

Waters ACQUITY UPLC™ System

Installation Checklist

Introduction

The ACQUITY UPLC™ System Installation Checklist is completed by a Waters engineer during the installation of the system. The purpose of the document is:

- To ensure that all the necessary steps are followed during the installation.
- To provide proof of professional installation by a Waters engineer.
- To demonstrate performance of the new ACQUITY UPLC™ System to the customer.
- To ensure that the customer is trained to a sufficient level to allow basic operation of the system.

A signed copy of the checklist is left with the customer at the end of the installation to document the installation and testing of the system.

The ACQUITY UPLC™ System has been properly installed and has passed the appropriate performance tests.	
Company:	Component Serial Numbers
Address:	Binary Solvent Manager:
.....	Sample Manager:
.....	Column Heater Module:
	2 nd Sample Manager (optional):
	2 nd Column Heater Module:
	TUV Detector (optional):
	PDA Detector (optional):
	Sample Organizer (optional):
	Mass Spectrometer (optional):
	MassLynx PC:
	Empower PC:
Customer's Name:	Engineer's Name:
Tel:	Signature:
Signature:	Installation Date:

Waters

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ACQUITY UPLC™ System

The shipping containers or unpacked items are not damaged. Report any damage to Waters. ☐

All the components required for the installation are present. Report any discrepancies. ☐

The system components are properly positioned in their final location. ☐

The test samples are available. ☐

For detail on the set up of any of the ACQUITY UPLC™ System components, please refer to the *Waters ACQUITY UPLC™ System Operator's Guide* or *Waters ACQUITY UPLC™ System Startup Video CD*. Also, for detail in using Empower or MassLynx software refer to their respective user documentation. Refer to the *Waters Ethernet Instrument Getting Started Guide* for detail on setup and control of Waters ethernet instruments.

ACQUITY UPLC™ Binary Solvent Manager Setup

Signal Connections

The Ethernet cable is connected from the Binary Solvent Manager to the 8-Port Ethernet Switch. ☐

Analog I/O connections required by the application (if applicable) are made to the terminal strip connectors and inserted into the back of the Binary Solvent Manager. ☐

The AC power cable is connected from the rear of the Binary Solvent Manager to a suitable electrical outlet. *Do not power up the Binary Solvent Manager until all fluidic and signal connections are complete.* ☐

Fluidic Connections

Solvent inlet supply lines (labelled Solvent A1, A2, B1 and B2) are plumbed from the in-line degasser to the appropriate solvent reservoirs. ☐

The plunger seal-wash inlet line (brown label) is plumbed to the plunger-seal wash reservoir. ☐

Note: See the *Operator's Guide* for choice of appropriate solutions for plunger-seal, strong and weak needle-washes.

The stainless steel pump outlet tubing (blue label) is plumbed from the Binary Solvent Manager mixer outlet to port # 5 on the inject valve of the Sample Manager. ☐

The drain fitting is installed on the drip tray. ☐

The waste line is plumbed from the drain of the drip tray to a waste container positioned below the Binary Solvent Manager. The waste line is free of any traps. ☐

Use the 1/4-inch high feet on the Binary Solvent Manager to allow placement under the Sample Organizer exterior shelf.

ACQUITY UPLC™ Sample Manager and Column Heater Module Setup

The foam block is removed from the XYZ compartment of the Sample Manager.



The sample plate holders are put into place.



The Column Heater Module door is properly positioned for the application (closed or in swing-out position for use with mass spectrometer).



Signal Connections

The Ethernet cable is connected from the Sample Manager to the 8-Port Ethernet Switch.



Analog I/O connections required by the application (if applicable) are made to the terminal strip connector and inserted into the back of the Sample Manager.



The eCord is connected to the Column Heater Module.



The AC power cable is connected from the rear of the Sample Manager and to a suitable electrical outlet. *Do not power up the Sample Manager until all fluidic and signal connections are complete.*



Fluidic Connections

The strong (white label) and weak (orange label) needle-wash lines are plumbed from the Sample Manager to the appropriate in-line degasser channels in the Binary Solvent Manager.



The strong and weak needle-wash supply lines are plumbed from the in-line degasser channels in the Binary Solvent Manager to the needle-wash reservoirs.



The stainless steel injector outlet tube assembly is plumbed from port # 6 of the inject valve to the appropriate column inlet.



ACQUITY UPLC™ TUV or PDA Detector Setup

Signal Connections

If using the TUV detector, the Ethernet cable is connected from the TUV to the 8-Port Ethernet Switch. ☐

Analog I/O connections required by the application (if applicable) are made to the terminal strip connector and inserted into the back of the detector. ☐

If using a PDA, a contact closure cable is connected from the Sample Manager to the PDA to trigger acquisition. ☐

The AC power cable is connected from the rear of the detector and to a suitable electrical outlet. *Do not power up the detector until all fluidic and signal connections are complete.* ☐

If Using Empower:

If using the PDA detector, the National Instruments IEEE to Ethernet converter box is installed and configured. ☐

If using the PDA detector, the IEEE-488 cable is connected from the PDA to the National Instruments IEEE to Ethernet converter box. The Ethernet cable is then connected from the IEEE to Ethernet converter box to the 8-Port Ethernet Switch. ☐

If Using MassLynx:

If using the PDA detector, the IEEE-488 cable is connected directly to the GPIB board in a MassLynx acquisition computer. ☐

Fluidic Connections

The detector flow cell is installed. ☐

If Using a TUV or PDA Only:

The appropriate column outlet tube assembly is plumbed from the column outlet to the detector inlet. ☐

- For TUV Low Flow Cell: 0.0025 in. ID; 6.0 in. length; PEEK
- For TUV Standard Flow Cell: 0.004 in. ID; 6.0 in. length; PEEK
- For PDA Low Flow Cell: 0.0025 in. ID; 10.5 in. length; PEEK
- For PDA Standard Flow Cell: 0.004 in. ID; 10.5 in. length; PEEK

The short tubing of the back pressure regulator is attached to the outlet of the flow cell and the longer outlet tubing is plumbed to an appropriate waste container. ☐

If Using a TUV or PDA with a Mass Spectrometer:

The appropriate column outlet tube assembly is plumbed from the column outlet to the detector inlet. ☐

- For TUV Low Flow Cell: 0.0025 in. ID; 6.0 in. length; PEEK
- For TUV Standard Flow Cell: 0.004 in. ID; 6.0 in. length; PEEK
- For PDA Low Flow Cell: 0.0025 in. ID; 10.5 in. length; PEEK
- For PDA Standard Flow Cell: 0.004 in. ID; 10.5 in. length; PEEK

The detector outlet is plumbed to the mass spectrometer inlet (0.005 in. or sufficient ID to not exceed the 1000 psi pressure limit of the flow cell; 22 in. length; PEEK). ☐

The waste tubing is plumbed from the outlet of the mass spectrometer to an appropriate waste container. ☐

ACQUITY UPLC™ Mass Spectrometer Setup

Signal Connections

Ethernet cables are connected from the ZQ, EMD 1000, LCT Premier, Quattro Premier, Q-tof Micro or Q-tof Premier to the 8-Port Ethernet Switch. ☐

Note: *The external 8-Port Ethernet Switch used with the ACQUITY UPLC System will configure itself appropriately for the device attached, regardless of which style ethernet cable is in use.*

A contact closure cable is connected from the Sample Manager to the mass spectrometer to trigger acquisition. ☐

Fluidic Connections

The appropriate column outlet tube assembly is plumbed from the column outlet to the mass spectrometer inlet (0.0025 in.; PEEK). ☐

Note: *If operating at high flow and need to split flow, a larger internal diameter tubing may be required.*

The waste tubing is plumbed from the outlet of the mass spectrometer to an appropriate waste container. ☐

For further detail on mass spectrometer setup, refer to the specific Installation Checklist for the mass spectrometer you are using.

ACQUITY UPLC™ Solvent Tray Module Setup

The Solvent Tray Module is positioned on the top module (usually above the detector).



The mobile phase and needle-wash reservoirs are placed in the Solvent Tray Module.



The drain tubing is routed from the rear of the Solvent Tray Module to a suitable waste container.



ACQUITY UPLC™ Sample Organizer Setup (if applicable)

Installation

The lift handles are removed from the Sample Organizer.



The outboard leg is attached to the base plate.



The exterior support shelf is attached to the outboard leg and to the side of the Sample Organizer.



The Binary Solvent Manager is positioned on the base plate.



The Sample Manager is positioned on the support shelf.



The Sample Manager is docked to the Sample Organizer.



The Autosampler Transfer Shuttle (ATS) is installed in the Sample Organizer.



The pneumatic tubing from the ATS is connected to the flow controls on the ATS harness assembly.



The Home and Away sensor switch cables from the ATS are connected to ATS shuttle.



The ATS Home hard stop and ETS (Elevator Transfer Shuttle) Away hard stop are set.



The flow controls are set for the ATS and ETS.



The internal shelves are installed and tested.



The regulator of the pneumatic assembly is set between 65 - 75 psi and there are no leaks.



The left side panel is in place.



The waste tubing is routed from the drain of the filter drainage assembly to a suitable waste container.



Signal Connections

The Ethernet cable is connected from the Sample Organizer to the 8-Port Ethernet Switch.



The AC power cable is connected from the rear of the Sample Organizer and to a suitable electrical outlet. *Do not power up the Sample Organizer until all signal connections are complete.*



Acquisition Computer Setup (Empower or MassLynx Control)

The following setup scenarios reflect the various configurations that may present themselves in the field. They include the Waters preconfigured computers purchased with the system, to the existing and non-Waters purchased computers at the customer site. Proceed to the appropriate acquisition computer set up checklist.

ACQUITY UPLC™ System Including Preconfigured Acquisition Computer (Empower)

- The Ethernet cable is connected from the Instrument Lan card to the 8-Port Ethernet Switch. ☐
- Verify for Empower (build 1154 only), that the ACQUITY Service Pack (includes Waters DHCP server) is installed on the acquisition computer. ☐
- Note:** *The ACQUITY Service Pack must be installed prior to installation of the Instrument Control Software.*
- The Instrument Control Software (instrument software drivers) is installed on the acquisition computer for every instrument in the system. ☐
- The Waters DHCP Server is configured for the acquisition computer. ☐
- The ACQUITY UPLC instruments are recognized by Empower software. ☐
- If applicable, the acquisition computer is configured for a mass spectrometer (includes adding Micromass user accounts; adding and configuring Internet Information Services, IIS). ☐

ACQUITY UPLC™ System Including Preconfigured Acquisition Computer (MassLynx)

- The Ethernet cable is connected from the Instrument Lan card to the 8-Port Ethernet Switch. ☐
- MassLynx Service Pack 4 is installed. ☐
- Note:** *Service Pack 4 must be installed prior to installation of the Instrument Control Software.*
- The Instrument Control Software (instrument software drivers) is installed on the acquisition computer for every instrument in the system. ☐
- The Waters DHCP Server is configured for the acquisition computer. ☐
- Any supplied mass spectrometer options are defined. ☐
- The ACQUITY UPLC instruments are recognized by MassLynx software. ☐

Acquisition Computers Not Purchased from Waters (Empower or MassLynx)

- The second network card (Instrument Lan) is installed in the acquisition computer (Empower and MassLynx). ☐
- The Instrument Lan card is configured and renamed for easy identification (Empower and MassLynx). ☐
- The Ethernet cable is connected from the Instrument Lan card to the 8-Port Ethernet Switch (Empower and MassLynx). ☐
- Empower or MassLynx software is installed. ☐
- For Empower (build 1154), the ACQUITY Service Pack (includes Waters DHCP server) is installed on the acquisition computer. ☐
- Note:** *The ACQUITY Service Pack must be installed prior to installation of the Instrument Control Software.*
- For MassLynx, Service Pack 4 is installed on the acquisition computer. ☐
- Note:** *Service Pack 4 must be installed prior to installation of the Instrument Control Software.*
- The Waters DHCP server is configured (Empower and MassLynx). ☐
- The Instrument Control Software (instrument software drivers) is installed on the acquisition computer for every instrument in the system (Empower and MassLynx). ☐
- The ACQUITY UPLC instruments are recognized (Empower and MassLynx). ☐
- For Empower and MassLynx, acquisition computers are configured for mass spectrometers. This includes adding Micromass user accounts, and adding and configuring Internet Information Services (IIS). ☐

Existing Acquisition Computers with Empower or MassLynx

MassLynx software supports use of only single system configuration. Unlike Empower software where a system can be taken on or off-line in the software, MassLynx requires the existing system to be physically removed from the acquisition computer and 8-Port Ethernet Switch before installing an ACQUITY UPLC™ System.

The second network card (Instrument Lan) is installed in the acquisition computer (Empower only, unless currently using with a mass spectrometer). ☐

The Instrument Lan card is configured and renamed for easy identification (Empower only, unless currently using with a mass spectrometer). ☐

The Ethernet cable is connected from the Instrument Lan card to the 8-Port Ethernet Switch (Empower and MassLynx). ☐

For Empower (build 1154), the ACQUITY Service Pack (includes Waters DHCP server) is installed on the acquisition computer. ☐

Note: *The ACQUITY Service Pack must be installed prior to installation of the Instrument Control Software.*

For MassLynx, Service Pack 4 is installed on the acquisition computer. ☐

Note: *Service Pack 4 must be installed prior to installation of the Instrument Control Software.*

The Waters DHCP server is configured (Empower only, unless currently using with a mass spectrometer). ☐

The Instrument Control Software (instrument software drivers) is installed on the acquisition computer for every instrument in the system (Empower and MassLynx). ☐

The ACQUITY UPLC instruments are recognized (Empower and MassLynx). ☐

For Empower, the acquisition computer is configured for a mass spectrometer (unless currently using with a mass spectrometer). Includes adding Micromass user accounts, and adding and configuring Internet Information Services (IIS). ☐

ACQUITY UPLC™ System Powerup and Verification Tests

Power-up

Perform the following during the customer orientation session.

The solvent reservoirs are placed in the Solvent Tray Module.

☐

The acquisition computer successfully boots into Windows.

☐

The ACQUITY UPLC instruments are powered ON and initialization diagnostics pass.

☐

Empower or MassLynx (if applicable) software boots successfully.

☐

The ACQUITY UPLC instruments are recognized by the acquisition software.

☐

A chromatographic system is configured in Empower or MassLynx.

☐

The XYZ mechanism in the Sample Manager is calibrated.

☐

The Binary Solvent Manager solvent lines and plunger-seal wash are primed.

☐

The Sample Manager's injector, sample syringe, and strong and weak wash syringes are primed.

☐

The Sample Manager's seal calibration has been performed.

☐

Needle Seal Calibration passed.

☐

Pressure: _____ psi

Offset: _____ mm

Confirmed by:

Waters Engineer: _____ **Customer:** _____ **Date:** _____

The Sample Manager's system volume is calibrated and the results are as follows:

☐

- System Volume with Loop: _____ uL
- System Volume without Loop: _____ uL

The Sample Manager needle passed.

☐

- Measured Volume: _____ uL

The Sample Manager Loop Volume passed.

☐

- Measured Volume: _____ uL

Confirmed by:

Waters Engineer: _____ **Customer:** _____ **Date:** _____

System Verification Tests

The System Verification Tests will consist of performing the system precision and gradient performance tests. Performing these tests will help verify that the ACQUITY™ UPLC System is functioning according to its design specifications. Additionally, it will produce test results that meet the minimum standards for accuracy and precision.

The 90:10 water/acetonitrile mobile phase has been prepared and solvent lines A1 and B2, the strong and weak needle-wash lines, and the plunger-seal wash line have been added. ☐

Note: For the system verification tests, the weak and strong washes will both be 90:10 water/acetonitrile. Other applications may require stronger wash solvents to prevent carryover.

Solvent lines A2 and B1 have been placed into 100% acetonitrile. ☐

The ACQUITY UPLC Hybrid column (2.1 x 50 mm) is connected and placed in the column heater. ☐

Note: Do not connect the outlet of the column until the it is properly flushed with 100% acetonitrile.

Note: The direction of the flow is very important. If the column is installed in the wrong direction, the packing material will become disturbed resulting in loss of efficiency and possible damage to the detector flow cell.

The Binary Solvent Manager solvent lines have been primed for 10 minutes each. ☐

The Binary Solvent Manager seal wash has been primed for several minutes. ☐

The Sample Manager has been primed at least 5 times. ☐

The seal calibration has been performed in the Sample Manager. ☐

The system volume has been calibrated in the Sample Manager. ☐

Note: Additionally, calibrate the system volume whenever you change the mobile phase, wash solvents, sample loop, needle or any of the syringes.

The ACQUITY UPLC Hybrid column is flushed before connecting the outlet to the detector. ☐

A mobile phase blank, system precision and gradient performance samples are put into the Sample Manager. ☐

System Precision Test

The following methods are described for Empower software. Use the same parameters if performing the System Verification procedures with MassLynx software.

An Instrument Method with the following Binary Solvent Manager parameters has been created for the system precision test (Figure 1).

Note: The Binary Solvent Manager parameters will be the same whether using the TUV or PDA.

The screenshot shows the 'Acquity Binary Solvent Manager' window. The title bar reads 'System Precision_2996 in ACQUITY_UPLC_START_UP as System/Administrator - Instr...'. The menu bar includes 'File', 'Edit', 'View', and 'Help'. The toolbar contains icons for file operations and a help icon. Below the toolbar are three buttons: 'Acquity UPLC Binary Solvent Manager (ACQ-BSM)', 'Acquity UPLC Sample Manager (ACQ-SM)', and 'Acquity UPLC 2996 Detector (ACQ-2996)'. The main window has tabs for 'General', 'Data', 'Analog Out', and 'Events', with 'General' selected. The 'General' tab contains the following sections:

- Solvents:** Two solvent entries are shown. Entry 1 has solvent 'A1' and composition '10/90 ACN/water'. Entry 2 has solvent 'B2' and composition '10/90 ACN/water'.
- Pressure Limits:** Low: 1000 psi, High: 15000 psi.
- Seal Wash:** 5.0 min.
- Comment:** An empty text field.
- Gradient:** A table with 6 rows and 6 columns: Time (min), Flow (mL/min), %A, %B, and Curve.

	Time (min)	Flow (mL/min)	%A	%B	Curve
1	Initial	0.400	50.0	50.0	Initial
2	30.00	0.000	50.0	50.0	11
3					
4					
5					
6					

The status bar at the bottom left indicates 'Ready'.

Figure 1 System Precision Parameters for the Binary Solvent Manager

An Instrument Method with the following Sample Manager parameters has been created for the system precision test (Figure 2).

The following **Advanced** parameters have been set:

- the syringe draw rate has been set to 100 $\mu\text{L}/\text{min}$.
- the pre-aspirate and post-aspirate air gaps have been set to 4 μL

Note: The Sample Manager parameters will be the same whether using the TUV or PDA.

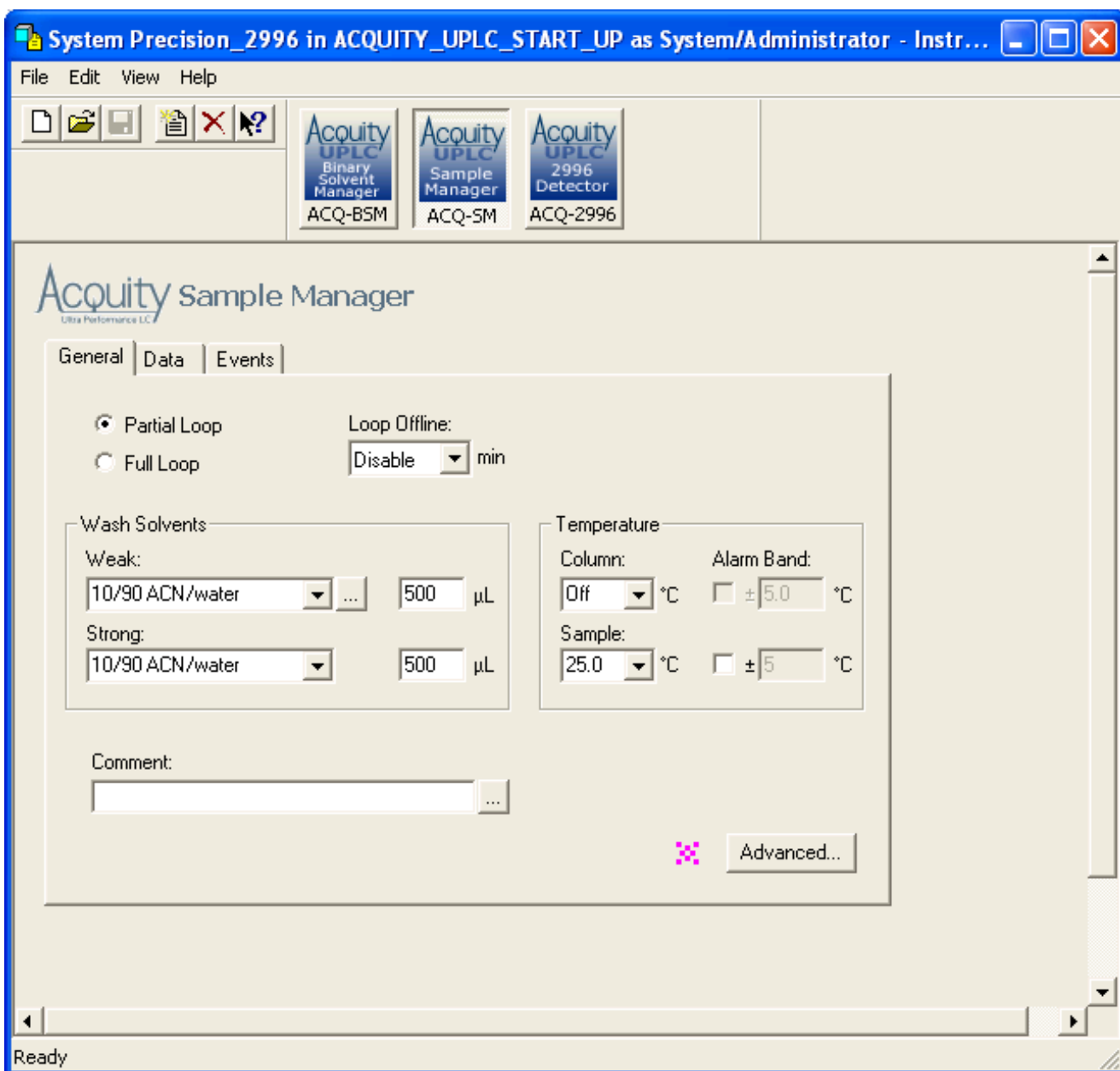


Figure 2 System Precision Parameters for the Sample Manager

If using the PDA, an Instrument Method with the following parameters has been created for the system precision test (Figure 3).

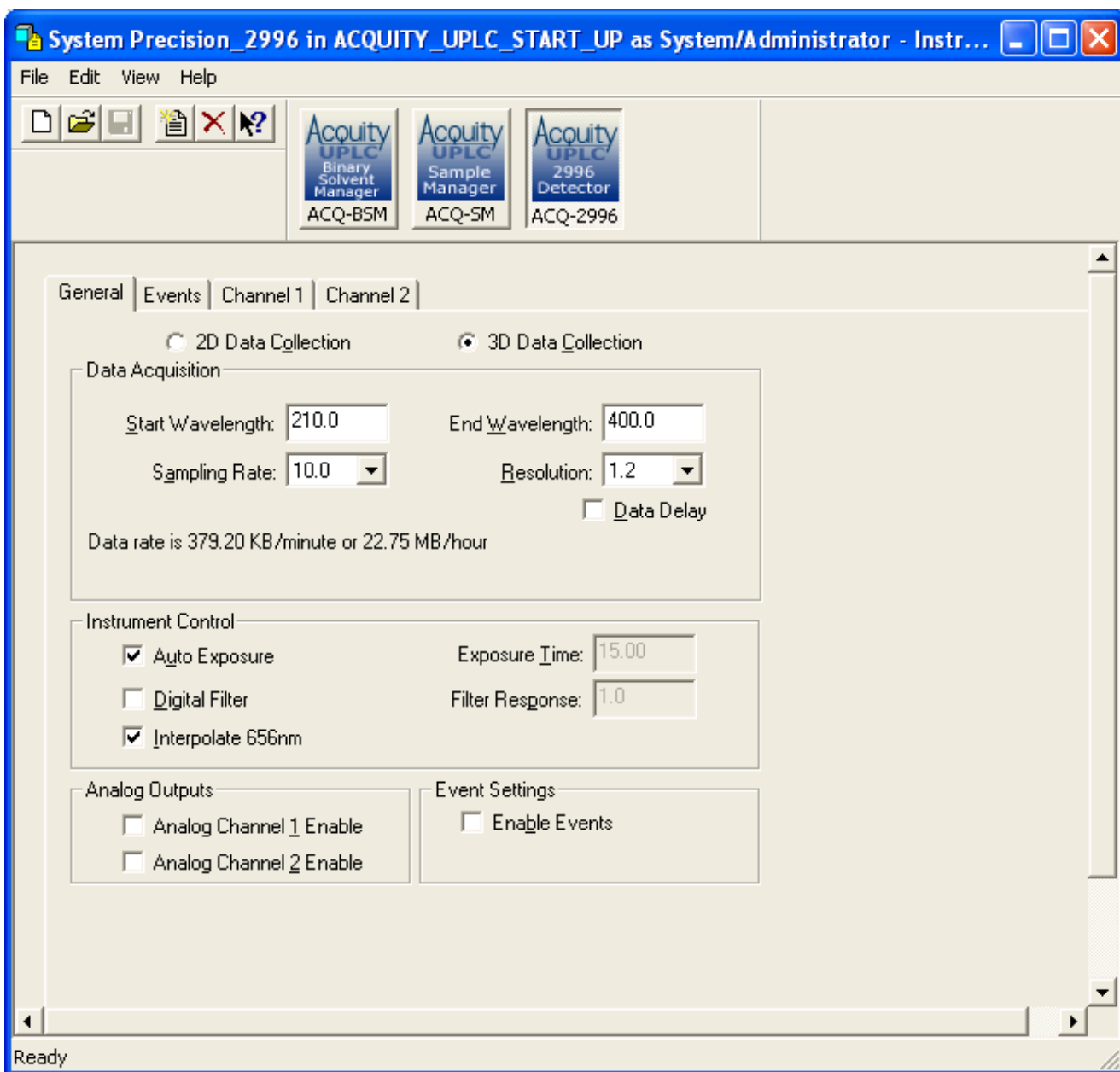


Figure 3 System Precision Parameters for the PDA

If using the TUV, an Instrument Method with the following parameters has been created for the system precision test (Figure 4).

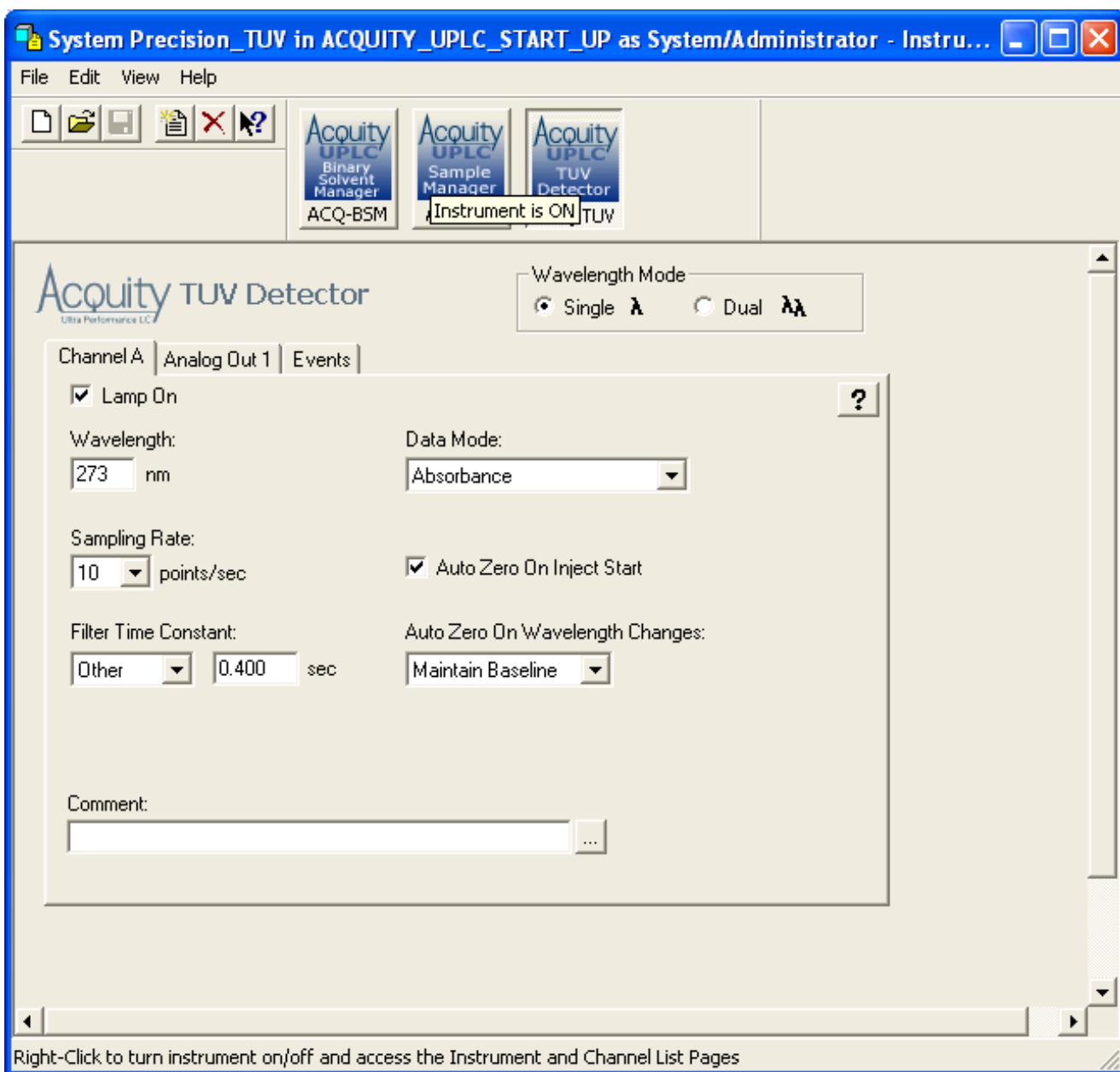


Figure 4 System Precision Parameters for the TUV

A Sample Set Method has been created for the system precision test.



Note: The Sample Set Method parameters (Inj Vol., # of Injs, Function, Run Time, and Next Inj, Delay) will be the same whether using the TUV or PDA. However, the method set and report methods will vary. Before acquiring, ensure that you choose the appropriate method set.

Note: If using the PDA, you will need to derive a channel at 273 nm in the method set.

The sample set parameters are as follows:

- Equilibrate once
- Injection volume = 5 uL
- # of Injections = 6
- Run time = 2.0 minutes

System Precision Test Results

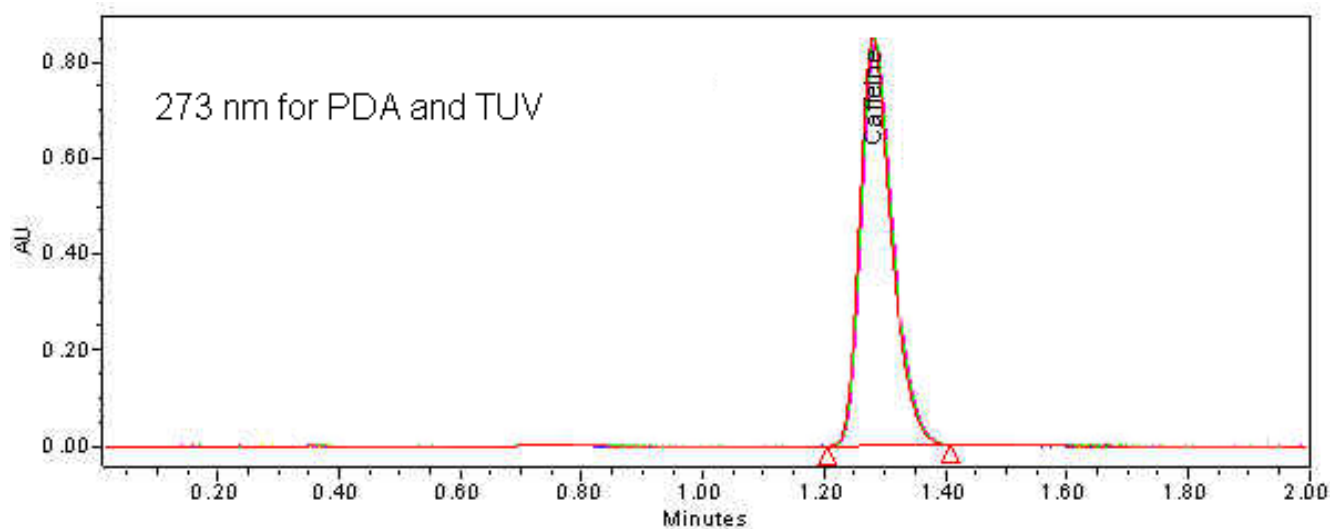


Figure 5 System Precision Chromatogram

The system precision tests have been run with the supplied test sample.



The peak is symmetrical, integrated and identified correctly.



The peak retention times for caffeine over six replicate injections, have a standard deviation of less than or equal to 1.0 second.



<i>Retention Time Reproducibility (Six Replicates)</i>			
Peak	Peak Retention Time Mean Value	%RSD	Acceptable %RSD

Confirmed by:

Waters Engineer: _____ Customer: _____ Date: _____

The peak areas over six replicate injections have a %RSD less than or equal to 0.9%.



<i>Peak Area Reproducibility (Six Replicates)</i>			
Peak	Peak Area Mean Value	%RSD	Acceptable %RSD

Confirmed by:

Waters Engineer: _____ Customer: _____ Date: _____

The peak heights over six replicate injections have a %RSD less than or equal to 0.5%.



<i>Peak Height Reproducibility (Six Replicates)</i>			
Peak	Peak Height Mean Value	%RSD	Acceptable %RSD

Confirmed by:

Waters Engineer: _____ Customer: _____ Date: _____

Gradient Performance Test

The following methods are described for Empower software. Use the same parameters if performing the System Verification procedures with MassLynx software.

An Instrument Method with the following Binary Solvent Manager parameters has been created for the gradient performance test (Figure 6).

Note: The Binary Solvent Manager parameters will be the same whether using the TUV or PDA.

The screenshot displays the 'Acquity Binary Solvent Manager' window. The title bar reads 'Gradient A1B1TUV in ACQUITY_UPLC_START_UP as System/Administrator - Instrume...'. The menu bar includes 'File', 'Edit', 'View', and 'Help'. The toolbar contains icons for file operations and a help icon. Below the toolbar are three buttons: 'Acquity UPLC Binary Solvent Manager (ACQ-BSM)', 'Acquity UPLC Sample Manager (ACQ-SM)', and 'Acquity UPLC TUV Detector (ACQ-TUV)'. The main window has tabs for 'General', 'Data', 'Analog Out', and 'Events', with 'General' selected. In the 'General' tab, the 'Solvents' section shows 'A1' as solvent 1 (10/90 ACN/water) and 'B1' as solvent 2 (Acetonitrile). The 'Pressure Limits' section shows 'Low: 0 psi' and 'High: 15000 psi'. The 'Seal/Wash' section shows '5.0 min'. A 'Comment' field is empty. The 'Gradient' section contains a table with 6 rows and 6 columns: 'Time (min)', 'Flow (mL/min)', '%A', '%B', and 'Curve'. The table data is as follows:

	Time (min)	Flow (mL/min)	%A	%B	Curve
1	Initial	0.500	95.0	5.0	Initial
2	3.00	0.500	5.0	95.0	6
3	3.50	0.500	5.0	95.0	6
4	4.00	0.500	95.0	5.0	6
5	30.00	0.000	95.0	5.0	11
6					

The status bar at the bottom left shows 'Ready'.

Figure 6 Gradient Performance Parameters for the Binary Solvent Manager

An Instrument Method with the following Sample Manager parameters has been created for the gradient performance test (Figure 7).

The following **Advanced** parameters have been set:

- the syringe draw rate has been set to 100 $\mu\text{L}/\text{min}$.
- the pre-aspirate and post-aspirate air gaps have been set to 4 μL

Note: The Sample Manager parameters will be the same whether using the TUV or PDA.

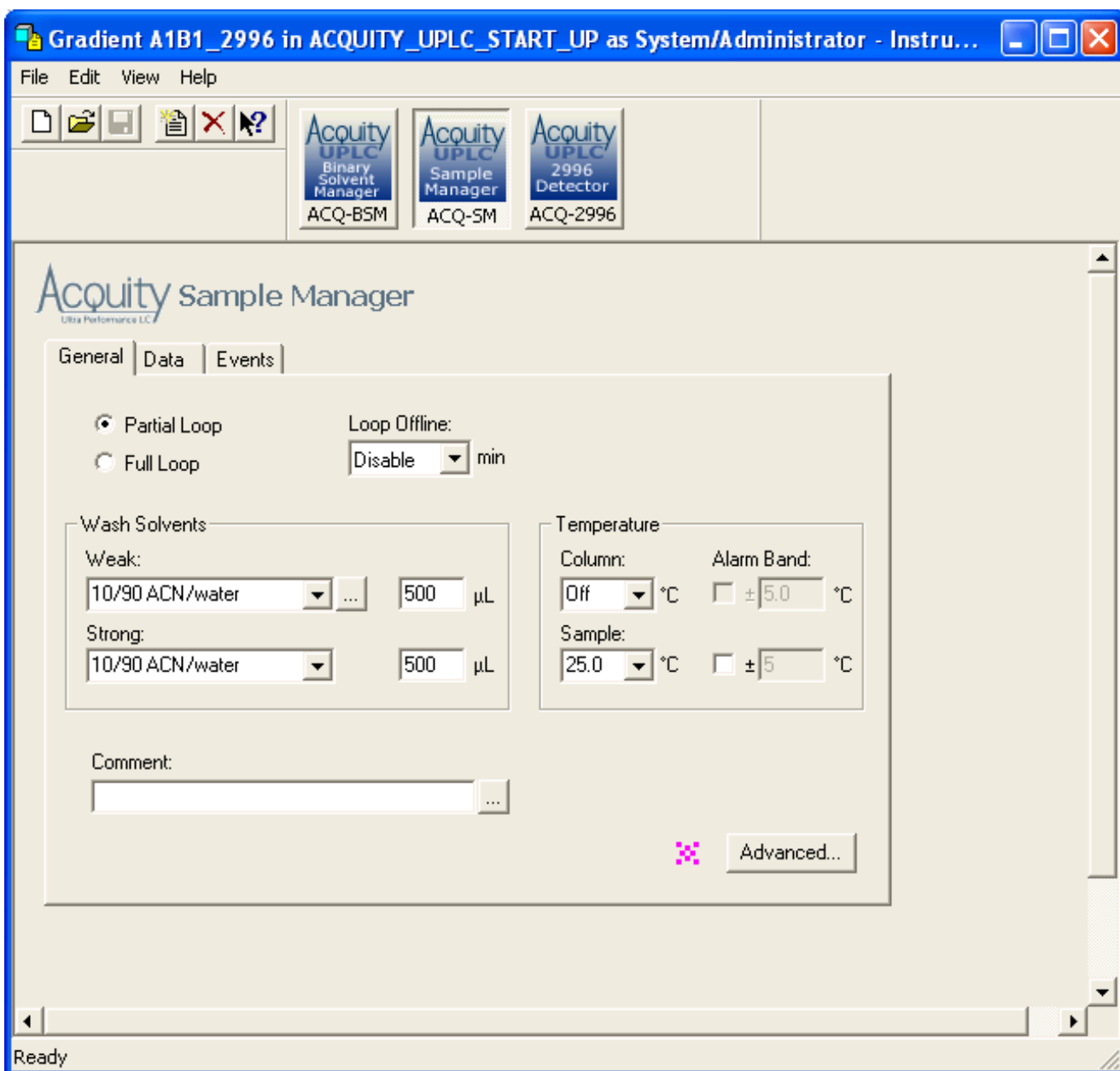


Figure 7 Gradient Performance Parameters for the Sample Manager

If using the PDA, an Instrument Method with the following parameters has been created for the gradient performance test (Figure 8).

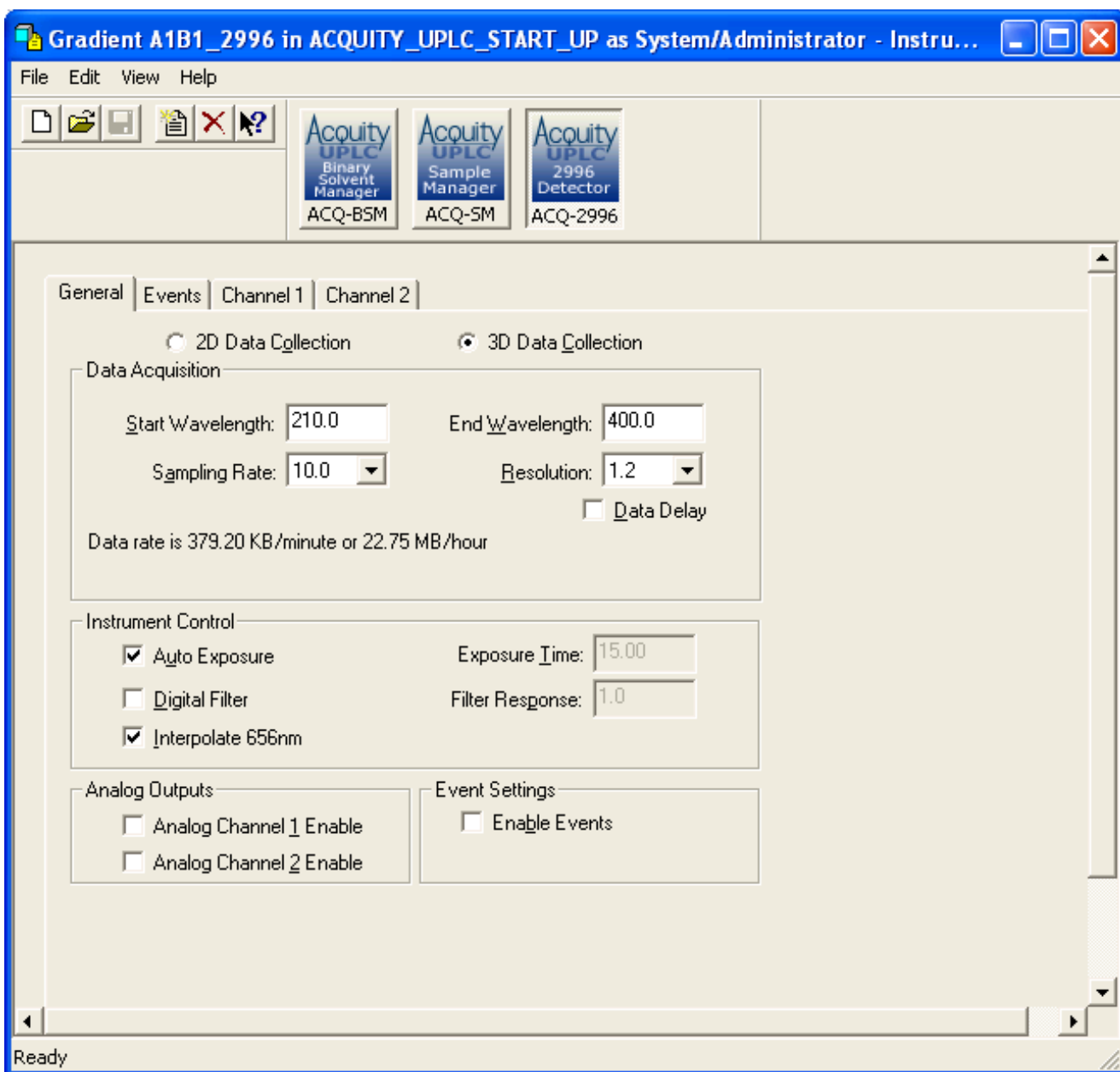


Figure 8 Gradient Performance Parameters for the PDA

If using the TUV, an Instrument Method with the following parameters has been created for the gradient performance test (Figure 9).

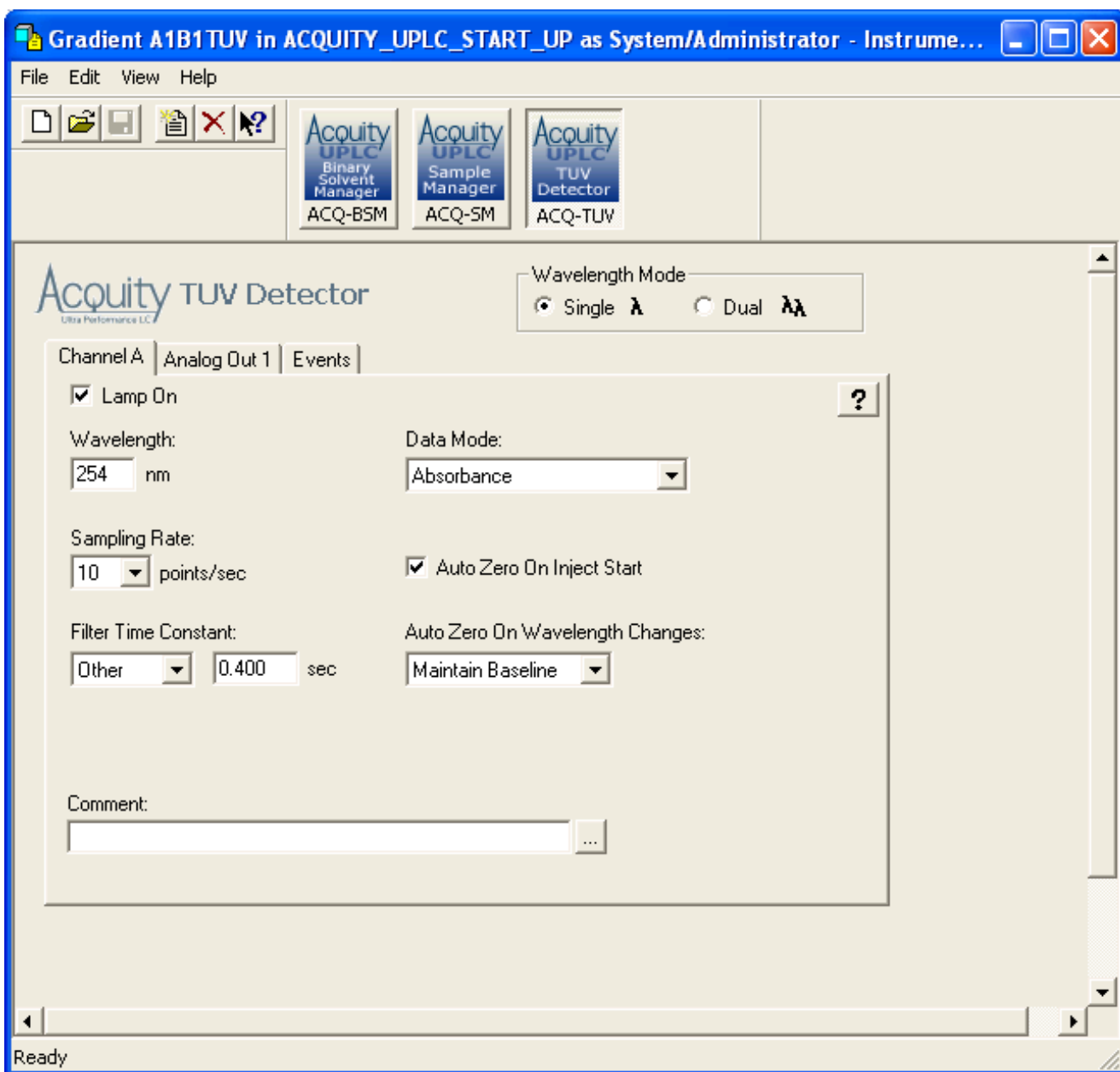


Figure 9 Gradient Performance Parameters for the TUV

A Sample Set Method has been created for the gradient performance test.



Note: The Sample Set Method parameters (Inj Vol., # of Injs, Function, Run Time, and Next Inj, Delay) will be the same whether using the TUV or PDA. However, the method set and report methods will vary. Before acquiring, ensure that you choose the appropriate method set.

Note: If using the PDA, you will need to derive a PDA MaxPlot in the method set.

The sample set parameters are as follows:

- Condition Column once (Run time = 6.0 minutes)
- Injection volume = 10 uL
- # of Injections = 3
- Run time = 4.0 minutes (w/ Next Inj. Delay = 2.5 minutes)

Gradient Performance Test Results

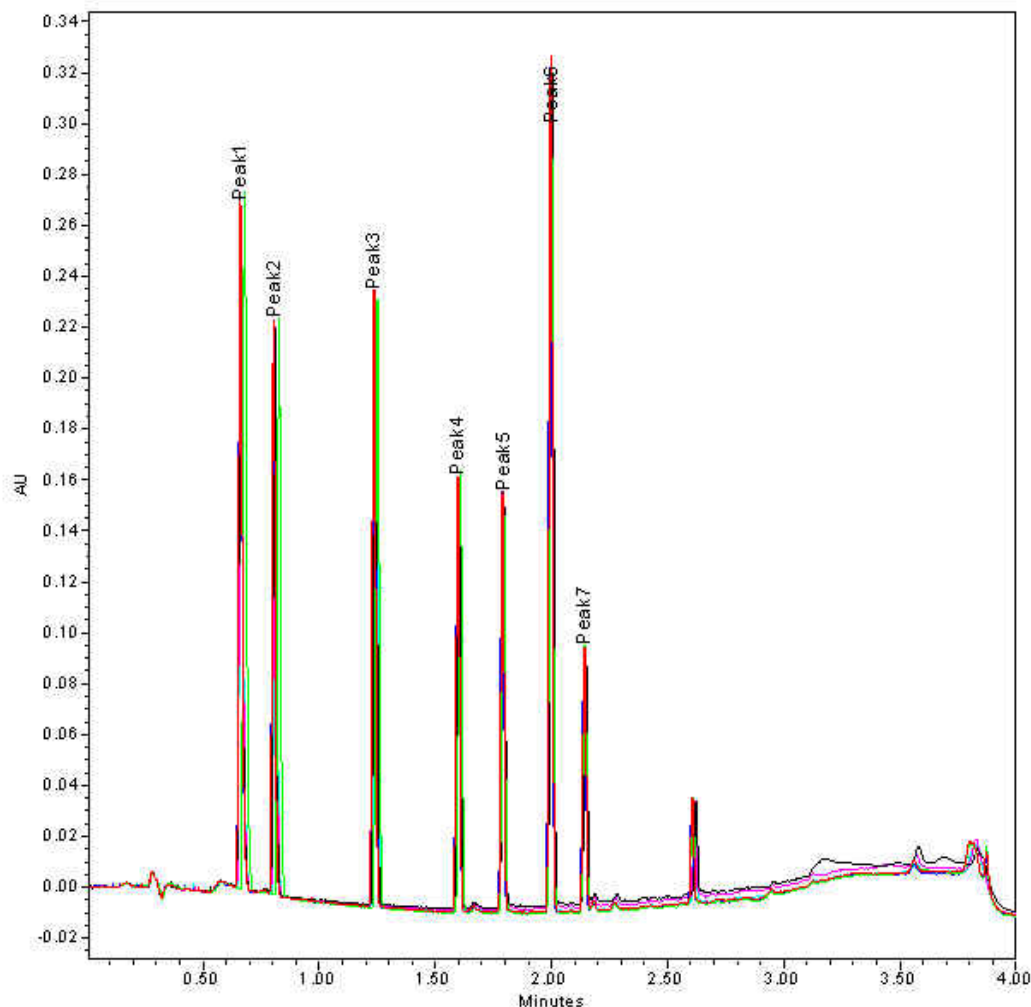


Figure 10 Gradient Performance Chromatogram

The gradient performance tests have been run with the supplied test samples.



The peaks are symmetrical, integrated and identified correctly.



The peak retention times over three replicate injections, have a standard deviation of less than or equal to 2.0 seconds.



<i>Retention Time Reproducibility (Three Replicates)</i>			
Peak	Peak Retention Time Mean Value	%RSD	Acceptable %RSD

Customer Training

The Waters engineer will introduce the following topics while demonstrating the system performance specifications. Waters intends only to provide familiarization with the basic operation and maintenance of the system, and does not attempt to provide comprehensive training during installation. For full details of training courses available, please contact your Waters representative.

Overview

Safety around the high pressure system.



Emergency shutdown.



Identify instruments.



Explain flow path through the system.



Identify drip management system in each component.



System covers and panels.



Instrument - PC Connections

Electrical connections.



Ethernet connection from PC to 8-Port Ethernet Switch.



Ethernet connections from 8-Port Ethernet Switch to instruments.



IEEE connection from PDA to National Instruments IEEE to Ethernet converter box.



Ethernet connection from National Instruments IEEE to Ethernet converter box to 8-Port Ethernet Switch.



Analog I/O connections.



Fluidic connections.



Column connections (fluidic and eCord).



In-line degasser connections.



Starting up and shutting down the Empower or MassLynx PC.



Using ping to test the TCP/IP link between the Empower/MassLynx PC and the embedded PC.



Communications state within Empower/MassLynx.



Basic Operation

Switching the system components ON and OFF.



Configuring a chromatographic system in Empower or MassLynx software.



Customer was shown how to make Instrument, Method Set, and Sample Set methods in Empower software.



Customer was shown how to use the Inlet Configuration, Inlet Method Editor, Sample List, Review Chromatogram and Preview Spectrum windows in MassLynx software.



Customer was shown how to initiate a chromatographic analysis.



Customer was shown how to review results and generate a report.



ACQUITY UPLC™ System Console

Customer was shown how to access the ACQUITY UPLC System Console.



Overview of features.



ACQUITY UPLC™ Binary Solvent Manager

Overview of operation.



Setting the flow rate.



Priming the solvent lines and plunger-seal wash.



Maintenance



ACQUITY UPLC™ Sample Manager and Column Heater Module

Overview of operation.



Priming the injector, sample syringe, and strong and weak wash syringes.



Calibrating the seal.



Calibrating the needle/system volume.



Installing the column.



Use/Loading of sample and vial plate types.



Sample thermal control.



Column heater control.



Maintenance



ACQUITY UPLC™ Sample Organizer (if applicable)

Overview of operation.



Installing the shelves.



Installing the sample or vial plates.



Maintenance



ACQUITY UPLC™ TUV or PDA Detector

Overview of operation.



Installation of back pressure regulator on outlet of detector.



Maintenance (lamp and flow cell replacement).



For mass spectrometers, refer to the appropriate Installation Checklists.