test record, or load an existing test record. When loading a test record, click the Result Data tab to display the results.

The flow test results display in the Ansur Test Record window.


2. Click the line containing the icon and name of the flow test.

Detailed test results display at the bottom of the Test Record window as shown in Figure 4-14



**Figure 4-14. Detailed Test Results**

gjb55.bmp


3. Access the graphs by clicking any of the headers along the left side of the screen.
4. Use the Scaling buttons on the toolbar to change the graph.
5. Click the Save button () to save changes to the file and print report.

To exclude a graph from the printed report, click the check box to remove the check mark next to the name of the graph.

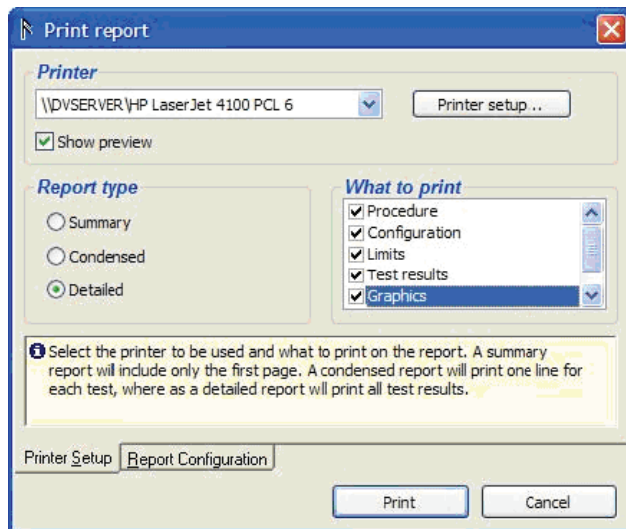
*Note*

In Figure 4-14, the Test Explorer is hidden to provide more room for test results. To hide the Test Explorer in the Ansur main menu, click **View Ansur Explorer**. To show the Test Explorer, click *Ansur Explorer* again.

**Printing Flow Graphs**


1. Click **File** → **Print** or click the Print button  on the main toolbar, or click **CTRL+P** on the keyboard.

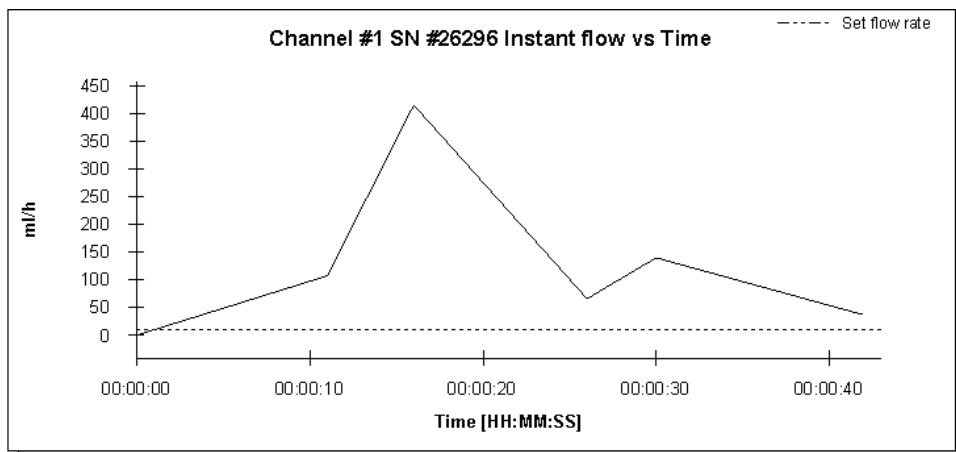
The Print Report window displays as shown in Figure 4-15.



**Figure 4-15. Printing Graphics**

gjb56.bmp

2. In the box titled **What to Print**, click to check **Graphics** check box.
3. In the **Report Type** box, click **Detailed**.
4. Check the **Show Preview** button for a preview of the print report. If the Show Preview check box is unchecked, the report will be sent directly to the printer and the Preview window will not display.
5. Click the **Print** button to open the Preview window as shown in Figure 4-16.
6. Click the Print button  on the toolbar.  
 The report prints to the default printer.



**Figure 4-16. Print Preview Window**

gjb57.bmp



# Chapter 5

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## Introduction

This chapter describes more details about the various IDA-4 Plus tests that the Plug-In is designed to remotely control.

## Flow Test Element

Flow Test Element tests the performance of a given infusion pump. The user sets the desired flow rate at the pump and the IDA-4 Plus measures the achieved flow rate. Instant flow rate is measured continually at a given sample period over the tests duration. The IDA-4 Plus can derive minimum, maximum, and mean flow rates.

## Custom Setup

The flow test duration, the parameters to be tested, and their acceptable performance criteria are defined within the **Custom Setup** and **Expected Results** tabs. Click on the **Custom Setup** tab in the template window to show the window shown in Figure 5-1.

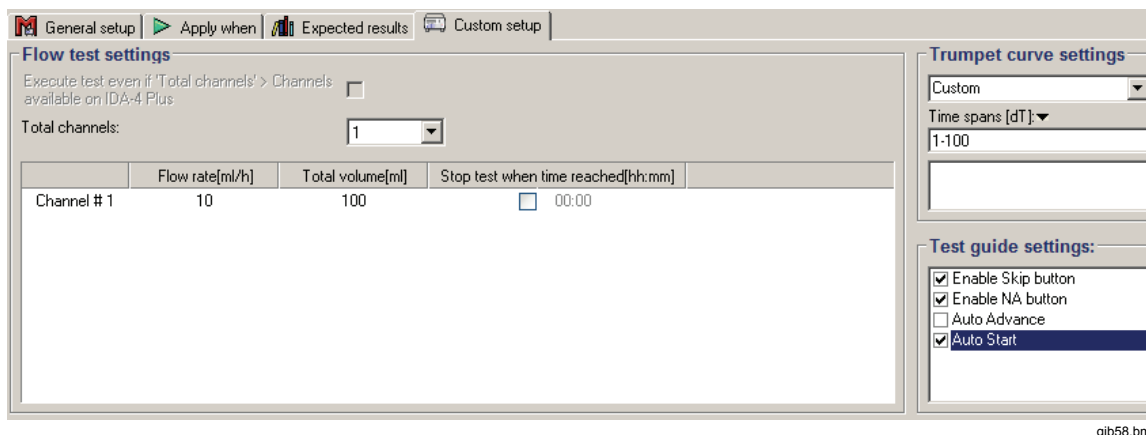




Figure 5-1. Flow Test Custom Setup Window

gjb58.bmp

Table 5-1 lists the flow test settings and describes their purpose.

Table 5-1. Flow Test

Setting	Description
<b>Flow Test Settings</b>	
Flow Rate	Flow rate is the flow demanded of the infusion pump. This value is used to calculate deviance in the flow measured by the IDA-4 Plus and when instructing the user how to perform the test in the Test Guide.
Total Volume	To set the volume, type in a value between 0 and 10000. Whenever the measured volume reaches total volume, the test automatically stops execution.
Total Channels	Total Channels provides a selection of 12 channels on the IDA-4 Plus Plug-In.
<b>Test Guide Settings</b>	
Enable Skip button	Adds the Skip Button  to the Test Guide window to allow the user to skip the test and move to the next test.
Enable NA Button	Adds the Not Applicable button  to the Test Guide window to allow the user to flag the test as not applicable.

**Figure 5-1. Flow Test (cont.)**

Setting	Description
Auto Advance	Sets Ansur to automatically proceed to the next test at the end of the present test and show the Test Guide for the next test element.
Auto Start	When checked, Auto Start causes the infusion pump analyzer to use its Auto-Start feature. Otherwise the manual start method must be used. When Auto-Start is enabled, the analyzer begins measuring as soon as it detects fluid.
<b>Stop Test when...</b>	
Time reached	Stops the Flow test when the entered time has elapsed.

**Expected Results**

The infusion pump must meet the limits defined within the Expected Results to pass the flow test. To set the expected results, click the **Expected Results** tab to show the expected results grid shown in Figure 5-2.

Limit	High	Low	Unit	Operand
<b>User defined</b>				
Average Flow	25	-25	%	X+[X*Y%]
Min instant flow	25	-25	%	X+[X*Y%]
Max instant flow	25	-25	%	X+[X*Y%]
Volume			ml	

gjb59.bmp

**Figure 5-2. Flow Test Expected Results**

These limits are usually expressed as a percentage of the pump flow rate as defined in Custom Setup.

The Operand menu defines how Ansur calculates the limit values. The operand can be set to:

- Y – absolute value,
- X + Y – limit calculated as defined flow rate + specified limit, or
- X + (X \* Y %) – limit calculated as a percentage deviance from the defined flow rate.

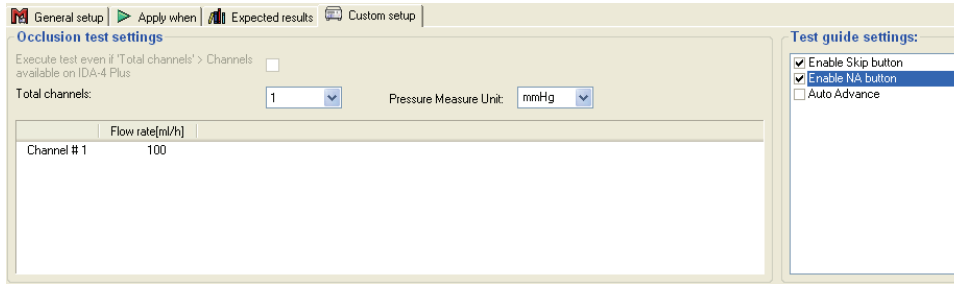
**Occlusion Pressure Test Element**

Occlusion Pressure Test Element tests the occlusion pressure alarm on an infusion pump device. The infusion pump alarm should activate when the pressure inside the administration set exceeds preset levels.

The IDA-4 Plus detects the alarm level and measures the Bolus Volume to ensure a safe level. The parameters to be tested and their acceptable performance criteria are defined within the **Custom Setup** and the **Expected Results** tabs.

**Custom Setup**

To set the occlusion test settings, click on the **Custom Setup** tab in the template window to show the window shown in Figure 5-3.





gjb60.bmp

**Figure 5-3. Occlusion Test Custom Setup**

Table 5-2 lists the occlusion test settings and describes their purpose

**Table 5-2. Occlusion Test Settings**

Setting	Description
<b>Occlusion test settings</b>	
Flow Rate	Pump Flow is the flow set on the infusion pump. This value is used when performing the test in the Test Guide.
Total Channels	Total Channels provides a selection of 12 channels on the IDA-4 Plus Plug-In.
Pressure Measure Unit	Sets the pressure measurement units for the test. The default value is set in the preference screen.
<b>Test Guide Settings</b>	
Enable Skip button	Adds the Skip Button  to the Test Guide window to allow the user to skip the test and move to the next test.
Enable NA Button	Adds the Not Applicable button  to the Test Guide window to allow the user to flag the test as not applicable.
Auto Advance	Sets Ansur to automatically proceed to the next test at the end of the present test and show the Test Guide for the next test element.

### Expected Results

The infusion pump must meet the limits defined within the Expected Results to pass the occlusion test. To set the expected results, click the **Expected Results** tab to show the expected results grid shown in Figure 5-4.

Limit	High	Low	Unit	Operand	Reference	Measurement
<b>User defined</b>						
Peak pressure			mmHg			
Time of peak			h:mm:ss			

gjb61.bmp

**Figure 5-4. Occlusion Test Expected Results**

These limits are always expressed as absolute values.

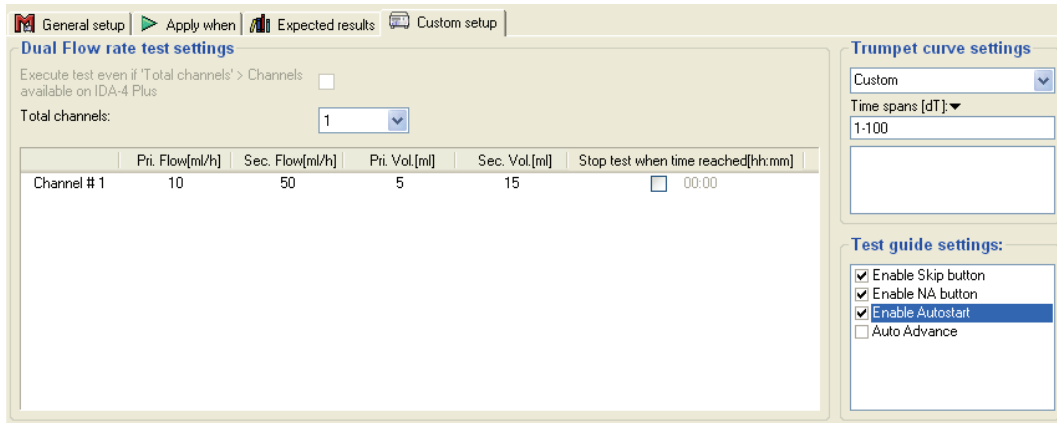
### Dual Flow Test Element

The Dual Flow Test Element tests the dual flow on an infusion pump device. The Dual Flow test will run for the time specified in the Custom Setup tab and measure the Secondary Flow, Secondary Volume, Primary Flow, and Primary Volume.

The parameters to be tested and their acceptable performance criteria are defined within the Custom Setup and the Expected Result tabs.

**Custom Setup**



To set the dual flow test settings, click on the **Custom Setup** tab in the template window to show the window shown in Figure 5-5.



gjb62.bmp

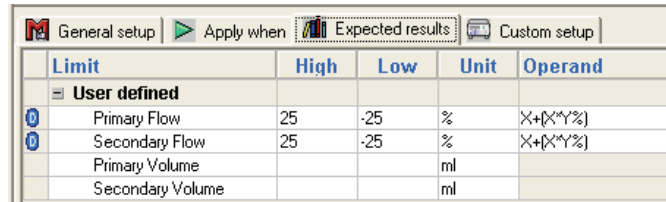
**Figure 5-5. Dual Flow Test Custom Setup**

**Table 5-3. Dual Flow Test Settings**

Setting	Description
<b>Dual Flow test settings</b>	
Test Time	Test Time specifies the duration of the test.
Pri. Flow	The Primary Flow rate as set on the infusion pump. This is the flow rate of the second part of the delivery.
Sec. Flow	The Secondary Flow rate as set on the infusion pump. This is the flow rate of the first part of the delivery.
Pri. Volume	The volume set for the infusion pump to deliver at Primary Flow.
Sec. Volume	The volume the infusion pump is set to deliver at the Sec. Flow.
Total Channels	Total Channels provides a selection of 12 channels on the IDA-4 Plus Plug-In.
<b>Test guide settings</b>	
Enable Skip button	Adds the Skip Button  to the Test Guide window to allow the user to skip the test and move to the next test.
Enable NA Button	Adds the Not Applicable button  to the Test Guide window to allow the user to flag the test as not applicable.
Auto Advance	Sets Ansur to automatically proceed to the next test at the end of the present test and show the Test Guide for the next test element.
Auto Start	When checked, Auto Start causes the infusion pump to use its Auto-Start feature. Otherwise the manual start method must be used.
<b>Stop Test when...</b>	
Time reached	Stops the Flow test when the entered time has elapsed.

### Expected Results

The infusion pump must meet the limits defined within the Expected Results to complete the Dual Flow test. To set the expected results, click the **Expected Results** tab to show the expected results grid shown in Figure 5-6.



Limit	High	Low	Unit	Operand
<b>User defined</b>				
Primary Flow	25	-25	%	X+[X*Y%]
Secondary Flow	25	-25	%	X+[X*Y%]
Primary Volume			ml	
Secondary Volume			ml	

Figure 5-6. Dual Flow Test Expected Results

gjb63.bmp

These limits are always expressed as absolute values.

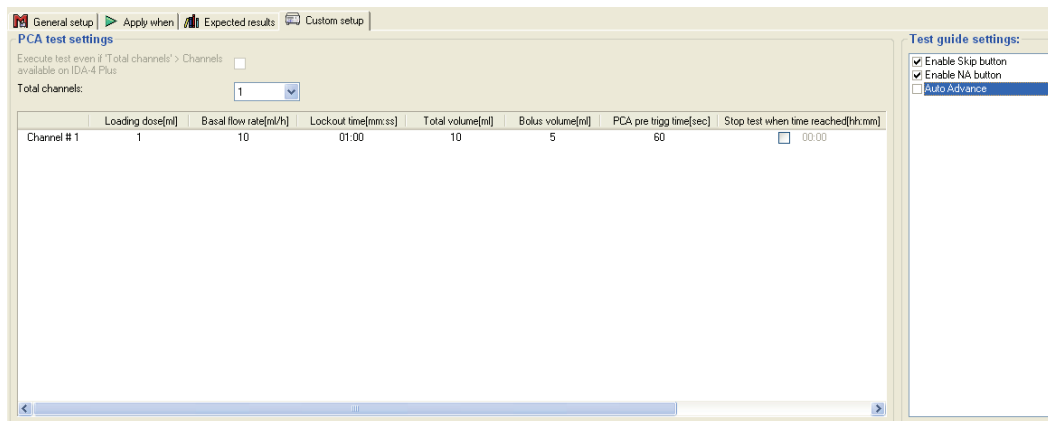
### PCA Test Element

PCA (Patient Control Analgesia) test provides automated PCA pump control. The Bolus Volume is delivered to the patient demand, as set on the infusion pump. The PCA test can be set up and operate unmonitored.

The parameters to be tested and their acceptable performance criteria are defined within the Custom Setup and the Expected Result tabs.

### Custom Setup

To set the PCA test settings, click on the **Custom Setup** tab in the template window to show the window shown in Figure 5-7.



Channel	Loading dose(ml)	Basal flow rate(ml/h)	Lockout time(mm:ss)	Total volume(ml)	Bolus volume(ml)	PCA pre trigger time(sec)	Stop test when time reached(hr:mm)
Channel #1	1	10	01:00	10	5	60	<input type="checkbox"/> 00:00



Figure 5-7. PCA Test Custom Setup

gjb64.bmp

Table 5-4. PCA Test Settings

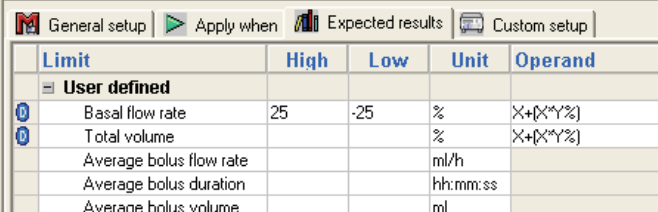
Setting	Description
<b>PCA test settings</b>	
Loading Dose	The dose programmed into the pump. This is detected as a bolus, but is often a different volume than patient demand.
Basal Flow Rate	The basal flow rate is the flow rate the infusion pump is set to deliver.
Lockout Time	The time in minutes and seconds, programmed into the infusion pump, that must elapse after one patient demand but before the next demand can be triggered.

Figure 5-4. PCA Test Settings (cont.)

Setting	Description
Total Volume	The volume the infusion pump is set to deliver: the value is copied into the stop test time. Whenever the measured volume reaches Volume 1 + Volume 2, the test automatically stops execution.
Bolus Volume	The volume to be delivered during each patient demand, as set on the infusion pump.
Total Channels	Total Channels provides a selection of 12 channels available to the IDA-4 Plus Plug-In.
<b>Test guide settings</b>	
Enable Skip button	Adds the Skip Button  to the Test Guide window to allow the user to skip the test and move to the next test.
Enable NA Button	Adds the Not Applicable button  to the Test Guide window to allow the user to flag the test as not applicable.
Auto Advance	Sets Ansur to automatically proceed to the next test at the end of the present test and show the Test Guide for the next test element.
<b>Stop Test when...</b>	
Time reached	Stops the Flow test when the entered time has elapsed.

### Expected Results

The infusion pump must meet the limits defined within the Expected Results to complete the PSA test. To set the expected results, click the **Expected Results** tab to show the expected results grid shown in Figure 5-8.



Limit	High	Low	Unit	Operand
<b>User defined</b>				
Basal flow rate	25	-25	%	X+{X*Y%}
Total volume			%	X+{X*Y%}
Average bolus flow rate			ml/h	
Average bolus duration			hh:mm:ss	
Average bolus volume			ml	

gjb65.bmp

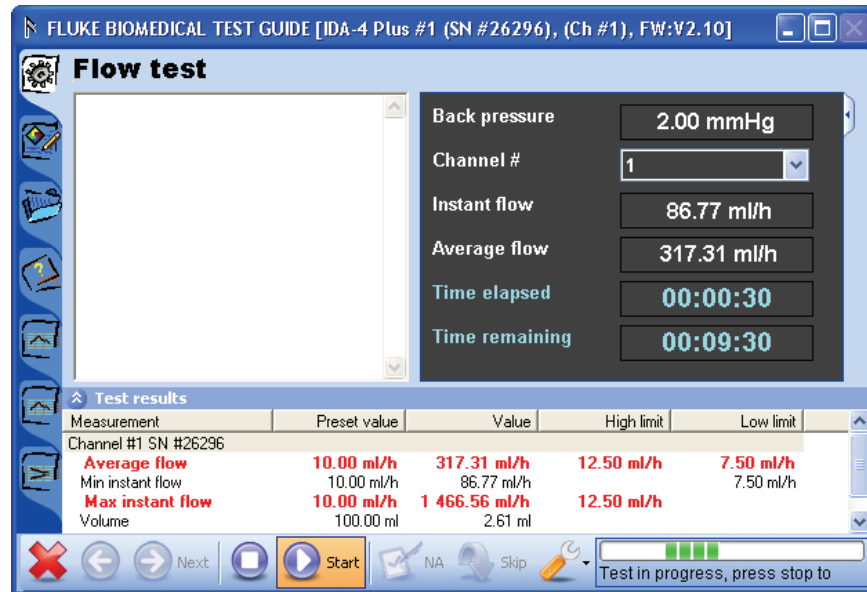
Figure 5-8. PCA Test Expected Results

These limits are always expressed as absolute values.

### Test Guide

When using a test template, the Test Guide shown in Figure 5-9 is the IDA-4 User Interface.

The Test Guide indices along the left side of the window for procedure, comment, and DUT details, are explained in the *Ansur Test Executive User Manual*. However, the Flow Test has three extra indices: Help, Flow vs. Time graph, and Average Flow vs. Time graph.



gjb66.bmp

**Figure 5-9. Test Guide**

When a test is started, the window caption displays the serial number (SN), channel number (Ch#) if applicable, and firmware version (FW) of the IDA-4 Plus used to perform the test. If an IDA-4 Plus is connected, this information will not be available.

### Toolbar Buttons

The buttons along the bottom of the Test Guide window are used to control the tests performed by the Plug-In. Table 5-5 lists the buttons with their names and a description of each button's function.

**Table 5-5. Toolbar Buttons**

Button	Name	Description
	Abort	Abort the Test Template.
	Previous	Go to previous dialog screen.
	Next	Go to next dialog screen.
	Start	Perform test.
	Stop	Stop test.
	Not applicable	Flag test as not applicable.
	Skip	Skip test and go to next.
	Additional Features	Allows access to standards, option, and customizing the Test Guide toolbar.

### Additional Features

The Additional Features drop-down list changes based in the mode of the Plug-In. Figures 5-10 show these changes. The PCA trigger option is used to trigger the

electrically triggered infusion pump through the PCA Trigger box.

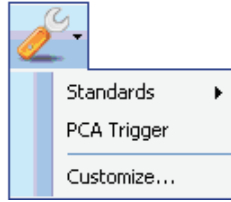



Figure 5-10. Test Guide Tools Menu PCA Trigger

gjb68.bmp

### Additional Test Guide Indices

The Flow Test element has three additional Test Guide indices.

### Help Index

The Help Index  explains how to execute the test. Hyperlinks provide access to instructions for hardware configuration as shown in Figure 5-11

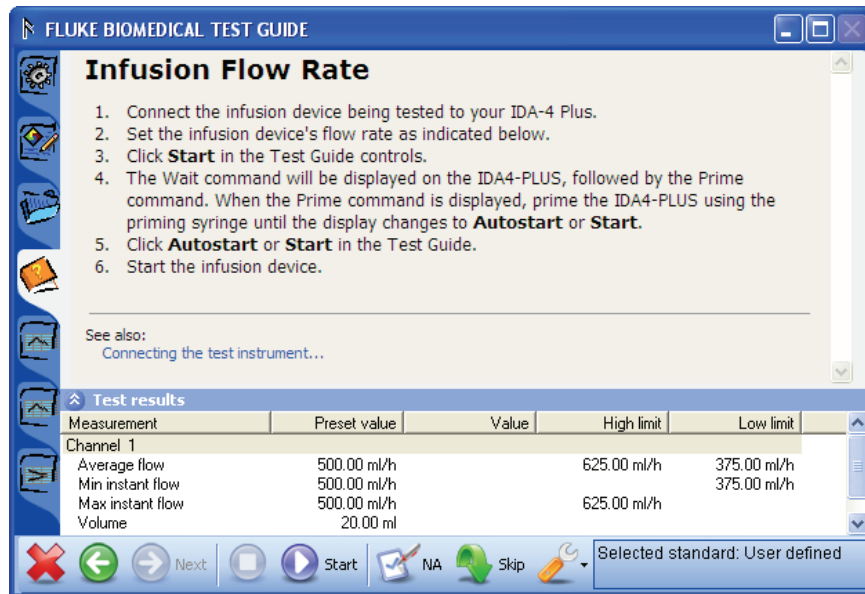



Figure 5-11. Test Guide Help Page

gjb69.bmp

### Real-Time Graphs

The final two indices display real time test data in graphical form. These graphs can be edited. The flow vs. time index  will display the instant flow while these measurements are taken as shown in Figure 5-12.



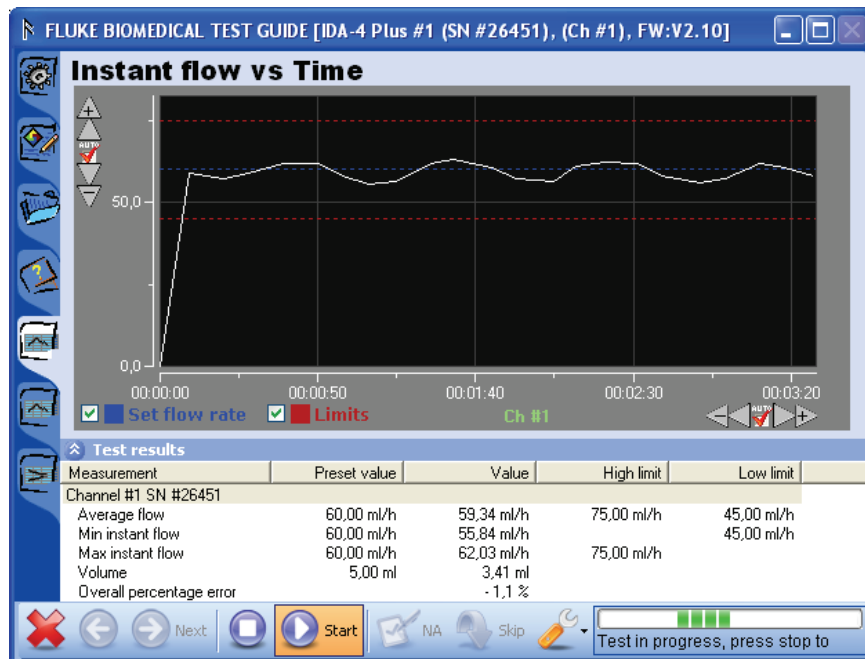


Figure 5-12. Flow vs. Time Graph

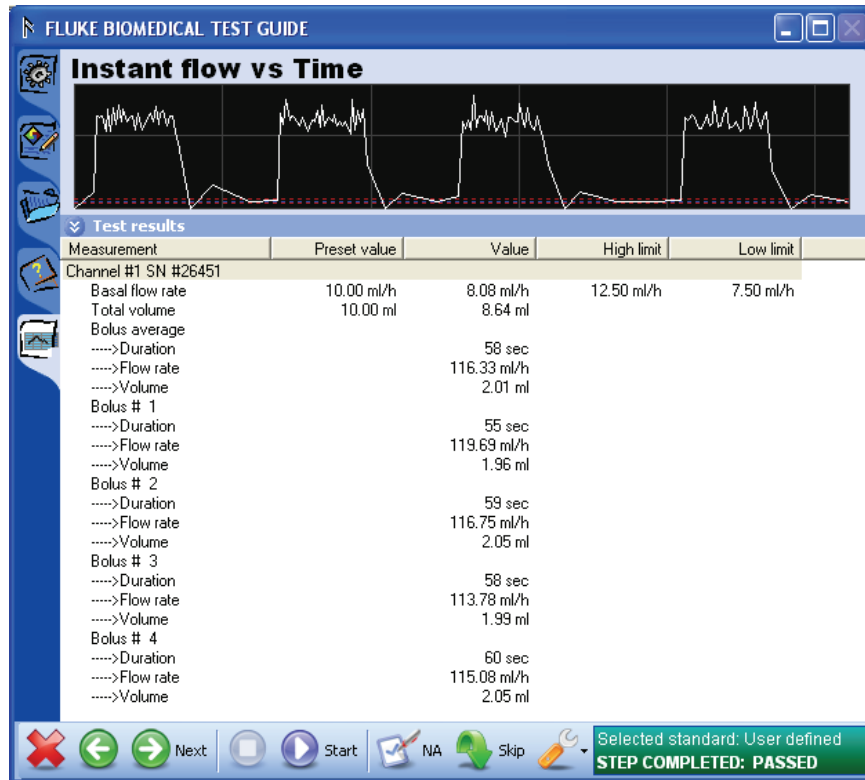
gjb70.bmp



Figure 5-13. Pressure vs. Time Graph

gjb71.bmp

In the Test Guide View for the Occlusion Test, the user can toggle auto scaling and view measurements using the Pressure vs. Time graph icon (📊).



gjb72.bmp

Figure 5-14. Flow vs. Time for PCA Test

In the Test Guide View for the PCA Test, the user can toggle auto scaling and view measurements using the Flow vs. Time graph icon (📊).

## Graph Editing

Every graph is equipped with a scale button group on every axis. Table 5-6 shows the different scaling buttons and describes their purpose.

### Note

*When clicking one of the zoom or pan buttons, auto scaling should be turned off.*

Table 5-6. Scaling Button Options

X	Y	Description
		Zooms in. The axis' span should be decreased by 10 % while its centre is maintained.
		Moves the graph right or up – i.e. pan left or down.
		Turns auto scaling on or off. When auto scaling is turned off the scale buttons becomes yellow.
		Moves the graph left or down – i.e. pan right or up.
		Zooms out. The axis span should be increased by 10 % while its centre is maintained.

While auto scaling is turned on, scale the graph so that the entire graph (all samples) is displayed and the data is centered on the Y-axis. This allows spanning an additional

±10% of the actual data range.

Click the Set Flow Rate legend (flow vs. time curve only) and the graph displays the flow rate set in the test's configuration as a dotted line. The dotted line is the same color as the legend.

Click the limit legend checkbox (flow vs. time curve only) and the graph displays the Instant Flow limits as dotted horizontal lines in the graph. The limit lines are the same color as the limit legend.

Any changes to scaling or checkboxes are saved and will appear in the detailed result view and on any printed reports.

## Channel Select Window

The Plug-In supports up to 12 channels using three to 12 IDA-4 Infusion Pump Analyzers. By default, each DUT channel selected from the custom setup is assigned to the IDA4 channels along with the serial number. Figure 5-15 shows channel #1 selected from the custom setup is assigned to the 1<sup>st</sup> channel of the IDA-4 instrument with the serial number by default.

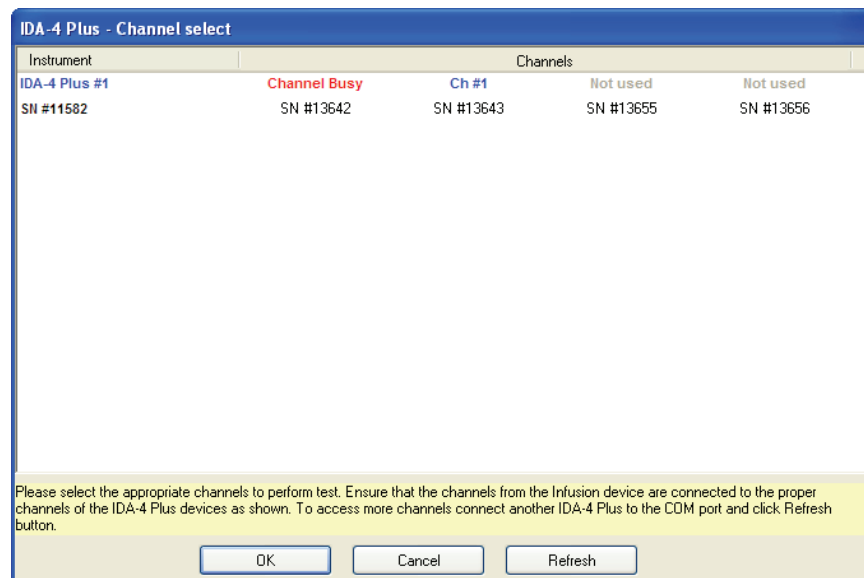


Figure 5-15. Channel Select Window

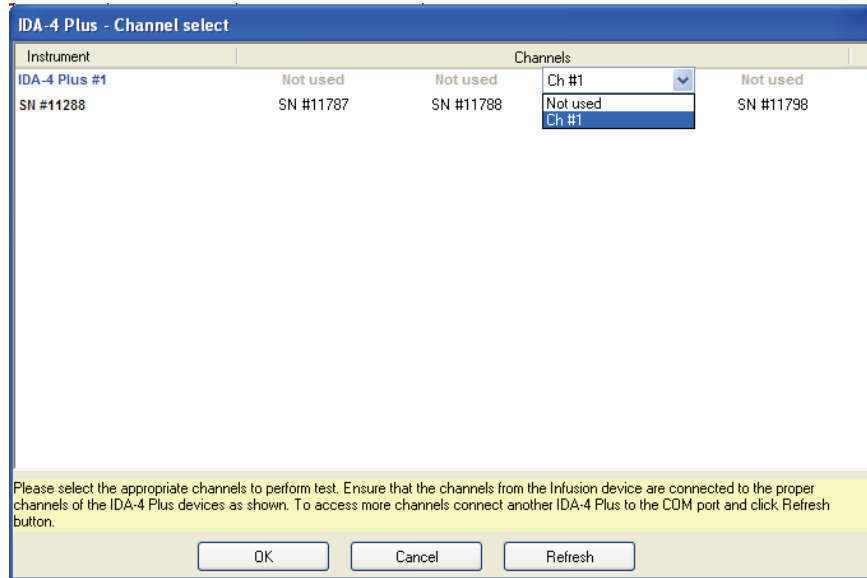
gjb014.bmp

The instrument column shows the number of IDA-4 Analyzers connected to the Plug-In. It also shows a number assigned and the respective SN# of the instrument.

Each IDA\_4 Plus row, can have up to four channels of the IDA-4 Analyzer against each IDA-4 Analyzer listed. Click the **Refresh** button to scan for more analyzers connected to the computer.

If the user connects the tubes to a 3<sup>rd</sup> channel of the IDA-4 Analyzer, then click **Not used** (3<sup>rd</sup> column of the Channels in the list) as shown in the Figure 5-15.

Figure 5-16 shows the three IDA-4 Analyzers connected to the PC with 12 DUT channels displayed as their serial numbers. If the channel is used by another device, the **Channel Busy** text shows in the display as shown in Figure 5-15.

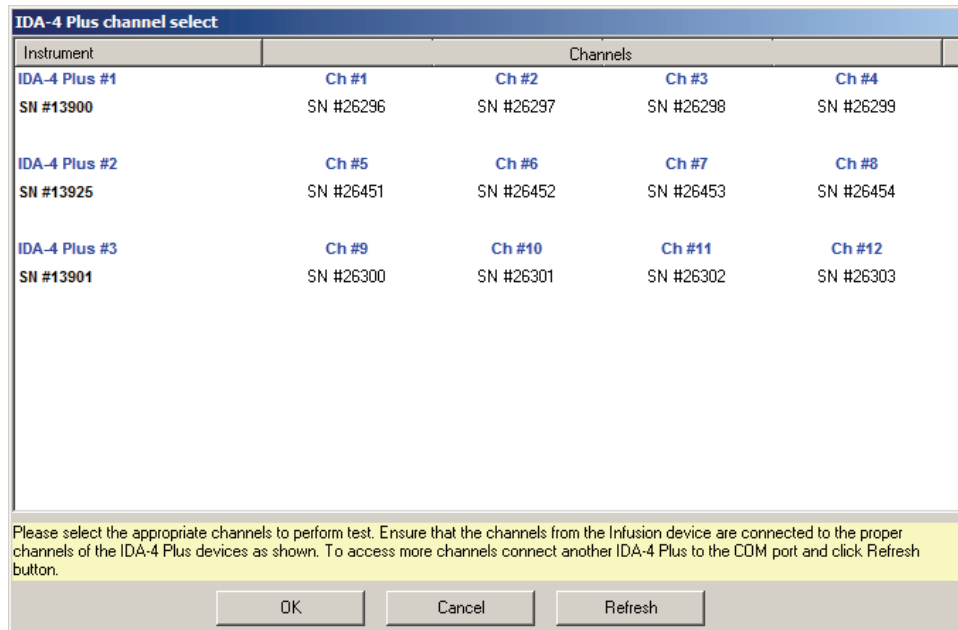


gjb08.bmp

**Figure 5-16. Select Channel of Infusion Device**

### **Multiple Channel Operation**

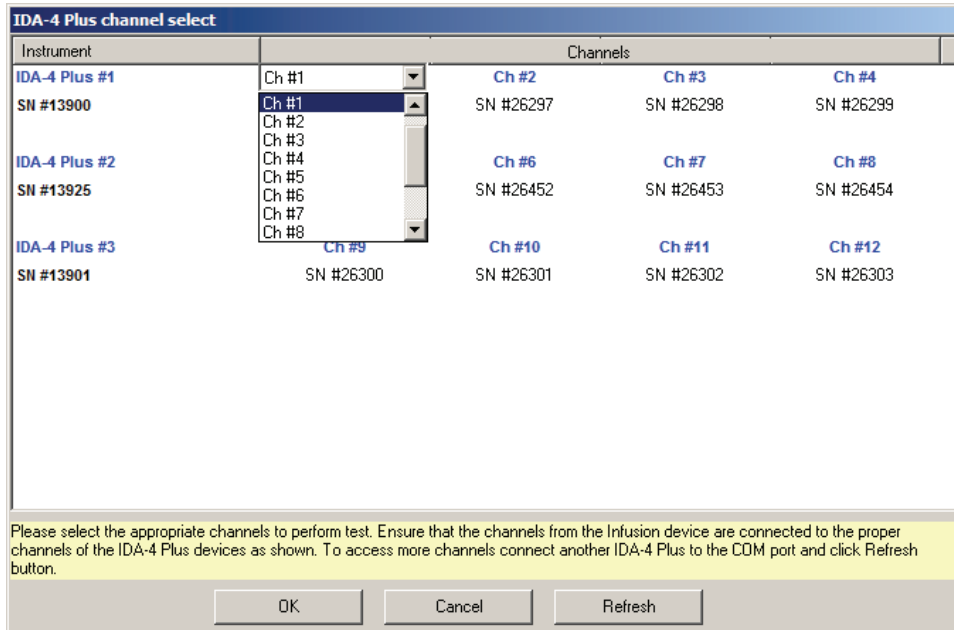
The Plug-In allows you to connect multiple IDA-4 Plus Infusion Pump Analyzers and can test up to twelve channels simultaneously. Figure 5-17 shows the channel selection screen with twelve infusion pumps connected to the Plug-In through three IDA-4 Plus Analyzers.



gjb74.bmp

**Figure 5-17. Twelve Channel Select Screen**

To change a channel assignment for an infusion pump click on a channel number to open the channel drop-down list as shown in Figure 5-18.



gjb67.bmp

**Figure 5-18. Channel Selection Drop-Down List**

You can select channels in any order. For example, the first pump on the first IDA-4 Plus Analyzer could be assigned to channel 5 and then the next pump on the same analyzer could be assigned to channel 10. Sequential assignment of channel numbers is not necessary.

*Note*

*You can not change the instrument assignments in the **Instrument** column of the screen.*

In the Test Guide screen, you can select a specific channel to see the data of the test on that channel in the upper-right corner of the screen. Click in number field of the **Channel #** to open the drop-down channel selection list as shown in Figure 5-19.

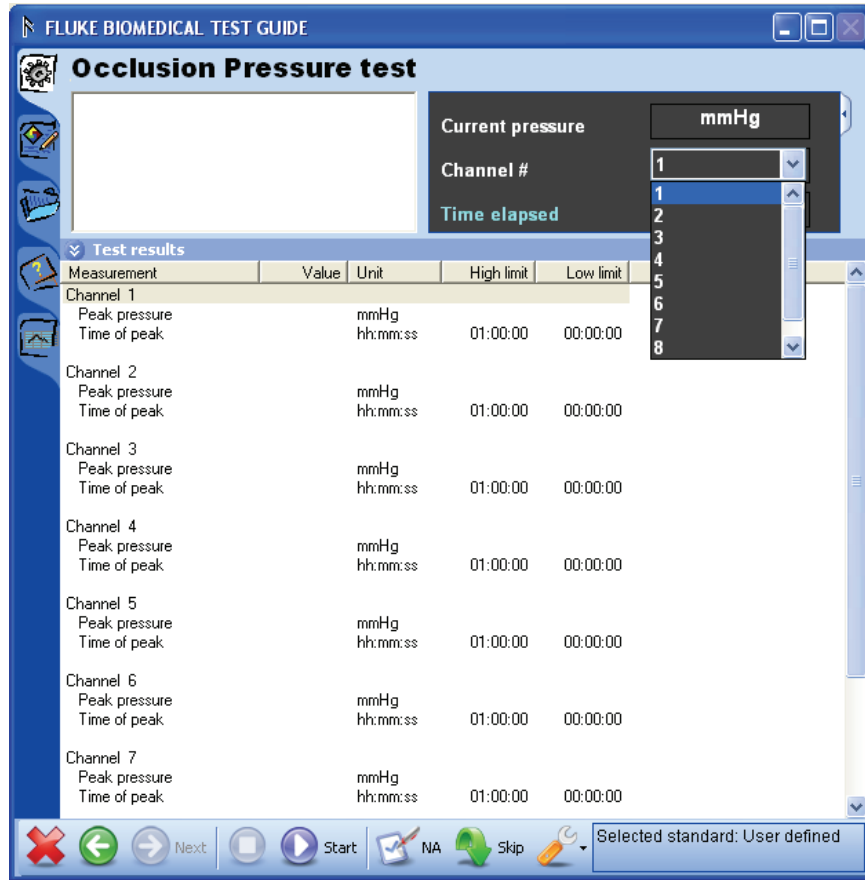


Figure 5-19. Test Data Viewing by Channel

gjb42.bmp

### Stop Multiple Channel

To stop the test on any or all channels, click on the stop button (⏏) to open the stop test screen shown in Figure 5-20.

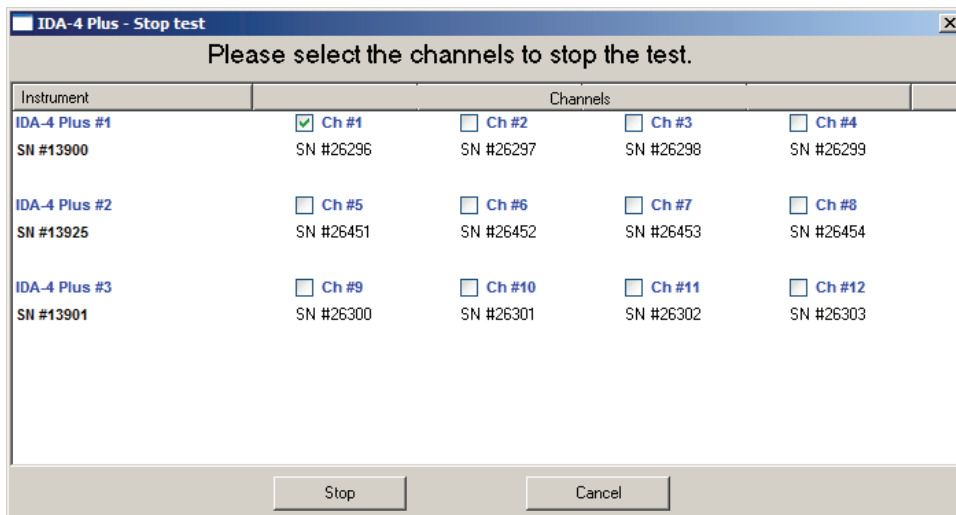


Figure 5-20. Channel Stop Test Screen

gjb41.bmp

Set the checkbox next to any number of channel numbers to select that channel for a stop command. With the desired channels checked, click on the **Stop** button to stop any tests running on the selected channels.

### Selecting Multiple Channel Graphs


To view a graph of the test on any channel, click  tab in the Test Guide window. Right-click on the graph to open the drop-down channel selection list as shown in Figure 5-21.



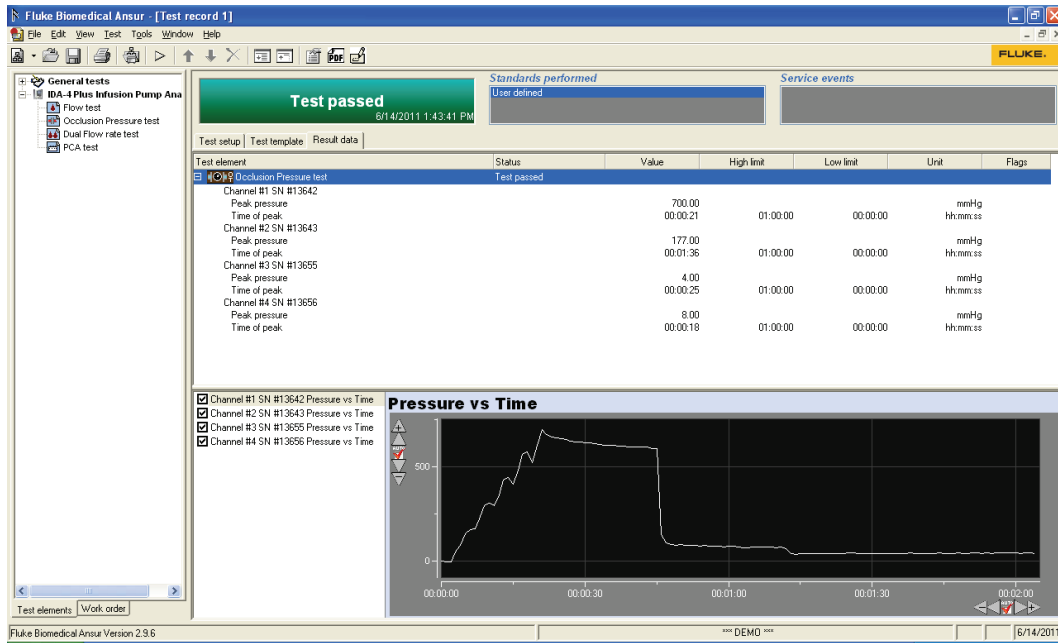
Figure 5-21. Graph Channel Selection

gjb36.bmp

Click on the channel you want to graph. When you select a channel for a graph view, the IDA-4 Plus number, serial number of the infusion pump connected to the channel, and the channel number are shown in the title bar of the Test Guide window.

### Viewing Multiple Channel Test Results

Figure 5-22 shows how results data for multiple channel testing is shown in the display.

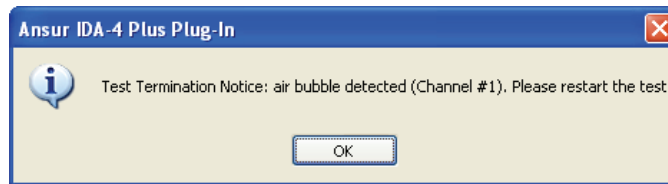


**Figure 5-22. Multiple Channel Test Results Screen**

gjb33.bmp

### **Bubble, Airlock, and Overpressure Messages**

When a bubble, airlock, or overpressure is detected, the test stops and the message box shown in Figure 5-23 shows in the display. The bubble or airlock must be cleared before the test is restarted.



**Figure 5-23. Bubble, Airlock, or Overpressure Message**

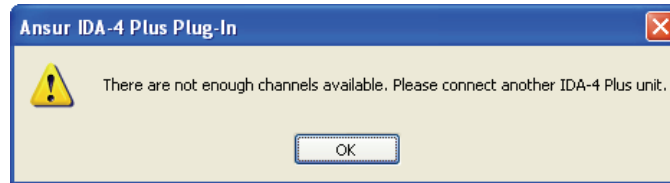
gjb81.bmp



### Connecting IDA-4 Instruments

To connect to three IDA-4 instruments, three COM ports need to be available on the PC.

If **Channel Select** is set to 6 and only one IDA-4 is connected, the Plug-In will show the message shown in Figure 5-24 to prompt the user to connect another IDA-4 instrument.



gjb73.bmp

Figure 5-24. Connect Another Instrument Message Box

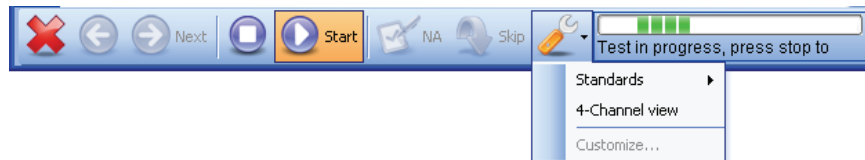
The channel numbers allocation for the three IDA-4 instruments is in incremental order of COM ports

- COM1 – Channel 1, Channel 2, Channel 3, Channel 4.
- COM2 – Channel 5, Channel 6, Channel 7, Channel 8.
- COM3 – Channel 9, Channel 10, Channel 11, Channel 12.

### 4-Channel View

The Plug-In can show up to four infusion pump channels at one time. To show four channels:

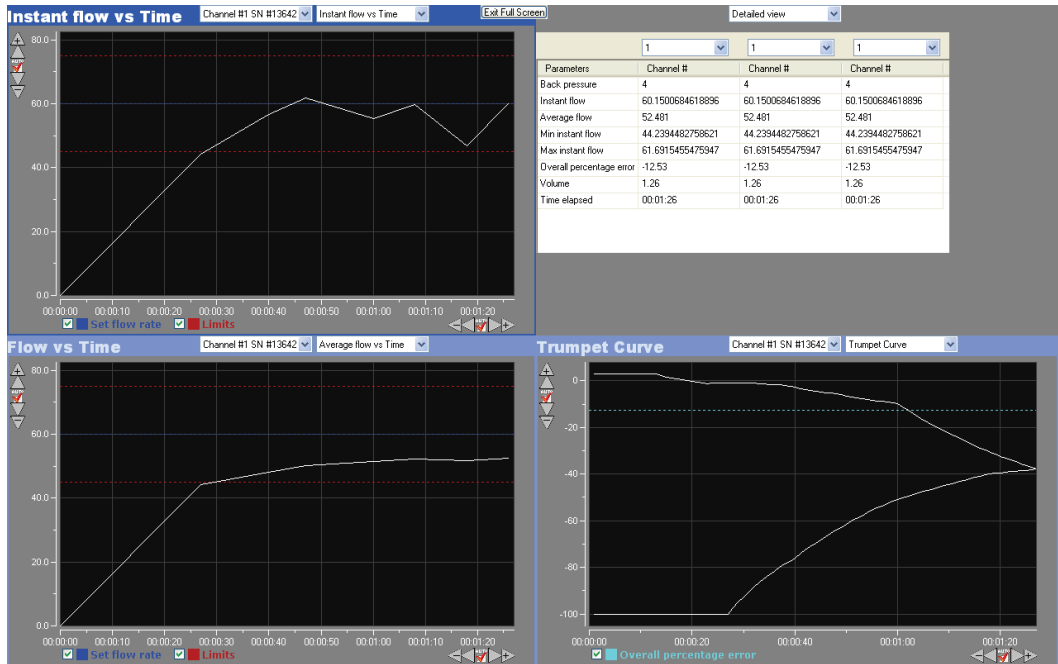
Click on the Tools button (🔧) at the bottom of the Test Guide window.



Gjb82.bmp

Figure 5-25. 4-Channel View Selection

Click on **4-Channel view** in the drop-down list to open the four-panel screen shown in Figure 5-26.



gjb82.bmp

**Figure 5-26. 4-Channel View**

Use the left combo box at the top of a viewing pane to select the channel you want to show in that pane. When the Detailed view is selected for a viewing pane, a numeric view of the data is shown in that pane. If applicable, use the right combo box to select the type of graph in each viewing pane.