

# SystemsQT Instrument and System Qualification Setup Procedure for the ACQUITY UPLC System with an ACQUITY PDA, ACQUITY PDA eλ, ACQUITY 2996 PDA, or ACQUITY TUV Detector with/without an ACQUITY ELS Detector

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This setup procedure applies to ACQUITY UPLC systems that include an ACQUITY PDA, ACQUITY PDA eλ, ACQUITY 2996 PDA, or ACQUITY TUV detector with or without an ACQUITY ELS detector. Follow the procedure to prepare a Waters®-installed system for qualification testing. Doing so ensures optimum system performance and excellent chromatographic results.

**Requirement:** Unless they are newly installed, chromatographic systems must have undergone an appropriate performance maintenance procedure before you perform a SystemsQT™ qualification on them.

This procedure requires these items:

- HPLC-grade water
- HPLC-grade acetonitrile
- Dedicated column: ACQUITY UPLC BEH C18 column, 2.1 × 50 mm, 1.7 μm (part number 186002350)
- Waters ACQUITY UPLC System OQ/PQ Test Solutions Kit for:
  - 3-mm and 5-mm flow cells (part number 700004380)
  - 10-mm flow cells (part number 700002642)
  - 25-mm flow cells (part number 700002846)

To maximize efficiency performing this procedure, ensure that these conditions are met:

- All solvent lines contain 100% acetonitrile.
- For the sample manager - FTN, the purge, wash, and seal-wash solutions are compatible with acetonitrile and water.
- For the sample manager, the weak wash, strong wash, and seal wash solutions are compatible with acetonitrile and water.
- The detector is well-flushed with acetonitrile.

You must perform the following manual tests before you perform the automated tests of the SystemsQT, as appropriate for your system configuration:

- Quaternary solvent manager (QSM) flow rate accuracy test
- Binary solvent manager (BSM) flow rate accuracy test

- Sample manager - flow through needle (FTN) heater/cooler temperature accuracy test
- Sample manager heater/cooler temperature accuracy test
- Column manager-A, column manager-Aux, column heater-A, 30-cm column heater-A, column manager, column heater/cooler, 30-cm column heater/cooler, column heater, or HT column heater temperature accuracy test
- Sample organizer heater/cooler temperature test
- Sample organizer plate positioning test

## Preparing the mobile phases

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When changing from a buffered to an organic solvent, follow the recommendations in Appendix D "Solvent Considerations" in the PDF version of the *Waters ACQUITY UPLC System Operator's Guide* before connecting solvent lines.

You must prepare two mobile phases, one of 100% HPLC-grade water, the other of 100% acetonitrile.

### To prepare the 100% HPLC-grade water:

1. Pour approximately 1 L of filtered HPLC-grade water into a 1-L reservoir bottle.
2. Label the reservoir bottle 100% water mobile phase.
3. For the quaternary solvent manager, submerge lines A and C in the reservoir bottle.
4. For the binary solvent manager, submerge lines A1 and A2 in the reservoir bottle.
5. Place the reservoir bottle in the ACQUITY UPLC solvent tray.

### To prepare the 100% acetonitrile:

1. Pour approximately 1 L of filtered acetonitrile into a 1-L reservoir bottle.
2. Label the reservoir bottle 100% acetonitrile mobile phase.
3. For the quaternary solvent manager, submerge lines B and D in the reservoir bottle.
4. For the binary solvent manager, submerge lines B1 and B2 in the reservoir bottle.
5. Place the reservoir bottle in the ACQUITY UPLC solvent tray.

## Sample manager - FTN purge, wash, and QSM seal-wash solvent

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You must prepare a solution of 90:10 water/acetonitrile, to serve as a purge and wash solvent for the sample manager - FTN and as a seal-wash solvent for the quaternary solvent manager.

### To prepare the purge, wash, and seal-wash solvent:

1. Pour 90 mL of filtered, HPLC-grade water into a reservoir bottle.
2. Pour 10 mL of filtered acetonitrile into the same reservoir bottle.
3. Label the reservoir bottle 90:10 water/acetonitrile.
4. Submerge the needle wash line in the reservoir bottle.
5. Place the reservoir bottle in the ACQUITY UPLC solvent tray.

## Sample manager weak wash, strong wash, and BSM seal wash solvent

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Submerge the weak wash, strong wash, and seal wash lines in a reservoir bottle containing 90:10 water/acetonitrile. See the above procedure to prepare the solvent.

## Startup procedure

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1. Depending on your system, power-on the QSM, BSM, sample manager - FTN, or sample manager, and start mobile phase flowing through the detector.

**Requirement:** Mobile phase must be flowing through the detector before you power-on the detector.

2. Power-on the detector.

**Requirement:** After the detector lamp ignites, allow time for it to equilibrate.

| Detector type    | Time required for lamp equilibration (minutes) |
|------------------|------------------------------------------------|
| ACQUITY PDA      | 60                                             |
| ACQUITY PDA eλ   | 60                                             |
| ACQUITY 2996 PDA | 60                                             |
| ACQUITY TUV      | 30                                             |
| ACQUITY ELS      | 60                                             |

3. Ensure that all diagnostic tests run to completion on all instruments.

**Requirement:** If the tests fail to run to completion, follow the appropriate procedure in the PDF version of the operator's guide.

4. Start the Empower software.

## Priming the quaternary solvent manager system

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Perform this priming procedure each time you qualify a system that includes a quaternary solvent manager.

### To prime the system:

1. From Configuration Manager, restore the SystemsQT project by clicking File > Restore Projects and then selecting the appropriate SystemsQT project.

2. From the Empower Pro interface, click Run Samples, select the project and chromatographic system, and then click OK.
3. In the ACQUITY sample manager - FTN control panel of Run Samples, click the ACQUITY UPLC Console icon.
4. In the ACQUITY UPLC Console, perform the following tasks:
  - a. Wet-prime solvent lines A, B, C, and D for a minimum of 5 minutes, or until the pump is primed, by clicking Quaternary Solvent Manager > Control > Prime Solvents.
  - b. In the dialog box, select A, B, C, and D.
  - c. In the Time field, specify 5 minutes, and then click Start.
  - d. Prime the seal wash pump by clicking Quaternary Solvent Manager > Control > Prime Seal Wash, and then click Yes.

## Priming the binary solvent manager system

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Perform this priming procedure each time you qualify a system that includes a binary solvent manager.

### To prime the system:

1. From Configuration Manager, restore the SystemsQT project by selecting File > Restore Projects and then selecting the appropriate SystemsQT project.
2. From the Empower Pro interface, click Run Samples, select the project and chromatographic system, and then click OK to open the Run Samples window.
3. In Run Samples, click the ACQUITY UPLC Console icon in the ACQUITY sample manager or sample manager - FTN control panel.
4. In the ACQUITY UPLC Console, perform the following tasks:
  - a. Wet prime solvent lines A1 and B2 for a minimum of 5 minutes, or until the pump is primed, by selecting Binary Solvent Manager > Control > Prime A/B Solvents.
  - b. In the displayed dialog box, select A1 and B2. In the Time field, specify 5 minutes, and then click Start.
  - c. Wet prime solvent lines A2 and B1 for a minimum of 5 minutes, or until the pump is primed, by selecting Binary Solvent Manager > Control > Prime A/B Solvents.
  - d. In the displayed dialog box, select A2 and B1. In the Time field, specify 5 minutes, and then click Start.
  - e. Prime the seal wash pump by selecting Binary Solvent Manager > Control > Prime Seal Wash, and then click Yes.

## Priming the sample manager - FTN

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**Requirement:** The qualification tests require the 15- $\mu$ L needle and 100- $\mu$ L syringe. Ensure that they are installed.

### To prime the sample manager - FTN:

1. Prime the syringes by clicking Sample Manager > Control > Prime.

2. In the Prime dialog box, select Wash Solvent and Purge Solvent.
3. In the Wash Solvent field, enter 60 seconds.
4. In the Purge Solvent field, enter 20 cycles, and then click OK.
5. Select Sample Manager from the console tree, and then click Configure > Volumes. Ensure the displayed needle size matches the installed needle size.

## Priming the sample manager syringes

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**Requirement:** The qualification tests require the 100- $\mu$ L syringe and the 10- $\mu$ L sample loop (the 10- $\mu$ L sample loop is N/A to the SM-FTN). Ensure that they are installed. Additionally, ensure the following needle size is installed, depending on your system configuration:

- 10- $\mu$ L needle for the SM-FL when used on ACQUITY I-Class systems
- 15- $\mu$ L needle for the SM-FTN when used on ACQUITY H-Class and I-Class systems
- 30- $\mu$ L needle for the SM when used on ACQUITY UPLC systems

### To prime and equilibrate the sample manager syringes:

1. In the Prime Syringes dialog box, select "Sample syringe and wash syringes".
2. In the Number of cycles field, specify 20, and then click OK.
3. Select Sample Manager from the console tree, and then select Configure > Volumes. Ensure the displayed loop size matches the installed sample-loop size.
4. Characterize the needle seal by selecting Sample Manager > Characterize > Needle Seal, and then click OK.
5. Characterize the sample manager's needle and loop volumes by selecting Sample Manager > Characterize > Needle and loop volumes.

**Note:** Characterizing the sample manager's needle and loop volumes is critical to its acceptable performance.

6. Ensure the nominal configuration settings are correct for your system, and then click OK.

**Requirement:** Perform step 4 and step 5 of the preceding procedure whenever you change or refill the mobile phase, weak wash, strong wash, or seal wash solvents.

## ACQUITY UPLC manual OQ tests performed before SystemsQT automated tests

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Perform the following manual tests before you perform the automated tests of the SystemsQT, as appropriate for your system configuration:

- QSM flow rate accuracy test, for the quaternary solvent manager
- BSM flow rate accuracy test, for the binary solvent manager
- Sample manager - FTN heater/cooler temperature accuracy test
- Sample manager heater/cooler temperature accuracy test

- Column manager-A, column manager-Aux, column heater-A, 30-cm column heater-A, column manager, column heater/cooler, 30-cm column heater/cooler, column heater, or HT column heater temperature accuracy test
- Sample organizer heater/cooler temperature test
- Sample organizer plate positioning test

**Requirement:** If your system includes the 30-cm column heater-A or 30-cm column heater/cooler, disconnect it from the system after completing its manual OQ test. Do not run the automated qualification tests with the 30-cm column heater-A or 30-cm column heater/cooler connected in line.

## Preparing the ACQUITY UPLC system for performance qualification tests

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Before you can run the performance qualification tests, you must prepare the system.

### To prepare the UPLC system:

1. Ensure that all instrumentation is powered-on.
2. Install the ACQUITY UPLC BEH C18 column in the system's column compartment.

**Requirement:** In a CM-A and CM-Aux configuration, ensure the column is installed in column position 1. Confirm the location of position 1 in the Column Manager Instrument Configuration of the ACQUITY Console.

3. Attach the eCord™ to the eCord receptacle on the instrument.
4. Ensure that the inlet preheater tubing is connected to the column, and then close the front cover of the instrument.
5. With the column outlet line directed to waste, equilibrate the column with the mobile phase (QSM systems: 90% A, 10%B, or BSM systems: 90% A1, 10% B1) at 0.6 mL/min for at least 30 minutes.
6. On the ACQUITY Console, stop flow.
7. Connect the outlet of the column to the inlet of the applicable detector.
8. In the ACQUITY Console, set flow at 0.6 mL/min (QSM systems: 90% A, 10%B, or BSM systems: 90% A1, 10% B1).
9. Load the sample vials in the sample tray, and proceed with the SystemsQT automated tests as soon as possible.

**Note:** The test injections sample set specifies a 20-minute equilibration period.