

ACQUITY Arc / Arc Bio System

Installation Manual

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General Information

The installation manual guides Waters field service engineers through the steps to successfully install Waters systems and instruments with minimal loss of productivity to the customer.

[Table 1](#) lists basic information about the installation procedure.

Table 1: Installation procedure information

Revision date	• August 2017
Average time to perform	• 2 to 3 days for separations system (depending on options purchased)
Parts required	• System Startup Kit, 200000445 • System component startup kits
Related information	• Configuring Optical Detectors in the ACQUITY Arc System (715004888) • ACQUITY Arc / Arc Bio System Site Preparation Guide (715004834) • ACQUITY Arc / Arc Bio System Configuration Guide • Controlling Contamination in UPLC/MS and HPLC/MS Systems (715001307) • Installing the Fraction Manager - Analytical (715003927) • Installing the Common Platform Sample Organizer (715002991) • QDa Detector Empower Installation Manual (715004282) • QDa Detector MassLynx Installation Manual (715004281) • ACQUITY Arc 30-cm Column Heater and Column Heater/Cooler Overview and Maintenance Guide (715004751) • The appropriate mass spectrometer installation manual • The appropriate system performance test
Technical support	USA phone support: • 508-482-8070 or 800-252-4752 x8070 Wilmslow phone support: • 44-161-435-4490 or 0800-345-7521 (UK) • 800-887-0874 (US)

System Setup



Warning: When performing maintenance to components of an ACQUITY Arc or Arc Bio system, remove power to the unit by powering down and disconnecting the power cord.

Confirm prerequisites

Confirm that all the prerequisites have been met:

- The site meets all requirements listed in the [ACQUITY Arc /Arc Bio System Site Preparation Guide](#) (715004834).
- The appropriate personnel and/or equipment are available for moving, lifting, and positioning the system instruments.
- You have completed the steps in [Configuring Optical Detectors in the ACQUITY Arc / Arc Bio System](#) (715004888).

Unpack the instrument/system

1. Perform a visual check to ensure there is no damage to the packaging.



Warning: To avoid injury, stand to the side when cutting the packing bands; they can fly apart when released from tension.

2. Carefully remove the packaging and perform a visual check to ensure there is no damage to the instrument.

Lift the system



Warning: The maximum weight for a single person to lift is 23 kg (50 lbs.). If the instrument exceeds 23 kg (50 lbs.), get the appropriate number of people to lift the instrument. If necessary, use lifting equipment that is capable of raising the instrument to the height of the laboratory bench.

1. Refer to the [ACQUITY Arc /Arc Bio System Site Preparation Guide](#) (715004834). (715004834) for individual component weights.

2. Using the instrument/system component weights as a basis, use the appropriate number of people or lifting equipment to lift the instrument onto the laboratory bench.

Position the system components

Refer to the [ACQUITY Arc /Arc Bio System Configuration Guide](#) for component positioning details for all supported Arc system configurations.

Refer to [Figure 1](#) and [Figure 2](#) for positioning guidelines of typical configurations. The steps that follow the figures provide detailed positioning instructions applicable to all configurations.

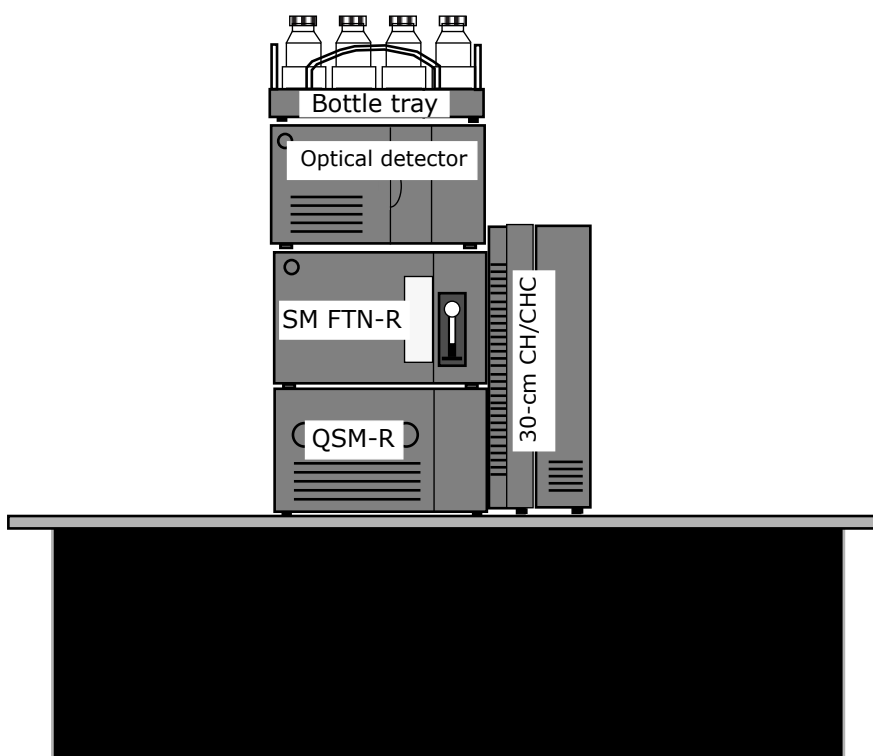


Figure 1 - Positioning the system components (PC not shown)

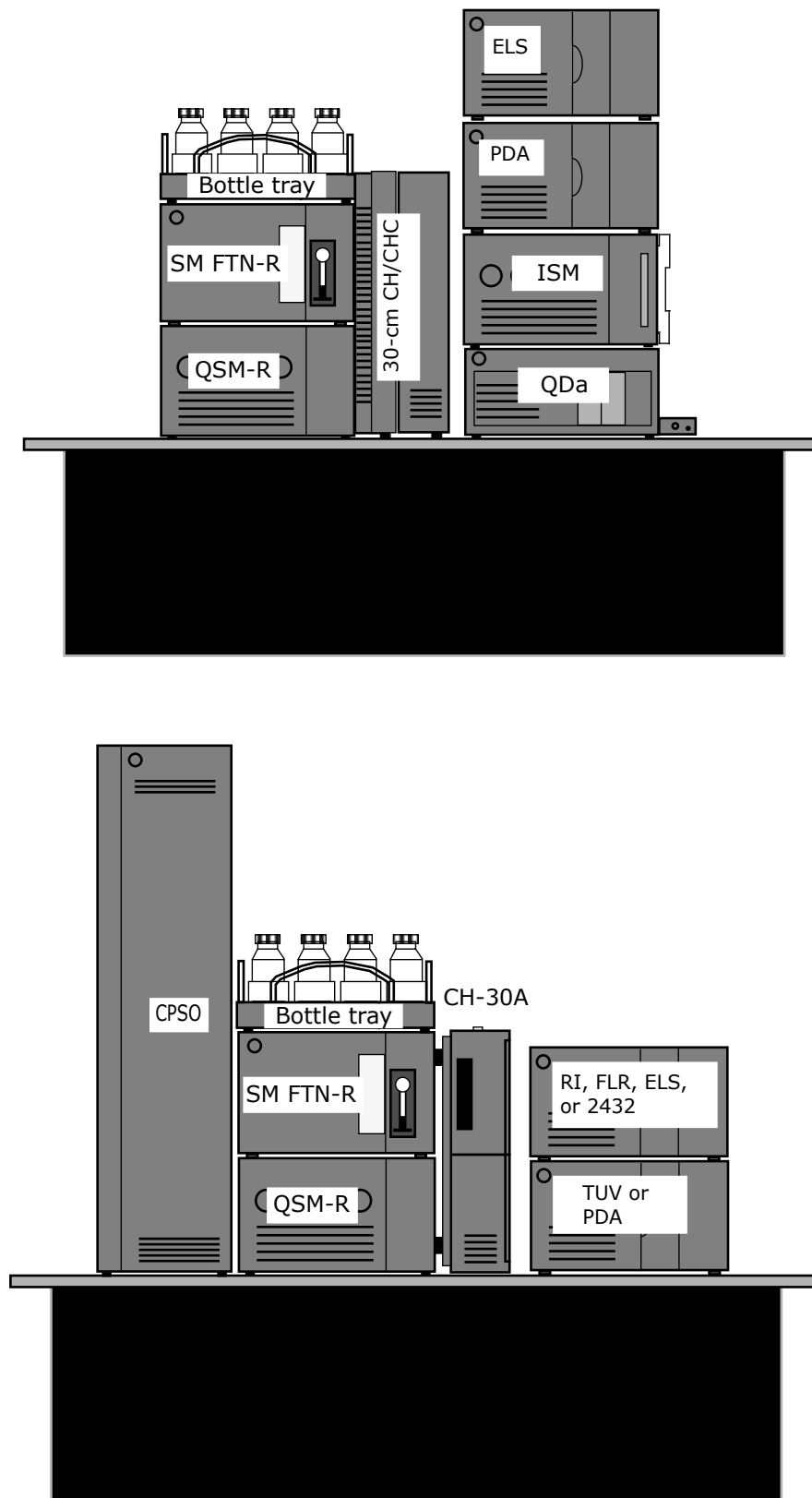
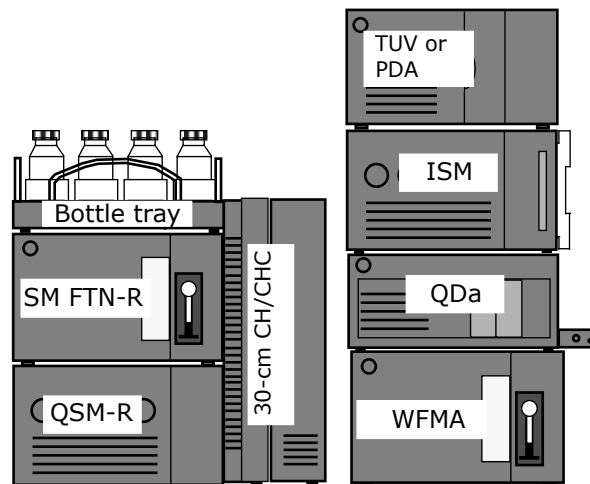
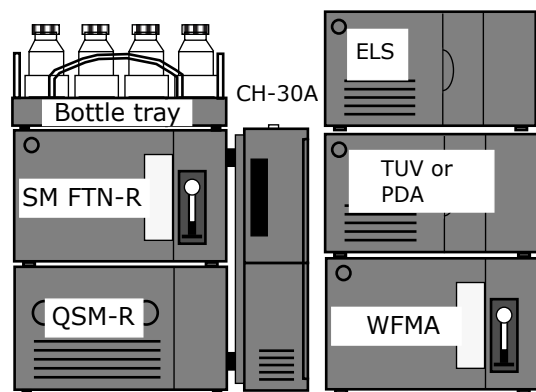
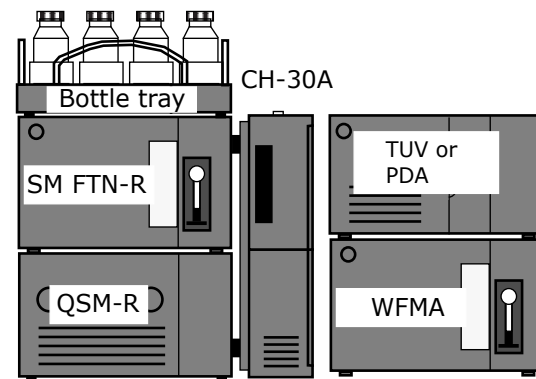


Figure 2 - Positioning the system components (PC not shown)



Important: Positioning the WFMA in locations other than in the instrument stack (which require using alternate tubing and fittings), can increase band broadening and lower recoveries.

Figure 3 - Positioning the system components (WFMA examples)

Position the QSM-R, SM FTN-R, and detector(s)

1. Position the QSM-R and SM FTN-R on the laboratory bench, as shown in [Figure 1](#) and [Figure 2](#).

! **Caution:** When positioning an optical detector that has a downward-facing drain plug, be careful not to damage the plug when lowering it into place on the stack.



Warning: To avoid injury, make sure two people lift and position the QSM-R onto the bench top.

2. Based on the number of detectors in your system, position the detector(s) and the bottle tray as follows:
 - *One optical detector* - position the detector on top the FTN-R and the bottle tray on top of the detector
 - *Two optical detectors* - position the bottle tray on top of the FTN-R and the detectors in a stack to the right of the column heater (column is heater is not positioned yet)
 - *QDa detector with ISM and one optical detector* - position the bottle tray on top of the FTN-R; position the QSM-R, ISM, and optical detector in a stack to the right of the column heater (column heater is not positioned yet)
 - *QDa detector with ISM and two optical detectors* - position the bottle tray on top of the FTN-R; position the QSM-R, ISM, and two optical detectors in a stack to the right of the column heater (column heater is not positioned yet)

Note: When installing a module above another, ensure that you angle the rear of the upper module downward so you can fit its rear bottom lug into the

corresponding mounting slot on the top of the lower module ([Figure 4](#)).



Figure 4 - Positioning modules

3. If the SM FTN-R includes the Vapor Reduction Kit option, refer to [Installing the Vapor Reduction Kit](#) (P/N 715004870), and then install the optional kit.
4. Complete the steps in either:
 - [Position the 30-cm CH or 30-cm CH/C or](#)
 - [Position the CH-30](#)

Position the 30-cm CH or 30-cm CH/C

Refer to the [ACQUITY Arc 30-cm Column Heater and 30-cm Column Heater/Cooler Overview and Maintenance Guide](#) (715004751) for detailed positioning and installation instructions.

Position the CH-30

Refer to the [ACQUITY Arc 30-cm Column Heater-Active Overview and Maintenance Guide](#) (715004750) for detailed positioning and installation instructions.

! **Important:** If your system includes two optical detectors, or an ISM and QDa with one or two optical detectors, ensure that they are positioned to the right of the column heater ([Figure 2](#)).

Connect the system

Make electrical connections

! Caution: To avoid damaging the 30-cm CH, 30-cm CH/C, or CH-30A, make sure that the SM FTN-R is powered OFF before connecting or disconnecting any column heater to the SM FTN-R PSPI port.

1. Connect all power cords.
2. Connect Ethernet cables from the following instruments to the 6-port Ethernet switch on the SM FTN-R, as applicable to the configuration:
 - Computer
 - QSM-R
 - Optical detectors - 2489 UV/Vis, 2998 PDA, 2475 FLR, 2424 ELS, or 2414 RI
 - WFMA
 - QDa
 - ISM
 - SQ Detector 2
 - Common Platform Sample Organizer
3. Connect column heater cables as follows:
 - For systems with a 30-cm CH/C, connect cable P/N 441001045 from the CH/C to the PSPI port on the SM FTN-R.
 - For systems with a CH-30A, connect cable P/N 441001040 from the CH-30A to the PSPI port on the SM FTN-R.
4. Install the upper and lower leak sensors in the SM FTN-R, the WFMA (if applicable), and the single leak sensor in the QSM-R.
5. For systems with a 2432 Conductivity Detector:
 - a. Connect the provided USB cable from the USB port on the 2432 detector to a USB port on the system workstation.
 - b. Connect the provided event cable (for the Inject Start signal) from the 2432 receptacle to its corresponding receptacle on the SM FTN-R.

Make fluidic connections

Follow the steps in this section to make the fluidic and waste connections between the core system components.

! Important: Make sure you route all tubing through the appropriate tubing channels.

Making fluidic connections from the solvent manager

1. Route the PTFE solvent tubing from the QSM-R upward through the tubing guides and into the bottle tray.
2. Connect the pump outlet tubing from port 6 of the QSM-R vent/dual mixer valve to port 5 of the SM FTN-R injection valve.

Making fluidic connections from the 30-cm CH or 30-cm CH/C

1. If the column heater does *not* include a column selection valve:
 - a. Connect the injector outlet tubing from port 6 of the SM FTN-R injection valve to the stainless steel union.

! Important: Make sure you carefully pre-stake the fitting in the union.

- b. Using the compression screw and ferrule from the CH/C start-up kit, connect the PPH on the 30-cm CH or the 30-cm CH/C to the open end of the union, again making sure that you carefully pre-stake the fitting.
2. If the column heater includes a column selection valve (Figure 5):
 - a. Connect tubing 430004637 (or tubing 430005237 for Arc Bio) from port 6 of the SM FTN-R injection valve to the IN port of the column selection valve.
 - b. Connect tubing 430004648 (or tubing 430005240 for Arc Bio) to port 1 of the column selection valve (Figure 5), but do *not* connect the other end of the tubing to the column 1 inlet yet. You connect to the column only after instructed to flush the system.

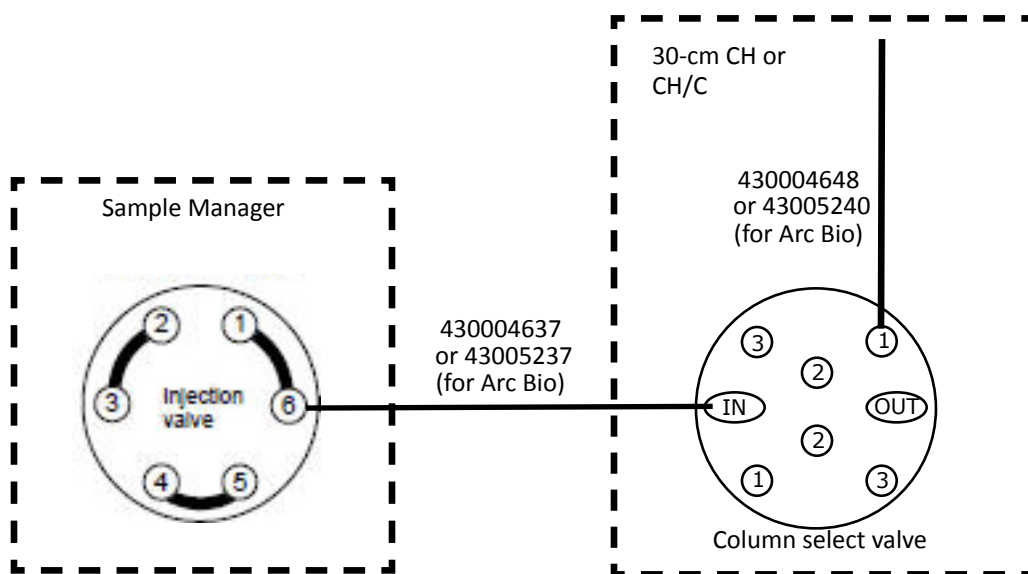


Figure 5 - Connecting an optional column selection valve

3. Remove the plug from port 2 (Figure 6) on the SM FTN-R metering syringe.
4. In the SM FTN-R startup kit, locate the sample manager purge solvent (PEEK) tubing assembly P/N 430004754.
5. Remove the fitting from one end of the tube, and then route this end downward through the tubing guides and into the SM FTN-R compartment (Figure 6).

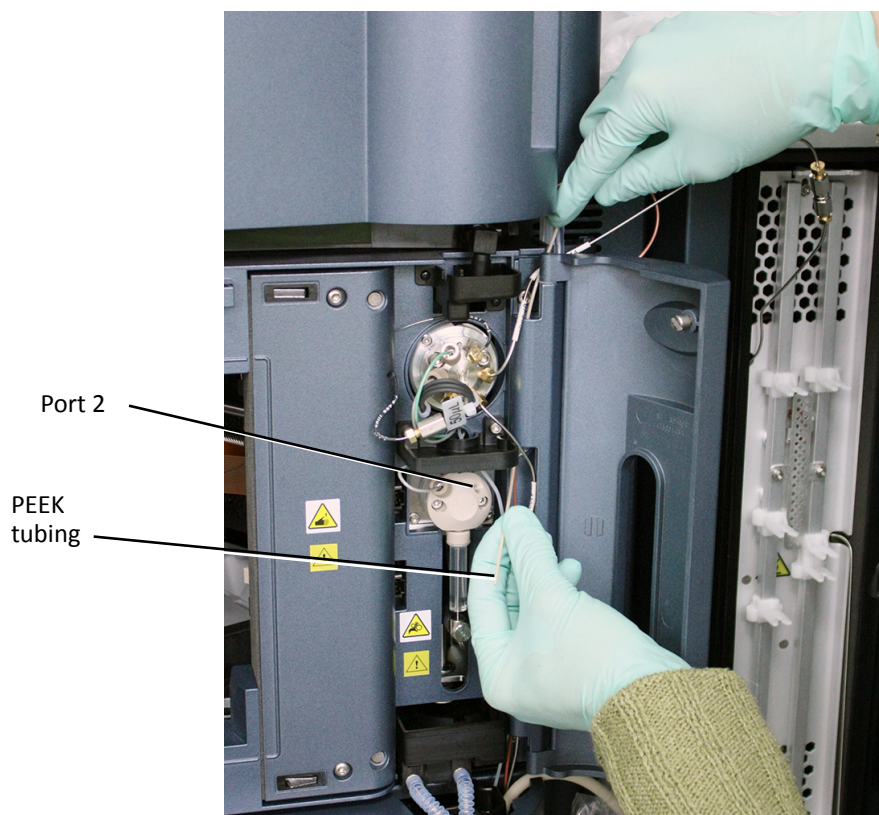


Figure 6 - Routing SM FTN-R purge solvent tube

6. Reinstall the fitting onto the tube end, and then finger-tighten it to port 2 of the metering syringe valve, making sure you first fully insert the tube end into the port.
7. Locate the solvent filter adapter and the union from the SM FTN-R startup kit.
8. Remove and discard the protective yellow cap from the end of the solvent filter adapter.



Figure 7 - Removing the protective cap

9. Screw the union onto the solvent filter adapter assembly ([Figure 8](#)).

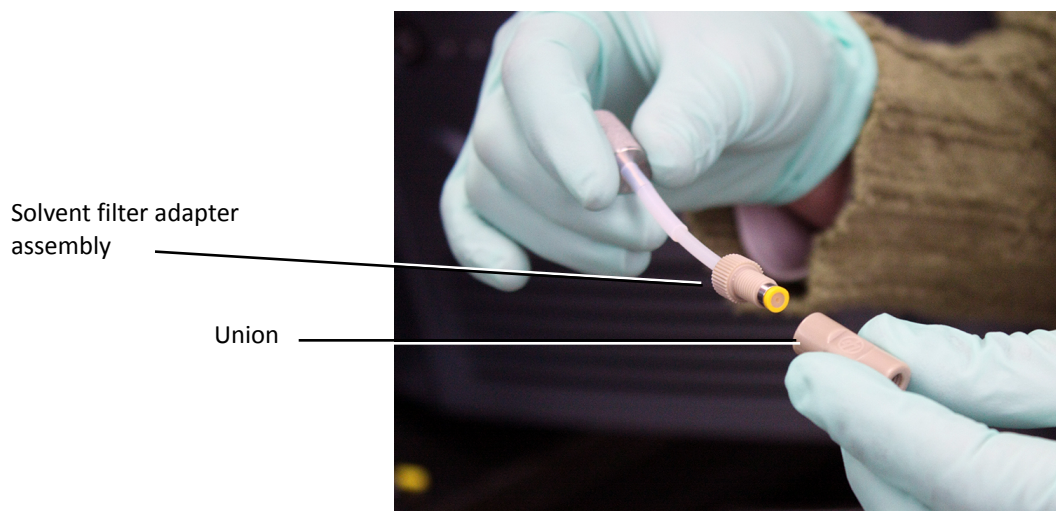


Figure 8 - Connecting the union and the solvent filter adapter

10. Finger-tighten the fitting on the PEEK tubing into the union (with the attached solvent filter adapter assembly). See [Figure 9](#).

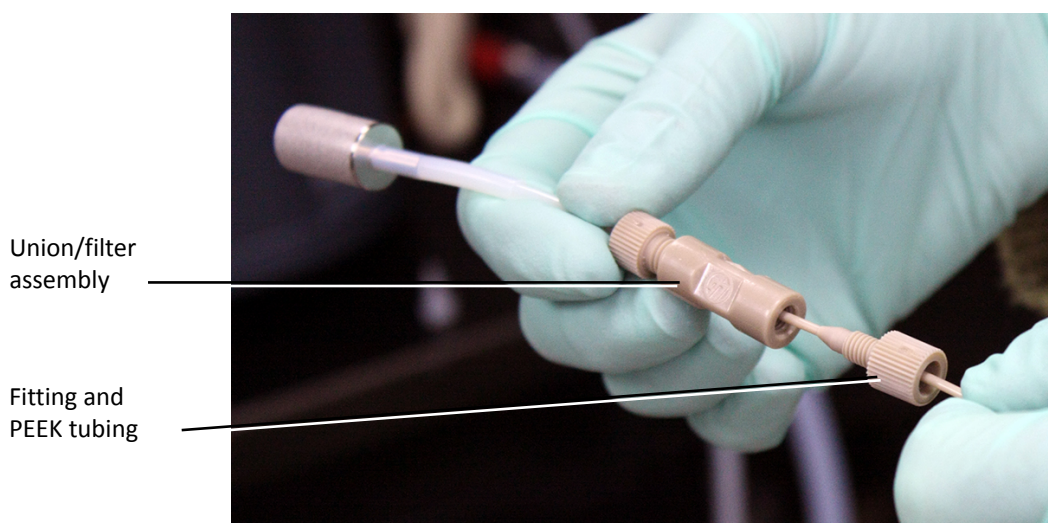


Figure 9 - Connecting the fitting to the union

Note: After you make up the sample manager purge solvent as instructed in the appropriate ACQUITY Arc system performance test document, you insert the union and solvent filter adapter assembly into the solvent reservoir.

11. For details on making additional fluidic connections for all supported Arc system configurations, refer to the [ACQUITY Arc / Arc Bio System Configuration Guide](#).

Note: You connect the column only after priming and flushing the system in preparation for the system performance tests.

Making fluidic connections from the CH-30A

1. Replace the existing (non-gasketed) APH mounting clip with a gasketed APH mounting clip:
 - a. Connect the inlet of the APH assembly (P/N 205001542) to port 6 of the SM FTN-R injection valve.
 - b. Use a screwdriver to remove the existing (non-gasketed) APH mounting clip ([Figure 10](#)) from the lower column position. Discard the clip.



Figure 10 - Non-gasketed APH mounting clip (removed)

- c. Remove the APH preheater key from the upper column position, and then install it in the lower position. This is required so that you can install the APH assembly with the gasketed mounting clip into the upper column position.
 - d. Insert the APH assembly into the new, gasketed APH mounting clip ([Figure 11](#)).

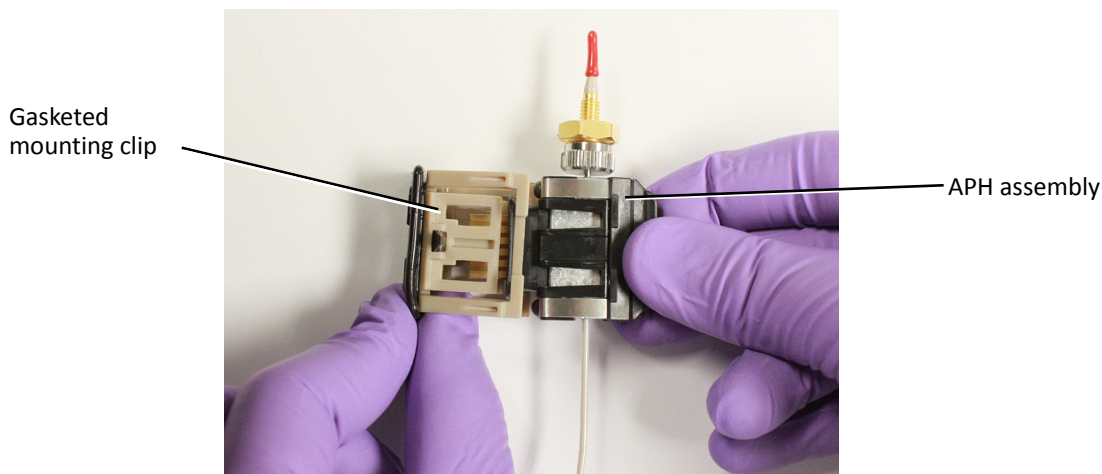


Figure 11 - Inserting the APH into the mounting clip

- e. Carefully install the APH assembly and mounting clip into the upper CH-30A column position, making sure that they “click” into place.
2. Complete [step 3](#) through [step 11](#) in [Making fluidic connections from the 30-cm CH or 30-cm CH/C](#).

Make waste and exhaust connections

This section provides waste connection steps for a core Arc system that includes a single optical detector with a 30-cm CH/C. Refer to the following documents for instructions on making the gas, waste, and exhaust connections for systems with other detector, column manager, and WFMA configurations:

- [ACQUITY Arc / Arc Bio System Configuration Guide](#)
- [QDa Detector MassLynx Installation Manual](#) (715004281) and [QDa Detector Empower Installation Manual](#) (715004282)

Tip: When installing waste tubing, make sure you use the provided Y connectors to properly route the tubing to a process and an optional condensate waste container (Figure 12).

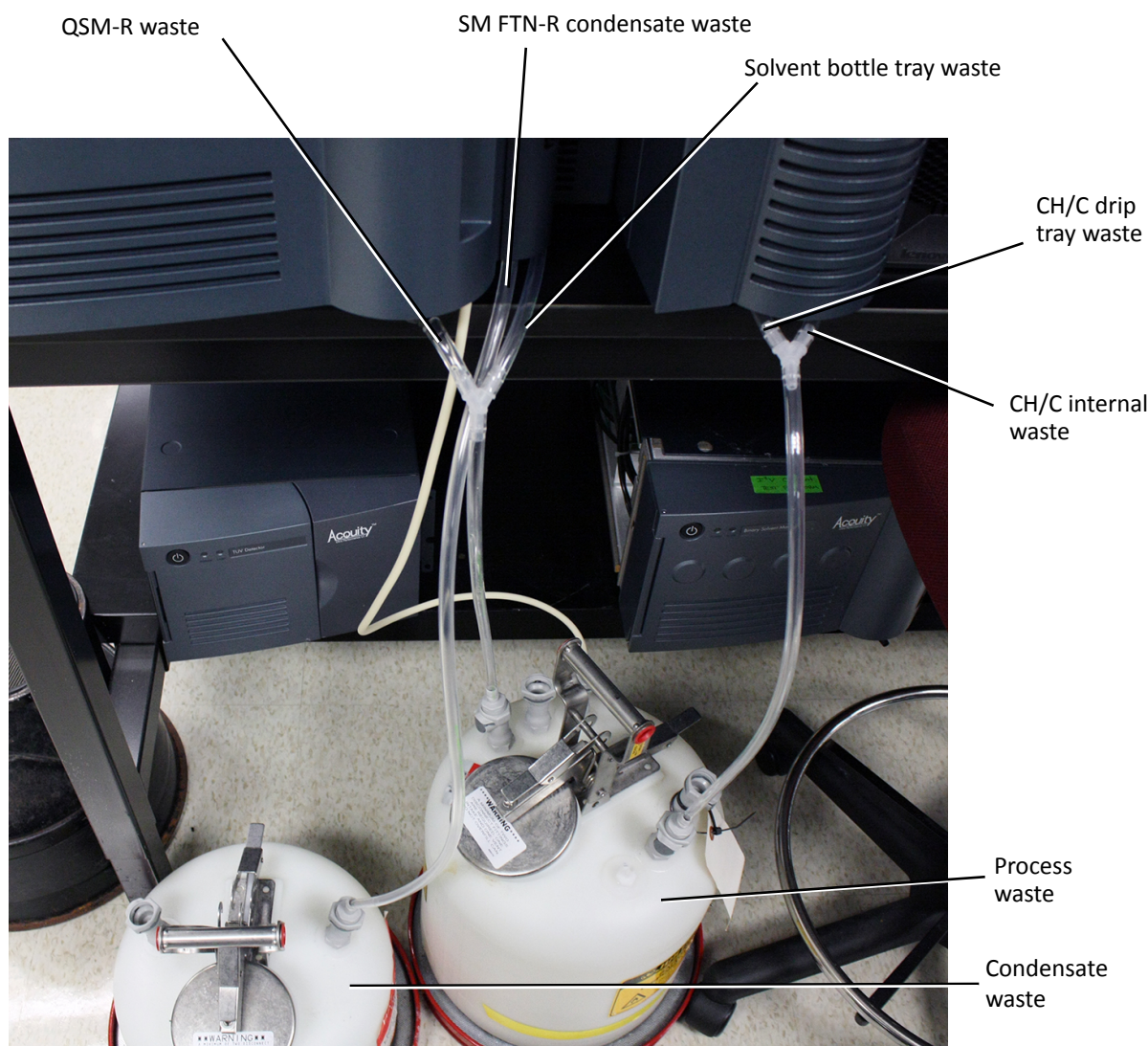


Figure 12 - Connecting waste tubing using Y connectors

1. Making sure you attach the end of the tubing with the short cuff to the SM FTN-R (Figure 13), connect the convoluted tubing to the left (process waste) port of the SM FTN-R drip tray (Figure 14).

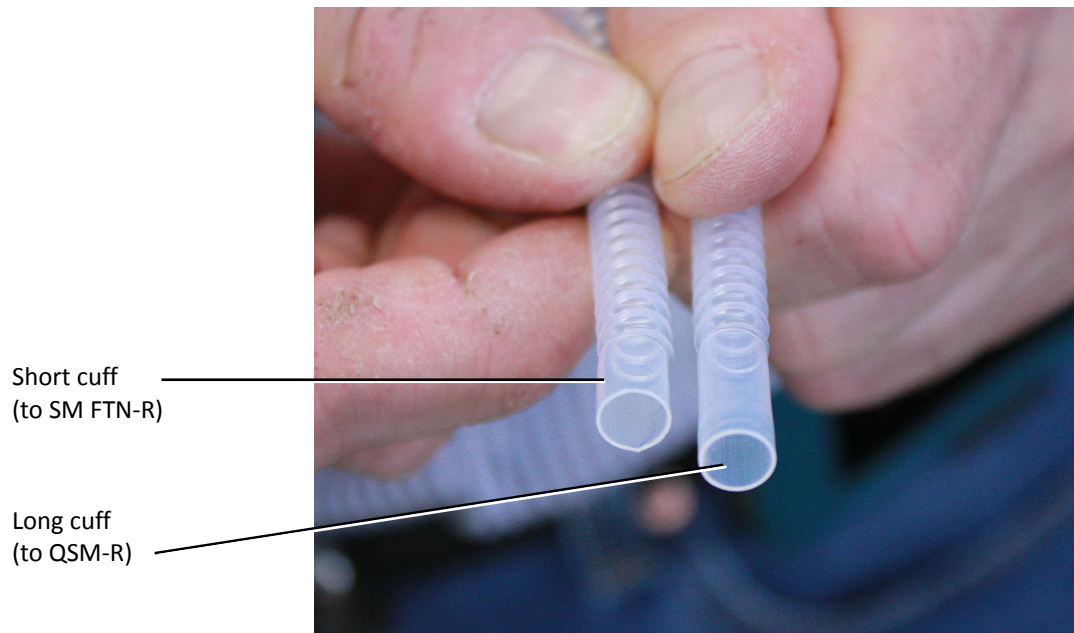


Figure 13 - Short and long cuff ends of the convoluted tubing

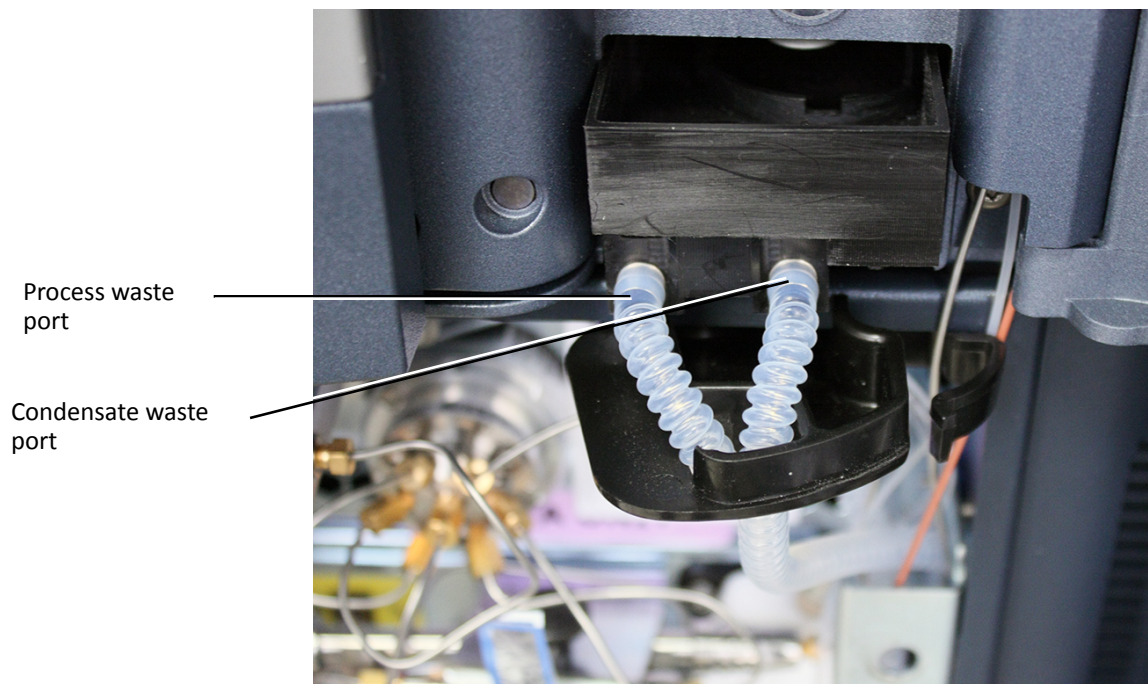


Figure 14 - Connecting waste tubing to the SM FTN-R drip tray

2. Connect the long cuff end of the convoluted (process waste) tubing to the QSM-R drip tray using tubing adapter. See [Figure 15](#).

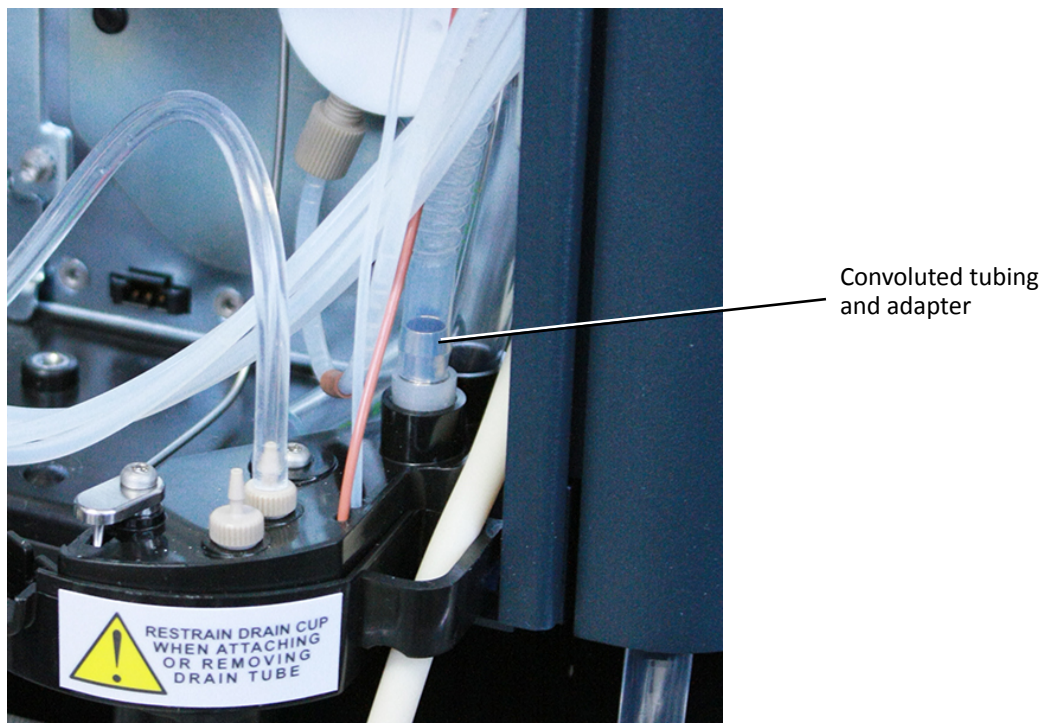


Figure 15 - Connecting SM FTN-R waste tubing to the QSM-R drip tray

3. Connect the shorter piece of convoluted tubing to the right (condensate waste) port of the SM FTN-R drip tray ([Figure 14](#)), again making sure you attach the end of the tubing with the short cuff to the SM FTN-R.
4. Route the open end of the convoluted (condensate waste) tubing through the right side opening of the QSM-R, and then connect it to a barbed fitting. See [Figure 16](#).
5. Measure and pre-cut a section of Tygon tubing that will connect the barbed fitting ([Figure 16](#)) to a dedicated condensate waste container.

6. Connect the pre-cut Tygon tubing to the open end of the barbed fitting (Figure 16), and then on to the condensate waste container.

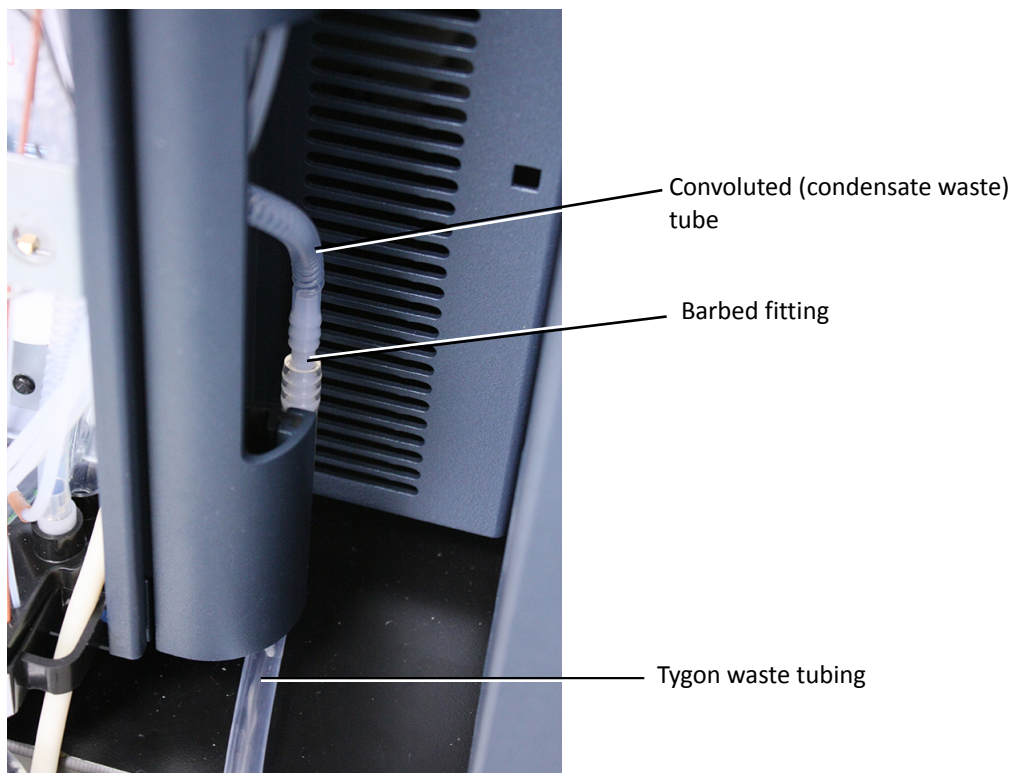


Figure 16 - Connecting the tubing to the barbed fitting

7. Connect a section of Tygon tubing from the rear of the solvent bottle tray, route it downward toward the front of the instrument stack, and then cut it and connect it to a Y connector port (Figure 12).
8. Connect a short section of Tygon tubing from the waste port at the bottom of the QSM-R to the open port of the Y connector (Figure 12).
9. Connect another section of Tygon tubing from the center port of the Y connector to the process waste container.
10. Assemble and install the 30-cm CH/C drip tray and make CH/C waste connections (Figure 17):
 - a. Install a barbed fitting onto the bottom of the CH/C drip tray.
 - b. Install the drip tray into the CH/C.
 - c. Connect a section of Tygon tubing to the end of the barbed fitting on the drip tray.
 - d. Connect a section of Tygon tubing to the internal CH/C waste port.

e. Connect the two CH/C waste tubing sections to a Y connector. See [Figure 12](#).

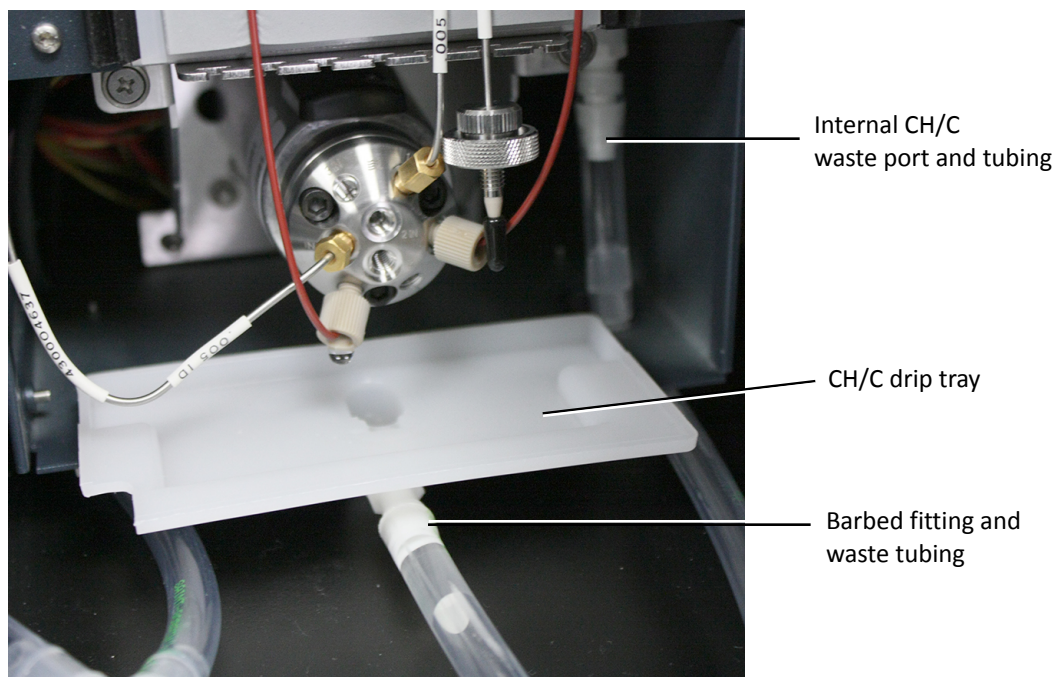


Figure 17 - CH/C waste connection details

11. Use another section of Tygon tubing to connect the combined CH/C waste to the process waste container. See [Figure 12](#).

Ensure system communication

1. Power-on the PC.
2. Load the ICS, and then restart the PC.
3. If the system includes a 30-cm CH/C, power it on first (to ensure that the 30-cm CH/C is recognized).
4. Power-on the SM FTN-R, and then power-on all remaining instruments (this can take several minutes).

Note: Monitor the Waters DHCP Server to verify communications to the system.

5. Launch Empower or MassLynx and ensure communication with the system instruments.

System Performance Tests

Complete the appropriate system performance test, as required by your ACQUITY Arc / Arc Bio system configuration. Find the latest system performance tests in the [ACQUITY Arc System Reference Information](#) section on the Waters portal.

Note: If the system includes a WFMA, complete the appropriate detector performance test before completing the WFMA test, as described in [Installing the Fraction Manager](#).