Thermo

Aria MX

User Guide

Software version 2.6

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Software version: Microsoft Windows 10 (64-bit), Microsoft Windows 7 Professional SP1 (64-bit); (Thermo) Foundation 3.1 SP7; Xcalibur 4.4

For Research Use Only. Not for use in diagnostic procedures.

Contents

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Preface

This guide describes the following:

- Suggested workflows for running samples using both your mass spectrometer software and Thermo Aria™ MX software
- Procedures that you perform with Aria MX software to control and monitor the LC system functions, including the autosampler, pumps, and valves
- How to use Aria MX software to create and edit autosampler and LC methods

Contents

Overview

The Aria MX interface controls certain liquid chromatography (LC) system functions so that you can use the Thermo Scientific Multichannel LC technology to process up to four LC systems on one mass spectrometer and to use TurboFlow™ technology to remove the large sample matrix molecules from the compounds of interest.

Thermo Scientific™ Transcend II, Transcend™, Thermo Scientific™ Prelude SPLC™, Vanquish™ Duo, and Aria are LC systems that can be optimized to run TurboFlow and/or laminar flow methods across multiple LC channels. They use Aria MX software, interfaced with your mass spectrometer applications, to control the LC system pumps, valves, and autosampler. The Aria MX interface uses methods appended to the instrument method that were created in the mass spectrometer application.

In fact, use of Aria MX software is nearly transparent, as access to it is through a mass spectrometer application, such as the Xcalibur™, TraceFinder™. You use the mass spectrometer or detector application to schedule sample runs and for data review. You use Aria MX software to create LC and AS (autosampler) methods that are appended to the instrument method, to check the status of the pumps and autosampler, and to perform periodic software-based system maintenance.

New Features in This Release

Control the optional Thermo Fisher Scientific Vanquish Charger module to expand your sample handling capacity for the Vanquish Dual Split autosampler. See "Vanquish Charger Module" on page 17 for details.

Intended Use

The Transcend II, Transcend, Prelude SPLC, and Aria systems are intended for research use only (RUO). The systems are not intended for diagnostic procedures.

Related Documentation

In addition to this guide, Thermo Fisher Scientific provides the following documentation for the LC system:

- *Multichannel LC Maintenance Guide* (for Transcend II, Transcend, Aria, and Prelude SPLC systems)
- Aria MX Help (from the Aria MX software window)
- The following Vanquish hardware documents, which are provided in hard copy with each Vanquish shipment or in PDF format on the Aria MX DVD:
  - *Vanquish Column Compartments VH-C10 Operating Manual*
  - *Vanquish Split Samplers VH-A10, VF-A10, VH-A40, VF-A40 Operating Manual*
  - *Vanquish Pumps VF-P10, VF-P20 Operating Manual*
  - *Vanquish Pumps VH-P10 Operating Manual*
  - *Vanquish Charger Operator Manual*

- *Prelude SPLC System User Guide*
- TraceFinder manuals as PDF files (when TraceFinder application is installed on your data system computer)
- TraceFinder Help (from the TraceFinder application window)
- Xcalibur manuals as PDF files
- Xcalibur Help (from the Xcalibur application window)
- Pump user documentation
- Autosampler user documentation from CTC Analytics

❖ **To view TraceFinder manuals if available on your system**

Choose **Start > All Apps** (Windows 10) **or All Programs** (Windows 7) **> Thermo Instruments > Thermo TraceFinder > Manuals**.

❖ **To view TraceFinder Help if available on your system**

Click the **Help** icon in the upper right corner of any TraceFinder window.

❖ **To view the Xcalibur Help**

Choose a command from the Help menu or click **?** in the upper left corner of any Xcalibur window.

❖ **To view instructions on navigating the Xcalibur Help**

1. Click the expand icon (+) beside the Welcome to Xcalibur Help book to view the topics.
2. Select **Using This Help**.

   Navigation instructions appear on the topic page.

❖ **To view other manuals that might be available on your computer**

Choose **Start > All Apps** (Windows 10) **or All Programs** (Windows 7) **> Thermo *product name* > Manuals**.

❖ **To view user documentation from the Thermo Fisher Scientific website**

1. Go to thermofisher.com.
2. Point to **Services & Support** and click **Manuals** on the left.
3. In the Refine Your Search box, search by the product name.
4. From the results list, click the title to open the document in your web browser, save it, or print it.

   To return to the document list, click the browser **Back** button.

Safety and Special Notices

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

CAUTION Highlights hazards to humans, property, or the environment. Each CAUTION notice is accompanied by an appropriate CAUTION symbol.

CAUTION Highlights electric shock hazards to humans. Each electric shock notice is accompanied by the international high voltage symbol.

CAUTION Highlights chemical hazards to humans, property, or the environment. Each chemical notice is accompanied by the chemical caution symbol.

CAUTION Highlights Class 1 laser light hazards to humans. Each Class 1 laser light hazard is accompanied by the international laser light caution symbol.

CAUTION Highlights high heat hazards to humans. Each high heat hazard notice is accompanied by the international high heat symbol.

IMPORTANT Highlights information necessary to prevent damage to software, loss of data, or invalid test results; or might contain information that is critical for optimal performance of the system.

Note Highlights information of general interest.

Tip Highlights helpful information that can make a task easier.

Transcend System Safety Precautions

Follow these safety precautions for Transcend TLX and LX systems.

CAUTION The TLX-4 and LX-4 systems use two (2) power cords. Before servicing the instrument, unplug both power cords from line power. To safely connect and disconnect the system from line power, place the system as close as possible to the laboratory AC power outlet.

CAUTION When working with solvents, follow the guidelines in the solvent's safety data sheet (SDS). Never refill one of the system's solvent containers without first removing the container from the system.

Environmental Conditions

Refer to the system component manuals for information on environmental conditions and specifications.

Good Laboratory Practices

To obtain optimal performance from your LC system and to prevent personal injury or harm to the environment, do the following:

- Keep good records.
- Read the manufacturers' SDSs for the chemicals you use in your laboratory.
- Remove particulate matter from your samples before injecting them into the liquid chromatograph.
- Use LC/MS-grade solvents or better.
- Connect the drainage tubes from the pump, autosampler, and detector to an appropriate waste receptacle. Dispose of solvents as specified by local regulations.

Keeping Good Records

To help identify and isolate problems with either your equipment or your methodology, keep good records of all system conditions (for example, %RSDs on retention times and peak areas, peak shape, and resolution). At a minimum, thoroughly document a chromatogram of a typical sample and standard mixture, with system conditions, for future reference. Careful comparison of retention times, peak shapes, peak sensitivity, and baseline noise can provide valuable clues to identifying and solving future problems.

Chemical Toxicity

Although the large volume of toxic and flammable solvents used and stored in laboratories can be quite dangerous, do not ignore the potential hazards posed by your samples. Take special care to read and follow all precautions that ensure proper ventilation, storage, handling, and disposal of both solvents and samples. Become familiar with the toxicity data and potential hazards associated with all chemicals by referring to the manufacturers' SDSs.

Solvent Requirements

Use LC/MS-grade solvents that are free of particulates. Choose a mobile phase that is compatible with the sample and column you have selected for your separation. Be aware that some solvents are corrosive to stainless steel.

CAUTION Do not use solvents containing Freon™ and perfluorinated solvents, such as Fluorinert™ and Fomblin™ perfluoro polyether solvents. They adversely affect the Teflon™ AF degassing membrane.

Solvent Disposal

Make sure you have a solvent waste container or other kind of drain system available at or below the bench top level. Most solvents have special disposal requirements prohibiting disposal directly down a drain. Follow all governmental regulations when disposing of any chemical.

High-Pressure Systems and Leaks

LC systems operate at high pressures. There is little immediate danger from the high pressures in an LC system. However, if a leak occurs, correct it as soon as possible. Always wear eye and skin protection when operating or maintaining an LC system. Always shut down the system and return it to atmospheric pressure before attempting any maintenance.

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Global support	❖ **To find global contact information or customize your request** 1. Go to thermofisher.com. 2. Click **Contact Us**, select the country, and then select the type of support you need. 3. At the prompt, type the product name. 4. Use the phone number or complete the online form. ❖ **To find product support, knowledge bases, and resources** Go to thermofisher.com/us/en/home/technical-resources. ❖ **To find product information** Go to thermofisher.com/us/en/home/brands/thermo-scientific.		

Note To provide feedback for this document, go to surveymonkey.com/s/PQM6P62 or send an email message to Technical Publications (techpubs-lcms@thermofisher.com).

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Introduction

With the Aria MX software and multichannel LC technology, you can control and synchronize up to four LC systems on one mass spectrometer and use TurboFlow technology to remove the large sample matrix molecules from the compounds of interest. It supports the Transcend II, Transcend, Prelude SPLC, and Aria systems, and your mass spectrometer operating and data review application.

These topics describe the general features of the Transcend, Vanquish Dual, Prelude SPLC, and Aria systems.

Contents

Supported Systems

The Aria MX software controls various configurations of HPLC/UHPLC hardware.

- Transcend configurations:
  - TriPlus autosamplers with UltiMate pumps (referred to as Transcend II)
  - TriPlus autosamplers with Vanquish Flex binary or quaternary pumps (referred to as Transcend)

  – Vanquish Dual Split Samplers with Vanquish Horizon or Vanquish Flex pumps (referred to as the Transcend Duo LX-2 configuration)
  – (Optional) Vanquish Charger module that extends Vanquish Dual Split Sampler sample rack/tray capacity
  – Accela Open autosamplers with UltiMate pumps (referred to as Transcend II)
- Prelude SPLC
- Aria

Transcend and Aria Product Family

Transcend II, Transcend, and Aria are HPLC (high-performance liquid chromatography) systems that separate sample components prior to analysis on a mass spectrometer (see Figure 1). Table 1 describes the Transcend II, Transcend, and Aria systems; Table 2 describes the Transcend II, Transcend, and Aria system features.

Figure 1. Transcend II HPLC system (Accela Open AS shown)

Figure 2. Transcend Vanquish Duo LX-2 with TCC and optional Charger modules

Table 1. Transcend and Aria system types (Sheet 1 of 2)

System	Description
Transcend systems (Transcend Duo LX-2, Transcend TLX, TLX-2, TLX-4, LX-2, and LX-4)	Incorporates UHPLC analysis using pumps and system components with pressure limits high enough to run less than 2 micrometer particle columns for UHPLC. Transcend systems are available as LX systems, which incorporate multichannel LC technology, or as TLX systems, which incorporate both TurboFlow and multichannel LC technology. Transcend systems offer autosampler and pump type flexibility.
Transcend II systems (Transcend II TLX, TLX-2, TLX-4, LX-2, and LX-4)	Incorporates ultra-high-performance liquid chromatography (UHPLC) analysis using pumps and system components with pressure limits high enough to run less than 2 micrometer particle columns for UHPLC. Transcend II systems are available as LX systems, which incorporate multichannel LC technology, or as TLX systems, which incorporate TurboFlow and multichannel LC technology. Transcend II systems differ from the Transcend systems in that they use the Thermo Scientific UltiMate™ 3000 RS pumps.
Aria systems (Aria TLX, TLX-2, TLX-4, LX-2, and LX-4)	Incorporates HPLC using pumps that can withstand backpressures of up to 400 bar, which is typical in traditional HPLC analysis. Aria systems are available as LX systems, which incorporate multichannel LC technology, or as TLX systems, which incorporate TurboFlow and multichannel LC technology.

Table 1. Transcend and Aria system types (Sheet 2 of 2)

System	Description
LX systems (Aria LX-2, Aria LX-4, Transcend LX-2, Transcend LX-4, Transcend II LX-2, Transcend II LX-4)	Incorporates HPLC analysis with multichannel LC technology. Can synchronize up to four parallel LC systems to a single mass spectrometer (MS). Each system operates independently, permitting multiple methods to run simultaneously in a staggered, parallel formation, generating the throughput of four traditional LC/MS or LC/MS/MS systems while maximizing the productivity of one mass spectrometer. LX-4 systems process throughput up to four times faster than traditional LC systems. Their sensitivity, Limit of Quantitation (LOQ), linearity, and carryover are comparable to conventional, single LC/MS systems because the mass spectrometer detector is dedicated to each sample stream during the elution step. See "Multichannel LC Technology" on page 8.
TLX systems (Aria TLX, Aria TLX-2, Aria TLX-4, Transcend TLX, Transcend TLX-2, Transcend TLX-4, Transcend II TLX, Transcend II TLX-2, Transcend II TLX-4)	Optimized for running TurboFlow methods that provide for the direct analysis of highly complex matrices, including plasma, urine, and food matrices, with minimal sample pretreatment. Using two injectors per LC channel, TLX systems perform TurboFlow column or analytical column injections without changing plumbing or cabling. As a result, TLX systems can run both HPLC methods and TurboFlow methods. See "TurboFlow Technology" on page 7. Can process up to four TLX systems that you can synchronize to a single mass spectrometer. Aria MX multichannel LC technology permits multiple methods to run simultaneously, generating the throughput of four TLX/MS or TLX/MS/MS systems, and at the same time, maximizing the productivity of one MS. See "Multichannel LC Technology" on page 8.

The Transcend II, Transcend, and Aria systems offer the following features (see Table 2).

Table 2. Aria and Transcend system features

Feature	System type	Description
HPLC (high-performance liquid chromatography)	All Transcend II, Transcend, and Aria systems	Traditional HPLC using an analytical column.
UHPLC (Ultra high-performance liquid chromatography)	All Transcend II and Transcend systems	The pumps, valves, and connections are optimized to operate at high pressures, providing optimal separation quality and speed.
TurboFlow technology	Transcend II, Transcend, and Aria TLX systems	These systems are optimized to run TurboFlow methods that separate sample components from complex sample matrices prior to separation on an HPLC column.
Multichannel LC technology	Transcend II, Transcend, and Aria systems with the following: • LX-2 (two LX systems) • LX-4 (four LX systems) • TLX-2 (two TLX systems) • TLX-4 (four TLX systems)	Can run up to four LC channels simultaneously using one mass spectrometer, maximizing the efficiency of your mass spectrometer.

Prelude SPLC

The Prelude SPLC is an HPLC front-end system that separates sample components prior to analysis on a mass spectrometer (see Figure 3 and Table 3). This sample preparation and liquid chromatography (SPLC) system integrates sample introduction, sample cleanup, and analytical HPLC separation on two channels that can operate independently. The Prelude SPLC system uses TurboFlow technology to automate most aspects of sample preparation, dramatically reducing manual steps and overall sample preparation time.

For detailed user instructions, refer to the *Prelude SPLC System User Guide*.

Figure 3. Prelude SPLC system

Table 3. Prelude SPLC instrument and table dimensions

Component	Dimensions
Instrument (without table)	95.5 × 112 × 73.7 cm (*w* × *h* × *d*) (37.6 × 44.1 × 29.0 in.) (*w* × *h* × *d*)
Table	132 × 73.7 × 78.7 cm (*w* × *h* × *d*) (52 × 29.0 × 31.0 in.) (*w* × *h* × *d*) Required space between back wall and table = 15.25 cm (6 in.)
Instrument and table	132 × 185.6 × 78.7 cm (*w* × *h* × *d*) (52.0 × 73.1 × 31.0 in.) (*w* × *h* × *d*)

Table 4. Environmental specifications

Environmental condition	Recommendation
Location	Indoor use only
Temperature	18–27 °C (64.4–80.6 °F)
Maximum relative humidity	40–80% noncondensing

Table 5. Pump operating specifications (Sheet 1 of 2)

Specification	Description
Flow rate range for optimal performance	25 (or 50)–1500 or 1750 µL/min
Maximum operating pressure	1000 bar (15 500 psi)

Table 5. Pump operating specifications (Sheet 2 of 2)

Specification	Description
Minimum programmable flow rate	1 µL/min
Flow rate range	1–2000 µL/min
Pressure signal accuracy	0.25% of full scale
Residual pulsation	< 1% for flow > 10 µL/min
Flow rate accuracy	0.5% of set point (optimal range)
Gradient composition accuracy	±0.5% of set point (5–95%)
Gradient composition range	0–100%

Table 6. Electronic specifications

Specification	Description
Communications	LAN and USB
Power	120/230 Vac, 50/60 Hz Voltage fluctuation not to exceed ±10% of the nominal voltage

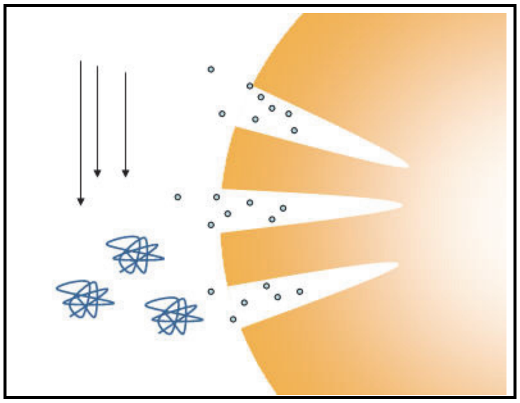
TurboFlow Technology

Sample extraction procedures in LC/MS-equipped labs remove matrix components present in complex mixtures (such as biological fluids) that can cause ion suppression in the mass spectrometer. Ion suppression results in loss of detector signal. TurboFlow technology is an online sample cleanup mechanism by which low molecular weight molecules are separated from high molecular weight matrix components using a specialized LC sample extraction column on a TLX system. TurboFlow online extraction allows for both faster and highly optimizable reduction in ion suppression.

About TurboFlow Particles

TLX systems inject samples directly onto a TurboFlow column, which contains large particles. These particles contain small pores into which small molecules can enter through diffusion from the liquid mobile phase. Small molecules have a faster diffusion rate than large molecules. When the recommended LC flow rates are applied to the specialized column, they create high linear velocities that quickly pass large molecules to waste before they can diffuse into particle pores.

Figure 4. Example of small compound diffusion into pores and large compound flow to waste.



Of the molecules that enter the pores, only those that have an affinity to the particle chemistry bind to internal pore surfaces. Those small molecules with a lower binding affinity quickly diffuse out of the pores and are flushed to waste. A change in mobile phase composition then elutes the small molecules bound by the TurboFlow column to the detector or to an analytical column for further separation. This latter separation is performed at typical HPLC flow rates.

About TurboFlow Columns

TurboFlow columns are available with a variety of column chemistries to accommodate different analyte types. They can withstand repeated, direct injection of complex samples such as biological fluids and reaction mixtures. Optimized for use with TLX systems, TurboFlow columns achieve fast, efficient separations of complex sample matrices and compounds of interest.

Multichannel LC Technology

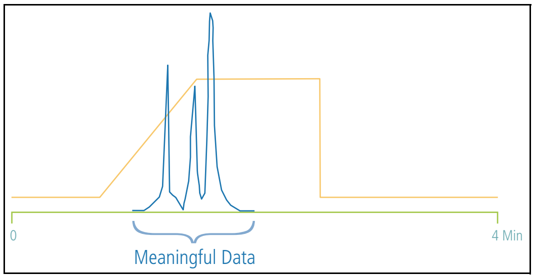
The multichannel LC technology used in TLX and LX systems brings the productivity of up to four separate, staggered, and parallel LC systems to a single mass spectrometer. Multichannel LC systems ensure the maximum performance of your mass spectrometer while limiting idle time so that you can boost productivity without compromising data quality or sensitivity.

Multichannel LC TLX and LX systems offers the following advantages:

- Provides quadruple mass spectrometer throughput
- Improves data quality
- Provides up to four independent channels
- Enhances traditional HPLC methods
- Upgrades TurboFlow technology for complex samples

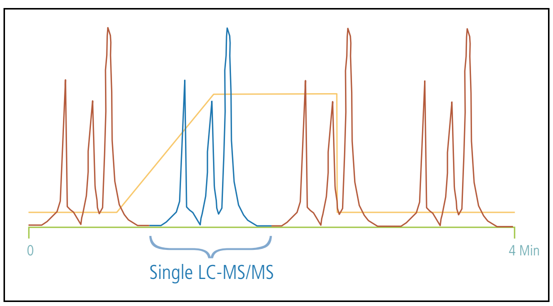
During a four-minute method in a single LC system, the mass spectrometer analyzes samples for only a fraction of the total method time.

Figure 5. Single LC/MS/MS system



TLX and LX multichannel systems synchronize up to four parallel systems on a single mass spectrometer. Each system operates independently, permitting multiple methods to run simultaneously. While traditional single-channel LC systems can have detectors that are idle more than 75 percent of the time, the TLX-4 system maximizes the productivity of one mass spectrometer, generating the throughput of four traditional LC/MS systems.

Figure 6. Four TLX or LX systems synchronized on a single mass spectrometer



TLX and LX systems use Intelligent Sample Processing (ISP). If one of the systems goes offline during a run, samples that are not specifically linked to the offline LC system continue to run.

Instrument Components

You can use TLX and LX systems with a mass spectrometer or UV detector.

TLX and LX systems have the following components.

Table 7. System components

System type	Component (standard quantity/LC channel)	Description
TLX	Loading pump (1)	Delivers programmed flow rate, time, and composition of mobile phase to the TurboFlow column. Refer to the pump reference manual for a detailed discussion on LC pump design, theory of operation, maintenance, and troubleshooting.
	Eluting pump (1)	Delivers programmed flow rate, time, and composition of mobile phase to the analytical column. Refer to the pump reference manual for a detailed discussion on LC pump design, theory of operation, maintenance, and troubleshooting.
LX	Eluting pump (1)	Delivers programmed flow rate, time, and composition of mobile phase to the analytical column. Refer to the pump reference manual for a detailed discussion on LC pump design, theory of operation, maintenance, and troubleshooting.
TLX and LX	Autosampler (1 or more)	Draws sample from a vial or plate well and injects it into the LC system. It includes a robotic arm with syringe, a sample drawer with optional refrigeration, injector ports, and wash stations.
TLX and LX	Valve Interface Module (VIM) (1)	Each system can include up to eight automated, six-port valves, depending on system configuration. Multi-channel systems include a selector and a bypass valve that determine which channel flow is directed to the detector.
TLX and LX	LC columns (1 or more)	Consists of stainless steel tubes that contain a stationary phase of a silica or polymer base and are used to separate analytes from solution.

VIM Configurations

The placement of the valves on the valve interface modules depends on the system model. The following topics show the number of valves and their locations on the valve interface module for each system model, including legacy systems.

- Transcend II Configurations
- Legacy Configurations
- Valve Types

Transcend II Configurations

Figure 7. Valve interface module for Transcend II LX-2

Figure 8. Valve interface module for the Transcend II LX-4

Figure 9. Valve interface module for the Transcend II TLX-1

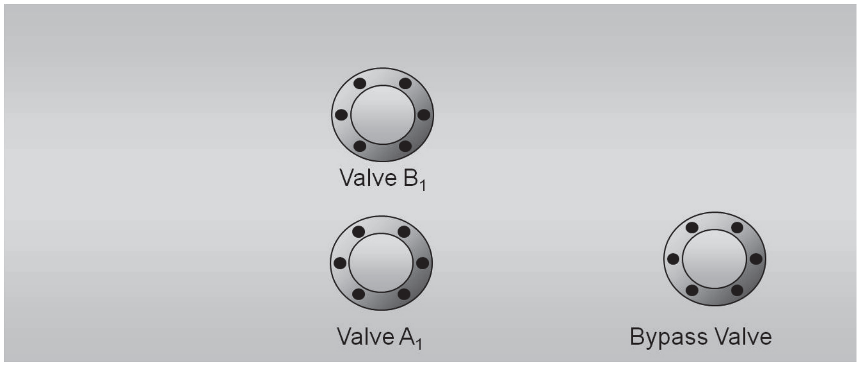


Figure 10. Valve interface module for the Transcend II TLX-2

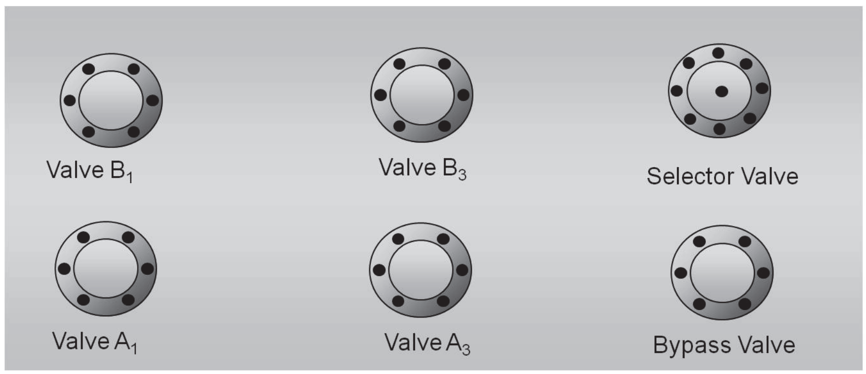
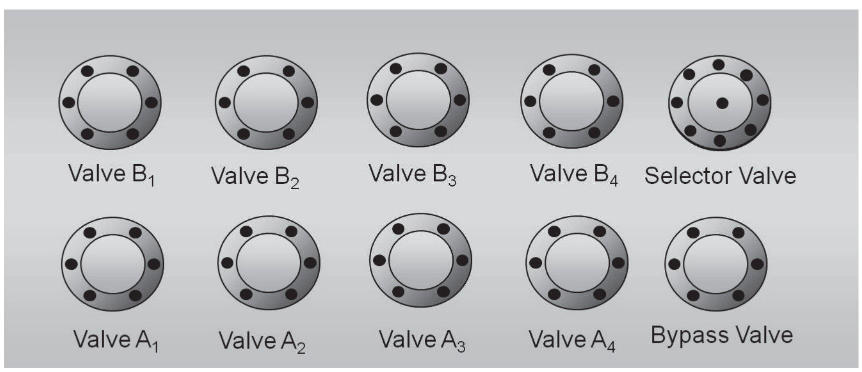


Figure 11. Valve interface module for the Transcend II TLX-4



Legacy Configurations

Figure 12. Valve interface module for LX-2 system models (2303LX)

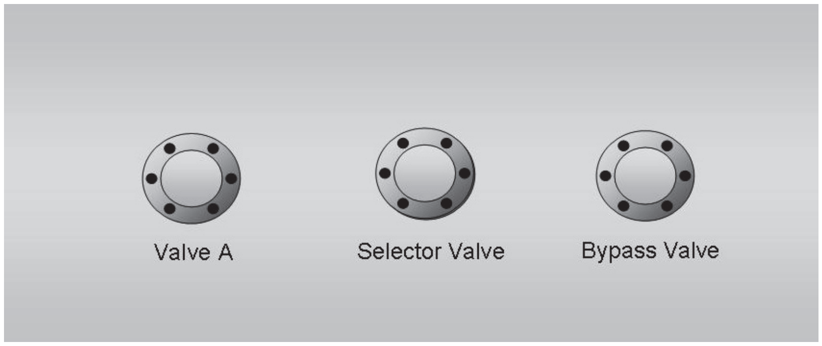


Figure 13. Valve interface module for LX-4 system models (2306LX)

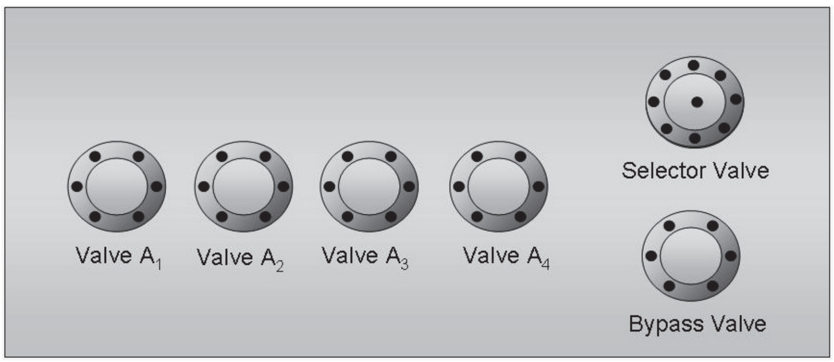


Figure 14. Valve interface module for TLX-1 system models (2303TX)

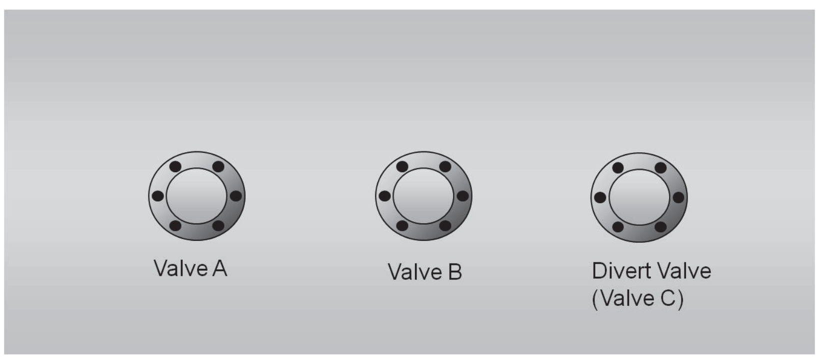


Figure 15. Valve interface module for TLX-2 system models (2306TX)

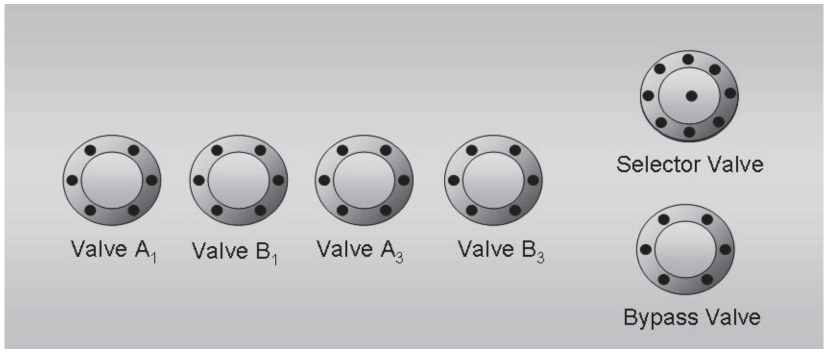


Figure 16. Valve interface module for TLX-2 TWIN system models (2306TX-TWIN)

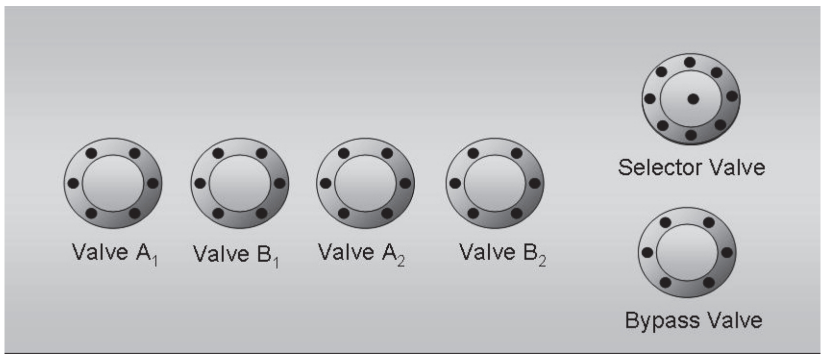
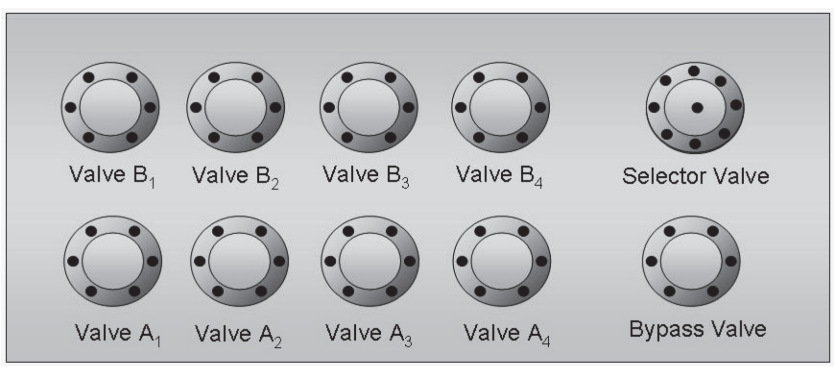


Figure 17. Valve interface module for TLX-4 system models (2310TX)



Valve Types

The valve interface module houses several different valves:

- Valve A and Valve B, in typical TLX systems, are 6-port valves and control the source and direction of fluid movement through the TurboFlow and analytical columns. The LC method determines the valve positions.

- The selector valve is a 6-port or 9-port valve. It is installed on multichannel systems and controls which channel is in line with the bypass valve. The position of this valve depends on the LC channel assignment, which is affected by the logic style selection and whether an LC channel is specified in the sequence.
- The bypass valve controls whether fluid flows to the detector or to waste. The settings you make in the Aria MX Configuration window affect the position of the bypass valve. See also "About the Bypass Override" on page 78.
- Some instrument models contain a divert valve. The divert valve controls whether fluid flows to the detector or to waste. The LC method determines the position of the divert valve. See also "Changing Valve Positions When Using a Divert Valve (System Model 2303TX)" on page 158.

Supported System Modules

The following topics provide an overview of the types of modules supported by the Aria MX software for the Transcend II, Transcend, and Prelude SPLC systems.

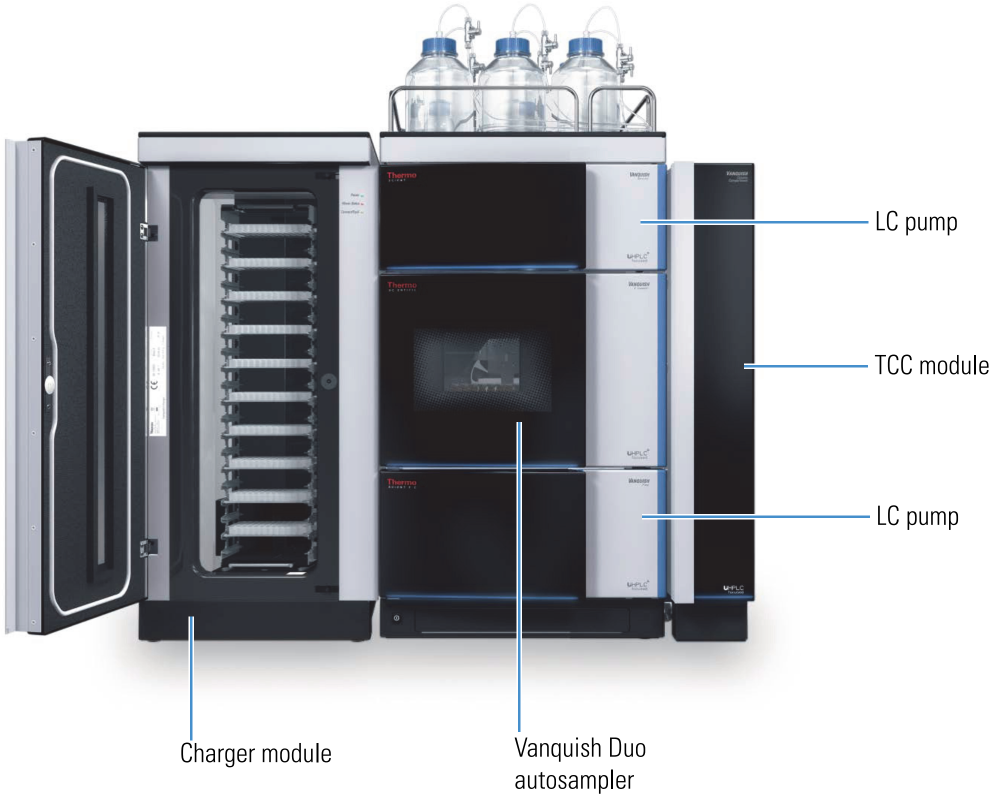
- Vanquish Dual Split Sampler
- Vanquish Thermostatted Column Compartment (TCC)
- Vanquish Charger Module
- Multiple Column Module
- MultiSLEEVE Controller
- Peltier Stacks
- Barcode Reader (TriPlus Autosampler)
- LCMS-P Module (TriPlus autosampler)

Vanquish Dual Split Sampler

The Vanquish Dual Split Sampler (Figure 18) provides two independent injection units. Each injection unit includes its own injection valve, sample loop, metering device, needle unit, needle seat, and a wash port. The injection units share the sample compartment with temperature controls. This setup enables multichannel LC applications by providing two connected pumps, two columns, and individual solvents.

> **Note** For Vanquish Dual Split autosampler hardware specifications, refer to the *Vanquish Split Samplers VH-A10, VF-A10, VH-A40, VF-A40 Operating Manual* located on the Aria MX DVD.

Figure 18. Transcend Duo LX-2 with TCC and optional Vanquish Charger modules



Related Topics

- Supported Autosampler Models
- About Autosampler Methods

Vanquish Thermostatted Column Compartment (TCC)

The Vanquish Thermostatted Column Compartment (TCC) module—referred to as the "Column Compartment"—is used in Transcend Duo LX-2 configurations that employ the Vanquish Dual Split Sampler (AS) with Vanquish Horizon pumps. See Figure 18 for details.

Key TCC features include the following:

- Column cooling
- Column thermostatting
- Two-column support
- Valve switching to change between the columns or to bypass the detector.

Related Topics

- Configuring the Vanquish TCC Module
- Configuring the TCC Module in an Instrument Method

- Controlling the TCC Module from the Aria MX Direct Control Window

Vanquish Charger Module

The Vanquish Charger module is used in Transcend Duo LX-2 configurations that employ the Vanquish Dual Split Sampler (AS) with Vanquish Horizon or Vanquish Flex pumps. The Charger module expands sample tray capacity and automates sample loading into the Vanquish system for extra-long unattended operation. See Figure 18 for details.

CAUTION The high luminosity produced by the LED inside the barcode reader can cause serious eye injury. Do not use light-focusing instruments for viewing the light output.

Charger module key features include the following:

- Barcode reader that automatically inventories each plate or rack each time the door is closed, which allows you to add samples at any time during operation
- Temperature-controlled to ensure reliable sample protection
- Multi-level shelves to store sample racks and well plates. Different shelf types are available for sample racks and well plates
- A mover to transport sample racks and well plates to the autosampler carousel and back

Refer to the *Vanquish Charger Operating Manual* (PDF format) provided in PDF format on the Aria MX DVD for more information.

Related Topics

- Working with the Optional Vanquish Charger Expanded Tray Capacity Module
- Common Vanquish AS Functions Using the Aria MX Direct Control Window
- Aria MX Control Parameters for the Vanquish AS

Multiple Column Module

You can use an optional multiple column module (MCM) to evaluate up to 12 columns in one overnight run. This saves you time when evaluating TurboFlow or analytical columns using various mobile phases. You can also use it for changing columns in very long runs to extend your walk-away time. You can connect one MCM to each LC channel to maximize the column-switching benefits.

MultiSLEEVE Controller

The MultiSLEEVE™ controller from Analytical Sales and Services is an optional component used to manage column heating. You can use it to control the IntelliSLEEVE™ and AgileSLEEVE PLUS™ heaters. You can manage up to eight column heating zones by using these controllers. See Chapter 10, "Configuring Temperature Controllers."

Peltier Stacks

The Peltier stack—sometimes referred to as a cool stack—is a module that holds sample vials on trays in a temperature-controlled environment. The autosampler retrieves the sample vials for processing (Figure 19).

Figure 19. Peltier stack module

The Peltier stack has the following hardware and system properties:

- Peltier stack modules have multiple drawers in sets of three or more, depending on the model, and are connected directly to the autosampler.
- Peltier stack module temperatures are set and monitored from the Aria MX Direct Control window (Thermo Scientific TriPlus™ autosampler).
- The autosampler arm moves to the proper drawer and sample vial to draw from, according to the sequence being executed during sample runs.

Related Topics

- Controlling the Peltier Stack Temperature (TriPlus)
- About Aria MX Direct Control

Barcode Reader (TriPlus Autosampler)

The TriPlus autosampler can scan barcode labels for sample vials using the optional barcode reader module. Bar coding can assist your lab in keeping track of samples, adding a layer of control over your lab processing. Add a Read Barcode step type to your autosampler method to turn on a configured barcode reader.

Note You must use a TriPlus LCP tool that is outfitted for magnetic vial transport.

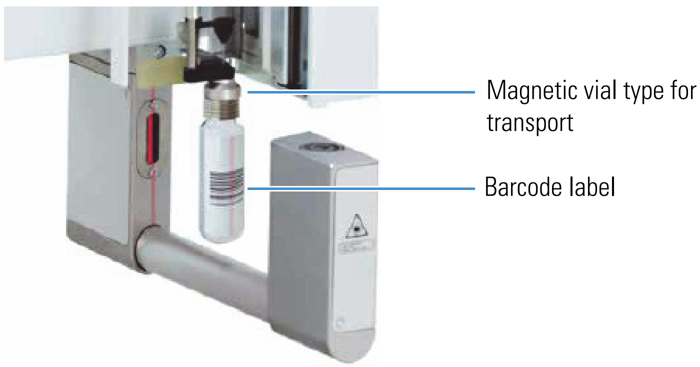
The barcode reader module has the following features:

- Reads horizontal 1D barcodes

- Scans barcode labels on 2 mL, 10 mL, and 20 mL vials regardless of the orientation on the vials
- Writes barcoded sample tracking information to the raw data file

The Read Barcode command can read and record the sample barcode, or it can compare the sample being processed to the sequence SampleID field and notify you if there is a sample mismatch.

Figure 20. TriPlus autosampler barcode reader module with barcoded vial



CAUTION The installed Laser device is a Class 1 Laser Product. Class 1 Laser devices are not considered to be hazardous when used for their intended purpose.

For more information, browse the Autosamplers folder on the Aria MX DVD and refer to the documentation that is located inside the folder corresponding to your autosampler model.

Related Topics

- Configuring the Optional Barcode Reader Module (TriPlus)

LCMS-P Module (TriPlus autosampler)

The LCMS-P module is a wash station and syringe combination similar to the DLW that can effectively inject samples and wash its system syringe and injector components.

Related Topics

- Changing a Syringe or Needle (TriPlus)
- Configuring the TriPlus LCMS-P Module Bubble Detector
- Accessing the TriPlus Autosampler Method Editor
- Tips to Create Methods for Systems Using the LCMS-P Tool (TriPlus)

Dynamic Load Wash (DLW)

The DLW is an autosampler wash station and syringe combination that improves on the standard Fast Wash by lowering carryover and decreasing washing time. For procedures specific to instruments that use a DLW, see Chapter 5, “Creating an Autosampler Method.”

Specifications and Requirements for Transcend II Systems

The following topics describe the Transcend II system specifications and requirements:

- Environmental Requirements
- Data System Hardware and Software Specifications
- Transcend II Pump Specifications

Environmental Requirements

Table 8 lists the environmental specifications for the Transcend II TLX and LX systems.

Table 8. Transcend II TLX and LX environmental specifications

Item	Specification
Temperature	4–40 °C (39–104 °F)
Relative humidity (noncondensing)	2–80%
Allowable temperature change for data acquisition	2.8 °C (5 °F)/hr

Data System Hardware and Software Specifications

Table 9 describes the hardware and software requirements for the Transcend II systems.

Note Data system computers purchased through Thermo Fisher Scientific, P/N CH-953269, meet all requirements.

Table 9. Transcend II system requirements (Sheet 1 of 2)

Item	Requirements
Computer hardware	• Quad-core processor, 3.10 GHz • DVD-ROM drive • 1 TB serial ATA hard drive (7200 RPM) • 16 GB of RAM • 2 Ethernet LAN ports 100/1000 • 4 USB ports • 2 PCIe slots • LCD monitor • (Optional) MCM: 1 open serial port, or use the PCIe expansion card supplied with the MCM, for systems that use Thermo Scientific pumps. • (Optional) Four-channel chromatographic heater from Analytical Sales and Products.
Pumps	Thermo Scientific UltiMate: • DGP-3600RS – Dual Ternary, dual-gradient pump • LGP-3400RS – Quaternary, low-pressure gradient pump • HPG-3200RS – Binary, high-pressure gradient pump • HPG-3400RS – Binary, high-pressure gradient pump with solvent selection valve (SSV)
Pump firmware	• Thermo Scientific UltiMate pump firmware 3.43 or later
Accela Open autosampler	• HTS and HTC PAL™ with xt-board firmware version 4.1.3 or later • HTS and HTC PAL firmware version 2.5.2

Table 9. Transcend II system requirements (Sheet 2 of 2)

Item	Requirements
TriPlus autosampler	• PAL 3 firmware version 2.2.9 • PAL 3, RSI model
Software	• Microsoft™ Windows™ 10 (64-bit) • Microsoft™ Windows™ 7 SP1 (64-bit) • (Recommended) Microsoft Office • Adobe™ Reader™ • Thermo Scientific products: – Foundation™ platform 3.1 SP5 or better – Xcalibur 4.4 – Aria MX 2.6 – (Optional) TraceFinder 5.1 SP1

Transcend II Pump Specifications

Table 10 lists the specifications for the UltiMate pumps.

Table 10. Transcend II UltiMate pump specifications (Sheet 1 of 2)

Item	Type HPG-3x00RS	DGP-3600RS	LPG-3400RS
Operating principle	Serial dual-piston	Serial dual-piston	Serial dual-piston
Flow rate range	0.001–8 mL/min (recommended: 0.05–8 mL/min)	0.05–8 mL/min (0.001–8 mL/min)	0.1–8 mL/min (0.001–8 mL/min)
Flow accuracy	±0.1%	±0.1%	±0.1%
Flow precision	<0.05% RSD or <0.01 min SD, whichever is greater	<0.05% RSD or <0.01 min SD, whichever is greater	<0.05% RSD or <0.01 min SD, whichever is greater
Pressure range[a]	2–103.4 MPa (15 000 psi) up to 5 mL/min, 2–80 MPa (11 600 psi) up to 8 mL/min	2–103.4 MPa (290–15 000 psi) up to 5 mL/min, 2–80 MPa (290–11 600 psi) up to 8 mL/min	2–103.4 MPa (15 000 psi) up to 5 mL/min, 2–80 MPa (11 600 psi up to 8 mL/min)
Pulsation	Typically: <2 bar or <1% whichever is greater	Typically: <2 bar or <1% whichever is greater	Typically: <2 bar or <1% whichever is greater
Gradient formation	High-pressure proportioning	Low-pressure proportioning	Low-pressure gradient proportioning

Table 10. Transcend II UltiMate pump specifications (Sheet 2 of 2)

Item	Type HPG-3x00RS	DGP-3600RS	LPG-3400RS
Proportioning accuracy	±0.2% (of full scale)	±0.5%	±0.5% (of full scale)
Proportioning precision	<0.15% SD	<0.15% SD	<0.15% SD
Number of eluent lines	2	6 (2 × 3)	4
Gradient delay volume	200 µL (35–1500 µL with optional mixer kits) independent of operating pressure.	690 µL by default (325–1790 µL with optional mixer kits).	690 µL by default (325–1790 µL with optional mixer kits).
Solvent degassing	External (optional)	External (optional)	Built-in, 4-channels
Dimensions	16 × 42 × 51 cm (6.3 × 16.5 × 20 in.) (*h* × *w* × *d*)	16 × 42 × 51 cm (6.3 × 16.5 × 20 in.) (*h* × *w* × *d*)	16 × 42 × 51 cm (6.3 × 16.5 × 20 in.) (*h* × *w* × *d*)
GLP features	Full support of Automatic Equipment Qualification (AutoQ™), Qualification Status and System Wellness Monitoring. All system parameters are logged in the Chromeleon™ software Audit Trail.	Full support of Automatic Equipment Qualification (AutoQ), Qualification Status, and System Wellness Monitoring. All system parameters are logged in the Chromeleon Audit Trail.	Full support of Automatic Equipment Qualification (AutoQ), Qualification Status and System Wellness Monitoring. All system parameters are logged in the Chromeleon Audit Trail.
I/O interfaces	2 digital inputs, 2 relay outputs.	2 digital inputs, 2 relay outputs.	2 digital inputs, 2 relay outputs.
Communications	USB for data system computer connection; USB hub with 3 sockets integrated 15-pin D-Sub connector for solvent rack/degasser connection.	USB for data system computer connection; USB hub with 3 sockets integrated; 15-pin D-Sub connector for solvent rack/degasser connection.	USB for data system computer connection; USB hub with 3 sockets integrated; 15-pin D-Sub connector for solvent rack/degasser connection.

[a] The Aria MX software limits the maximum pump operating pressure to 1034 bar (14 997 psi).

Note For Vanquish Flex and Vanquish Horizon pump specifications, refer to the following Thermo Fisher Scientific documentation located on the Aria MX DVD:

- Vanquish Flex: *Vanquish Pumps (VF-P10, VF-P20) Operating Manual*
- Vanquish Horizon: *Vanquish Pumps (VH-P10) Operating Manual*

Specifications and Requirements for Transcend and Aria Systems

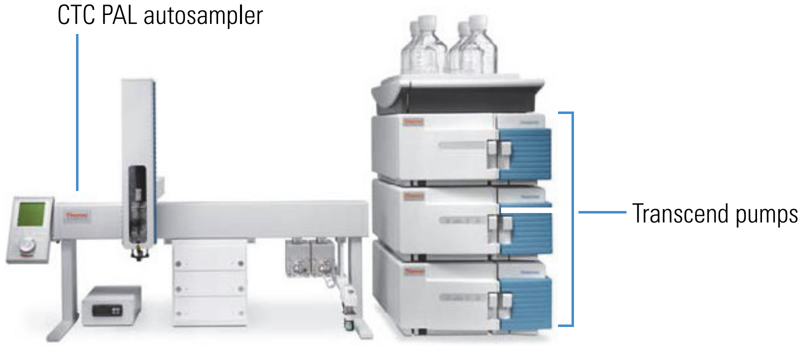
Note For system specifications for the Transcend II systems, see "Specifications and Requirements for Transcend II Systems" on page 21.

The following topics describe system specifications and requirements for the Transcend and Aria systems:

- Environmental Requirements
- Transcend and Aria System Requirements
- Transcend Pump Specifications

Figure 21 shows an example of a Transcend or Aria TLX-1 system or an LX-2 system.

Figure 21. TLX-1 or LX-2 system



Environmental Requirements

Table 11 lists the environmental specifications for the Transcend TLX and LX systems.

Table 11. Transcend environmental specifications

Item	Specification
Temperature	5–35 °C (45–95 °F)
Relative humidity (noncondensing)	20–80%
Allowable temperature change for data acquisition	2.8 °C (5 °F)/hr

Transcend and Aria System Requirements

For hardware and software requirements for the Transcend and Aria systems, see Table 12.

Table 12. Transcend and Aria system requirements (Sheet 1 of 2)

Item	Requirements
Computer hardware	• Quad-core processor, 3.10 GHz • DVD-ROM drive • 1 TB serial ATA hard drive (7200 RPM) • 16 GB of RAM • 2 Ethernet LAN ports 100/1000 • 4 USB ports • 2 PCIe slots • LCD monitor • (Optional) MCM: 1 open serial port, or use the PCIe expansion card supplied with the MCM, for systems that use Thermo Scientific pumps. • (Optional) Four-channel chromatographic heater from Analytical Sales and Products.
Pumps	• Thermo Scientific Vanquish Flex pump models: – VF-P10, binary – VF-P20, quaternary • Thermo Scientific Vanquish Horizon pump, VH-P10 • Thermo Scientific Accela™ 600 and 1250 pumps • KD Scientific Allegro™ pumps (with cable CH-953431) • Agilent 1100, 1200, 1200SL, 1260 Infinity™, 1260 Infinity II pumps **Note** Use only one model of pump per system.
Accela Open autosampler firmware	• HTS and HTC PAL with xt-board firmware version 4.1.3 or later • HTS and HTC PAL firmware version 2.5.2
TriPlus autosampler	• PAL 3 firmware version 2.2.9 • PAL 3, RSI model

Table 12. Transcend and Aria system requirements (Sheet 2 of 2)

Item	Requirements
Vanquish Dual Split Sampler	• VH-A40-A firmware version 2.02
Vanquish Charger	• Firmware version 1.11
Vanquish TCC	• Firmware version 2.01
Pump firmware	• Thermo Scientific Vanquish pump firmware version 2.02 (Flex and Horizon pumps) • Thermo Scientific Accela 600 and 1250 pumps firmware 23.67 • Thermo Scientific Allegro pump firmware 12.47c • Agilent 1100 pump firmware 5.x • Agilent 1200 and 1200SL pump firmware 6.x • Agilent 1260 Infinity pump firmware 6.x or later • Agilent 1260 Infinity II pump firmware D.07.20 or later
Software	• Operating system support: – Windows 10 (64-bit) – Windows 7 SP1 (64-bit) • (Recommended) Microsoft Office • Adobe Reader • Thermo Scientific products: – Foundation platform 3.1 SP5 – Xcalibur 4.4 – Aria MX 2.6 – (Optional) TraceFinder 5.1 SP1

Transcend Pump Specifications

Table 13 lists the specifications for the Transcend 600 and 1250 pumps.

Table 13. Transcend pump specifications (Sheet 1 of 2)

Item	Pump model	
	Transcend 600 pump	Transcend 1250 pump
Pump type	Quaternary	Quaternary
Flow accuracy	±0.5%	±0.5%

Table 13. Transcend pump specifications (Sheet 2 of 2)

Item	Pump model	
	Transcend 600 pump	**Transcend 1250 pump**
Flow precision	0.2% RSD (based on the retention time at constant temperature)	0.2% RSD (based on the retention time at constant temperature)
Flow rate range	1–5000 µL/min	1–2000 µL/min
Maximum pressure	600 bar (8702 psi)	1250[a] bar
Delay volume	90 µL (liquid displacement assembly [LDA]) + 65 µL (static mixer) for a total of 155 µL as shipped	70 µL (LDA) + 65 µL (static mixer) for a total of 135 µL as shipped
Wetted surfaces	Titanium, zirconium dioxide, 316 stainless steel, PEEK, glass-filled polytetrafluoroethylene (PTFE), Teflon™ AF (a family of amorphous fluoropolymers)	Same as Transcend 600 Pump
Mixing	Low pressure	Low pressure
Gradient accuracy	±0.5% absolute	±0.5% absolute

[a] The Aria MX software limits the maximum pump operating pressure to 1034 bar (14 997 psi).

Note For Vanquish Flex and Vanquish Horizon pump specifications, refer to the following Thermo Fisher Scientific documentation located on the Aria MX DVD:

- Vanquish Flex: *Vanquish Pumps (VF-P10, VF-P20) Operating Manual*
- Vanquish Horizon: *Vanquish Pumps (VH-P10) Operating Manual*

Specifications and Requirements for Prelude SPLC Systems

The following tables describe system specifications for Prelude SPLC systems for instrument and table dimensions and specifications for the laboratory environment, pump operations, and power and network communications.

Table 14. Prelude SPLC instrument and table dimensions

Component	Dimensions
Instrument (without table)	95.5 × 112 × 73.7 cm (*w* × *h* × *d*) (37.6 × 44.1 × 29.0 in.) (*w* × *h* × *d*) See Figure 3 on page 6.
Table	132 × 73.7 × 78.7 cm (*w* × *h* × *d*) (52 × 29.0 × 31.0 in.) (*w* × *h* × *d*) Required space between back wall and table = 15.25 cm (6 in.)
Instrument and table	132 × 185.6 × 78.7 cm (*w* × *h* × *d*) (52.0 × 73.1 × 31.0 in.) (*w* × *h* × *d*)

Table 15. Environmental specifications

Environmental condition	Recommendation
Location	Indoor use only
Temperature	18–27 °C (64.4–80.6 °F)
Maximum relative humidity	40–80% noncondensing

Table 16. Pump operating specifications

Specification	Description
Flow rate range for optimal performance	25 (or 50)–1500 or 1750 µL/min
Maximum operating pressure	1000 bar (15 500 psi)
Minimum programmable flow rate	1 µL/min
Flow rate range	1–2000 µL/min
Pressure signal accuracy	0.25% of full scale
Residual pulsation	< 1% for flow > 10 µL/min
Flow rate accuracy	0.5% of set point (optimal range)
Gradient composition accuracy	±0.5% of set point (5–95%)
Gradient composition range	0–100%

Table 17. Electronic specifications

Specification	Description
Communications	LAN and USB
Power	120/230 Vac, 50/60 Hz Voltage fluctuation not to exceed ±10% of the nominal voltage

2

Getting Started

This topic describes setup procedures that are required to run an LC system using the Aria MX interface. You do not need to perform these procedures each time you run samples.

Table 18 provides high-level details of the sequence of tasks necessary to run your system and begin running samples.

Table 18. Getting started procedures (Sheet 1 of 3)

Procedure	Description
Install the software.	A Thermo Fisher Scientific field service engineer installs the software required to run the system during system installation in your laboratory. At this time, the Software Installation Qualification report is printed and stored with the system.
Configure the autosampler, pumps, and Aria MX software.	You configure the autosampler, pumps, and appropriate software interfaces to the system software at the time the hardware and software are installed in your laboratory.
Create and save an instrument method and optimize method components.	The instrument method defines how to draw the sample from the sample vial, how the LC system separates the sample components, and how to acquire the raw data in the mass spectrometer. Plan to include a mass spectrometer section in your method that imports the MS tune file, an LC method section, and an AS method section. See Chapter 4, “Using Aria MX Instrument Methods.”
Optimize method components.	If you are running a TurboFlow method, optimize method components by performing a series of experiments to determine the optimal method conditions.

Table 18. Getting started procedures (Sheet 2 of 3)

Procedure	Description
(For the TraceFinder application only) Create and save a master method.	A master method combines the instrument method and processing information. The instrument method defines how the sample is drawn from the sample vial, how the LC system separates the sample components, and how the raw data is acquired in the mass spectrometer. The processing information includes how the data is processed, how the data is evaluated against acceptance criteria, and how the results appear in reports. For information on creating a master method, refer to the TraceFinder documentation.
If you are using the Xcalibur data system for data processing, create and save a processing method.	Defines how the data is processed and how the results appear in reports.
Perform required maintenance.	Perform required maintenance on your system and mass spectrometer, such as the following: • Prepare fresh aqueous mobile phases daily. • Tune and calibrate the mass spectrometer as indicated in the mass spectrometer documentation. • Optimize the mass spectrometer to the compound as indicated in the mass spectrometer documentation. • Install TurboFlow and/or HPLC columns as appropriate for your method. • Prime the LC system pumps if the pumps have been idle for more than 24 hours, or if you installed new mobile phases. • Prime the autosampler wash stations if the autosampler has been idle for more than 24 hours, or if you installed new autosampler wash solutions. For detailed procedures, refer to the *Multichannel LC Maintenance Guide.*

Table 18. Getting started procedures (Sheet 3 of 3)

Procedure	Description
(Optional) Change software options using the Aria Configuration tool.	Your Thermo Fisher Scientific service engineer configured the Aria MX software based on your laboratory needs. If you want to change these options, see "Editing Aria MX Logic Settings" on page 73.
If you are running multichannel LC systems, perform these additional setup tasks. You must have Aria MX software to process your multichannel LC systems.	1. Verify that the sampling priorities selected when Aria MX software was configured are appropriate for your laboratory. See "Editing Aria MX Logic Settings" on page 73. 2. If you are running the TraceFinder application, verify that multichannel LC processing is configured by referring to the TraceFinder user documentation or Help. 3. Enter the LC method data window duration into the mass spectrometer portion of the instrument method for the acquisition time. See "Accessing the LC Method Editor" on page 143. For information on entering the mass spectrometer acquisition time, refer to the TraceFinder documentation or your mass spectrometer software user documentation. If the LC method length and the mass spectrometer acquisition length are not the same, system errors might occur during the run. 4. (For the TraceFinder application) If you want to specify which channel a batch should run, select the channel in the ChannelSelect area of the Sample Definition page using the Acquisition Mode. 5. If you want to specify on which channels a method should run, select the channel in the ChannelSelect area of the Method Editor. Assigning a channel in the sample list, by sample or by batch, overrides this selection. See "Assigning Channels to the Method" on page 161. 6. If you want to specify on which channel a sample runs, enter the channel in the sample list.

3

Controlling System Components

Use the procedures in the following topics to control the pumps, valves, column heater, MCM, and autosampler directly by using the Aria MX application rather than through a method.

Note Method settings override Aria MX Direct Control settings once a sequence starts.

Contents

Accessing the Aria MX Status Pane

The Aria MX Status pane is visible from your MS control application. It gives you a clear view of the system channels, pumps, autosamplers, additional modules and their corresponding status in real time.

Note Items displayed in the Status pane might change depending on your system's hardware configuration.

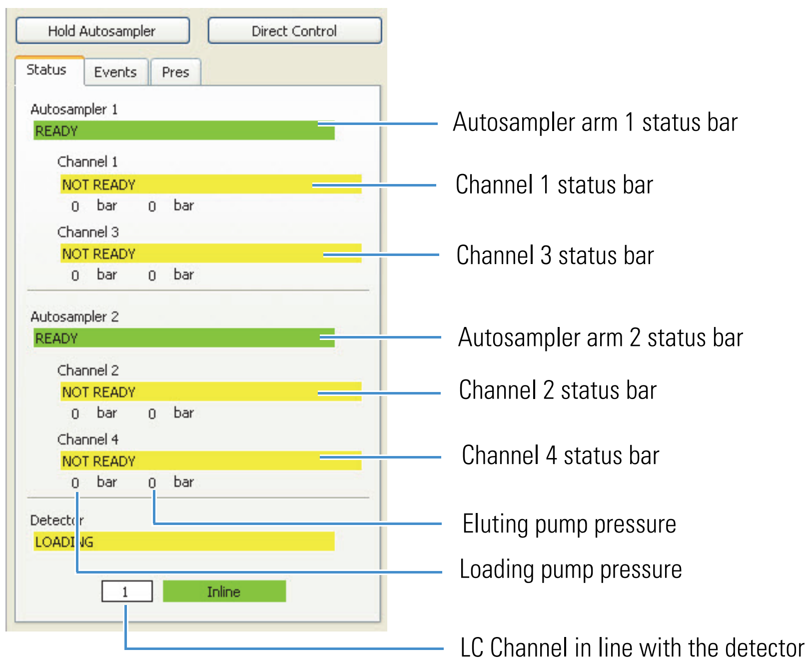
❖ To access the Aria MX status pane

1. Open the system status window in your MS control application. Refer to the documentation that comes with the MS control application for more details.

2. Click **Aria MX**.

   The Aria MX Status pane opens.

Figure 22. Aria MX Status pane showing status bars (TLX-4 system)



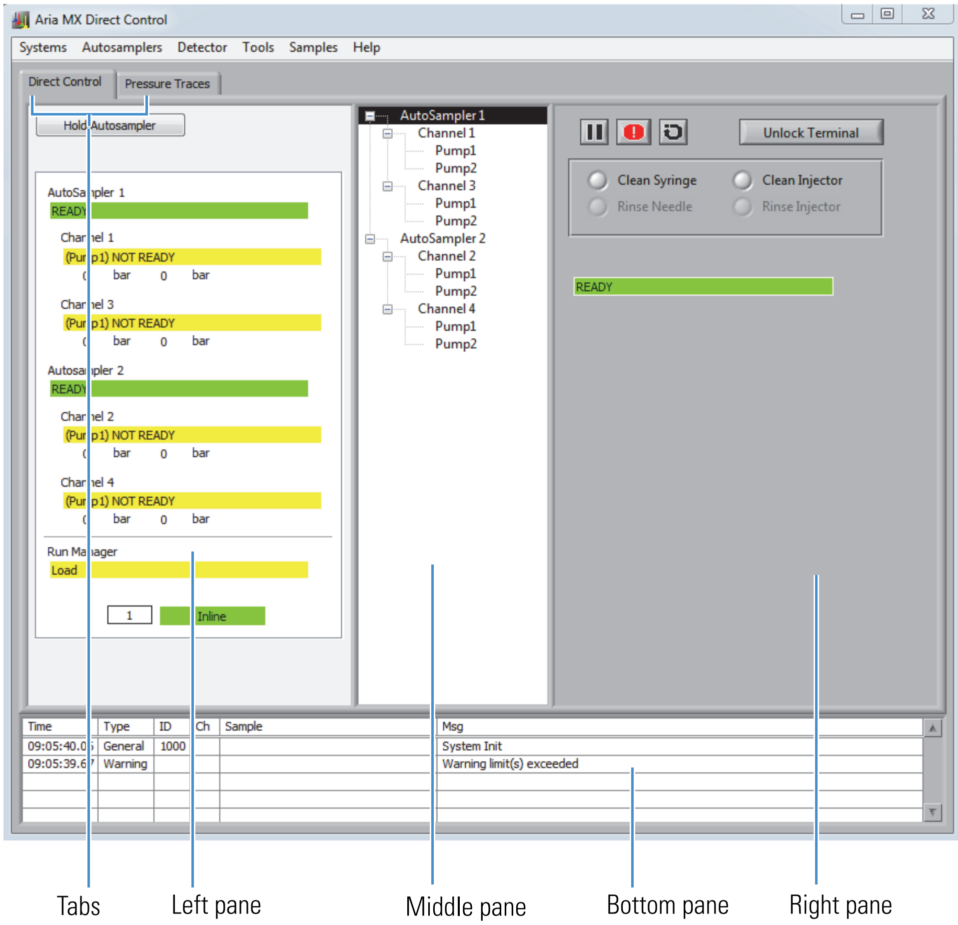
For descriptions of the bars in the status pane, see "Status pane information" on page 208.

About Aria MX Direct Control

Aria MX Direct Control gives you a clear view of the system channels and complete control over the system components.

The Aria MX Direct Control window is organized into multiple panes and two tabs as shown in Figure 23.

Figure 23. Aria MX Direct Control window (TLX-4 system)



The panes in the Aria MX Direct Control window have the following functions:

- The left pane provides the system status.
- The middle pane provides direct control of the autosampler, pump, and heaters that are configured on the data system computer.
- The right pane provides access to additional options or status information depending on the item that you select in the middle pane.
- The bottom (event) pane displays the event log of the most recent system events.

Additionally, you can click the Pressure Traces tab at the top to view and monitor system pressure traces in real time.

Related Topics

- Accessing the Direct Control Window

- To view a larger image of the pressure trace
- Viewing the Event Log

Accessing the Direct Control Window

The Aria MX Direct Control window provides a system status view with the ability to manage numerous tasks related to the autosampler and pump control.

❖ To access the Direct Control window

Choose **Start** > **All Apps** (Windows 10) **or All Programs** (Windows 7) > **Thermo** > **Instruments** > **Aria MX** > **Direct Control**.

The Direct Control window opens (see Figure 23 on page 37).

Related Topics

- About Aria MX Direct Control
- New Features in This Release

Controlling the Pumps

Follow these procedures.

- To start or stop the pumps for one channel
- To activate or deactivate a channel
- To start or stop all LC pumps
- To change mobile phase conditions and turn on the pumps
- To set pump conditions from the All Pumps Control dialog box
- To edit pump options

For information on how to prime the pumps, refer to the *Multichannel LC Maintenance Guide*.

❖ To start or stop the pumps for one channel

1. Open the Aria MX Status window. See "Accessing the Aria MX Status Pane" on page 36.
2. Right-click the LC channel that you want to start or stop, and do one of the following:
   - To start the pumps for the selected LC channel, choose **On**.
   - To stop the pumps for the selected LC channel, choose **Off**.

❖ To activate or deactivate a channel

1. Open the Aria MX Status window. See "Accessing the Aria MX Status Pane" on page 36.
2. Right-click the LC channel that you want to activate or deactivate.
3. From the shortcut menu, do one of the following:
   - To turn off the pumps for the selected LC channel, choose **Disable**.
   - To turn on the pumps for the selected LC channel, choose **Enable**.

   Note The system does not use a deactivated channel during a method.

❖ To start or stop all LC pumps

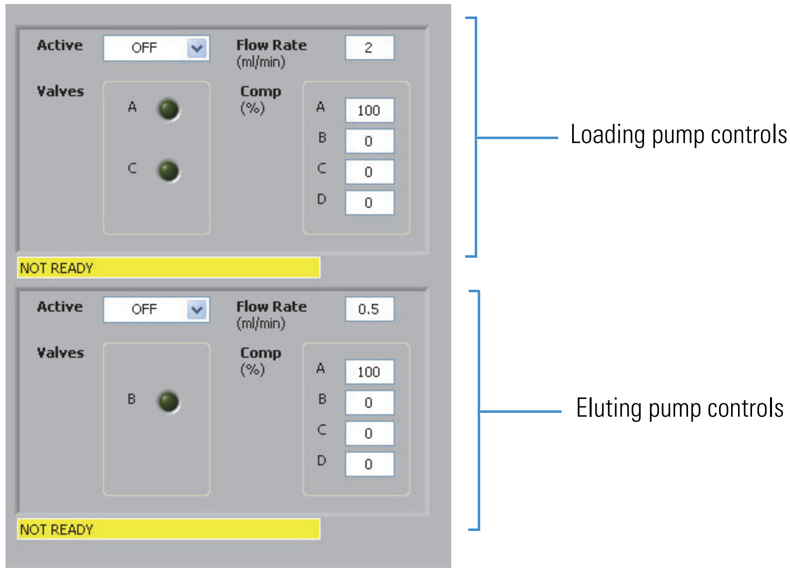
1. Open the Direct Control window. See "Accessing the Direct Control Window" on page 38.
2. Do one of the following:
   - To turn on the pumps for all enabled LC channels, choose **Pumps > All On**.
   - To turn off the pumps for all enabled LC channels, choose **Pumps > All Off**.

❖ To change mobile phase conditions and turn on the pumps

1. Open the Direct Control window.
2. In the middle pane, select the appropriate channel.

   The pump and valve controls for the channel you selected appear (see Figure 24). In two-pump systems, the top area controls the loading pump. The lower area controls the eluting pump.

Figure 24. Pump and valve controls



Note These fields might appear differently depending on the pump make and model on your system.

3. In the Flow rate box for the pump you want to run, select a flow rate that is appropriate for the column installed on the system.

4. In the A, B, C, and D boxes of the Comp area, enter the percentage of each solvent that you want to flow through the system.

5. In the Active box, select one of the following.

   - Select **On** to turn on the pump.

   - Select **Off** to turn off the pumps.

6. If you want to change the valve positions, select the valve option for the valve you want to change (**A**, **B**, or **C**).

   The color switches between light green and dark green when the valve option is selected repeatedly.

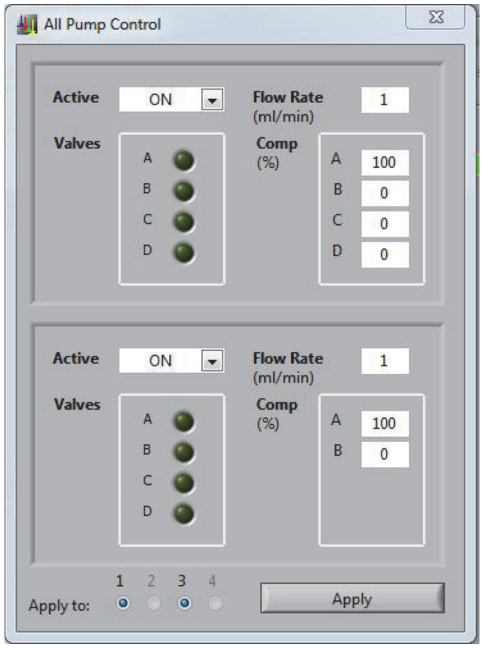
❖ To set pump conditions from the All Pumps Control dialog box

1. Open the Direct Control window.

2. Choose **Systems > All Pumps Control**.

   The All Pumps Control dialog box appears (see Figure 25).

Figure 25. All Pumps Control dialog box



3. In the Flow Rate boxes for the loading and eluting pumps, enter the applicable flow rates.
4. In the Comp boxes for the loading and eluting pumps, enter the solvent percentages for each channel.
5. In the Apply to area, select the LC channels to which the settings apply.
6. In the Active box for the loading and eluting pumps, select **On** to turn on the pumps, or **Off** to turn off the pumps.
7. If you want to change the valve positions, select the valve option for the valve you want to change (**A**, **B**, or **C**).

   The color switches between light green and dark green when the valve option is selected repeatedly.
8. Click **Apply**.

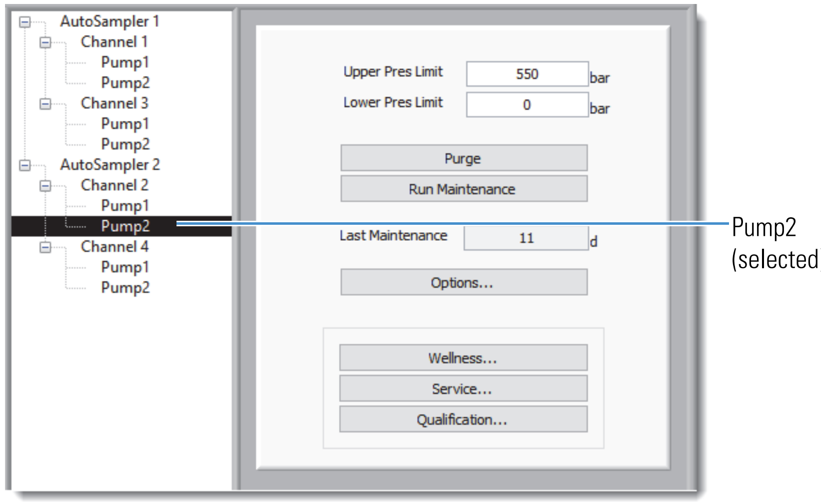
You can set high and low pressure limits and other pump options specific to the pump type you use.

❖ To edit pump options

1. Open the Aria MX Direct Control window.
2. Select the applicable pump.

   The boxes associated with the pump type appear in the right pane (see Figure 26).

Figure 26. Pump options (Vanquish Flex pump view)



3. Make entries in the boxes based on descriptions in Table 19.

Table 19. Pump option descriptions

Parameter	Description
High Pres Limit (Vanquish) High Limit (UltiMate)	Enter the highest value in bar that you want the pump pressure to reach before the pump shuts down. Enter a value that is equal to or less than the pump's pressure limit. Refer to the pump user documentation.
Low Pres Limit (Vanquish) Low Limit (UltiMate)	Enter the lowest value in bar that you want the pump pressure to reach before the pump shuts down.
CCF and PCA (not present with all pump types)	CCF (compression correction factor) PCA (pre-compression attenuation) See Table 20 for information on entering values in these boxes.
Compressibility (not present with all pump types)	Select the solvent to use with the pump from the list. The pump software adjusts for the solvent's compressibility factor. Pump types vary in how they adjust for solvent compressibility. If this box is present, refer to your pump user documentation for more information.
Additional fields	Remaining fields are specific to the pump type you use. Refer to the pump's user documentation for entering these values.

Table 20. Recommended values for CCF and PCA parameters

Typical pump pressure during operation	CCF value	PCA value
Under or equal to 600 bar	106	25
Greater than 600 bar	100	100

For additional information on how to prime the pumps, refer to the *Multichannel LC Maintenance Guide*.

Controlling the Valves

This topic provides several procedures to control valve behavior on the system.

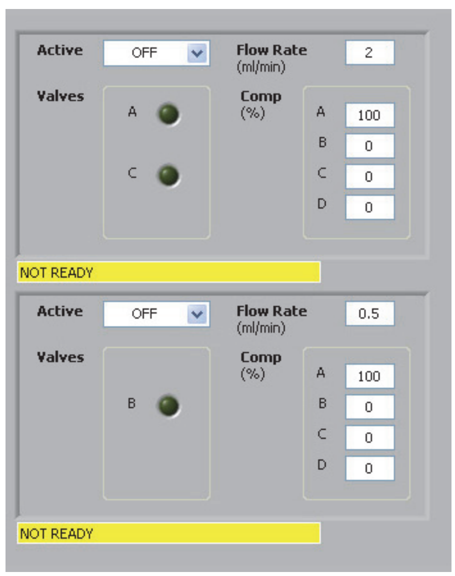
- To control valves A and B
- To control the selector valve
- To control the bypass valve

❖ To control valves A and B

1. Open the Direct Control window.
2. In the middle pane, choose **Channel 1**, **Channel 3**, **Channel 2,** or **Channel 4**.

   The pump and valve controls for the appropriate system appear.

   Figure 27. Pump control options



3. Click the appropriate valve options to switch its position.

   The color switches from dark green to light green.

❖ To control the selector valve

1. Open the Direct Control window.
2. Choose **Detector > Source**, and select the system channel that you want to flow to the detector.

❖ To control the bypass valve

> **Note** The bypass valve directs the flow exiting the column to the detector or to waste. To switch the position of the bypass valve, follow this procedure. See also "About the Bypass Override" on page 78.

1. Open the Direct Control window.
2. Choose **Detector > Bypass** to switch the position of the bypass valve.

   The Bypass indicator in the Direct Control window and status window switches to indicate the position of the bypass valve, as follows:

   - When the valve directs the mobile phases to bypass the detector and flow to waste, "Bypass" appears in a red status bar.
   - When the valve directs the mobile phases to flow to the detector, "In line" appears in a green status bar.

Controlling the Supported Autosamplers

Aria MX Direct Control provides certain control functions for the supported autosamplers.

The following topics provide information on how to control and configure features available in the supported autosamplers.

- Controlling the Accela Open Autosampler
- Controlling the TriPlus Autosampler
- Controlling the Vanquish Dual Split Sampler (AS)

For more information, browse the Autosamplers folder on the Aria MX DVD and refer to the documentation that is located inside the folder corresponding to your autosampler model.

Controlling the Accela Open Autosampler

Use the following procedures to perform common Accela Open autosampler tasks.

- To access the Accela Open autosampler features
- To pause the Accela Open autosampler
- To stop the Accela Open autosampler
- To reset the Accela Open autosampler
- To clean the Accela Open autosampler needle
- To clean an Accela Open autosampler injector
- To use the Accela Open autosampler handheld controller

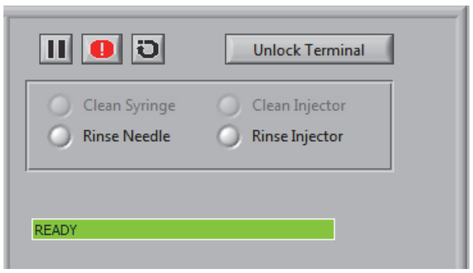
- To view Accela Open autosampler objects
- To change the tray type configuration for a sample tray

❖ To access the Accela Open autosampler features

1. Open the Direct Control window.
2. Select the autosampler in the middle pane.

   The autosampler options appear. See Figure 28.

Figure 28. Aria MX Direct Control autosampler options (Accela Open)



❖ To pause the Accela Open autosampler

1. Click the **Pause** icon,  .

   The autosampler completes the method for the current sample but does not draw additional samples. The Pause icon changes to the Continue icon.

2. When you want to continue sampling, click the **Continue** icon.

❖ To stop the Accela Open autosampler

Click the **Abort** icon,  .

The autosampler cancels the current method.

❖ To reset the Accela Open autosampler

Click the **Reset** icon,  .

The autosampler arm returns to the origin (0,0,0) position and resets the XYZ coordinates based on the origin position.

❖ To clean the Accela Open autosampler needle

1. Select the **Rinse Needle** option.

   The Rinse Needle dialog box appears.

2. In the Wash list, select the wash solution that you want to use to clean the syringe.
3. In the Injector list, select the injector that you want to rinse the needle.

4. In the Needle Gap box, leave the default setting, unless you have been instructed to change it by a field service engineer.

5. In the Rinse Time list, select the amount of time to rinse the needle, and click **OK**.

   Note Thermo Fisher Scientific recommends that you set the rinse time to a minimum of 10 seconds for optimal cleaning.

   The dialog box closes. The autosampler cleans the outside of the needle while flushing the wash through the needle.

❖ To clean an Accela Open autosampler injector

1. Select the **Rinse Injector** option.

   The Rinse Injector dialog box opens.

2. In the Wash list, select the wash that will clean the injector.

3. In the Injector list, select the injector that you want to clean.

4. In the Rinse Time list, select the amount of time that you want for the rinse cycle, and then click **OK**.

   Note Thermo Fisher Scientific recommends that you set the rinse time to a minimum of 5 seconds for optimal cleaning.

   The dialog box closes and the autosampler cleans the injector.

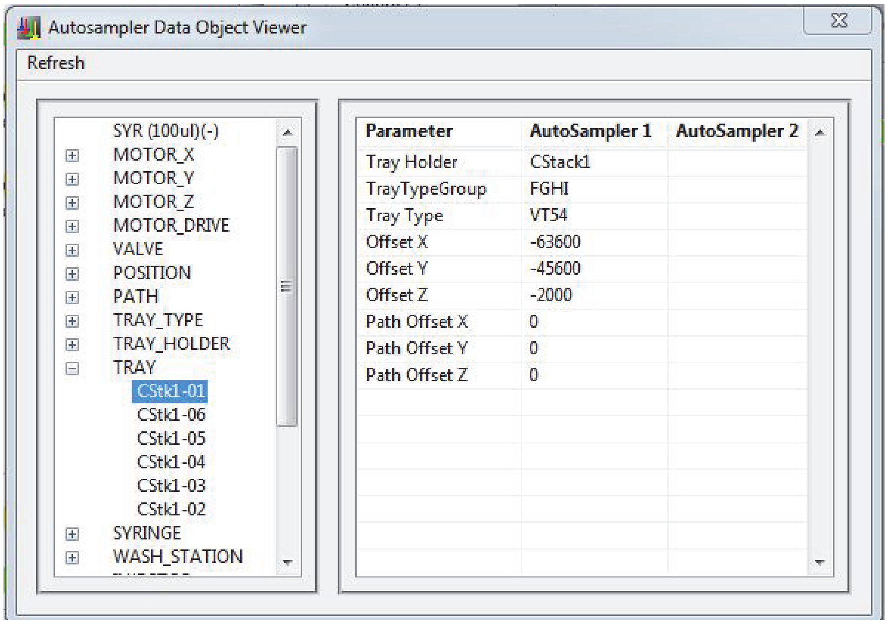
❖ To view Accela Open autosampler objects

1. Open the Direct Control window.

2. Choose **Autosamplers > AS Object Viewer**.

   The list of autosampler objects opens. See Figure 29.

Figure 29. Autosampler Data Object Viewer dialog box



❖ To use the Accela Open autosampler handheld controller

Note The autosampler handheld controller is intended for advanced users. Use the Aria MX interface to perform most of the general or daily tasks.

1. Open the Direct Control window.
2. Select the appropriate autosampler in the middle pane.

   The autosampler options appear.
3. Click **Unlock Terminal**.

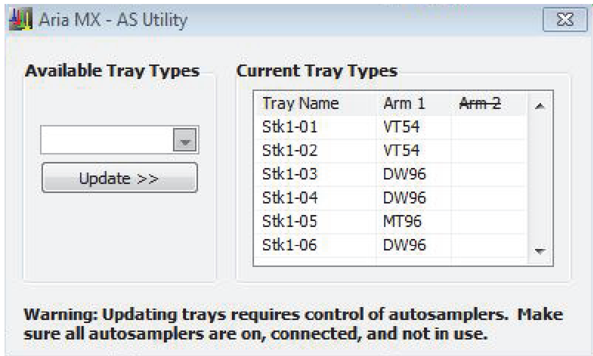
   The handheld controller becomes active. Refer to your autosampler documentation for instructions on using the handheld controller.

❖ To change the tray type configuration for a sample tray

1. In the Direct Control window, choose **Autosamplers > AS Tray Utility**.

   The AS Tray Utility dialog box opens.

Figure 30. AS Tray Utility dialog box



2. In the Current Tray Types list, select the tray that you want to configure.
3. In the Available Tray Types list, select the tray type to assign to the selected tray.
4. Click **Update**.

Controlling the TriPlus Autosampler

The following topics provide information on various TriPlus autosampler tasks, including information on configuring the Peltier stack tray types.

Follow the procedures provided to perform common TriPlus autosampler tasks.

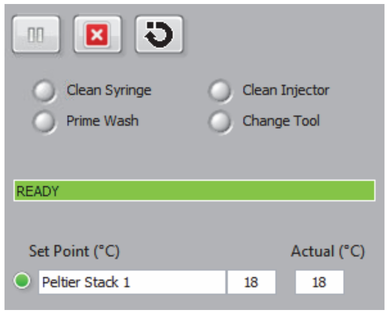
- To access the TriPlus autosampler features
- To pause the TriPlus autosampler
- To stop the TriPlus autosampler
- To clean a TriPlus autosampler syringe
- To clean a TriPlus autosampler injector
- To prime the wash pumps for the LCMS-P tool
- To use the TriPlus autosampler handheld controller
- About the Peltier Stack Drawer Tray Types (TriPlus)
- Configuring the Optional Barcode Reader Module (TriPlus)
- Changing a Syringe or Needle (TriPlus)
- Configuring the TriPlus LCMS-P Module Bubble Detector

❖ To access the TriPlus autosampler features

1. Open the Direct Control window.
2. Select the autosampler in the middle pane.

The autosampler options appear.

Figure 31. Aria MX Direct Control autosampler options (TriPlus)



❖ To pause the TriPlus autosampler

1. Click the **Pause** icon, .

   The autosampler completes the method for the current sample but does not draw additional samples. The Pause icon changes to the Continue icon.

2. When you want to continue sampling, click the **Continue** icon.

❖ To stop the TriPlus autosampler

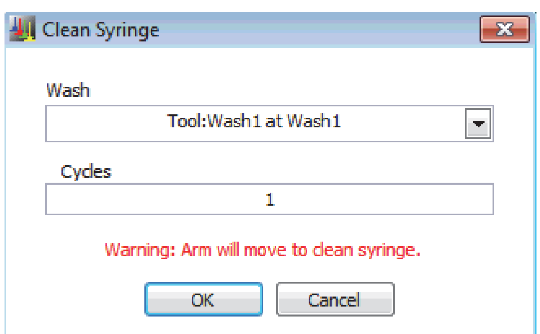
Click the **Abort** icon, .

The autosampler cancels the current method.

❖ To clean a TriPlus autosampler syringe

1. Select the **Clean Syringe** option.

   The Clean Syringe dialog box appears.



2. In the Wash list, select the wash solution that you want to use to clean the syringe.

3. In the Cycles box, type the number of rinse cycles that you want, and then click **OK**.

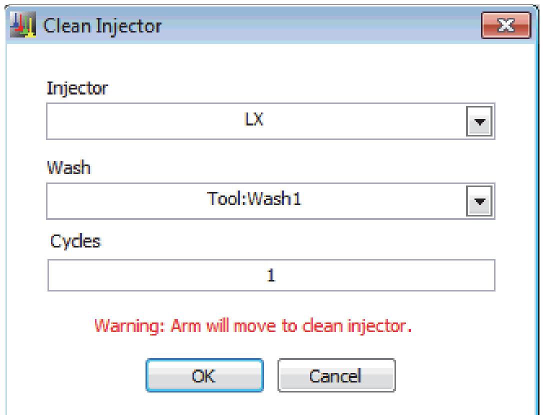
   The dialog box closes. The autosampler arm moves to the configured wash station and starts the cleaning operation. The autosampler arm moves back to its standby position when the operation is complete.

❖ To clean a TriPlus autosampler injector

1. Select the **Clean Injector** option.

   The Clean Injector dialog box opens.

   Figure 32. TriPlus Clean Injector dialog box



2. In the Injector list, select the injector that you want to clean.
3. In the Wash list, select the wash that will clean the injector.
4. In the Cycles box, type the number of rinse cycles that you want, and then click **OK**.

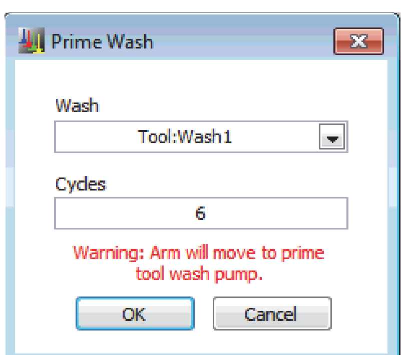
   The dialog box closes. The autosampler arm moves to the injector port to start the cleaning operation. The autosampler arm moves back to its standby position when the operation is complete.

❖ To prime the wash pumps for the LCMS-P tool

1. Select the **Prime Wash** option.

   The Prime Wash Pump dialog box appears.

   Figure 33. Prime Wash pump dialog box



2. In the Wash list, select the wash pump solution (1 or 2) that you want to prime.

3. In the Cycles box, type the number of priming cycles that you want, and then click **OK**.

> **Note** Thermo Fisher Scientific recommends setting the prime cycle count to 15 to 20 cycles if the system has been inactive for a long period of time. For short periods of inactivity—overnight, for example—3 to 5 prime cycles are sufficient.

The dialog box closes. The selected wash pump starts the priming operation.

❖ To use the TriPlus autosampler handheld controller

> **Note** The autosampler handheld controller is intended for advanced users. Thermo Fisher Scientific recommends that you use the Aria MX interface to perform most of the general and daily tasks.

Make sure that the TriPlus autosampler is in standby (or inactive) mode and that no samples are pending in the queue.

You can now use the TriPlus handheld controller.

> **Note** If the handheld controller indicates that the autosampler is "Busy" without any apparent activity, do the following:
>
> 1. Select **Autosampler** from the Direct Control window's middle pane.
> 2. Click the **Abort** icon, .
> 3. Perform any necessary changes with the handheld controller, and then return to the Direct Control window for any further operations.

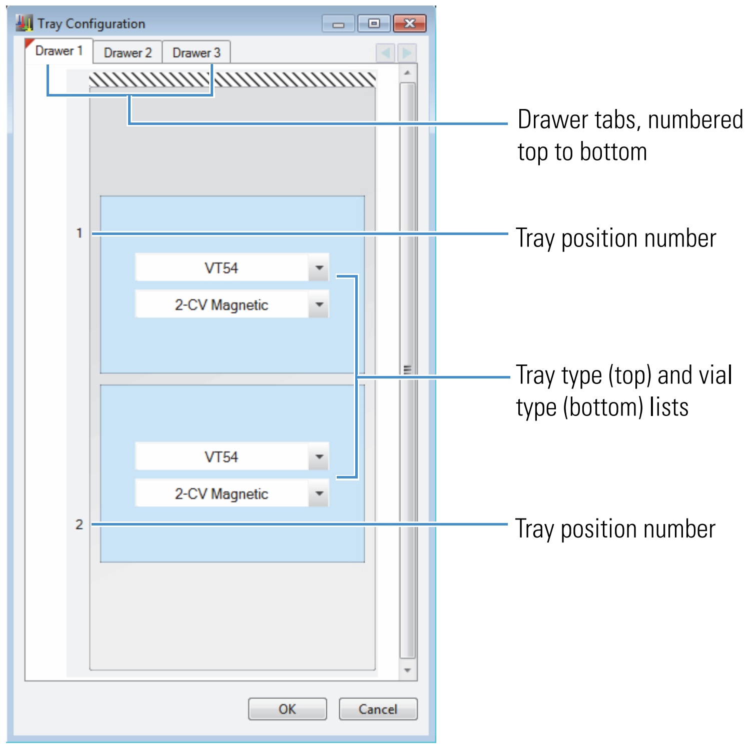
For more information, browse the Aria MX DVD and refer to the CTC documentation inside the folder that corresponds to your autosampler model.

About the Peltier Stack Drawer Tray Types (TriPlus)

With the Configure Tray command, you can make changes to the TriPlus autosampler tray and vial types that hold samples in the Peltier stack drawers for analysis. When you choose this command, the Tray Configuration dialog box appears, showing the available drawers as clickable tabs. Click the tab for the drawer you want to configure according to your lab's sample requirements (see Figure 34).

> **Note** The stack drawer hardware for the Peltier stack module is numbered from *front to back*, which is the opposite from the stack module.

Figure 34. Tray Configuration dialog box example, Model B autosampler



You can make changes to the following tray and vial options for each Peltier stack drawer by using the Tray Configuration dialog box:

- Each drawer can be configured for one or two trays.
- Each tray position can be configured to use a different tray type. Supported tray types appear in the tray type list (top).
- Each supported vial type appears in the vial type list (bottom) for the tray type selected.

For more information, browse the Autosamplers folder on the Aria MX DVD and refer to the documentation that is located inside the folder corresponding to your autosampler model.

Related Topics

- Peltier Stacks
- Configuring the Peltier Stack Drawer Tray Types (TriPlus)
- Accessing the Direct Control Window

Configuring the Peltier Stack Drawer Tray Types (TriPlus)

Configure the tray type for the TriPlus autosampler by running the Configure Trays command from the Direct Control window.

❖ To configure the Peltier Stack tray type for the TriPlus autosampler

1. Open the Direct Control window.
2. Choose **Autosamplers > Configure Trays**.

   The Tray Configuration dialog box appears (see Figure 34).
3. Click the tab for the tray drawer that you want to configure, and then choose the tray and vial type that you want to configure from the tray and vial lists.
4. Click **OK**, or click **Cancel** to exit without saving the changes.

For more information, browse the Autosamplers folder on the software installation DVD and refer to the documentation that is located inside the folder corresponding to your autosampler model.

Configuring the Optional Barcode Reader Module (TriPlus)

❖ To include the TriPlus barcode reader functionality in an autosampler method

1. Open the LC method editor.
2. Do one of the following:
   - To add the barcode reader function to an existing autosampler method, open the method by choosing **File > Open** from the method editor menu bar, navigate to the method you want, and then click **OK**.

     The method opens in the default LC Method editor and displays the current method.
   - To create a new autosampler method that includes the barcode reader function, choose **File > New** from the method editor menu bar.

     A default method opens in the LC method editor (see "Accessing the TriPlus Autosampler Method Editor" on page 97).
3. From the middle pane, click **Autosampler**.

   The Autosampler editor opens. The editor window contains Get Sample and Inject Sample steps by default if you are creating a new method, or the window is populated with the steps from the existing method that you opened in step 2.
4. From the autosampler method editor box, click **Get Sample,** and then click **Insert** if you are creating a new autosampler method.

   –or–

   Highlight the **Get Sample** step inside the step table, and then click **Insert**.

   A blank step is created in the editor box step table (see "Accessing the TriPlus Autosampler Method Editor" on page 97).
5. From the autosampler method step list, select **Read Barcode**.

Note The Read Barcode step must always be inserted before the Get Sample step.

A Read Barcode step is inserted in the method. The Read Barcode method step has one option, Check Sample ID, with two possible settings:

- True—(Default) The barcode information is written to the raw data file, is compared to the Sample ID field from the sequence row, and displays an error message if the ID information does not match.
- False—The barcode information is written to the raw data file only.

6. Choose the state of the Check Sample ID option—either **True** or **False**—that you want to use with your method.

IMPORTANT If you choose True, populate the Sample ID column of the sequence row—or sample list—with the appropriate barcode number listed on the vial.

For more information, browse the Autosamplers folder on the Aria MX DVD and refer to the documentation that is located inside the folder corresponding to your autosampler model.

Changing a Syringe or Needle (TriPlus)

Use the Change Tool command to change a TriPlus LCMS-P tool, syringe barrel, or needle. When you run the Change Tool command, the Syringe Exchange wizard appears and takes you through the step-by-step procedure (see Figure 35).

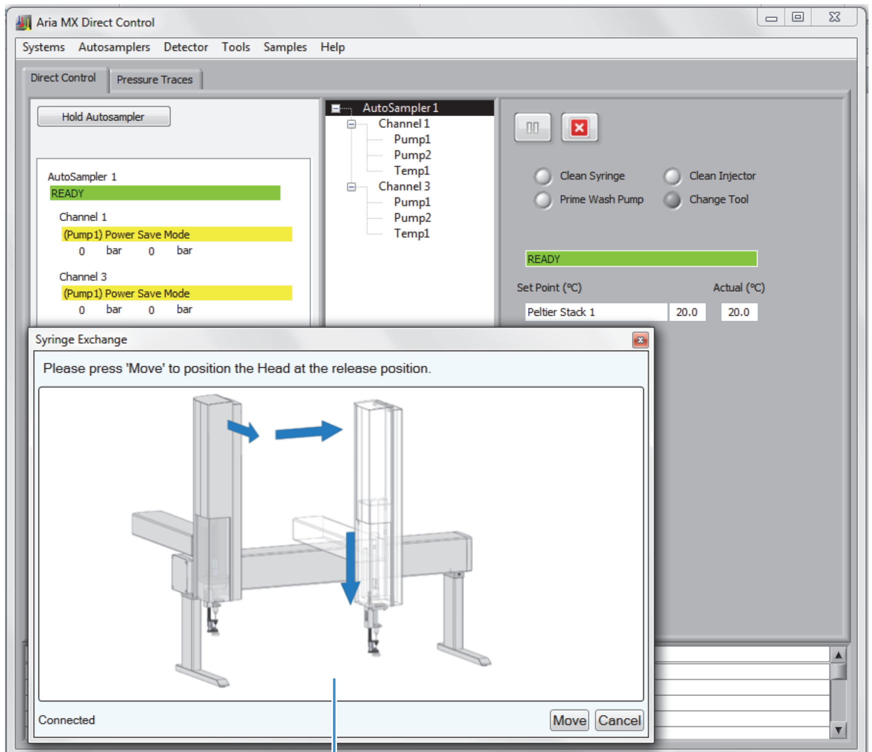
❖ To change an LCP tool, syringe barrel, or needle

CAUTION The autosampler arm moves to perform the following operation. To prevent personal injury, make sure that you wait until the autosampler arm stops moving before you open the autosampler door. Carefully follow the on-screen Syringe Exchange wizard instructions. Always wait until the autosampler arm stops moving before opening the autosampler compartment door.

1. Open the Direct Control Window.
2. From the middle pane, click **Autosampler1**,the autosampler where you want to make the change, and then open the autosampler compartment door.
3. In the right pane, select the **Change Tool** option.

   The Syringe Exchange wizard appears (Figure 35).

Figure 35. Syringe Exchange wizard from the Direct Control window



Syringe Exchange wizard

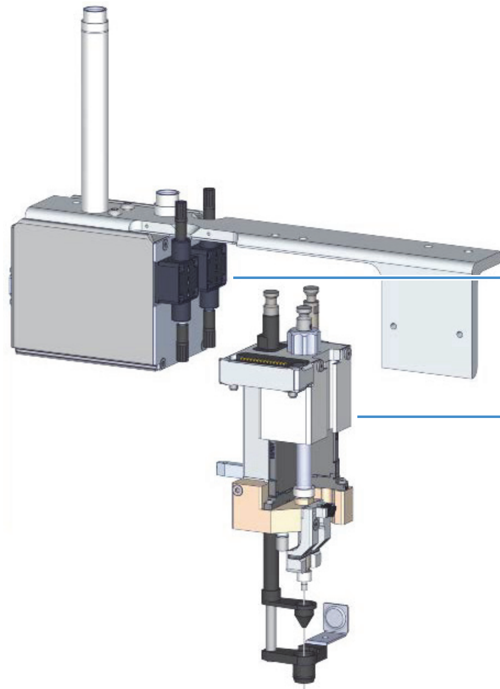
4. Follow the on-screen wizard instructions to change the LCP tool, syringe barrel, or needle.

For more information, browse the Autosamplers folder on the software installation DVD and refer to the documentation that is located inside the folder corresponding to your autosampler model.

Configuring the TriPlus LCMS-P Module Bubble Detector

The TriPlus autosampler requires an uninterrupted supply of wash solvents when running methods that use the LCMS-P module (see Figure 36). A bubble detection feature is available to warn you when a gap is detected in the wash solvent supplied by either wash pump, preventing further injection of valuable sample.

Figure 36. LCMS-P module with LCP tool (detached)



The TriPlus can detect missing wash solvent during the Clean Syringe and Clean Injector commands when bubble detection is turned on. If a lack of wash solvent is detected during method execution of these commands, the affected LCP tool stops drawing samples until the error is resolved.

The bubble detector is positioned at the base of the holding loop within the LCP tool (see Figure 36), which is the syringe component of the LCMS-P module.

The bubble detector is off by default. Turn on the bubble detector by using the TriPlus handheld controller.

> **Note** Before using the bubble detection feature, verify that the wash solvents are fully primed by using the Direct Control Clean Syringe or Clean Injector command for 3 cycles each of Wash 1 and Wash 2.
>
> Thermo Fisher Scientific recommends running a minimum of 20 prime cycles to prime wash pumps that are out of solvent.

Turn on the TriPlus LCMS-P module bubble detector to prevent further injection of valuable sample if the system runs out of wash solvents.

❖ To turn on the TriPlus LCMS-P module bubble detector

1. Ensure that the autosampler is inactive and that no samples are pending in the queue.
2. Remove the TriPlus handheld controller from its carriage on the autosampler rail.

3. From the Start Screen on the handheld controller, select **LCP**, and then do the following:

   a. Set the BD (bubble detector) Error Handling to **Error**.

      IMPORTANT The Warning mode does not function for TriPlus autosamplers equipped with an LCMS-P module running CTC Analytics firmware version 2.2. Choose either **Error** or **Off**.

   b. Set the BD filter to **500**.

4. Verify that the changes have been accepted by the handheld controller.

5. (Optional) Repeat the above steps for a second LCP tool, if installed.

   The configuration is complete and you can return to normal autosampler operations.

Note If the TriPlus handheld controller indicates that the autosampler is "Busy" without any apparent activity, do the following:

1. Select **Autosampler** from the Direct Control window's middle pane.
2. Click the **Abort** icon, .
3. Perform any necessary TriPlus changes with the handheld controller, and then return to the Direct Control window for any further operations.

For more information, browse the Aria MX DVD and refer to the CTC documentation inside the folder that corresponds to your autosampler model.

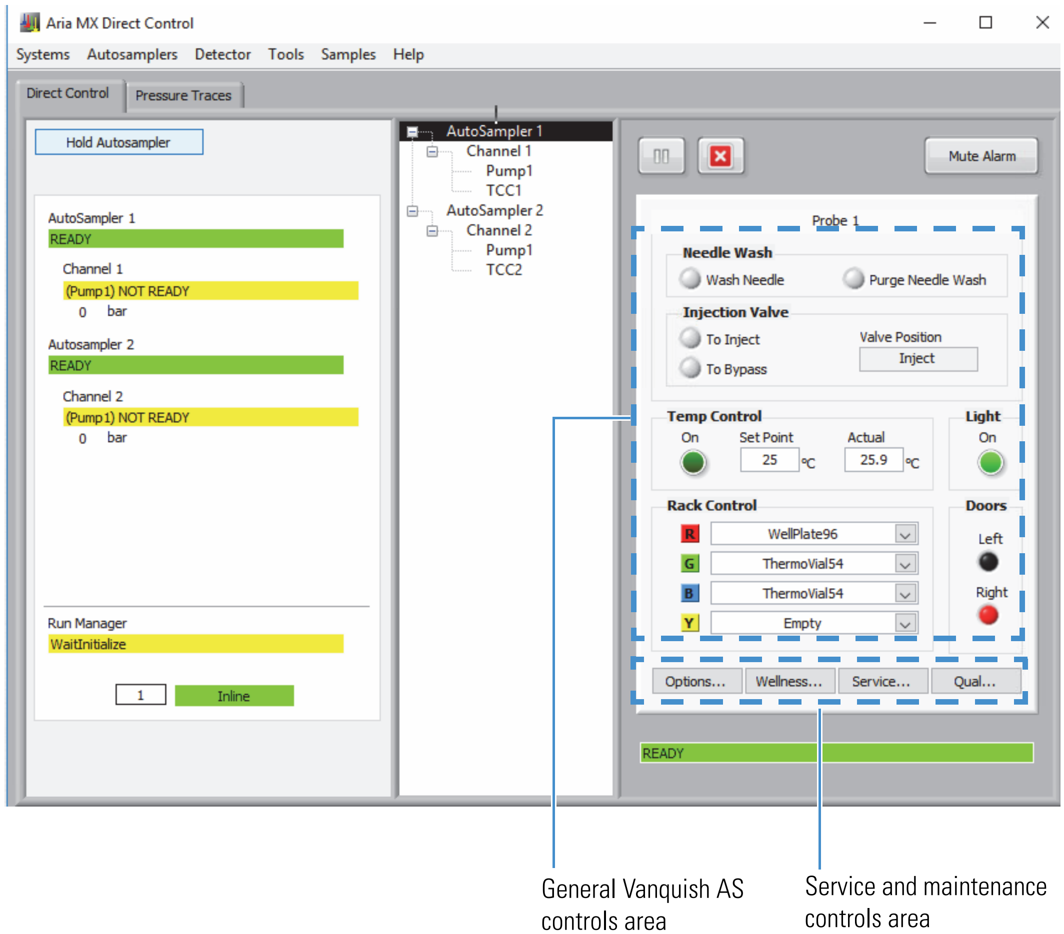
Related Topics

- Controlling the TriPlus Autosampler

Controlling the Vanquish Dual Split Sampler (AS)

The following topics provide information on various Vanquish AS functions that you can control from the Aria MX Direct Control window (see Figure 37).

Figure 37. Aria MX Direct Control window, Vanquish AS view (Autosampler 1selected)



Aria MX Control Parameters for the Vanquish AS

Table 21 provides information on the available parameters from the Aria MX Direct Control window for the Vanquish AS. Refer to Figure 37, as needed.

Table 21. Vanquish AS controls

Parameter area	Description
Needle Wash	Two available options (buttons): • Wash Needle • Purge Needle Wash Choose the button that you want to open the control dialog box.
Injection Valve	Two available options (buttons): • To Inject • To Bypass Choosing one of the above options sets the AS valve position. The position selected is displayed in the Valve Position status box. **IMPORTANT** Turn on the LC flow before you manually switch the injection valve position.
Temp Control	Turns the AS compartment temperature controller on or off and also controls temperature in the optional Charger module. Click the On button to turn on the temperature control. Type the temperature that you want in the Set Point box. The current compartment temperature is displayed in the Actual box. **IMPORTANT** When using the optional Charger module, Temp Control in the Vanquish AS must always be set to On.
Rack Control	Specifies the table that is used for the tray that is assigned to it. Vanquish AS tables are color-coded Red, Green, Blue, and Yellow. Trays are automatically registered when you insert one onto one of the 4 tray tables. When inserted, the specific type of tray registered to each table is displayed in the tray information box.
(General) maintenance and service buttons	The four service and maintenance buttons (“Options...”, “Wellness”, “Service”, and “Qual...” access various functions used to track and log system use, set AS cleanup and global options, and review various Vanquish AS metrics. **Note** These are advanced features and should only be used by qualified personnel. For specific autosampler method options, see “Working with Autosampler (AS) Methods” on page 100.

Common Vanquish AS Functions Using the Aria MX Direct Control Window

Follow the procedures provided to perform common Vanquish AS tasks from the Aria MX Direct Control window.

❖ To access the Vanquish AS features

1. Open the Aria MX Direct Control window.
2. Select the autosampler in the middle pane.

   The autosampler controls appear in the right pane (Figure 37).

❖ To pause the Vanquish autosampler

1. Click the **Pause** icon,  at the top of the right pane (Figure 37).

   The autosampler completes the method for the current sample but does not draw additional samples.

2. Click the **Pause** icon again when you want to continue sampling.

❖ To stop the Vanquish autosampler

Click the **Abort** icon, .

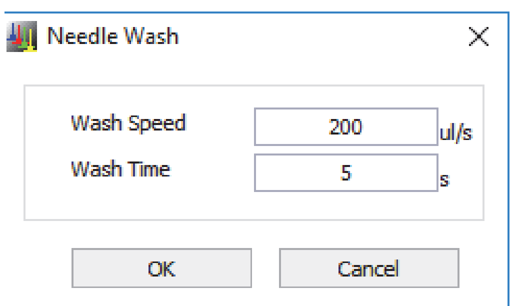
The autosampler cancels the current method.

❖ To clean a Vanquish autosampler syringe

> **Note** Only the lower exterior portion of the needle is cleaned. Wash solution is provided by the wash pump to a wash cup located behind the injector.

1. Select the **Wash Needle** option.

   The Needle Wash dialog box appears.



2. In the Wash Speed box, type the wash speed that you want.
3. In the Wash Time box, type the time in seconds that you want to wash the needle, and then click **OK**.

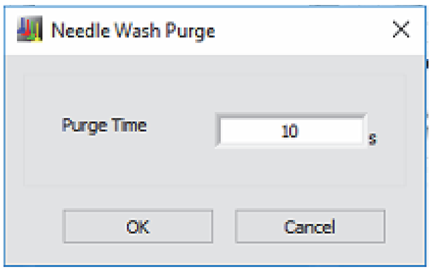
The dialog box closes, and the Vanquish autosampler starts the needle wash operation. The Aria MX Direct Control window displays the current state with a purple status—“Wash”—bar within the status area.

❖ To purge the Vanquish AS wash solution

1. Select the **Purge Needle Wash** option.

   The Needle Wash Purge dialog box opens.

   Figure 38. Vanquish Needle Wash Purge dialog box

2. In the Purge Time box, type the number of seconds that you want to run the purge, and then click **OK**.

   The needle wash purge function starts immediately, and the progress is displayed in the Aria MX Direct Control window.

❖ To configure the Vanquish AS Options

1. Open Aria MX Direct Control (see “Accessing the Direct Control Window” on page 38).
2. From the middle pane of the Aria MX Direct Control window, select **AutoSampler 1** or **Autosampler 2**.
3. From the right pane, click **Options**.

   The Vanquish AS Options dialog box appears (see Figure 55).
4. Make your selections, and then click **Close**.

Note Configuration changes to either Autosampler1 or Autosampler2 are global and apply to the other channel, except for the Needle Height parameter when “2 Needle Heights” is selected. For more AS parameter information, see Table 28.

Refer to the *Vanquish Split Samplers Operating Manual* (PDF format) provided in hard copy with each Vanquish shipment or in PDF format on the Aria MX DVD for more information.

Related Topics

- Controlling the Vanquish Dual Split Sampler (AS)
- Vanquish AS Method Timing Options
- Autosampler Method Overview

Working with the Optional Vanquish Charger Expanded Tray Capacity Module

The optional, thermostatically-controlled, Vanquish Charger module expands sample tray capacity of the Vanquish Dual Split autosampler.

When installed, the Charger module is attached directly to the Vanquish autosampler and shares the same sample compartment temperature setting, which is controlled from the autosampler Temp Control area in the Direct Control window (see Figure 37).

Note You must leave at least one of the four Vanquish autosampler shelves free to use the Charger module.

For more information and details on using the Vanquish Charger module, refer to the *Vanquish Charger Operating Manual* (PDF format) provided in PDF format on the Aria MX DVD for more information.

CAUTION Parts inside the Charger are moving when the device is operating and can cause minor injury. Do not open the door during the phases when parts inside the Charger are moving. During these phases, the Mover Status LED on the Charger blinks green.

CAUTION Flammable or hazardous vapors from sample spills can accumulate inside the device. This can pose health and safety risks. Follow the guidelines for preventing spills below. If a spill occurs inside the Charger, turn the Charger power off. Clean up the spill and leave the Charger door open. Allow sufficient time for the spill to dry and any vapors to disperse before putting the Charger back into use.

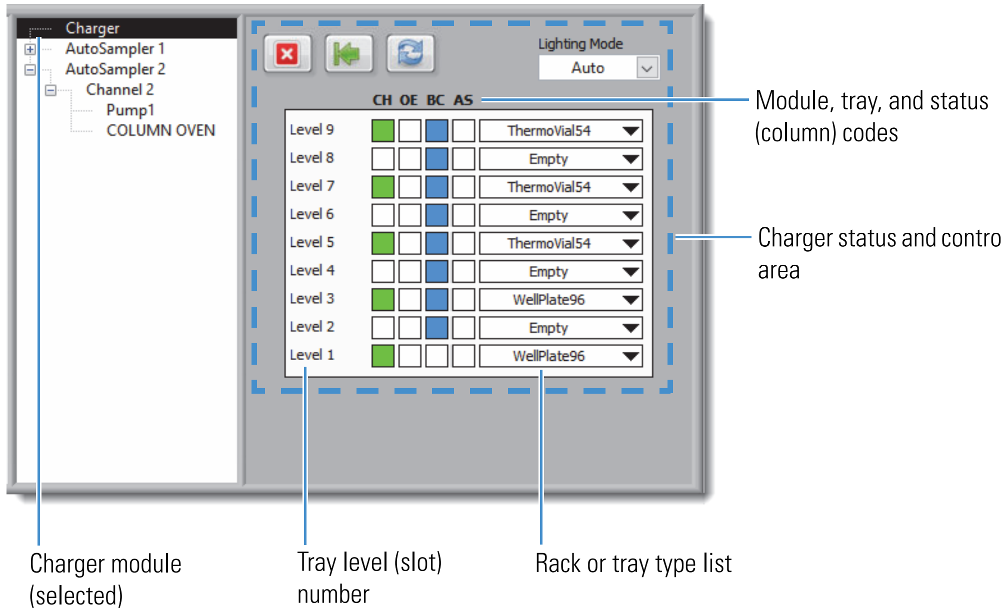
CAUTION The high luminosity produced by the LED inside the barcode reader can cause serious eye injury. Do not use light-focusing instruments for viewing the light output.

❖ To view and control the Charger module from the Direct Control window

1. Open the Direct Control window.
2. Select **Charger** in the middle pane.

   The Charger status and control area appears in the right pane.

Figure 39. Charger status and controls



3. If you are not using a barcoded sample rack or tray, note the CH Level location and choose the supported rack or tray type from the list.

Note Barcoded sample racks or trays are automatically scanned and inventoried.

For more information and details on using the Vanquish Charger module, refer to the *Vanquish Charger Operating Manual* (PDF format) provided in PDF format on the Aria MX DVD for more information.

Table 22 describes the Charger module status codes, color-coded indicators, and buttons.

Table 22. Vanquish Charger module status codes, color status indicators, and control buttons (Sheet 1 of 2)

Charger status code, color indicator, or button	Description
CH	Specifies the Charger module.
OE	Specifies an orientation error of a rack or tray.
BC	Specifies a barcoded sample rack or tray.
AS	Specifies the Vanquish autosampler.

Table 22. Vanquish Charger module status codes, color status indicators, and control buttons (Sheet 2 of 2)

Charger status code, color indicator, or button	Description
(Green)	Indicates that the Charger sample rack shelf position (rack numbers Level 1 to Level 9) contains an inventoried sample well plate or tray. For example, a green indicator under the CH column for “Level 9” means that a sample rack/tray is currently inventoried in the Charger module, Level 9 position.
(Blue)	Indicates a barcoded (BC status column) well plate or tray is inventoried for the associated sample rack shelf position.
(White)	Indicates the following depending on the Charger status column where it appears: • An empty shelf at the given Charger (CH status column) shelf position • No rack/tray orientation errors (OE status column) at the given shelf position • No barcoded (BC status column) sample rack or tray at the given shelf position • The Vanquish autosampler (AS status column) does not hold a Charger sample well plate or tray for the given Charger shelf position
(Red)	Indicates that a tray or rack orientation error (OE status column) is detected at the given shelf position
	Stops current autosampler activity and also clears any errors.
	Returns all trays to their assigned slot positions.
	Resets the Charger module tray inventory. All non-barcode, manually configured, tray types are set to “Unknown” and must be re-configured. Barcoded tray types are re-inventoried automatically upon the system scan.

Note The Charger module sample racks/trays that are transferred to the Vanquish autosampler are noted by using the lettered Red, Green, Blue, or Yellow Vanquish autosampler position indicators under the AS column. To use the Charger module, at least one Vanquish autosampler tray position must be vacant. See Figure 37 for details.

❖ **To view where a sample rack or tray is currently located**

Do the following:

- Check the “AS” status column in the Charger control area (see Figure 39).
- Click **Autosampler** from the Direct Control middle pane and check the AS tray table and sample rack or tray status on the right pane.

Related Topics

- Aria MX Control Parameters for the Vanquish AS
- Common Vanquish AS Functions Using the Aria MX Direct Control Window
- Vanquish Charger Module

Controlling System Module Temperatures

The Aria MX software controls several types of configurable modules that can provide temperature-controlled environments for your system:

- MultiSLEEVE controllers—These modules control the LC column temperature. See Controlling the LC Column Heater Temperature (MultiSLEEVE Controller) for an overview of these controllers, or for detailed setup instructions and information, see Chapter 10, “Configuring Temperature Controllers.”
- Vanquish Thermostatted Column Compartment (TCC)—This module controls the LC column temperature, see Controlling the Column Heater Temperature (TCC Module) and Chapter 10, “Configuring Temperature Controllers.”
- Vanquish AS—The Vanquish AS sample compartment holds samples in a temperature-controlled sample tray enclosure. You can set the sample tray enclosure temperature from the Direct Control window when a Vanquish AS is selected. See Controlling the Vanquish AS Sample Compartment Temperature.
- Peltier stack modules—These modules hold samples in temperature-controlled drawers and are available in multiple form factors. You can set the temperature from the Direct Control window if your system is using the TriPlus autosampler. See Controlling the Peltier Stack Temperature (TriPlus).

Controlling the LC Column Heater Temperature (MultiSLEEVE Controller)

The MultiSLEEVE controller is an optional configurable module that can control the temperature of up to four LC column heaters and has the following features:

- Control of up to eight column heaters through two configurable controllers
- LC method-controlled column temperatures during a run

For detailed information on setting up the MultiSLEEVE module to control the column heater temperatures in a method, see Chapter 10, “Configuring Temperature Controllers.”

Controlling the Column Heater Temperature (TCC Module)

The Vanquish Thermostatted Column Compartment (TCC module) is a configurable module that can control the temperature of up to two LC columns. The TCC module is supported in Transcend configurations that employ the Vanquish Dual Split Sampler (Vanquish AS) with Vanquish Horizon pumps in an LX-2 mode.

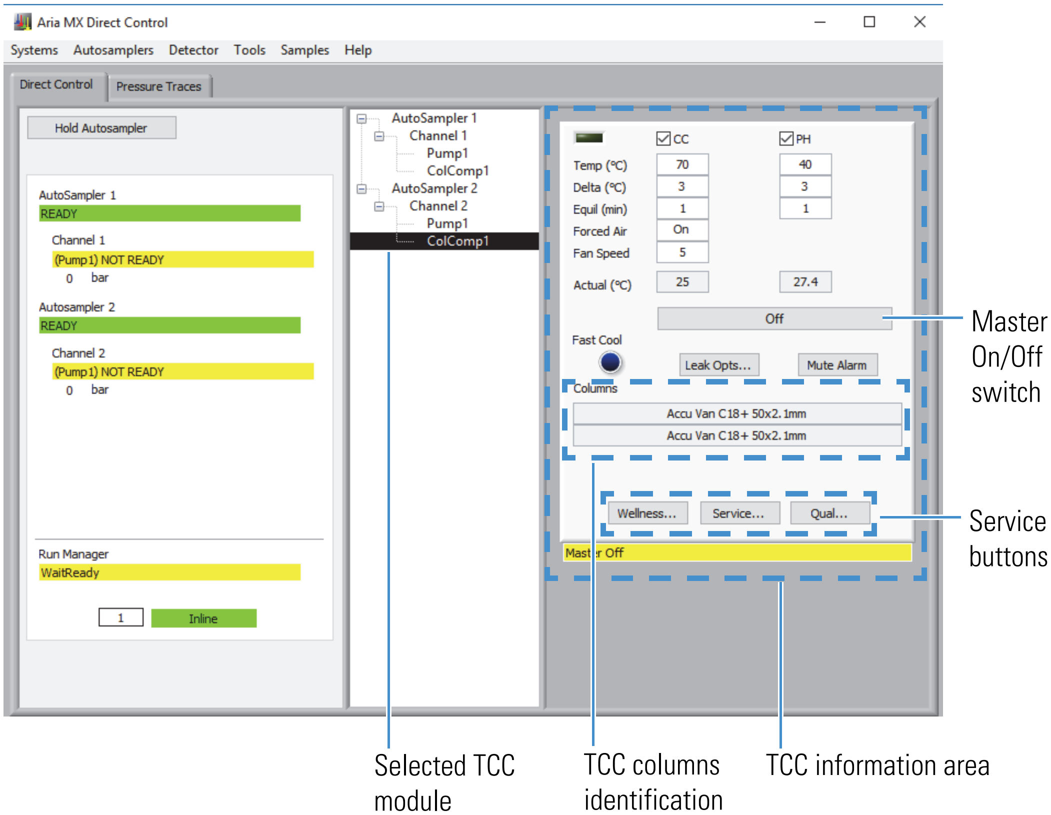
You can set the Vanquish TCC component (column chamber, preheaters, or cooler options, if present) temperature required for your method using the Aria MX software.

Other features and functions unique to the TCC include the following:

- A single TCC module can be shared, or an additional (optional) TCC can be configured, which allows independent temperature control across the two channels.
- One TCC module contains Selector (upper) and ByPass (lower) valves to allow for Channel selection and bypass of the detector.

Figure 40 shows the TCC module information and controls in the right pane of the Aria MX Direct Control window.

Figure 40. Aria MX Direct Control window showing configuration of a single, shared TCC module (labeled as "ColComp1") in the middle pane, and TCC module information and controls in the right pane



Note Column identification in Aria MX Direct Control as shown in Figure 40 is supported only for the Vanquish Accucore HPLC columns.

CAUTION Operate the temperature controller away from liquids so as not to accidentally spill solvents on the top cover. Do not immerse or operate any part of the column heater in liquids. In the event of solvent leakage, wipe the component clean and fix the source of the solvent leak before further use.

CAUTION Column heaters can become extremely hot and, therefore, unsafe to handle. Allow heated components to cool before you touch them. If removed from their heating sleeves, columns may be hot enough to burn skin. Allow sufficient time for cooling—approximately 15 minutes—before attempting to remove columns from heaters.

CAUTION Always power down the TCC controller before installing a new column. Allow sufficient time for cooling—approximately 15 minutes—before installing a new column. Failure to do so can result in burns.

IMPORTANT Refer to and review the detailed TCC safety information in the *Vanquish Column Compartments (VH-C10) Operating Manual* located on the Aria MX DVD in PDF format and also provided as a printed document with the hardware.

Note Refer to the *Vanquish Column Compartments (VH-C10) Operating Manual* for more information on the TCC module.

Related Topics

- Controlling System Module Temperatures
- Configuring the Vanquish TCC Module
- Configuring the TCC Module in an Instrument Method
- Controlling the TCC Module from the Aria MX Direct Control Window

Controlling the Vanquish AS Sample Compartment Temperature

You can configure and control the temperature for your samples using Aria MX Direct Control.

❖ **To set the Vanquish AS sample compartment temperature**

1. Open the Direct Control window.
2. Select an autosampler from the middle pane.

   The Vanquish AS controls appear in the right pane (see Figure 37).
3. From the Temp Control area of the Vanquish AS controls, click the **On** icon, .

   The On icon changes to light green and the Vanquish AS sample compartment thermostatting is enabled.
4. Type the temperature setting that you want in the Set Point box and press ENTER.

   The Vanquish AS sample compartment temperature is set. The compartment cools—or warms—until it reaches the configured temperature. The current compartment temperature is displayed in Actual box.

IMPORTANT The Vanquish AS insulation loop cover must be installed to enable and use sample compartment thermostatting. Refer to the V*anquish Split Samplers Operating Manual* for detailed information.

Controlling the Peltier Stack Temperature (TriPlus)

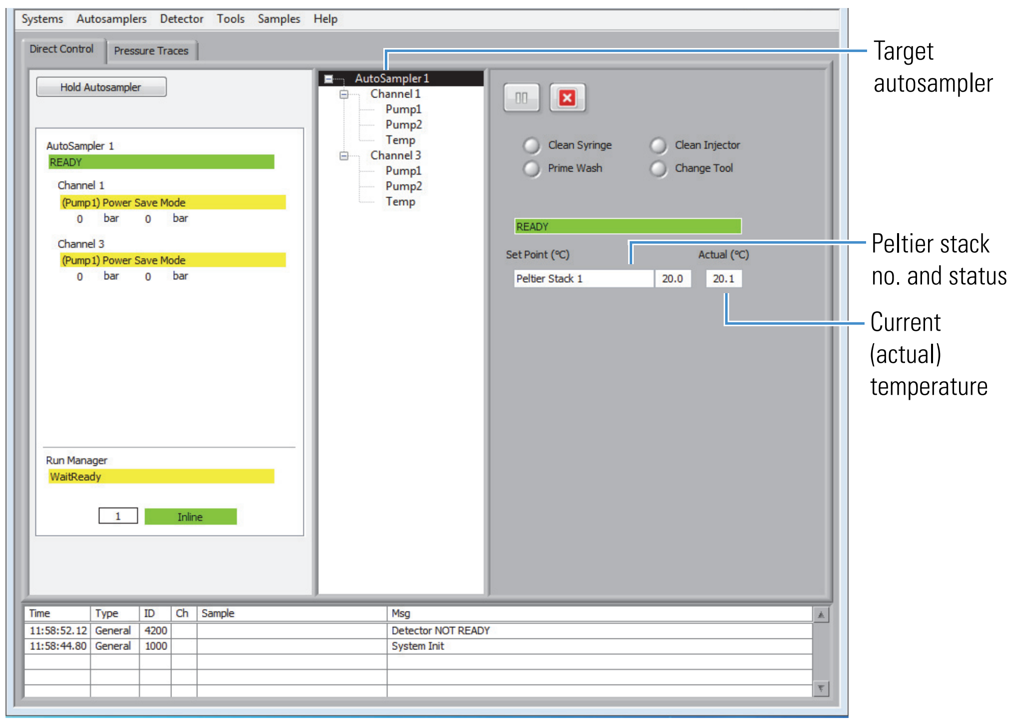
When using the TriPlus autosampler, you can set the target temperature for each installed Peltier (cool) stack module from the Aria MX Direct Control window. Temperatures can be set to an accuracy of one-tenth of a degree Celsius.

❖ To set the Peltier stack temperature

1. Open the Direct Control window.
2. In the middle pane, click the target autosampler that you want to monitor.

   If a Peltier stack is configured for that autosampler, its stack (reference) number, the set temperature value, and the current (actual) temperature readout appear in the right pane (see Figure 41).

   Figure 41. Direct Control window, Peltier Stack temperature settings

3. In the Set Point box (°C) for the selected Peltier stack, type the temperature in degrees Celsius that you want, and then press ENTER.

   The temperature for the Peltier stack is set. The module cools—or warms—until it reaches the configured temperature (Figure 41).

Note If you have more than one Peltier stack configured on your system, the stacks are numbered in order as **Peltier Stack 1**, **Peltier Stack 2**, and so on.

Viewing the Peltier Stack Temperature in a Sequence Log (TriPlus)

The TriPlus autosampler Peltier Stack temperature control status and set points are recorded at the start of each sample acquisition. You can view the sequence record of these items by reviewing the sequence log file (*.tslx file extension).

❖ To view the recorded Peltier stack temperature for a sample

1. Open the Direct Control window.
2. Choose **Tools > Sequence Log Viewer**.

   The Sequence Log Viewer opens.

3. Click **File > Open**, then navigate to and select a sequence log file (*.tslx) that you want to review.

   > **Tip** You can quickly open recent sequence log files by clicking **File > Recently Accessed** or **Recently Submitted**

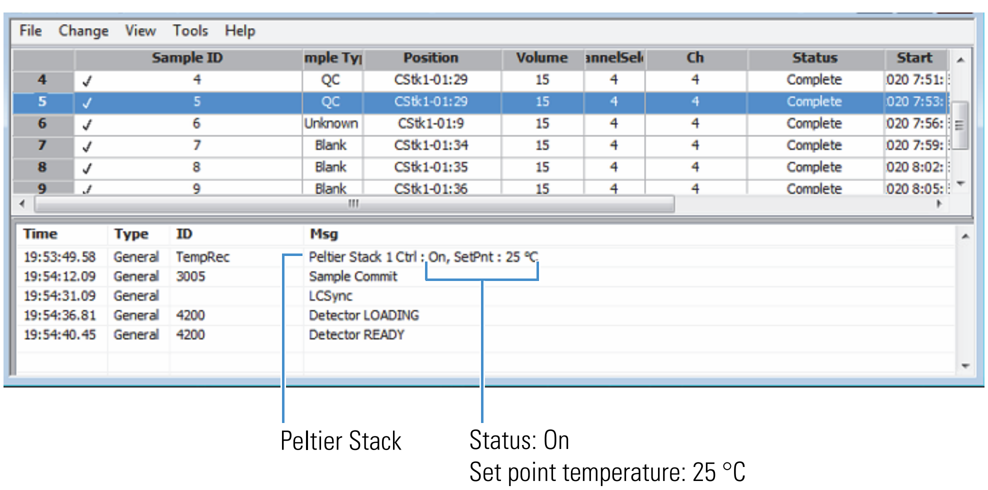
   The sequence log file opens to the last view (either Events or Pressure) used in the Sequence Log Viewer.

4. If the current view is set to Pressure, click **View > Events**, and then click a sample ID of interest.

   The event view for that sample opens in the bottom pane of the Sequence Log Viewer (see Figure 42).

In general, the first line of the log message displays the temperature control status and its Set Point temperature value. See Figure 42 for a sequence record example of a Peltier Stack.

Figure 42. Sequence Log Viewer, Peltier Stack On/Off status and set point values



Controlling the Multiple Column Module

The multiple column module (MCM) gives you the option to evaluate up to 12 TurboFlow or HPLC columns in one overnight run.

The MCM uses two valve sets to accommodate the columns. You can install up to six TurboFlow columns and six analytical columns, or up to eleven of either all TurboFlow columns or all analytical columns. The MCM simplifies the selection of appropriate TurboFlow and analytical columns when developing methods.

For more information on controlling the MCM, see Chapter 9, "Using the MCM."

Changing the LC Timeout Value

You can control the amount of time that you want the LC pumps to continue pumping—and a configured column heater to continue heating—after the rest of the system has been idle.

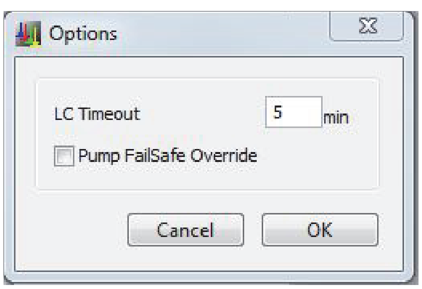
CAUTION Turn on and equilibrate the column heaters before turning on the LC pumps to ensure that the column is warm enough to handle the set LC flow rate.

❖ **To change the LC timeout value**

1. Open the Direct Control window.
2. Choose **Tools > Options**.

   The Options dialog box appears.

   Figure 43. Options dialog box

3. In the LC Timeout box, type the number of minutes that you want to elapse without a sample request or other command before the LC pumps stop pumping (and the column heater stops heating).
4. (Optional) Select the **Pump Failsafe Override** check box if you want the pumps to continue pumping (and a configured column heater to continue heating) when samples are pending but no samples are running.

Editing Aria MX Logic Settings

The Aria MX Logic Settings dialog box is an advanced interface used to customize how you want to process samples to the mass spectrometer or detector. For most methods, the default logic settings are sufficient; however, you can change the logic settings to better meet your laboratory's needs.

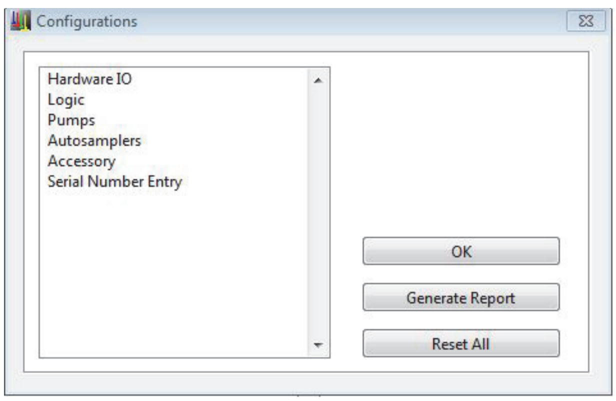
❖ To change the Aria MX logic settings

1. Close all Thermo Scientific applications.
2. From the Start menu, choose **All Programs > Thermo Foundation *x.x* > Instrument Configuration**.

   The Thermo Foundation Instrument Configuration dialog box opens.
3. On the right side of the dialog box, select the **Aria MX** icon and click **Configure**.

   The Configurations dialog box appears.

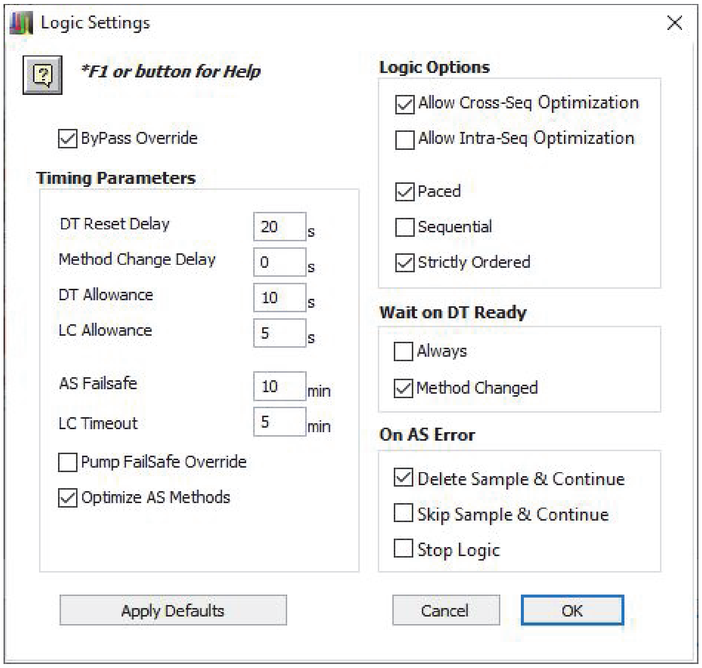
   Figure 44. Configurations dialog box

4. Click **Logic**, and then click **Advanced**.

   The Logic Settings dialog box opens. See Figure 45.

Figure 45. Aria MX Logic Settings dialog box, default settings



5. Edit any of the options described in Table 23.

6. Do any of the following:

   - Click **OK** to save your changes.
   - Click **Cancel** to discard your changes and return the settings to the previous selections.
   - Click **Apply Defaults** to discard all changes and to return to the factory-set selections.

Table 23. Logic Settings dialog box options (Sheet 1 of 3)

Option	Description
Bypass Override	Do one of the following: • Leave this check box cleared if your valve interface module does not contain a bypass valve. • Select this check box if your valve interface module contains a bypass valve, and you want fluid exiting the column to flow to the mass spectrometer only during the data collection time specified in the LC method. At other times, the fluid flows to waste. • Leave this check box cleared if your valve interface modules contains a bypass valve, and you want the fluid to flow to the detector as directed by the A and B valves. For more information, see "About the Bypass Override" on page 78.
Timing Parameters	
DT Reset Delay	The amount of time in seconds that the detector takes to return to a ready state after it has completed the data collection. The Aria MX application uses this information to forecast when a detector is ready for the next acquisition, and to determine when a detector's ready or not-ready state might indicate an error. This time value acts as a buffer between mass spectrometer acquisitions to allow time for the mass spectrometer to prepare for acquisition.
Method Change Delay	The amount of time that you want the system to wait before sampling whenever a new instrument method runs. This time allows the columns and mass spectrometers conditions to equilibrate before the system runs the next method.
DT Allowance	The time allowed for the detector to respond to a command.
LC Allowance	The time allowed for the LC pumps to respond to a command.
AS Failsafe	The time allowed to elapse (idle time) before the autosampler shuts down.
LC Timeout	The time allowed to elapse without a command before the LC pumps stop pumping.
Pump Failsafe Override	If you select both the Pump Failsafe Override and the Allow Cross-Seq Optimization check boxes, and samples are waiting or pending, the pumps do not shut off when the LC Timeout time has elapsed.
Optimize AS Methods	For a multichannel system when you want the Aria MX application to calculate the optimal system starts based on stored AS method timing values from previous runs of the autosampler method. If you leave this check box cleared, the application uses the time values you typed in the Prior to Sample and Pre-injection Total boxes in the AS Method Editor window.

Table 23. Logic Settings dialog box options (Sheet 2 of 3)

Option	Description
Logic Options	
Allow Cross-Seq Optimization	**Note** • Thermo Fisher Scientific recommends choosing this option (selected by default) for most applications. • When turned off, the system runs the sequence queue in order and stops if a specific sample cannot be processed.
	Specifies the software to run multiple sequences concurrently, or to skip sequences, which maximizes sample throughput. This option also allows the system to process higher priority sequences first, regardless of their location in the queue. When selected, this check box activates the Allow Intra-Seq Optimization and the Sequential check boxes. Default: On (selected)
Allow Intra-Seq Optimization	Instructs the system to process samples out-of-order within an individual sequence. The order of samples within a sequence is maintained by default. Sequence processing stops when a sample in the sequence cannot be run. When using Intra-Seq optimization with the "Channel Select" feature on a per-sample basis, the ordering of sampling can move within a sequence according to channel availability. For more information, see "Assigning Channels to the Method" on page 161 Default: Off (not checked)
	Note The first sample in a sequence must always be the first sample to be processed.
Paced	Instructs the system to delay starting a sample to achieve normalized spacing between data windows. This option helps to avoid irregular timing between samples that can result when methods have not been optimized to run across the number of available channels. Default: Off (not checked)
	Tip This option works best when the same method—or methods—with identical timing characteristics are run across all of the available channels.

Table 23. Logic Settings dialog box options (Sheet 3 of 3)

Option	Description
Sequential (Not recommended for most applications)	This check box becomes active when Allow Cross-Seq Optimization is selected. This option prioritizes the sample order over sample processing speed, even when another channel might be available to start sooner. The queue runs in order, but the system can skip samples that cannot be run due to the operational state of the LC channels to which they are assigned. See Allow Cross-Seq Optimization. Default: Off (not checked)
Strictly Ordered	This option gives precedence to the next available channel in the channel number order even if another channel can start running its samples sooner. This option prioritizes load balancing over speed. Default: Off (not checked)
On AS Error	
Delete Sample and Continue	When you want the Aria MX application to delete any sample with an autosampler error, before continuing with the next sample. The sample remains in the batch but the application deletes it from the system application queue.
Skip Sample and Continue	When you want the Aria MX application to skip any sample with an autosampler error, before continuing with the next sample. The sample remains in the batch and in the system application queue.
Stop Logic	When you want the Aria MX application to stop sampling whenever a sample has an autosampler error.
Wait on DT Ready	
Always	Select this check box if you want the Aria MX application to receive the detector-ready signal before starting the next sample in all conditions. Thermo Fisher Scientific recommends that you select this check box if you have a single LC channel. For example, a TLX system.
Method Changed	When you want the Aria MX application to receive the detector-ready signal before starting the next sample if the next sample involves a different instrument method. Thermo Fisher Scientific recommends that you select this option if you have an LC system with multiple LC channels. For example, A TLX-2, TLX-4, LX-2, or LX-4 system.

About the Bypass Override

The Bypass (valve) Override feature directs LC flow to the detector only during the data acquisition window. This feature is useful when you want to prevent biological matrices from causing any interference with analytes of interest, or when you want to keep potential contaminants out of the mass spectrometer.

Thermo Fisher Scientific recommends that you enable this feature under the following scenarios:

- When the analysis sample is a biological assay with a biological matrix
- When the analysis sample might contain contaminants that can interfere with data acquisition
- When you do not want the wash stage in your LC profile to run through the detector in the post-detection timing window

To enable the Bypass Valve Override from the Aria MX Logic Settings dialog box, see "Editing Aria MX Logic Settings" on page 73.

Setting the Bypass Override

❖ **To set the bypass (valve) override**

1. Close all Thermo Scientific applications.
2. From the Start menu, choose **All Programs > Thermo Foundation *x.x* > Instrument Configuration**.

   The Thermo Foundation Instrument Configuration dialog box opens.
3. On the right side of the dialog box, select the **Aria MX** icon and click **Configure**.

   The Configurations dialog box appears (see Figure 44 on page 73Figure 25).
4. Click **Logic**, and then click **Advanced**.

   The Logic Settings dialog box opens (see Figure 36 on page 56Figure 26).
5. Select the **Bypass Override** check box.
6. Click **OK** to save your changes, and then click **OK** to exit the Configurations dialog box.
7. Click **Done**.

   The Bypass indicator in the Aria MX Direct Control window and the system status window changes to red to indicate that the position of the bypass valve is now diverted to waste.

Tip You can change the position of the bypass valve manually by right-clicking inside the status bar, which temporarily changes the flow to the detector. Once a sequence is submitted, the valve automatically switches to bypass mode when the method starts.

Entering the Valve Interface Module Serial Number

Enter the valve interface module (VIM) serial number for the Aria MX software from Instrument Configuration.

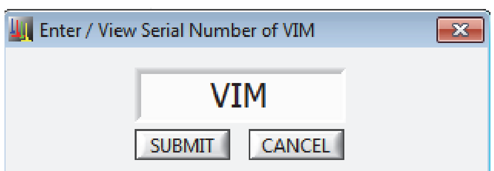
❖ To enter the VIM serial number

1. Close all Thermo Scientific applications.
2. From the Windows Start menu, choose **All Programs > Thermo Foundation *x.x* > Instrument Configuration**.

   The Thermo Foundation Instrument Configuration window appears.
3. From the right side of the window, select the **Aria MX** icon and click **Configure**.

   The Configurations window appears (Figure 44 on page 73).
4. Click **Serial Number Entry**.

   The Enter/view VIM Serial Number text box appears.



5. Type the VIM serial number in the text box, and then click **Submit**.
6. Click **OK**, and then click **Done**.

Assigning Values Using the Sample List

These topics describe procedures for assigning certain values in the sample list for each sample. In some sample runs, you might want to change a component setting for specific samples using the same method and batch. You would usually assign all of the values described in this topic, except the method variables, in the method. However, these values, including method variables, are assigned in the sample list as a method development procedure.

Perform these procedures only if instructed to do so by your standard operating procedure or if you have advanced system knowledge.

- To create a custom column using the Xcalibur data system

- To assign the injector in the sample list
- To assign the LC channel in the Xcalibur data system
- To assign the column temperature in the sample list (MultiSLEEVE modules only)
- To assign values to a method variable in the sample list
- To assign the MCM port number

❖ To create a custom column using the Xcalibur data system

1. From the Xcalibur Roadmap view, click **Sequence Setup**.

   The Sequence Setup page appears.

2. Choose **Change > User Labels**.

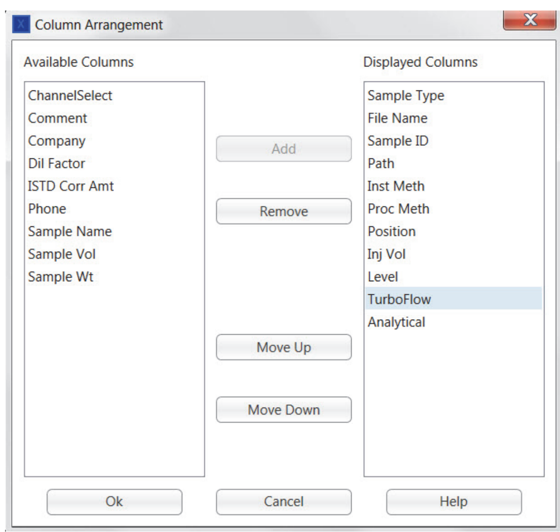
   The User Labels dialog box appears.

3. Highlight one of the Heading fields and type the name of your new custom column. The field is case-specific.

4. Choose **Change > Column Arrangement**.

   The Column Arrangement dialog box appears.

   Figure 46. Column Arrangement dialog box

5. In the Available Columns list, select the new columns and click **Add**.

   The new columns move to the Displayed Columns list.

6. Click **OK**.

7. Verify that the new columns appear in the sequence file.

❖ To assign the injector in the sample list

Note To use the sample list to select the injector that you want to dispense the sample, the instrument method must indicate "SEQ" in the Injector option for any task that specifies an injector. See "Assigning the Injector in the Sample List" on page 134.

1. Create a custom column in the sample list named "**AS_Injector**".
2. Enter one of the following into the AS_Injector column in the sample list:
   - If you are running a laminar HPLC method, type **LX** in the AS_Injector column for each sample. The system injects the sample using the LX injector.
   - If you are running a TurboFlow method, type **TX** in the AS_Injector column for each sample. The system injects the samples using the TX injector.

   Note "TX" and "LX" are the default names for the injectors, which might have been changed. Verify the names of your injectors as follows:

   1. Open the AS Method Editor window. See "Accessing the Autosampler Method Editors" on page 96.
   2. Select a method step that uses the Inject Sample, Clean Injector, Rinse Injector, or Infuse Sample step type.
   3. Open the Injector list.

      The Injector list shows all of the injector names on your system. Type a name from this list in the AS_Injector column.

❖ To assign the LC channel in the Xcalibur data system

1. Create a custom column named "**ChannelSelect**".
2. In the ChannelSelect column, enter the LC channel that you want to run the sample.

   If you want to enter more than one channel, you can do so without using a separator. For example, enter 12 to specify Channels 1 and 2.

   The system runs the samples using the first available channel that you enter.

You can assign the column temperature for the MultiSLEEVE module in the sample list.

❖ To assign the column temperature in the sample list (MultiSLEEVE modules only)

IMPORTANT When you assign the temperature in the sample list, consider the following:

- The system injects the sample after the temperature has reached the entered value. For best results, allow more time for the temperature to equilibrate. You can do this by adding a wait time to the autosampler method before the sample injection and by scheduling multiple injections of the same sample.
- Enter samples into the sample list with lower heater temperatures first; then enter samples in order of increasing temperatures.

CAUTION Be aware that the heater operates at different temperatures during the run, and can, at times, be too hot to handle depending on your settings.

1. In the sample list, create a custom column for each column heater.
2. Name the sample list column the same as the column heater name. For information on creating custom columns, refer to the documentation that comes with the MS control application. View the Direct Control window on your system for the name of your column heaters.
3. In the new column, for each sample, type the temperature that you want to set.

   Figure 47 shows an example of a sample list with temperature values set for the TurboFlow and Analytical column heater temperatures.

Figure 47. Sample list showing set temperatures for column heaters named TurboFlow and Analytical (MultiSLEEVE modules only)

Type	File Name	Sample ID	Path	Inst Meth	Proc Meth	Position	Inj Vol	Level	TurboFlow	Analytical
	Test01	Stk1-01:1	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:1	0.00		25	25
	Test02	Stk1-01:2	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:2	0.00		30	30
	Test03	Stk1-01:3	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:3	0.00		35	35
	Test04	Stk1-01:4	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:4	0.00		40	40
	Test05	Stk1-01:5	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:5	0.00		45	45
	Test06	Stk1-01:6	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:6	0.00		50	50
	Test07	Stk1-01:7	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:7	0.00		55	55
	Test08	Stk1-01:8	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:8	0.00		60	60
	Test09	Stk1-01:9	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:9	0.00		65	65
	Test10	Stk1-01:10	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:10	0.00		70	70
							0.00			

❖ To assign values to a method variable in the sample list

1. Create a custom column and then name the column the same name as the method variable. For information on method variables, see "Allowing Method Variables During a Run" on page 176. For information on creating custom columns, refer to the documentation that comes with the MS control application.
2. Enter the variable value for each sample in the new column.

❖ To assign the MCM port number

1. Create two custom columns named **MCM1** and **MCM2** (no spaces in MCM1 and MCM2).

> **Note** The following instructions assume MCM ports 1 through 5 and ports 7 through 11 house all TurboFlow or all analytical columns on the same system channel, with port 6 used to connect MCM 1 to MCM2. Exceptions are noted in the procedure.

2. In the MCM 1 column for each sample, enter one of the following:

   - If the column you want to run resides on MCM 1 (ports 1 through 6), enter the appropriate MCM port number in the MCM 1 column and leave the MCM 2 column blank.

   - If the column you want to run resides on MCM 2 (ports 7 through 12), enter **6** in the MCM 1 column and enter the appropriate port number in the MCM 2 column. See Table 24.

Table 24. MCM port number selections

Sample	MCM1	MCM2
1	1	–
2	2	–
3	3	–
4	4	–
5	5	–
6	6	1
7	6	2
8	6	3
9	6	4
10	6	5
11	6	6

> **Note** If MCM 1 houses TurboFlow columns and MCM 2 houses analytical columns, or MCM 1 and MCM 2 are plumbed to different channels, enter the appropriate port numbers in the MCM 1 and MCM 2 columns.

For more information, see Chapter 9, "Using the MCM."

4

Using Aria MX Instrument Methods

The instrument method is a set of instructions for the system components to perform during a sample run. Create and save instrument methods using the Aria MX instrument method editor.

Contents

Aria MX Method Editor and Autosampler Windows

In the left pane of the Aria MX method editor window, you select the method type—either LC or autosampler—that you want to create or change (see Figure 48 for the Accela Open and TriPlus and Figure 50 for the Vanquish AS). Note that the visual layout of the autosampler method editor window varies slightly depending on your system's autosampler model (see Figure 49).

Figure 48. Aria MX instrument method editor window with the LC Method editor selected

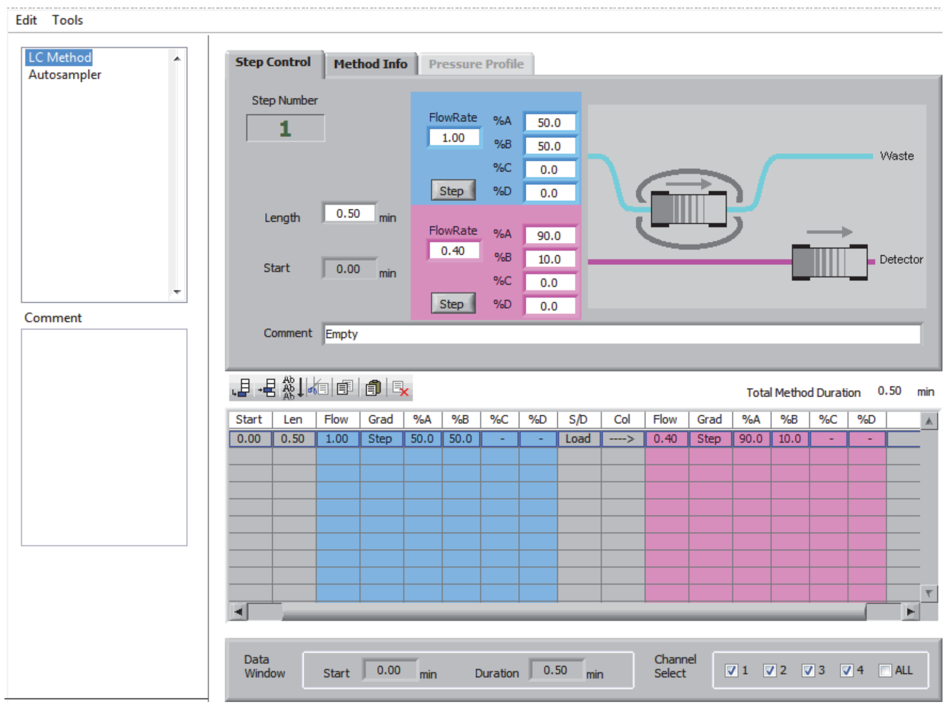


Figure 49. Aria MX autosampler instrument method editor windows, Accela Open and TriPlus

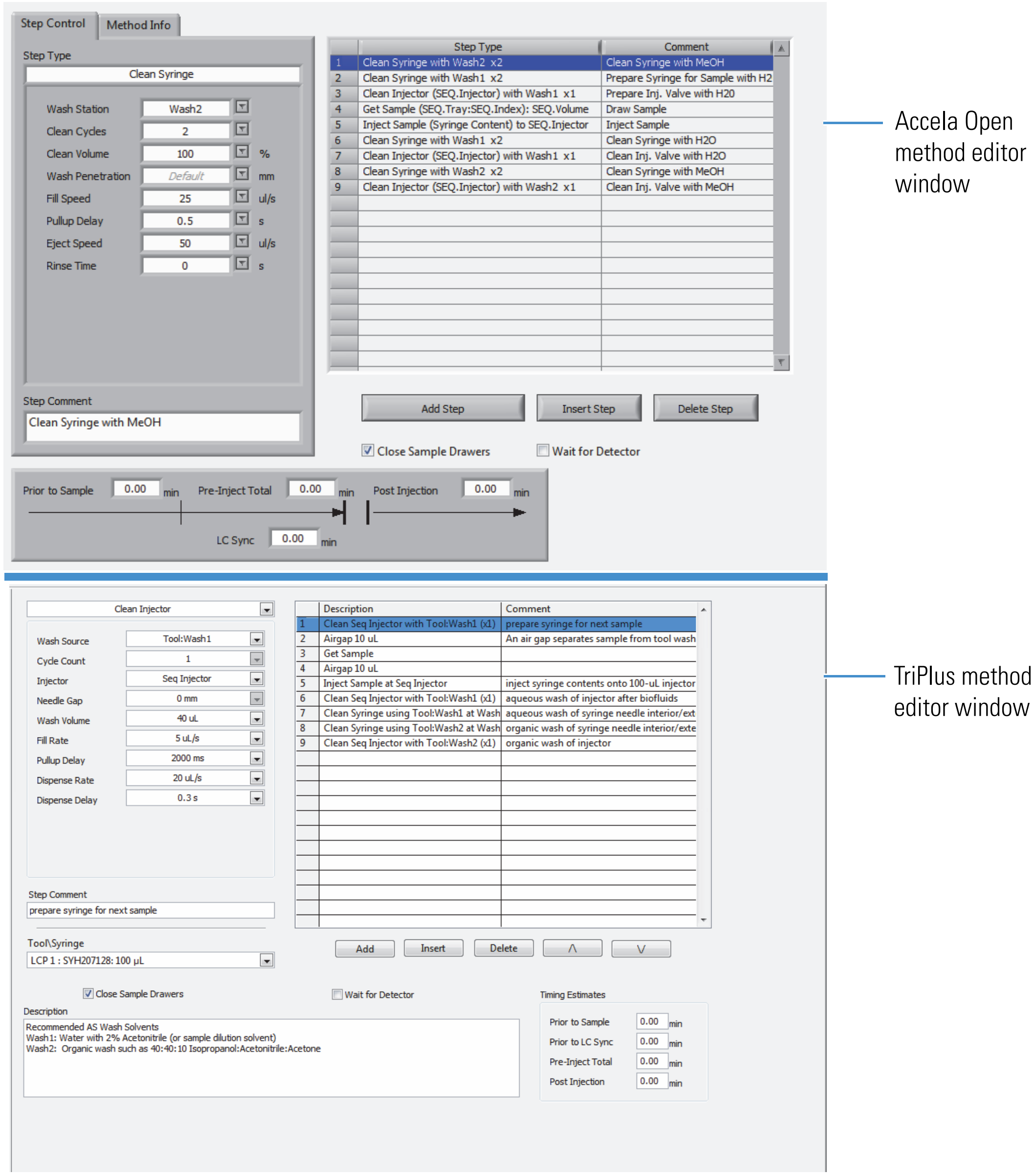
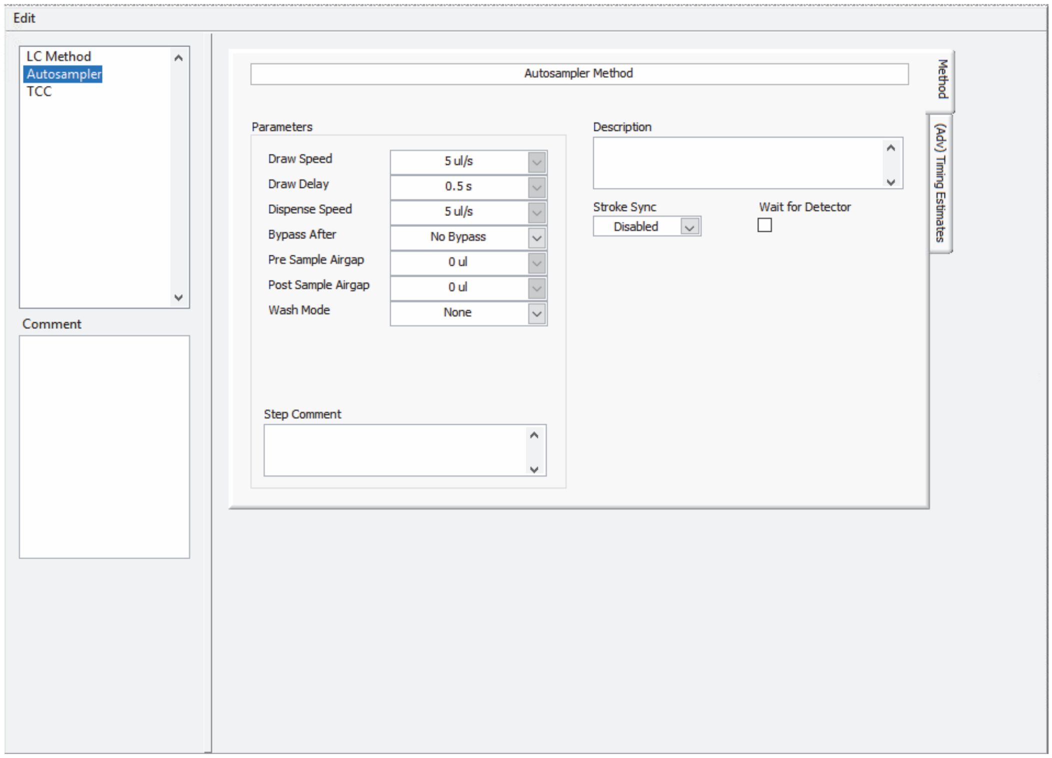


Figure 50. Vanquish AS method editor window



Instrument Method Tasks and Components

The instrument method includes instructions for the following tasks:

- For the autosampler to draw/inject the sample and wash the autosampler components at the appropriate time and speed, with the correct wash solution
- For the pumps and valves to force the flow of mobile phases through the system at the appropriate time and flow rate
- For the mass spectrometer to acquire the data

The instrument method contains three parts:

- Mass spectrometer (MS) method
- LC method
- Autosampler method (referred to in the interface as either “AS” or “Autosampler” for the Accela Open, TriPlus, and Vanquish AS respectively (see Figure 49 for Accela Open and TriPlus and Figure 48 for the Vanquish AS)

After you create an instrument method using the data system for your mass spectrometer, enter the mass spectrometer acquisition information. Then, use the Aria MX software to create an autosampler method and LC method. Aria MX software automatically appends these methods to your instrument method. See Table 25 for more details.

Table 25. Parts of the instrument method

Part	Description
MS method	Contains instructions for acquiring the mass spectrometer data. Enter the data using the mass spectrometer software. For information on entering the MS information, refer to the mass spectrometer documentation. Use the MS method to enter the LC method data window duration into the mass spectrometer portion of the instrument method for the acquisition time. If the LC method length and the mass spectrometer acquisition length are not the same, system errors might occur during the run.
LC method	Controls the LC systems, including the pumps and valves. When you create an LC method, determine the best flow rates, mobile phase compositions, and step durations to use in your TurboFlow method to maximize sample extraction and recovery. The LC method also sets the start and end time for the mass spectrometer. For instructions on entering LC method information into the instrument method and optimizing LC method steps, see Chapter 6, "Creating an LC Method."
AS or Autosampler method	Controls the autosampler functions. When you create an autosampler method, determine the best wash, sample aspiration, and sample dispense steps for the autosampler to maximize the sample delivery and minimize carryover. For instructions and tips on entering autosampler method information and tips on selecting autosampler commands, see Chapter 5, "Creating an Autosampler Method."

The instrument method can also contain information on optional components, such as the MCM and a MultiSLEEVE controller, or a TCC module. See Table 26.

Table 26. Optional instrument method components

Component	Description
MCM (multiple column module)	If an MCM is installed on your system, the MCM options appear in the instrument method area of the software. With the optional MCM module, you can evaluate up to 12 columns in one overnight run. You can install an MCM on each LC channel. See Chapter 9, "Using the MCM."
MultiSLEEVE controller	If you install a MultiSLEEVE controller on your system, the MultiSLEEVE options appear in the instrument method area of the software. This optional device can help you manage up to four column heaters. You can install up to two controllers onto one Transcend system. If you use the MultiSLEEVE controller, assign the appropriate column heater temperature for the method in the MultiSLEEVE area of the instrument method. See Chapter 10, "Configuring Temperature Controllers."
TCC module	The TCC is used in conjunction with the Vanquish Dual Split Sampler (Vanquish AS). If a TCC is installed on your system, the TCC options appear in the instrument method area of the software. Chapter 10, "Configuring Temperature Controllers."

Related Topics

- Creating an LC Method
- Creating an Autosampler Method
- Configuring Temperature Controllers

5

Creating an Autosampler Method

The autosampler executes all tasks associated with drawing the sample from the sample vial, injecting it into the LC system, and washing the needle and injectors.

Contents

Supported Autosampler Models

Transcend configurations and the Prelude SPLC use the Aria MX software to support the following autosampler models:

- TriPlus RSI, used in newer Transcend TLX and LX configurations
- Vanquish Dual Split Sampler, used in Transcend Duo LX-2 configurations
- Accela Open, used in legacy Transcend TLX and LX configurations and Prelude SPLC

Note

- You can use only one autosampler type for each data system computer to process samples. Use Thermo Foundation Instrument Configuration to set the type of autosampler that your system is running.
- See Chapter 1 for information on the supported pump models and general Transcend system specifications.
- For detailed Vanquish autosampler and Vanquish Charger module maintenance information and system specifications, refer to the maintenance sections in the *Vanquish Split Samplers Operating Manual* and *Vanquish Charger Operator Manual,* which are provided in hard copy with each Vanquish hardware shipment or in PDF format located on the Aria MX DVD.

Related Topics

- Autosampler Method Overview
- Converting Legacy Accela Open AS Methods to TriPlus

About Autosampler Methods

The autosampler method contains the steps and/or parameter settings that define how the autosampler—either TriPlus, Vanquish Dual Split Sampler (Vanquish AS), or Accela Open—executes the workflow of obtaining a sample, injecting a sample, and washing the autosampler needle before or after a sample injection.

The TriPlus and Accela Open autosamplers use sequential steps to define autosampler workflow. The Vanquish AS uses a set of parameters that define the autosampler's sample injection workflow.

Related Topics

- Autosampler Method Overview
- Basic Tips to Create a TriPlus or Accela Open Autosampler Method
- Accessing the Autosampler Method Editors

- Accessing the TriPlus Autosampler Method Editor
- Accessing the Vanquish Autosampler Method Editor

Autosampler Method Overview

The Aria MX software saves the autosampler method that you create as part of an instrument method in the MS control application. Instrument methods have a .meth extension.

Note Method settings overrule direct control settings once a batch starts to run.

During the autosampler method, the autosampler acquires a sample by drawing it from the vial and then injecting it onto the column.

General guidelines for setting up an autosampler method are as follows:

- To program sample acquisition steps for the TriPlus or Accela Open autosamplers, you use two method step types: Get Sample and Inject Sample.
- For the Vanquish AS, you set the parameters, as needed for your AS method.
- To wash the injector and syringe, add wash steps for the Accela Open and TriPlus, or enable the wash parameters for the Vanquish AS.

Related Topics

- Accessing the Autosampler Method Editors
- Accessing the TriPlus Autosampler Method Editor
- Accessing the Vanquish Autosampler Method Editor
- Basic Tips to Create a TriPlus or Accela Open Autosampler Method
- Converting Legacy Accela Open AS Methods to TriPlus
- Tips to Create Methods for Systems Using the Dynamic Load Wash (Accela Open)

Basic Tips to Create a TriPlus or Accela Open Autosampler Method

Follow these tips as you create an autosampler method.

- Use the following wash solutions for Wash 1 and Wash 2.
  - Wash 1: Water with 2% acetonitrile or 0.1% formic acid (to prevent microbial growth in the reservoir).
  - Wash 2: A mixture of acetonitrile/isopropanol/acetone, 45:45:10.

  IMPORTANT Thermo Fisher Scientific recommends that you re-validate your LCMS method if you make any changes to autosampler wash solvents within an existing assay when using the Accela Open autosampler with a DLW or a TriPlus autosampler with an LCMS-P module.

- Once you have a satisfactory autosampler method, edit it to improve the system's throughput. See "Editing the Autosampler Method for Maximum Throughput" on page 127.

The following tips refer to the Accela Open Method Editor window (see Figure 51 on page 97).

- Always wash the injector and syringe with aqueous solution before and after a step where a biological sample has contacted the injector and syringe. This prevents the proteins in the biological sample from precipitating in the organic wash solution. Figure 51 on page 97 shows an example of an AS method. Notice that an aqueous Wash 1 appears before and after the Get Sample and Inject Sample step types.
- For systems using a Fast Wash, leave the Rinse Time option for the Clean Injector step type set to zero if any of the following are true. Setting the rinse time to a value other than zero in these conditions might result in insufficient washing.
  - The Clean Injector step type is followed by a Clean Syringe step type that uses the same wash solution.
  - The Clean Injector step type is followed by another Clean Injector step type that uses the same wash solution.

Tips to Create Methods for Systems Using the Dynamic Load Wash (Accela Open)

For the dynamic load wash (DLW), consider the following:

- Do not import an Aria OS AS method. Aria OS AS methods are not compatible with the DLW.
- Use the Rinse Needle and Rinse Injector step types (the Clean Syringe and Clean Injector step types are unavailable).

- Enter **2** or higher in the Rinse Time list for the Rinse Needle and Rinse Injector step types. For more information, see "Clean Syringe" on page 114 and "Rinse Injector" on page 118.
- In the Rinse Injector step type, ensure that you specify the appropriate injector in the Injector list. Injector options are usually TX and LX, but the injector names might be different on your system. See "Rinse Injector" on page 118.
- In the Location box in the Rinse Needle step type, select one of the following options:
  - To use Wash 1, select **NdlRns1**.
  - To use Wash 2, select **NdlRns2**.

  See "Clean Syringe" on page 114.
- Use the Air Gap step type before and after the Get Sample step type to separate the sample and solvent. See "Airgap" on page 126.
- When you use viscous samples, enter a slower fill speed and longer pull-up delay in the Get Sample and Aspirate Sample step types. See "Get Sample" on page 110 and "Inject Sample" on page 112.
- If you use the default autosampler method that Thermo Fisher Scientific provided with the software, use the default method for the DLW. See "Using a Default Method (Accela Open)" on page 131.

Tips to Create Methods for Systems Using the LCMS-P Tool (TriPlus)

The TriPlus LCMS-P tool holds the syringe and needle and the wash lines used to rinse them. The basic configuration for the TriPlus syringe and needle wash protocol most often uses both the LCMS-P tool and an LCMS wash module as part of the overall process.

For biological samples that are processed on a TLX system, Thermo Fisher Scientific recommends that you use the default autosampler method file called "Default AS Method for TriPlus RSI.meth" that is provided on the Aria MX DVD as the starting point for developing your new TriPlus AS methods.

The TriPlus syringe and needle wash protocol requires the following items for best results:

- LCMS-P tool—This tool contains two wash lines labeled Wash 1 and Wash 2, which is similar to the Accela Open DLW wash system. Separate solvents feed the Wash 1 and Wash 2 wash lines.
- LCMS wash module—This module is used as the solvent/sample waste receptacle, which channels fluids to waste when the TriPlus runs a Clean Syringe or Prime Wash step type. Samples that are canceled are also ejected through the LCMS wash module.

- (Optional) Active Wash Cups—These optional wash cups might be required depending on the type of sample that is processed. The default method can be modified to work with the wash cups. Contact Thermo Fisher Scientific Technical Support for questions pertaining to their use in your lab. See "Contacting Us" on page xv.
- TriPlus default method—Use this method, "Default AS Method for TriPlus RSI.meth", included on the Aria MX DVD (Methods directory) as a basis for writing new methods. This default method was designed to work with biological samples that are processed on a TLX system; however, it can be modified as necessary for other sample types and to accommodate optional wash cups.

> **Note** The named wash source options that are visible when importing the default method might be different from the wash source names in the default method steps if they were previously named or configured using the TriPlus autosampler handheld device.

Contact Thermo Fisher Scientific Technical Support for questions regarding the TriPlus syringe and needle wash protocol in your lab. See "Contacting Us" on page xv.

Accessing the Autosampler Method Editors

The Aria MX software supports 3 different autosampler models. Each model of autosampler has its own method editor and unique method steps and parameters that are used to build the autosampler portion of your instrument method.

Related Topics

- Accessing the Accela Open Autosampler Method Editor
- Accessing the TriPlus Autosampler Method Editor
- Accessing the Vanquish Autosampler Method Editor
- Autosampler Method Overview

Accessing the Accela Open Autosampler Method Editor

Use the Accela autosampler (AS) method editor to create and edit autosampler methods.

❖ **To open the Accela Open AS method editor window**

1. Navigate to and then double-click the instrument method (.meth) file that you want to open.

   > **Note** For information on accessing the instrument method, refer to the documentation provided with the MS control application.

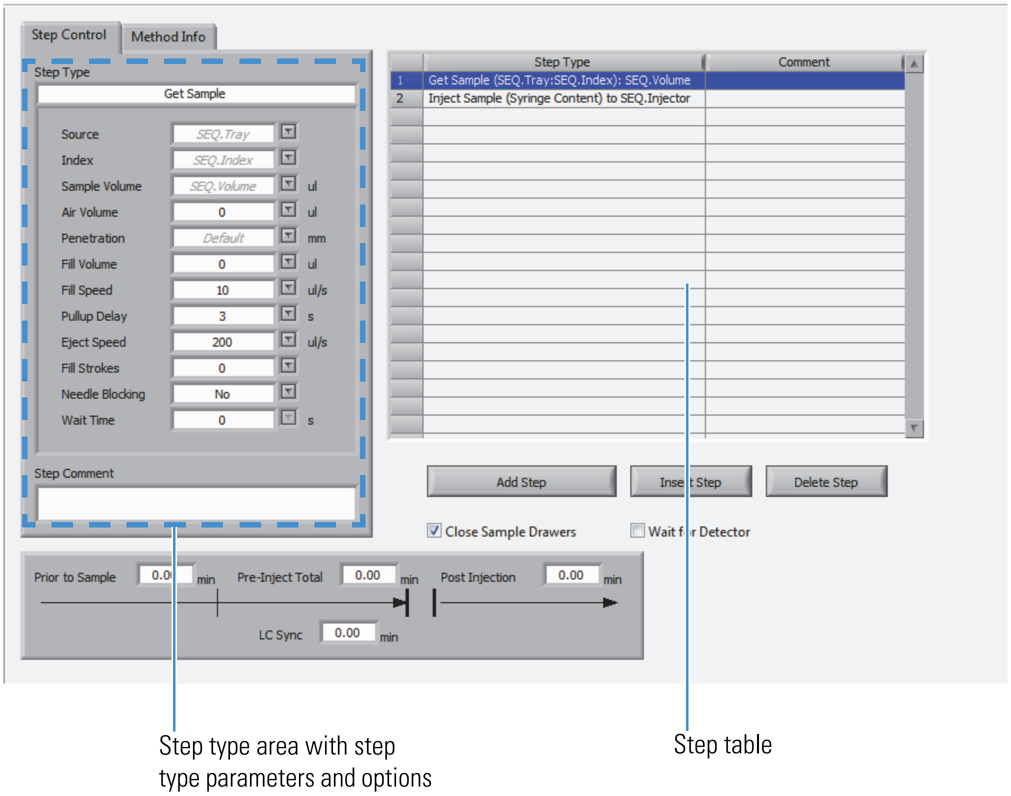
2. Click **Aria MX**.

   The LC Method Editor window opens.

3. From the middle pane, click **AS Method**.

   The Autosampler Method Editor window opens (Figure 51).

Figure 51. Accela Open method editor window (Step Control tab)



Accessing the TriPlus Autosampler Method Editor

Use the TriPlus autosampler method editor to create and edit methods.

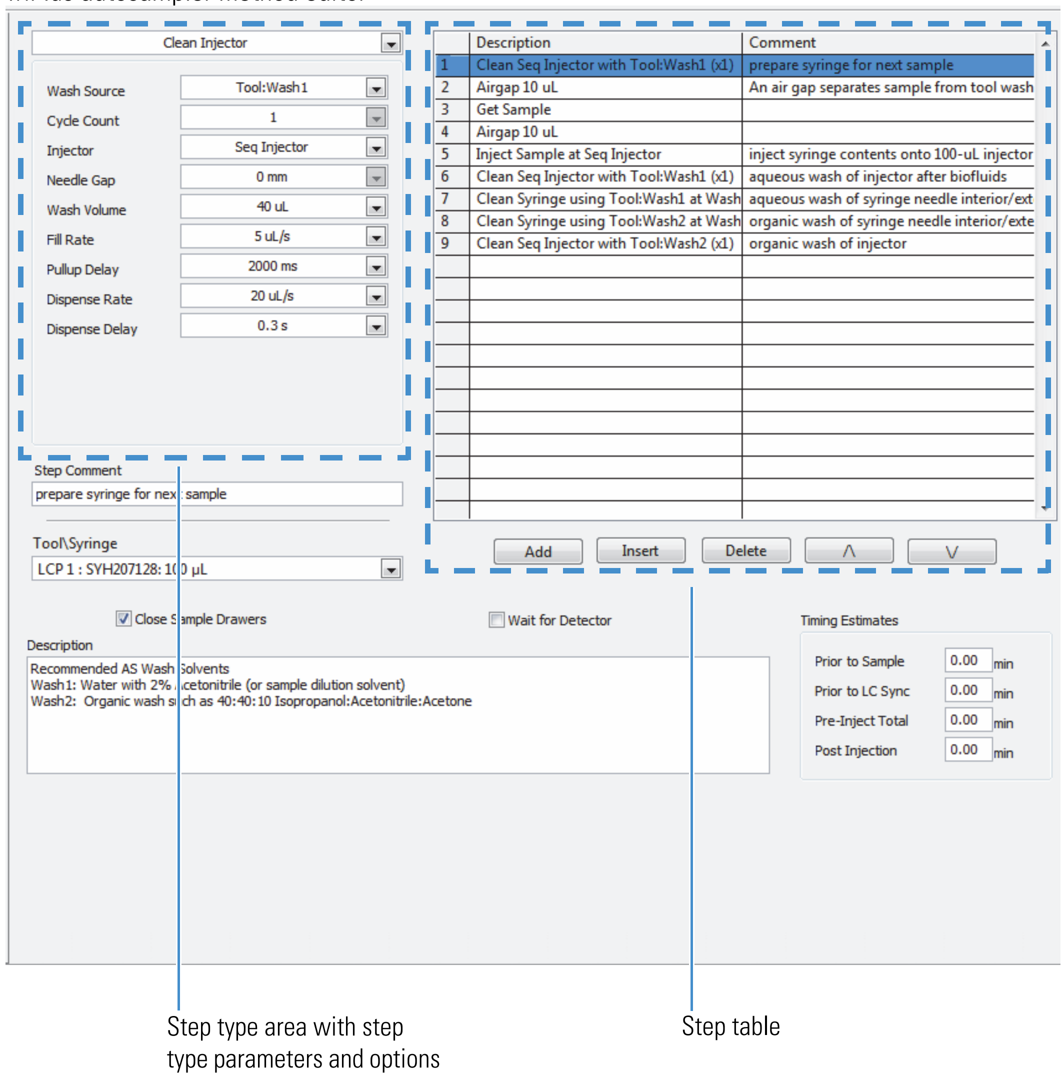
❖ To open the TriPlus autosampler method editor window

1. Navigate to and then double-click the instrument method (.meth) file that you want to view.

   The Aria MX AS Method Editor opens to the Step Control page and displays the AS method steps in the step table (Figure).

> **Note** For more information on accessing the instrument method, refer to the documentation provided with the MS control application.

TriPlus autosampler method editor



Accessing the Vanquish Autosampler Method Editor

Autosampler (AS) methods are made up of a series of parameters that are set in the Aria MX LC method editor, Autosampler area, when selected.

Use the Aria MX Method Editor to create and edit your AS method parameters such as sample Draw Speed, Draw Delay, and so on (Figure 52).

❖ To access the Autosampler Method Editor

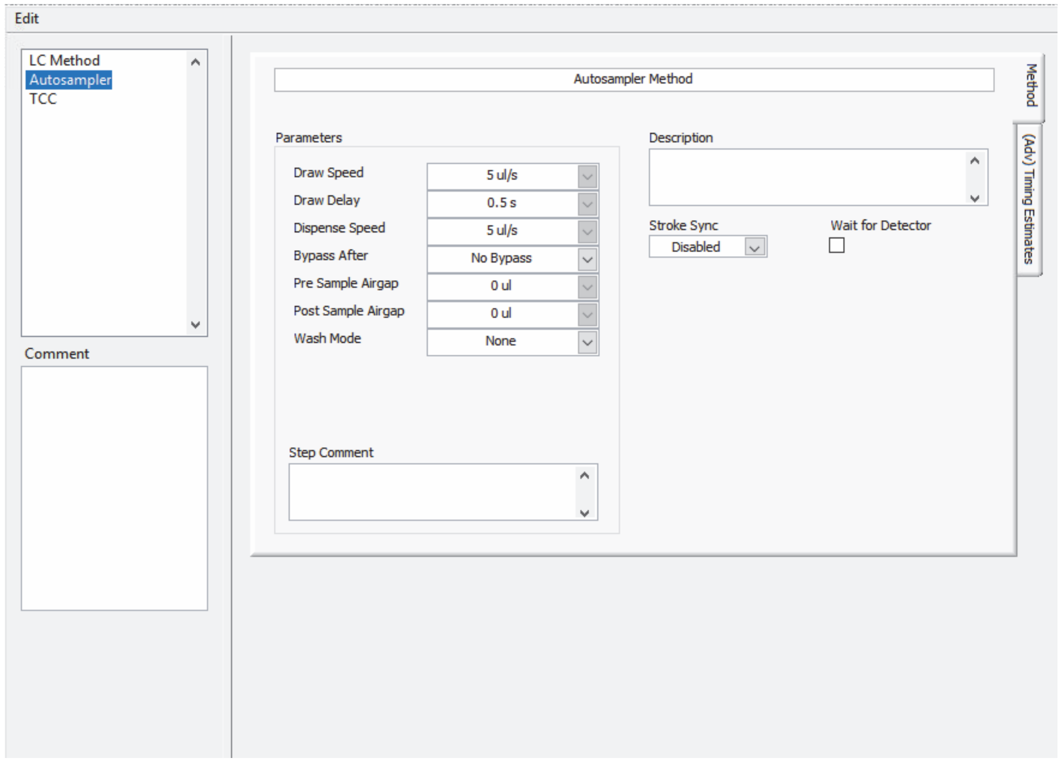
1. Open the TraceFinder LDT instrument data system.
2. From the File menu, open the instrument method that you want to view.

   The LC Method Editor window opens (default view).

3. From the left pane, click **Autosampler**.

   The autosampler method editor opens (Figure 52).

Figure 52. Aria MX LC method editor window, Autosampler method editor (selected)



Use the Vanquish AS method editor to create and edit methods.

❖ To open the AS method editor window

1. Navigate to and then double-click the instrument method (.meth) file that you want to view.

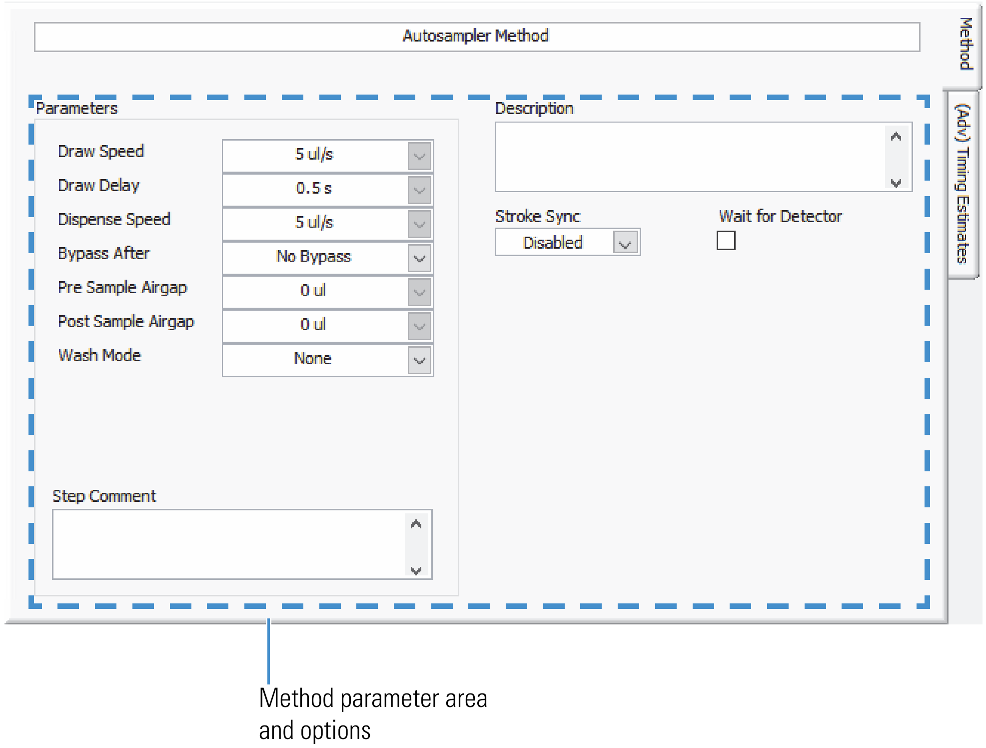
   The Aria MX LC Method Editor opens to the Step Control page.

   > **Note** For more information on accessing the instrument method, refer to the documentation provided with the MS control application.

2. From the middle pane of the LC Editor window, click **Autosampler**.

   The Vanquish AS method editor window opens showing the available autosampler method parameters (see Figure 53).

Figure 53. Vanquish AS method editor, parameters area



Related Topics

- Autosampler Method Overview
- To create an autosampler method (Vanquish AS)
- Vanquish AS Method Timing Options

Working with Autosampler (AS) Methods

The Aria MX software saves AS methods that you create as part of an instrument method in the MS control application. Instrument methods have a .meth extension.

During the autosampler method, the autosampler draws sample from the vial and injects it onto the column. To program this action for the Accela Open or the TriPlus autosampler, use two method step types: Get Sample and Inject Sample.

To wash the injector and syringe, add wash steps. If you assay biological samples, ensure that the aqueous wash steps bracket the Get Sample and Inject Sample steps to avoid precipitating the sample with an organic wash.

Follow these procedures or review the following topics for more information:

- To create an autosampler method (Accela Open and TriPlus Autosamplers)

- To create an autosampler method (Vanquish AS)
- Accessing the Accela Open Autosampler Method Editor
- Accessing the TriPlus Autosampler Method Editor
- Accessing the Vanquish Autosampler Method Editor

❖ To create an autosampler method (Accela Open and TriPlus Autosamplers)

1. Open the Method Editor for your autosampler model. See “Accessing the Autosampler Method Editors” on page 96, “Accessing the TriPlus Autosampler Method Editor” on page 97, or “Accessing the Vanquish Autosampler Method Editor” on page 98.

   The autosampler method editor opens with two default steps, Get Sample and Inject Sample.

2. Do one of the following for the Accela Open or TriPlus AS:

   - For the Accela Open AS, click **Add Step** (see Figure 51 on page 97).
   - For the TriPlus AS, click **Add** (see Figure on page 98).

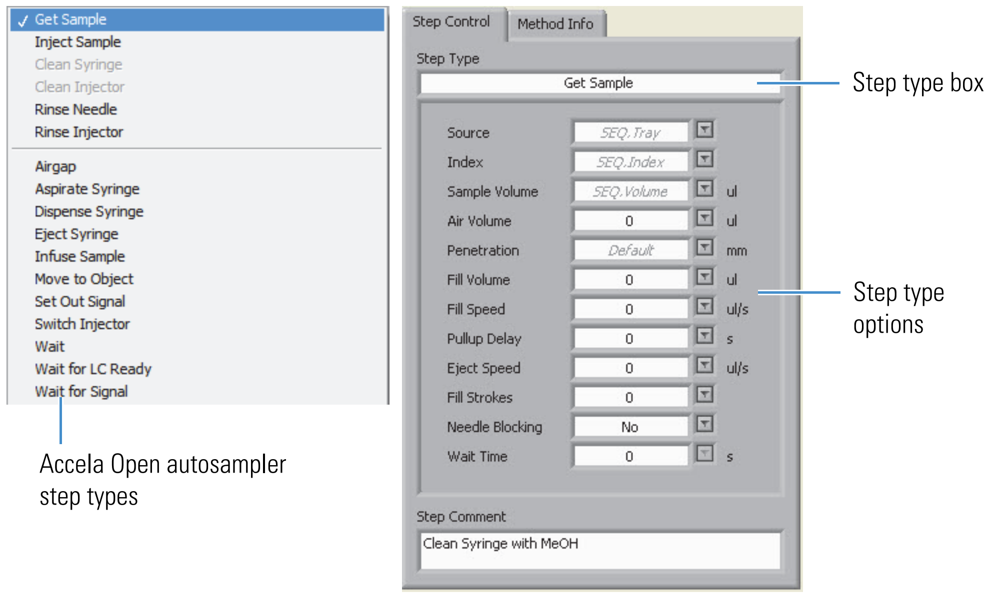
   A new step appears in the step table at the bottom. See also “Adding and Deleting Autosampler Method Steps (Accela Open and TriPlus)” on page 106.

   > **Tip** Use the Insert Step button (Accela Open) or the Insert button (TriPlus) to place a new step before a step that you select in the step table.

3. In the Step Control pane on the left, click in the Step Type box to open a list of step types.

4. Choose the step type that describes the action you want the autosampler to perform in this step, for example, **Get Sample** in Figure 54 (Accela Open autosampler) and Figure 79 on page 138 (TriPlus autosampler). For information on the step types, see “Autosampler Step Types (Accela Open and TriPlus)” on page 109.

Figure 54. Accela Open step types



The step type appears in the Step Type table on the right, and step type options appear in the Step Control pane on the left. See Figure 51 on page 97 and Figure 54.

5. Enter the appropriate parameters for the step type options or use the default values. For parameter information, see "Autosampler Step Types (Accela Open and TriPlus)" on page 109.

6. In the Step Comment box, type a description of the step for your reference.

7. Repeat step 2 through step 6 until the method actions meet your needs.

8. In the Timing Estimates pane, leave the Prior to Sample, Pre-Inject Total, and Post Injection boxes set to **0** minutes. For more information on these parameters, see "Autosampler Method Timing Options" on page 127.

9. To close the sample drawer after each injection, select the **Close Sample Drawers** check box.

> **Tip** If you have a Peltier (cool) stack, select this check box to keep the temperature of the cool stack regulated.

10. If you want the autosampler to wait for a signal from the detector that indicates the detector is ready to accept a new sample, select the **Wait for Detector** check box.

> **Tip** To improve throughput, leave this check box blank if you are running more than one LC channel.

11. Click the **Method Info** tab.

    The Method Info pane opens.

12. Type a description of the wash solutions to keep for your records. See “Entering Information in the Method Info Pane (Accela Open)” on page 107.

13. Choose **File > Save** to save the method. To save the method using a new name, choose **File > Save As**, type the new name, and then click **Save**.

❖ To create an autosampler method (Vanquish AS)

1. Open the Method Editor for your autosampler model. See “Accessing the Vanquish Autosampler Method Editor” on page 98.

   The autosampler method editor opens and displays the available AS method parameters.

2. From the AS method editor window, choose from the available method parameters to create your method (see Figure 52 on page 99). For a list of the available method parameters with descriptions, see Table 27.

3. As needed, type a description and/or comment in the available boxes.

4. After making your AS method parameter selections, choose **File > Save** to save the method. To save the method using a new name, choose **File > Save As**, type the new name, and then click **Save**.

Table 27 lists the available options and parameter descriptions for the Vanquish AS.

Table 27. Vanquish AS method parameter descriptions (Sheet 1 of 2)

Parameter	Options (if applicable)	Sub-option (if applicable)	Value(s)	Function
Draw Speed	–	–	0–20 µL/s	Specifies the AS draw speed in µL/s.
Draw Delay	–	–	0–5 seconds	Specifies the draw delay (s).
Dispense Speed	–	–	0.05–15 µL/s	Specifies the dispense speed in µL/s.
Bypass After				
	No Bypass (default)	–	–	Keeps the valve in the injected position after Step 1 of the AS method.
	LC Step 1	–	–	Specifies injection bypass after Step 1 of the AS method. **Tip** You can also select this box and enter a value in seconds using the format [**seconds**] [**s**] to instruct the injection valve to move to bypass.
Pre Sample Airgap	–	–	0–5 µL	Specifies the volume of air drawn by the syringe before the sample is drawn.
Post Sample Airgap	–	–	0–5 µL	Specifies the volume of air drawn by the syringe after the sample is drawn.

Table 27. Vanquish AS method parameter descriptions (Sheet 2 of 2)

Parameter	Options (if applicable)	Sub-option (if applicable)	Value(s)	Function
Wash Mode				
	Note Choosing a Wash Mode list option other than None—the default—adds the additional sub-parameters: Wash Time, Wash Speed, and Pre-wash Airgap.			
	None (default)	–	–	–
	Before Draw	Wash Time	0–300 s	Specifies total draw wash time (s).
	After Draw	Wash Speed	0–200 µL/s	Specifies the wash speed in µL/s.
	Both	Pre-wash Airgap	0.1–0.45 µL	Specifies the prewash airgap in µL.
Stroke Sync	–	–	Disabled or Enabled	Turns the Stroke Sync feature on (Enabled) or off (Disabled) in a one-pump configuration. Two-pump configurations provide an additional option to select the pump that synchronizes the stroke (Pump1 or Pump2). This feature is disabled by default.
Wait for Detector	–	–	On or Off	Specifies the AS to wait for detector signal before running the next sample.

Note In general, Thermo Fisher Scientific does not recommend adding airgaps to most methods. A very small, pre-sample airgap might help to avoid mixing of the previous loop contents and a sample.

Contact your Thermo Fisher Scientific technical support contact for additional assistance.

Refer to the *Vanquish Split Samplers Operating Manual* (PDF format) provided in hard copy with each Vanquish shipment or in PDF format on the Aria MX DVD.

Figure 55 shows the Vanquish AS options from the Aria MX Direct Control window. Table 28 provides Vanquish AS Options dialog box parameter details.

Figure 55. Vanquish AS Options dialog box

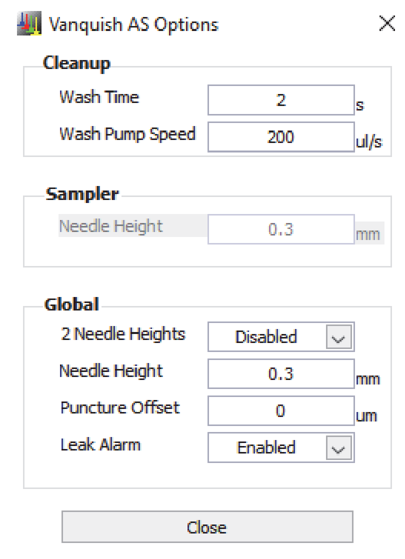


Table 28. Vanquish AS Options dialog box details (Sheet 1 of 2)

Related area	Option	Description
Cleanup		
	Note Cleanup definitions apply when the AS method is stopped, after the sample has been aspirated.	
	Wash Time	Specifies the length of an automatic cleanup cycle that the AS performs if a sample is stopped in seconds. Default: 2 seconds; Range: 0–10 seconds.
	Wash Pump Speed	Specifies the wash pump speed in µL/s during an automatic cleanup cycle that the AS performs if a sample is stopped. Default: 200 µL/s; Range: 24–200 µL/s
Sampler	Needle Height	Specifies the height the needle stops above the bottom of the sample vial in mm for each autosampler (Autosampler 1 and Autosampler 2) probe. Choose the autosampler that you want to configure by selecting it from the middle pane of the Direct Control window, and then click **Options** Selecting “2 Needle Heights” from the Global area makes this option available. Default: 2; Range: 0–50 mm

Table 28. Vanquish AS Options dialog box details (Sheet 2 of 2)

Related area	Option	Description
Global		
	2 Needle Heights	Activates the Needle Height option from the Sampler area, which allows different needle height settings for each autosampler (Autosampler 1 and Autosampler 2) probe. Options: • Enabled (on) • Disabled (off) Default: Off
	Needle Height	Specifies the height the needle stops above the bottom of the sample vial in mm. Default: 2; Range: 0–50 mm
	Puncture Offset	Specifies the distance the needle moves after puncturing a sample vial septum in micrometers (µm). This setting can help avoid creating a vacuum during a sample draw. Default: 0; Range: 0–3000 µm
	Leak Alarm	The leak alarm is on by default. Options: • Enabled (on) • Disabled (off) Default: Enabled

See “Common Vanquish AS Functions Using the Aria MX Direct Control Window” on page 61. For more information, refer to the *Vanquish Split Samplers Operating Manual* and *Vanquish Charger Operator Manual* (PDF format) provided in hard copy with each Vanquish shipment or in PDF format on the Aria MX DVD.

Adding and Deleting Autosampler Method Steps (Accela Open and TriPlus)

An Accela Open or TriPlus AS method contains multiple steps. Program each step that the autosampler performs during the method as a method step.

❖ To add or delete steps

1. Open the AS method. See "Accessing the Autosampler Method Editors" on page 96.
2. Do one of the following:
   - To add a step at the end of the method, click **Add Step**. A copy of the last step appears at the end of the method.
   - To add a step in the middle of the method, select the step above where you want the step, and click **Insert Step**. A copy of the selected step appears below it.
3. Edit the step type as necessary. See "Editing Autosampler Step Types (Accela Open and TriPlus)" on page 109.

❖ To delete a step

Select the step and click **Delete Step**.

Entering Information in the Method Info Pane (Accela Open)

Use the Accela Open Method Info pane to record information about the method (see Figure 56). For example, record the wash solution 1 and 2 composition or add comments.

Figure 56. Method Info pane in the AS method editor window

❖ To enter information in the Method Info pane

1. In the Comment box, type a description of the autosampler method.
2. In the Wash 1, Wash 2, and Loop boxes, type a description of wash solutions 1 and 2, and indicate the size of the sample loop.
3. In the Syringe list, select your system's syringe type.

Editing Autosampler Step Types (Accela Open and TriPlus)

❖ **To edit an autosampler step type**

1. Open the autosampler Method Editor by doing one of the following:
   - For the Accela Open autosampler, see "Accessing the Autosampler Method Editors" on page 96.
   - For the TriPlus autosampler, see "Accessing the TriPlus Autosampler Method Editor" on page 97.
2. Select the method step that you want to edit.
3. From the Step Type list, select the step type that corresponds to the task that you want the autosampler to perform during this method step.

   The step type appears in the Method table, and step type options appear below the Step Type box.
4. Enter the appropriate parameters for the step type options or use the default values.
5. Save the method.

Autosampler Step Types (Accela Open and TriPlus)

Table 29 provides specific information about the step types available when you create or edit an autosampler method.

Table 29. AS method step types (Sheet 1 of 2)

Step types	Function
Get Sample	The probe moves to the vial position and draws the sample.
Inject Sample	The probe injects the sample into the specified autosampler valve.
Rinse Needle	The syringe needle enters a specified wash port. The specified wash solution rinses the inside and outside of the needle. This option appears only when the DLW is present.
Rinse Injector	The specified wash solution flushes the injector port. This step type differs from the Clean Injector step in that the Rinse Injector step type does not use the syringe to fill the injector with wash solution. This option only available when the DLW present.
Airgap	The syringe moves from the sample or wash and draws in air.
Aspirate Syringe	The syringe draws up at its current location. Precede this step type with the Move to Object step type to move the syringe to the appropriate location. This step type is intended for advanced users and applications.

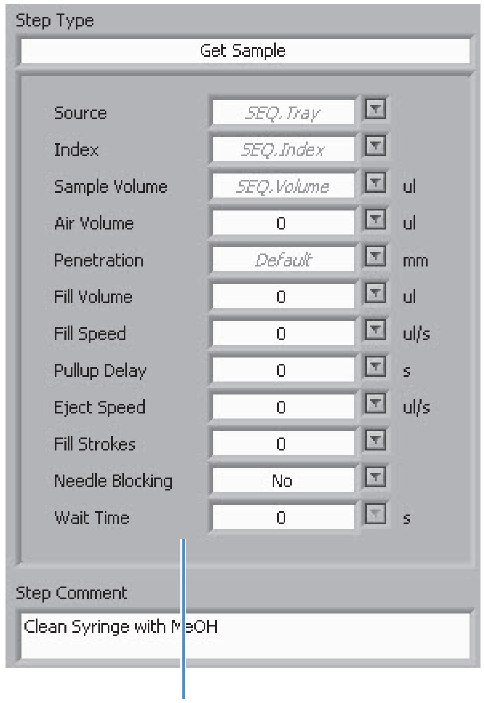
Table 29. AS method step types, continued (Sheet 2 of 2)

Step types	Function
Dispense Syringe	The syringe dispenses a specified volume at its current location. Precede this step type with the Move to Object step type to move the syringe to the appropriate location. This step type is intended for advanced users and applications.
Eject Syringe	The syringe dispenses its entire volume at its current location. Precede this step type with the Move to Object step type to move the syringe to the appropriate location. This step type is intended for advanced users and applications.
Infuse Sample	Moves the autosampler arm to the current injector, switches the injector valve into the fluid path, activates the LC pumps to start their methods, and then injects the sample.
Move to Object	Instructs the autosampler arm to move to a specified position. This step type is intended for advanced users and applications.
Set Out Signal	Controls the output signal of a non-injector autosampler valve. This step type is intended for advanced users and applications.
Switch Injector	Instructs the injector valve to change position. This step type is intended for advanced users and applications.
Wait	Instructs the autosampler to wait a specified amount of time.
Wait for LC Ready	Instructs the autosampler to wait for the LC system to signal that it is ready to accept another sample.
Wait for Signal	Instructs the autosampler to wait for the LC pumps, or other hardware, to be in the ready state. This step type is intended for advanced users and applications.

Get Sample

The Get Sample step type (Figure 57) instructs the probe to move to the sample vial and draw the sample. For a description of the Get Sample options, see Table 30. This step type is common between the Accela Open and the TriPlus autosamplers; however, the step type options vary slightly.

Figure 57. Get Sample step type options



Accela Open autosampler options

Table 30. Get Sample options (Sheet 1 of 2)

Option	**Description**
Source	The tray number that contains the sample. To specify the tray in the sample list, select **SEQ.Tray**. Otherwise, select the tray number.
Index	The vial location for the sample that you want to draw. To specify the vial in the sample list, select **SEQ.Index**. Otherwise, select the vial location.
Sample Volume	The sample volume that you want the syringe to aspirate. To specify the volume in the sample list, select **SEQ.Volume**. Otherwise, type the sample volume.
Air Volume	The volume of air that you want the needle to draw in after the needle moves out of the sample.

Table 30. Get Sample options (Sheet 2 of 2)

Option	Description
Penetration	The depth at which you want the needle to enter the vial. If this value appears gray, the autosampler uses the default value. To override the default value, type a new value. If this value appears black, the autosampler default value has been overridden. To return to the autosampler default value, delete the override. **IMPORTANT** Changing this value can affect the performance of your system. See "Penetration Value Special Notice" on page 127.
Fill Volume	The total amount of sample that you want drawn into the needle while it performs fill strokes. This value does not affect the final sample volume.
Fill Speed	The plunger speed as the syringe fills. **Tip** When you use viscous samples, enter a slower fill speed than the default value.
Pullup Delay	The delay time between pulling up the plunger and the next action, such as ejecting sample from the syringe or moving the syringe to waste. **Tip** When you use viscous samples, enter a longer delay than the default value.
Eject Speed	The plunger speed for all ejections while the syringe performs fill strokes.
Fill Strokes	The number of aspiration cycles in the sample vial.
Needle Blocking	When you select Yes, the application temporarily locks the needle guide in place as the syringe extracts the sample. The system unlocks the needle guide at the end of the Get Sample step type.
Wait Time	The time in seconds that the autosampler waits before going to the next step.

Inject Sample

The Inject Sample step type (Figure 58) instructs the autosampler to inject the sample into the specified autosampler injector. This step type is common between the Accela Open and the TriPlus autosamplers; however, the step type options vary slightly. For a description of the Inject Sample options, see Table 31.

Figure 58. Inject Sample step type options

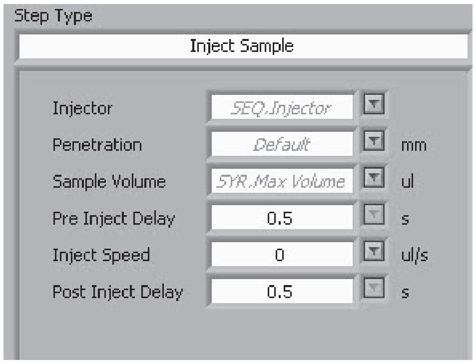


Table 31. Inject Sample options (Sheet 1 of 2)

Option	Description
Injector	Specifies the injector where the autosampler injects the sample. To select the injector in the sample list, select **SEQ.Injector**. Otherwise, select another injector, as appropriate. If the selection in this list does not match the selection in the Injector lists for other related step types in the method, a warning message appears when you save the method. Click **Yes** to continue.
Penetration	Depth at which the needle point enters the LC injector. • If this value appears gray, the autosampler uses the default value. Type a new value if you want to override the autosampler default value. • If this value appears black, the autosampler default value has been overridden. To return to the autosampler default value, delete the override. **IMPORTANT** Changing the Penetration value can affect the performance of your system. See "Penetration Value Special Notice" on page 127.
Sample Volume	Specifies the sample volume to inject. • If SYR.Max Volume appears, the syringe injects the entire syringe contents. • If SEQ.Volume appears, the syringe injects the volume specified in the sample list.
Pre Inject Delay	The delay time prior to sample injection.
Inject Speed	The plunger speed for sample injection.

Table 31. Inject Sample options (Sheet 2 of 2)

Option	Description
Post Inject Delay	The delay time after injection.
Wait for LC Ready	Instructs the autosampler to wait until it receives a ready signal from the LC system before making this injection. The default setting is True (on).

Clean Syringe

The Clean Syringe step type instructs the autosampler arm to move to the wash station and clean the syringe. If a DLW is installed on your system, this option appears gray and is not accessible.

Note After a Clean Syringe step type is executed during the method, Aria MX software assumes the syringe volume equals zero, even if the Clean Cycles value equals zero.

When you select the Clean Syringe step type, the following options appear.

Figure 59. Clean Syringe options

The following table describes the options available for the Clean Syringe step type.

Table 32. Clean Syringe options (Sheet 1 of 2)

Option	Description
Wash Station	Select either **Wash 1** or **Wash 2**, depending on which solvent you want to use for the wash.
Clean Cycles	The number of syringe priming or cleaning cycles.
Clean Volume	Percent of syringe to use for cleaning.

Table 32. Clean Syringe options (Sheet 2 of 2)

Option	Description
Wash Penetration	Depth at which the needle point is inserted into the wash station. • If this value appears gray, the default autosampler value is used. Type a new value if you want to override the autosampler default value. • If this value appears black, the autosampler default value has been overridden. To return to the autosampler default value, delete the override. **IMPORTANT** Changing this value can affect the performance of your system. See "Penetration Value Special Notice" on page 127.
Fill Speed	The plunger speed while drawing wash solution.
Pullup Delay	The delay time between pull-up and ejection or movement of syringe.
Eject Speed	The plunger speed for ejections at the wash station.
Rinse Time	The amount of time solvent flows through the wash station liners after the last wash stroke is performed and the needle is retracted. Leave the Rinse Time option for the Clean Syringe step type set to zero if either of the following is true: • The Clean Syringe step type is followed by a Clean Injector step type that uses the same wash solution. • The Clean Syringe step type is followed by another Clean Syringe step type that uses the same wash solution. **IMPORTANT** Setting the rinse time to a value other than zero in these conditions might result in insufficient washing. See "Penetration Value Special Notice" on page 127.

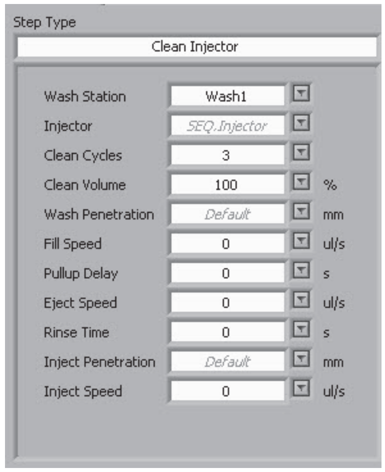
Clean Injector

The Clean Injector step type instructs the autosampler to move from its current location over to the specified wash station, extract wash solution, move to the specified injector port, and deliver the wash fluid. If a DLW is installed on your system, this option appears gray and is not accessible.

Note After a Clean Injector step type is executed during the method, Aria MX software assumes the syringe volume equals zero, even if the Clean Cycles value is set to zero.

When you select the Clean Injector step type, the following options appear (Figure 60).

Figure 60. Clean Injector options



The following table describes the options available for the Clean Injector step type.

Table 33. Clean Injector options (Sheet 1 of 2)

Accela Open option	Description
Wash Station	Select either **Wash 1** or **Wash 2**, depending on which solvent you want to use.
Injector	To select the injector in the sample list, select **SEQ Injector**. If the selection in this list does not match the selection in the Injector lists for other related step types in the method, a warning message appears when you save the method. If the discrepancy is intentional, select **Yes** to continue.
Clean Cycles	Number of syringe priming or cleaning cycles.
Clean Volume	Percent of syringe to use for cleaning.
Wash Penetration	Depth at which the needle point is inserted into the wash station. If this value appears gray, the autosampler uses the default value; otherwise, type a new value. If this value appears black, the autosampler default value has been overridden. To return to the default value, delete the override. **IMPORTANT** Setting the rinse time to a value other than zero in these conditions might result in insufficient washing. See "Penetration Value Special Notice" on page 127.
Fill Speed	Speed of plunger movement while drawing wash solution.
Pullup Delay	Delay time between pull-up and ejection or movement of the syringe.
Eject Speed	Plunger speed for ejections at the wash station.

Table 33. Clean Injector options (Sheet 2 of 2)

Accela Open option	Description
Rinse Time	The amount of time solvent flows through the wash station liners after the last wash stroke is performed and the needle is retracted. Leave the Rinse Time option for the Clean Syringe step type set to zero if either of the following is true: • The Clean Syringe step type is followed by a Clean Injector step type that uses the same wash solution. • The Clean Syringe step type is followed by another Clean Syringe step type that uses the same wash solution. **IMPORTANT** Leave the Rinse Time option for the Clean Syringe step type set to zero if any of the following are true: • The Clean Syringe step type is followed by a Clean Injector step type that uses the same wash solution. • The Clean Syringe step type is followed by another Clean Syringe step type that uses the same wash solution. • Setting the rinse time to a value other than zero in these conditions might result in insufficient washing.
Inject Penetration	Depth at which the needle point is inserted into the injector. If this value appears gray, the autosampler uses the default value; otherwise, type a new value. If this value appears black, the autosampler default value has been overridden. To return to the default value, delete the override. **IMPORTANT** Changing this value can affect the performance of your system. See "Penetration Value Special Notice" on page 127.
Inject Speed	Plunger speed for injecting solution.

Rinse Needle

The Rinse Needle step type (Figure 61) washes the needle during the AS method. If you select the Rinse Needle step type, the robotic arm moves to the specified location during the method, and flushes both the interior and exterior of the needle with the specified wash solution.

For a description of the Rinse Needle options, see Table 34.

Figure 61. Rinse Needle step type

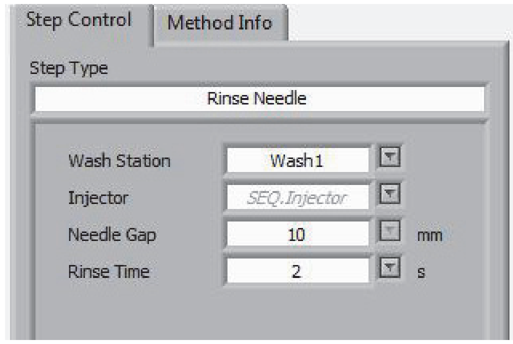


Table 34. Rinse Needle options

Option	Description
Wash Station	Select either **Wash 1** or **Wash 2**, as applicable.
Injector	The location that the autosampler uses to wash the needle. On the Transcend and Transcend II systems with a DLW, the location for NdlRns1 is Wash Station 1, and for NdlRns2 it is Wash Station 2.
Needle Gap	The height above the normal penetration depth for the injector. **Tip** Use the default value unless you have been instructed to change it by a service engineer.
Rinse Time	The time in seconds that the autosampler washes the needle in the wash station. **Tip** Select **2** or higher.

Rinse Injector

The Rinse Injector step type is available on autosamplers with the DLW; otherwise, it appears gray. If you have a DLW, use the Rinse Injector step type (Figure 62) to wash the injector during the AS method. For a description of the Rinse Injector options, see Table 35.

Figure 62. Rinse Injector step type

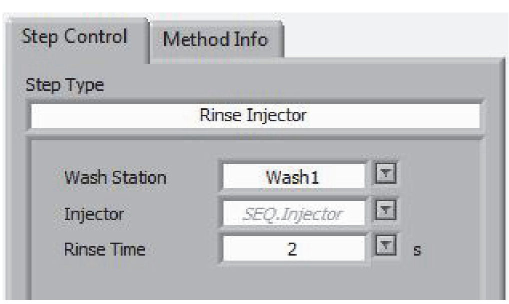


Table 35. Rinse Injector options

Option	Description
Wash Station	The solvent that the autosampler uses to wash the injector. Select **Wash 1** or **Wash 2**.
Injector	The injector that you want the autosampler to wash. To select the injector in the sample list, select **SEQ.Injector**.
	Note If the selection in this list does not match the selection in the Injector lists for other related step types in the method, a warning message appears when you save the method. Click **Yes** to continue.
Rinse Time	The time in seconds that the autosampler washes the injector.
	Tip Enter a rinse time equal to **2** or higher.

Infuse Sample

The Infuse Sample step type (Figure 63) moves the autosampler arm to the current injector, switches the injector valve into the fluid path, activates the LC pumps to start their methods, and then injects the sample. Use this step type to infuse the sample into the stream, rather than introduce it into the system as a single injection. You can use the Infuse Sample step type in place of the Inject Sample step type. For a description of the Infuse Sample options, see Table 36.

Figure 63. Infuse Sample step type

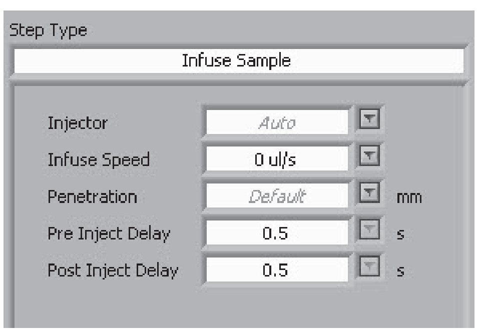


Table 36. Infuse Sample options

Option	Description
Injector	Specifies the injector where the autosampler infuses the sample. To select the injector in the sample list, select **SEQ.Injector**. **Note** If the selection in this list does not match the selection in the Injector lists for other related step types in the method, a warning message appears when you save the method. Click **Yes** to continue.
Infuse Speed	The speed at which you want the autosampler to inject the sample.
Penetration	Determines the depth at which the needle point penetrates the sample. • If this value appears gray, the autosampler uses the default value; otherwise, type a new value. • If this value appears black, it overrides the default value. To return to the autosampler default value, delete the override. **IMPORTANT** Changing this value can affect the performance of your system. See "Penetration Value Special Notice" on page 127.
Pre Inject Delay	Adds a delay before infusion begins. Select the delay time in seconds.
Post Inject Delay	Adds a delay after the sample infusion. Select the delay time in seconds.

Aspirate Syringe

The Aspirate Syringe step type (Figure 64) instructs the autosampler syringe to draw a specified volume of fluid from its current location. For a description of the Aspirate Syringe options, see Table 37.

Figure 64. Aspirate Syringe step type

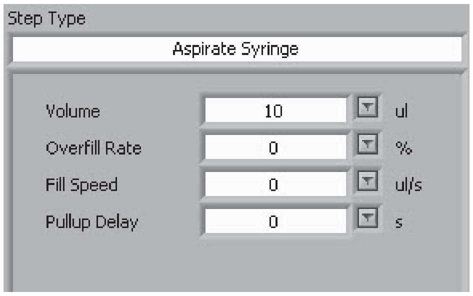


Table 37. Aspirate Syringe options

Option	Description
Volume	Amount of volume to aspirate.
Overfill Rate	Additional percentage to aspirate and return to the sample vial.
Fill Speed	The speed of the plunger as the syringe fills.
	Tip When you use viscous samples, enter a slower fill speed than the default value.
Pullup Delay	The delay time between pull-up and ejection or movement of the syringe.
	Tip When you use viscous samples, enter a slower fill speed than the default value.

Dispense Syringe

The Dispense Syringe step type (Figure 65) delivers a specified volume at the needle's current location. For a description of the Dispense Syringe options, see Table 38.

Figure 65. Dispense Syringe step type

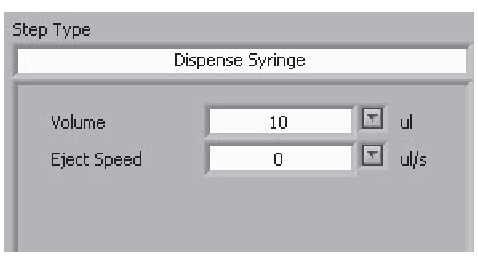


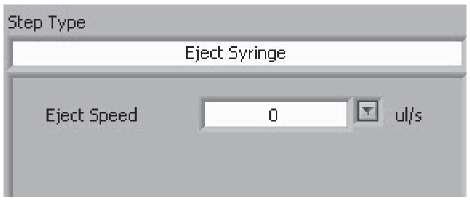
Table 38. Dispense Syringe options

Option	Description
Volume	The volume in the syringe that you want to eject.
Eject Speed	The plunger speed for ejections.

Eject Syringe

The Eject Syringe step type (Figure 66) instructs the autosampler to eject the entire contents of the syringe at its current location. The only option for this step type is Eject Speed, which is the plunger speed for the ejection.

Figure 66. Eject Syringe step type



Switch Injector

The Switch Injector step type (Figure 67) actuates the LC injector valve to the specified position. For a description of the Switch Injector options, see Table 39.

Figure 67. Switch Injector step type

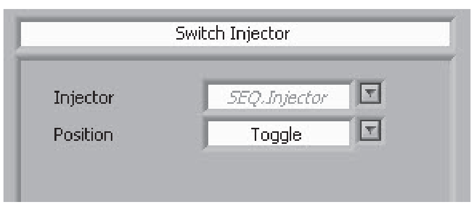


Table 39. Switch Injector options (Sheet 1 of 2)

Option	Description
Injector	Contains the valve that you want to switch. To select the injector in the sample list, select **SEQ.Injector**. Otherwise, select another injector, as appropriate. **Note** If the selection in this list does not match the selection in the Injector lists for other related step types in the method, a warning message appears when you save the method. Click **Yes** to continue.

Table 39. Switch Injector options (Sheet 2 of 2)

Option	Description
Position	Specifies between two injector valve positions: • Standby: The sample loop is in line with the fluid path and closed to the injector port. • Active: The sample loop is closed to the fluid path and open to the injector port. For example, if the injector was in Standby, it switches to the Active position, where it remains until another step in the method changes it back. **Tip** Switching the injector several times during a method might be helpful for optimal cleaning. **Note** To prevent the system from shutting down due to increased pressure, always end the method with the valve in the Standby position.

Move to Object

The Move to Object step type (Figure 68) instructs the autosampler arm to move to a specified location. Use this step type with step types that do not automatically move to an object, including Aspirate Syringe, Dispense Syringe, and Eject Syringe. For a description of the Move to Object options, see Table 40.

Figure 68. Move to Object step type

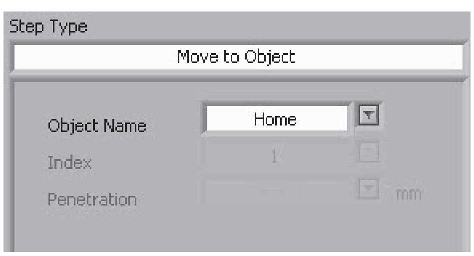


Table 40. Move to Object options

Option	Description
Object Name	The object to which the autosampler moves. • To move the autosampler arm to the current sample vial as determined by the sample list, select **SEQ.Tray**. • To move the autosampler arm to the current AS injector as determined by the sample list, select **SEQ.Injector**. • To move the autosampler arm to a specific location, select an autosampler object position, such as Wash Station, Home (autosampler arm resting position), Injector, Vial, or Tray.
Index	The specific vial location in the tray.
Penetration	The depth at which the needle penetrates the object. If this value appears gray, the autosampler uses the default value; otherwise, type a new value. If this value appears black, the autosampler default value has been overridden. To return to the default value, delete the override. **IMPORTANT** Changing this value can affect the performance of your system. See "Penetration Value Special Notice" on page 127.

Wait for Signal

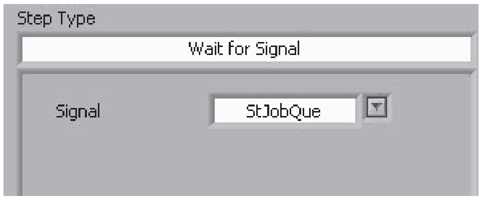
The Wait for Signal step type (Figure 69) temporarily halts the autosampler method to wait for the occurrence of the specified hardware signal.

Note Typical users do not use this advanced option.

The Signal option indicates which signal the autosampler waits for. The signals include the following:

- St Job Que
- Start
- Start 2
- Inject
- Inject 2
- Pause

Figure 69. Wait for Signal step type



Wait for LC Ready

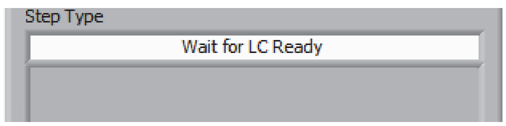
The Wait for LC Ready step type (Figure 70) instructs the autosampler to pause until it receives a ready signal from the LC system.

There are two options:

- True—Instructs the autosampler to pause for an LC ready signal.
- False—Instructs the autosampler to continue regardless of the LC status.

This step type has no additional parameters.

Figure 70. Wait for LC Ready step type

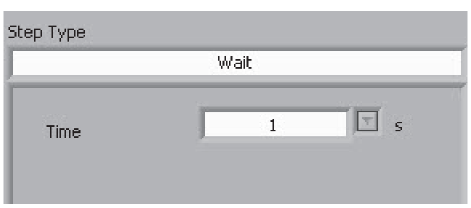


Wait

The Wait step type (Figure 71) adds a wait time to your autosampler method.

The Time option is the time in seconds that you want to add to the method.

Figure 71. Wait step type



Set Out Signal

The Set Out Signal step type (Figure 72) sets the output signal and signal state of a non-injector autosampler valve. Some external applications use non-injector autosampler valves.

Note Do not use this advanced step type for TurboFlow or laminar methods.

For a description of the Set Out Signal options, see Table 41.

Figure 72. Set Out Signal step type

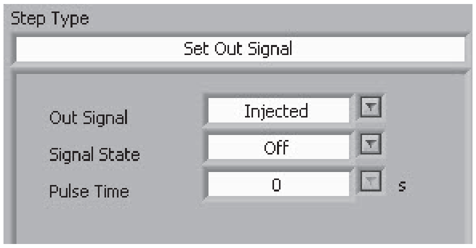


Table 41. Set Out Signal options

Option	Description
Out Signal	The autosampler signal type that triggers the valve to change.
Signal State	The signal state that changes the valve to the position you want.
Pulse Time	The time in milliseconds that you want the valve to remain in the new state. To keep the valve in the new state, type **0**.

Airgap

The Airgap step type (Figure 73) removes the syringe from the injector or wash station and draws in air. You might want to use this step type before and after the Get Sample step type to avoid mixing solvent and sample. It is also useful to have the DLW installed on the autosampler. For a description of the Airgap options, see Table 42.

Figure 73. Airgap step type

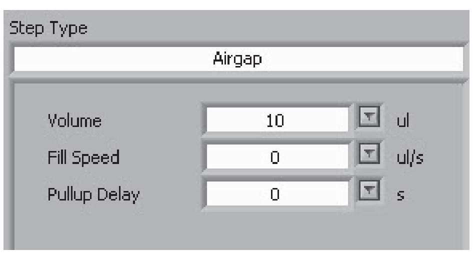


Table 42. Airgap options

Option	Description
Volume	The amount of air that the syringe draws in.
Fill Speed	The speed of the plunger as the syringe fills.
Pullup Delay	The amount of delay time after the syringe has fully aspirated.

Penetration Value Special Notice

The Inject, Infuse, and Move to Object step types provide the option to set the penetration value; however, Thermo Fisher Scientific recommends that you use the default value.

IMPORTANT A service engineer carefully calibrates the default Penetration value at the time of installation. Only override this value for experimental purposes and only if you have advanced knowledge of the autosampler functions. If you believe that the current default penetration value is faulty, then a service engineer must recalibrate it. To contact Technical Support, see "Contacting Us" on page xv.

Editing the Autosampler Method for Maximum Throughput

To optimize your autosampler method for better multichannel throughput, do the following:

- Verify that the Optimize AS Methods option is selected. See "Editing Aria MX Logic Settings" on page 73 and "Autosampler Method Timing Options."
- Leave the boxes blank for Prior to Sample, Pre-Inject Total, and Post Injection in the AS Method Editor window for the Accela Open autosampler. See "Autosampler Method Timing Options."
- Create an autosampler method that is less than or equal to half of the LC method length.

Autosampler Method Timing Options

This topic provides details about the autosampler method timing options available for the supported autosamplers (see Chapter 1).

The autosampler method editor window for the supported autosamplers each contain a unique Timing Estimates area.

- See Figure 74 on page 128 for the Accela Open autosampler
- See Figure 75 on page 129 for the TriPlus autosampler
- See Figure 76 on page 130 for the Vanquish AS

The Prior to Sample, Pre-Inject Total, and Post Injection boxes in the AS Method Editor window represent the time segments of the autosampler method before and after the sample injection. The "LC Sync" and "Prior to LC Sync" timing estimates each represent the time when the LC is ready ahead of switching the injection loop in line to make an injection. The default setting of this synchronization is True for the Inject step of the AS method for the Accela Open and TriPlus autosamplers.

When you run multiple channels, the Aria MX application considers the AS method timing when it times the sample starts. The accuracy of the time segments before and after the sample injection affects the timing of the sample starts, which then affects sample throughput. As the accuracy of the time segment values improves, so does the sample throughput. The Optimize AS Methods feature maintains the accuracy of these values by recording and averaging the applicable time segments with each method run. However, you can override this feature.

Tip Use timing estimates when not using auto-optimization. Doing so helps to normalize inter-sample spacing and/or improves sample processing efficiency when switching between methods. Actual method run times can be reviewed from the event log.

Thermo Fisher Scientific recommends that you use the longest likely time values for your timing estimates.

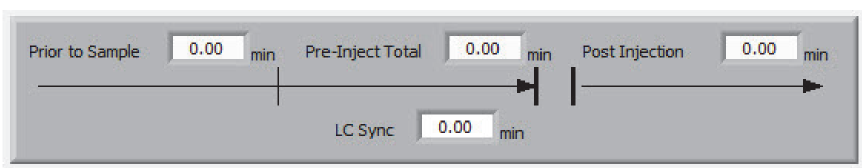
Related Topics

- Accela Open AS Method Timing Options
- TriPlus Autosampler Method Timing Options
- Vanquish AS Method Timing Options

Accela Open AS Method Timing Options

Figure 74 shows the timing estimates area for the Accela Open autosampler.

Figure 74. Accela Open AS method timing estimates area



❖ To set the timing estimates in the Accela Open AS Method Editor window

Note Enter values in these boxes only if you are an advanced user.

Do one of the following:

- To have the Aria MX software adjust the sample starts using AS method timing values calculated from previous runs, leave these boxes at their default setting (“0.00 min”).

  Note The calculated values do not appear in these boxes. The application stores them internally.

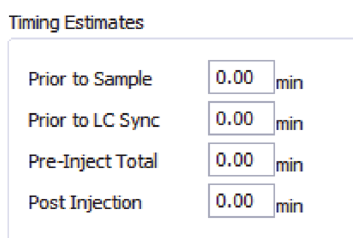
- To override the calculated values for these time segments, clear the **Optimize AS Methods** timing feature (check box) in the Aria MX Logic Settings dialog box, and type values in the four Time Estimates boxes. See "Editing Aria MX Logic Settings" on page 73.

  Tip The values that you enter can be derived from averaging the estimates of several sample runs in the Sequence Log Viewer.

TriPlus Autosampler Method Timing Options

Figure 75 shows the timing estimates area for the TriPlus autosampler.

Figure 75. TriPlus Autosampler method Timing Estimates area



❖ To set the Timing Estimates in the TriPlus Autosampler Method Editor window

Tip Enter values in these boxes only if you are an advanced user.

Do one of the following:

- To have the Aria MX software adjust the sample starts using AS method timing values calculated from previous runs, leave these boxes blank.

  Note The calculated values do not appear in these boxes. The application stores them internally.

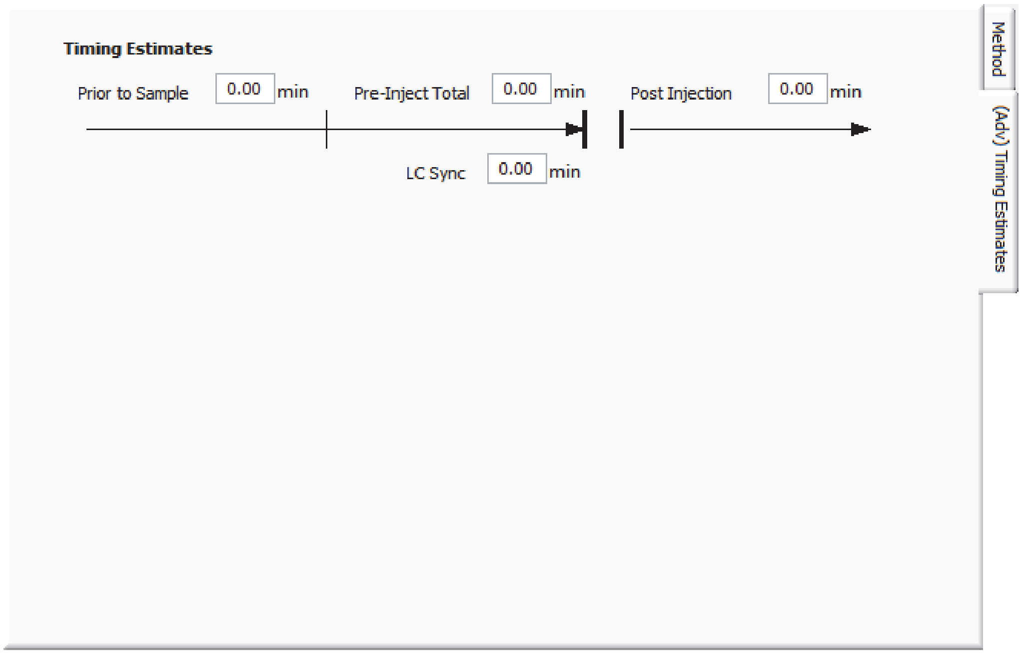
- To override the calculated values for these time segments, clear the **Optimize AS Methods** timing feature (check box) in the Aria MX Logic Settings dialog box, and type values in the four Timing Estimates boxes.

- See "Editing Aria MX Logic Settings" on page 73.

Vanquish AS Method Timing Options

Figure 76 shows the timing estimates configuration screen for the Vanquish AS autosampler, which are located on the Method Editor Advanced tab.

Figure 76. Vanquish AS method timing estimates, Advanced (Adv) tab



❖ To set the timing estimates in the Vanquish AS Method Editor window

Note Thermo Fisher Scientific recommends that you use the Aria MX software timing estimates because the Aria MX software automatically optimizes method timings. Enter values in these boxes only if you are an advanced user.

Do one of the following:

- To have the Aria MX software adjust the sample starts using AS method timing values calculated from previous runs, leave these boxes at their default setting (“0.00 min”).

  Note The calculated values do not appear in these boxes. The application stores them internally.

- To override the calculated values for these time segments, clear the **Optimize AS Methods** timing feature (check box) in the Aria MX Logic Settings dialog box, and type values in the four Time Estimates boxes. See “Editing Aria MX Logic Settings” on page 73.

  Tip The values that you enter can be derived from averaging the estimates of several sample runs in the Sequence Log Viewer.

Using a Default Method (Accela Open)

You can use a default method while optimizing the LC method steps. Default methods come with the Aria MX software DVD. Use this procedure to import only the autosampler method portion.

❖ **To import the default autosampler method**

1. Open the MS instrument method using the MS control application.
2. Import one of the following methods for a system using a DLW:

   > **Note** For instructions on importing AS methods, see "Importing the AS Method from an Instrument Method" on page 131.

   - To import the default AS method for running with TurboFlow LC methods, select the **Default_TX_DLW.meth** file. This method uses the TX injector.
   - To import the default AS method for running with Laminar LC methods, select the **Default_LX_DLW.meth** file. This method uses the LX injector.

   The AS method information from the default method imports into the instrument method.

3. Do one of the following:
   - If you have a DLW, import and edit the DLW default AS method on the Aria MX DVD. See the instructions in Importing the AS Method from an Instrument Method.
   - If you have a Fast or Active wash, import and edit the default AS method on the Aria MX DVD. See the instructions in Importing the AS Method from an Instrument Method.

Importing the AS Method from an Instrument Method

You can import the AS method portion of an instrument method (.meth file type) into another instrument method. Following this procedure imports the AS portion of the method only, not the LC method and MS method information.

> **Note**
>
> - You cannot import a legacy AS method into a Vanquish Dual Split Sampler.
> - To import the LC method information, see "Importing the LC Method from an Instrument Method" on page 188.

❖ **To import the AS method information from an instrument method**

1. Open the instrument method where you want to add the AS method information.
2. Click **Aria MX**.

   The LC Method Editor window appears.
3. Click **AS Method**.

   The AS Method Editor window appears.
4. Choose **Edit > Import**. Navigate to the instrument method (.meth) that contains the AS method information that you want to import, and select it.
5. Click **Import**.

   The AS method information appears in your open method.

Importing an Aria OS Autosampler Method

You can import an Aria OS autosampler method into an instrument method. You might want to import an Aria OS method if you share methods with a system that uses Aria OS.

IMPORTANT

- Do not import Aria OS autosampler methods if you have a DLW. They do not meet DLW programming requirements. Create your own method, or open the Aria MX DLW default method.
- Do not import Aria OS autosampler methods that contain the Loop Back or Clean Up step types because they do not import correctly. These step types are uncommon and do not appear in the development AS methods.

❖ **To import the AS Method from Aria OS**

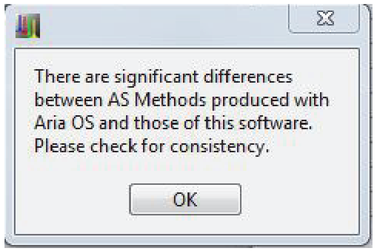
1. Open the instrument method where you want to import the Aria OS autosampler method.
2. Click **Aria MX**.

   The LC Method Editor appears.
3. Click **AS Method**.

   The AS Method Editor appears.
4. Choose **Edit > Import Aria AS Method (*.tmt)**, and then navigate to the Aria Methods folder and select the Aria OS autosampler method to import.

   The method information and the following message appear (see Figure 77).

Figure 77. Import AS Method message



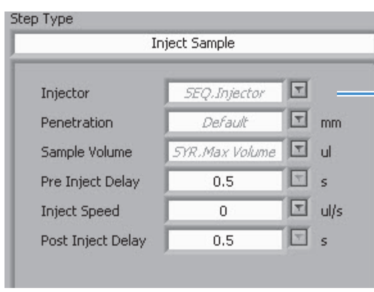
5. Click **OK**.

   The message closes, and the imported method appears.

6. In the Injector box for the Inject Sample, Clean Injector, Rinse Injector, Rinse needle, or Switch Injector step types, do one of the following:

If you want to ...	Then ...
Run a TurboFlow method.	Select **TX**.
Run an LX method.	Select **LX**.
Run your system as an LX system.	Select **LX**.
To specify the injector from the sample list rather than in the AS method.	Select **SEQInjector**. In the sample list, create a custom column named "AS_Injector" and enter **TX** or **LX** into the AS_Injector column for each sample. See Figure 78.

Figure 78. Inject Sample options



In the Injector list, select **SEQ.Injector** to use the value specified in the sample list, or in the Injector box, enter **TX** to use the TX injector or **LX** to use the LX injector.

7. When your method contains a Move to Object, Infuse Sample, or Wait for Signal step type, select the appropriate options for the step type.

8. Verify that the options selected in all other step types are correct for your method.

9. Choose **File > Save** to save the method. To save the method using a new name, choose **File > Save As**, type the new name, and click **Save**.

Assigning the Injector (Accela Open and TriPlus)

The Aria and TLX systems have two injectors on each LC channel. The TX injector injects sample onto the TurboFlow column during TurboFlow methods, and the LX injector injects sample onto the analytical column during HPLC methods. You can select the injector in the autosampler method or in the sample list.

Note An Injector assignment is not needed for an LX-only system.

Assigning the Injector in the AS Method Editor

You can assign an injector in each step type in the AS method that is associated with an injector; these include the Inject Sample, Clean Injector, Rinse Injector, and Infuse Sample step types. If an injector is assigned in the Injector list for the step type, the autosampler uses that injector to complete the step.

❖ To assign the injector in the AS method

1. In the AS Method Editor window, select a step type that is associated with an injector, such as I**nject Sample**, **Clean Injector**, **Rinse Injector**, and **Infuse Sample**.
2. From the Injector list, select the injector that you want the system to use.
   - To run a TurboFlow method, select **TX**.
   - To run a laminar method without injecting sample into the TurboFlow column, select **LX**.

   Note "TX" and "LX" are the default names for the injectors. If these injector names do not appear in the list, then your laboratory or service engineer changed the names. Choose the appropriate injector name.
3. Choose **File > Save** to save the method.

Assigning the Injector in the Sample List

If SEQ.Injector appears in the Injector list, the autosampler uses the injector specified in the sample list. Follow this procedure to assign SEQ.Injector to the AS method if it has not already been done, and to assign the values in the sample list.

❖ To assign the injector in the sample list

1. In the AS Method Editor, select **Inject Sample**.
2. Open the Injector list, and select **SEQ.Injector**.
3. Repeat step 2 for other injector step types in your method, such as the **Clean Injector**, **Rinse Injector**, or **Infuse Sample** step type.

4. In the sample list, create a custom column named **AS_Injector**. Refer to the appropriate MS application documentation.

5. Do one of the following:

   - To run a laminar HPLC method, type **LX** in the AS_Injector column for each sample.

     The system injects the sample using the LX injector.

   - To run a TurboFlow method, type **TX** in the AS_Injector column for each sample.

     The system injects the samples using the TX injector.

> **Note** "TX" and "LX" are the default names for the injectors, which might have been changed. Verify the names of your injectors as follows:
>
> 1. Open the AS Method Editor window. See "Accessing the Autosampler Method Editors" on page 96.
>
> 2. Select a method step that uses the Inject Sample, Clean Injector, Rinse Injector, or Infuse Sample step type.
>
> 3. Open the Injector list.
>
>   The injector name you enter in the sample list must appear in the injector list.

Saving the Method

Saving the instrument method saves the autosampler method.

❖ To save the instrument method in the AS or Autosampler Method Editor window

Do one of the following:

- To save changes made to the autosampler or instrument method, choose **File > Save**.

- To save the autosampler method and any changes you made to a new file name, choose **File > Save As**.

Converting Legacy Accela Open AS Methods to TriPlus

You can quickly convert legacy Thermo Scientific Accela Open autosampler (AS) methods to TriPlus autosampler methods by using the Aria MX Autosampler method editor Import feature, which you can access from your data system application.

This feature is useful if your lab is updating its autosampler hardware to the TriPlus autosampler, or if your lab is using a mix of Accela Open and TriPlus hardware. It can help simplify integrating the TriPlus autosampler into your lab by minimizing autosampler method step rewriting.

Note

- Legacy Accela Open autosampler method steps imported to a Model B autosampler method require review and validation on the TriPlus system. In certain cases, converted methods might also require modifications to step parameters. Follow the on-screen message instructions when performing a conversion to understand which step parameters might require further editing or modification.
- Accela Open autosampler methods created on instrument control software version 2.5 or earlier function under instrument control software version 2.6 without further modification.

Before you convert a legacy Accela Open autosampler method to a TriPlus method, Thermo Fisher Scientific recommends that you do the following:

- Print the legacy AS method report from an existing RAW file for reference. Refer to your data acquisition software documentation for information how to print a RAW data file.
- Create a separate copy of the method file by performing a Save As command of the Accela Open method file to prevent overwriting a file that might be in use.

The Aria MX software notifies you that it will attempt to convert to the current hardware, but some parameters might not translate. Review, make any necessary modifications to the converted method, and then save your changes.

❖ To convert a legacy Accela Open autosampler method to a TriPlus autosampler method

1. Open the Instrument Method editor from the data acquisition application that is used in your laboratory.
2. Click **Autosampler**.

   The autosampler method editor window appears (see Figure 79).
3. Choose **Edit > Import from Inst Method (*.meth)**.

   The Import from instrument method dialog box opens.
4. Using Windows Explorer, navigate to and then choose the method file that you want to open and convert, and then click **OK**.

   A method warning message appears regarding the conversion process.
5. Read the message, and then click **OK**.

The legacy autosampler method is converted and the method steps appear in the TriPlus step table.

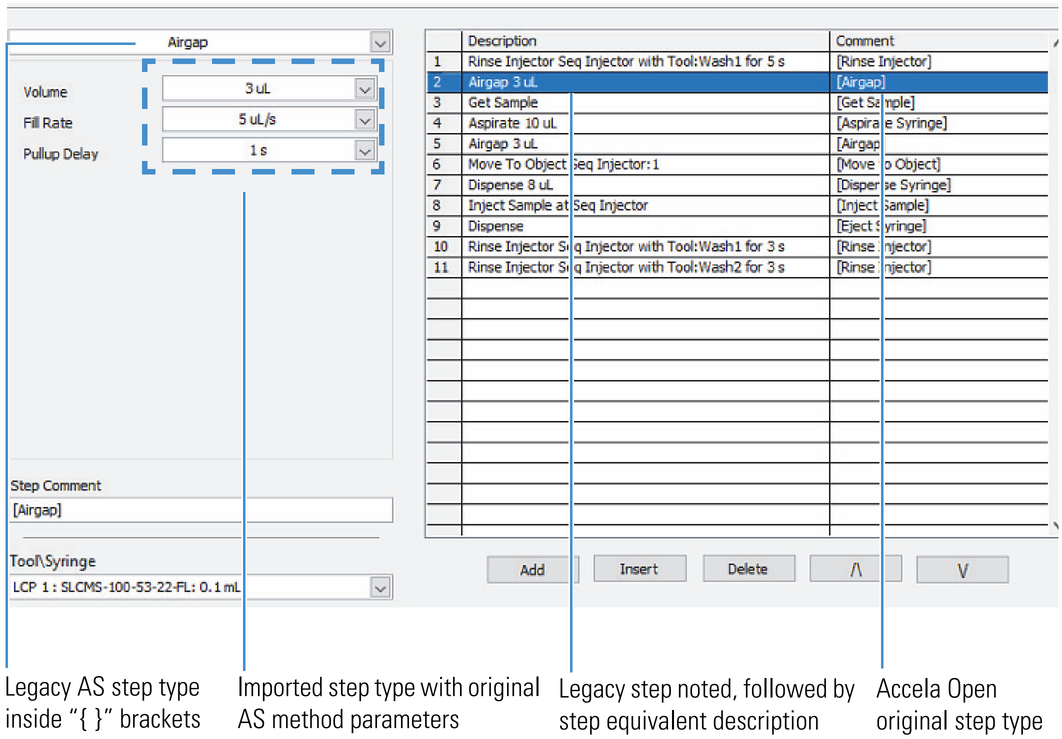
Note Contact Thermo Fisher Scientific Technical Support if you have any questions on the appropriate modifications that your converted method might require

After you have performed the conversion, review the method steps that might require substitution or modification. The TriPlus autosampler method editor highlights the converted steps as follows (see Figure 79):

- All legacy autosampler (AS) method steps are noted and placed inside "[ ]" brackets in the TriPlus method step table, Comments column.
- All legacy method steps that require additional modifications are placed inside "{ }" brackets in the TriPlus method step table Description column. The converted TriPlus method step immediately follows the bracketed legacy AS step type.
- The converted TriPlus method step types, when selected in the step table (blue highlighted row in Figure 79), appear in the step type area and *retain the original (legacy) AS method step parameters*.
- The original (legacy) AS method step appears inside "{ }" brackets inside the TriPlus step type box. Use the step type box to formally change the displayed legacy AS step type to the equivalent TriPlus step type, but *be aware that default TriPlus method step parameters replace the original AS method step parameters*.

Note A default TriPlus autosampler method is included on the Aria MX disk. Thermo Fisher Scientific recommends that you review the various step type parameters used in the default method, which can be different between the Accela Open and TriPlus autosamplers, and use them as a starting point when making changes to your laboratory's converted legacy methods.

Figure 79. TriPlus method editor with a converted AS method showing step type substitutions



After importing the legacy autosampler method to a TriPlus AS method, review the result and then do the following:

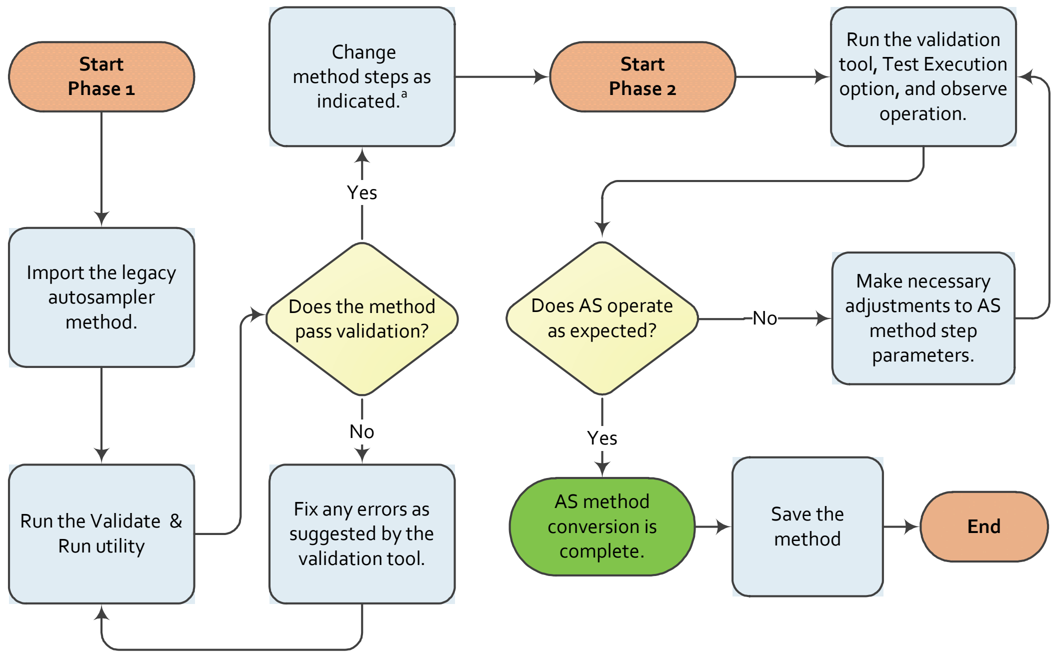
- (Recommended) Change the Accela Open legacy AS step types—highlighted inside "{ }" brackets—to the equivalent TriPlus step type by choosing it from the step type list (see Figure 79).

> **Note** TriPlus method step parameters are different from the Accela Open step parameters. Do the following:
>
> - Carefully review your printed legacy Model A method step options.
> - Double check your TriPlus step parameters after making the suggested step changes, as applicable.

- Validate the new method using the Direct Control Validate & Run utility, which is completed in two phases (see Figure 80), and then correct any errors or make step type parameter adjustments, as needed. For more information, see .

- (Optional) Change legacy Rinse Injector/Rinse Needle commands to Clean Injector/Clean Syringe commands to access the more versatile TriPlus autosampler command options. Make a note of legacy Rinse command step parameters before changing to the Clean command step.

Figure 80. Workflow for validating converted Accela Open (legacy) autosampler methods



[a] Review a copy of the legacy method step parameters before changing step types to Model B version .

Complete the legacy method conversion by validating the new TriPlus autosampler method. For more information, see .

Related Topics

- Supported Autosampler Models
- Autosampler Method Overview
- Basic Tips to Create a TriPlus or Accela Open Autosampler Method

6

Creating an LC Method

These topics describe how to enter or edit LC method information, such as adding and deleting steps, and changing the flow rates, valve positions, and mobile phase composition.

Contents

LC Method Overview

An LC method contains the flow rate values, mobile phase compositions, and valve positions used throughout the sample run. A TurboFlow method is an LC method that uses the TurboFlow column to separate large sample matrix molecules, salts, and sugars from the compounds of interest. After the TurboFlow separation, the LC transfers the compounds to the analytical column, where they are separated using HPLC analysis.

On LC systems where you can change the plumbing configuration, there are two types of TurboFlow methods: Quick Elute Mode and Focus Mode. An LC system whose method you cannot change uses Focus Mode plumbing.

Related Topics

- About the LC Method Editor
- Accessing the LC Method Editor
- Creating and Modifying LC Methods

About the LC Method Editor

Use the LC Method Editor to configure the pump and valve switching portion of the Aria MX instrument method and define the LC conditions for separating compounds of interest (see Figure 69).

The LC Method Editor has the following display and development properties:

- Displays the loading and eluting pumps and the available solvent channels, based on the system configuration for TLX-based systems.
- Displays the eluting pumps and the available solvent channels, based on the system configuration for LX-based systems.
- Generates method tables for both isocratic methods and methods that require a gradient.
- Creates channel selections and the run times for sample analysis directly in the LC Method Editor.

The LC Method Editor also provides system variables and pressure profiling options.

Related Topics

- LC Method Overview
- Accessing the LC Method Editor
- Creating and Modifying LC Methods
- Modifying Steps in an LC Method
- Adding Method Variables to an LC Method
- Assigning a Pressure Profile
- Importing an Aria OS LC Method
- Importing the LC Method from an Instrument Method

Accessing the LC Method Editor

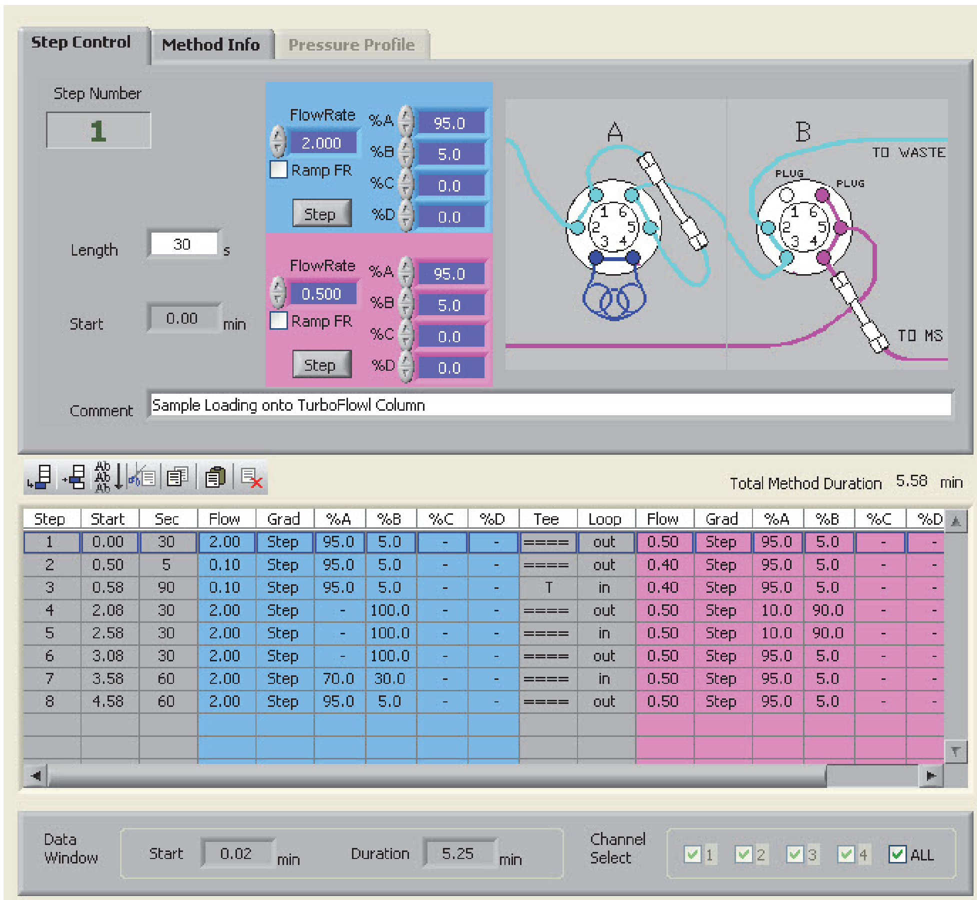
❖ To access the LC Method Editor

1. Open the instrument method you want to view using your instrument data system, such as Xcalibur or TraceFinder.

2. Select **Aria MX**.

   The LC Method Editor appears.

Figure 81. LC Method Editor window (TLX system)



Creating and Modifying LC Methods

The following topics describe how to use the LC Method Editor to create and enter the LC method information.

- To create an LC Method
- Modifying Steps in an LC Method
- Modifying Components in an LC Method Step

- Recommended Valve Position Settings
- Assigning Channels to the Method
- Prelude System Prestart Method Parameters
- Saving an LC Method
- Entering Information in the Method Info Pane

❖ To create an LC Method

1. In the LC Method Editor, click the **Step Control** tab and then click the **Add** button,  , to add steps to your method. See “Modifying Steps in an LC Method.”
2. In the Step Control pane, enter the appropriate method step duration, flow rate, mobile phase composition, and valve positions. See “Modifying Components in an LC Method Step” on page 147.
3. In the Data Window area, assign the start time and duration. See “Assigning the Data Window” on page 160.
4. In the ChannelSelect area, select the channels that can run this method. You can override this entry when you create and submit the sample list. See “Assigning Channels to the Method” on page 161.
5. To view a graphical representation of your method, see “Viewing the Method Graph” on page 166.
6. To enter variables for a method component, such as flow rate or mobile phase composition, see “Allowing Method Variables During a Run” on page 176. Use this feature to vary method components while optimizing a method.
7. Click the **Method Info** tab and enter general information about the LC method, such as solvents used. See “Entering Information in the Method Info Pane” on page 164.
8. Enter the LC method data window duration into the mass spectrometer portion of the instrument method for the acquisition time.

   Refer to your application user guide for information on entering the mass spectrometer acquisition time. If the LC method length and the mass spectrometer acquisition length are not the same, system errors might occur during the run.

Modifying Steps in an LC Method

Follow these procedures to add, delete, copy, and move steps in the LC Method Editor.

- To change the columns displayed in the Method Step table
- To insert a step within the method
- To delete a step

- To remove a step and paste it to a different position
- To copy one or more steps
- To undo a change you made to the LC method
- To redo the most recent changes that you undid

❖ To change the columns displayed in the Method Step table

Edit the method steps using the Method Step table.

The method step table lists the method steps, the step duration, solvent compositions, flow rates, and valve positions. See Figure 82.

Figure 82. Method Step table (TLX system)

Step	Start	Sec	Flow	Grad	%A	%B	%C	%D	Tee	Loop	Flow	Grad	%A	%B
1	0.00	30	1.50	Step	100.0	-	-	-	====	out	0.80	Step	100.0	-
2	0.50	60	0.40	Step	100.0	-	-	-	T	in	0.40	Step	100.0	-
3	1.50	60	1.50	Step	-	-	-	100.0	====	in	0.80	Ramp	5.0	95.0
4	2.50	90	1.50	Step	20.0	-	-	80.0	====	in	0.80	Step	5.0	95.0
5	4.00	60	1.50	Step	100.0	-	-	-	====	out	0.80	Step	100.0	-

For a complete description of the method step table columns, see "Editing the LC Method Step Table Columns" on page 172.

❖ To add a step to the end of the method

1. Click the **Add** button.

A new step appears at the end of the LC Method Step table with the same information as the previous step.

2. Edit the step information. See "Modifying Components in an LC Method Step" on page 147.

❖ To insert a step within the method

1. Click the row below where you want to add the step.

   The row is highlighted.

2. Click the **Insert** button.

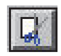
A new step with the same information as the highlighted step appears beneath it. The application sequences the step numbers.

3. Edit the step information. See "Modifying Components in an LC Method Step" on page 147.

❖ To delete a step

1. Select the step that you want to delete.
2. Click the **Delete** button.

❖ To remove a step and paste it to a different position

1. Select the step that you want to move.
2. Click the **Cut** button,  , to remove the step.
3. Select the step that is below the position where you want to paste the step.
4. Click the **Paste** button,  .

   The step appears above the selected step.

❖ To copy one or more steps

1. Select the step or steps that you want to copy.
2. Click the **Copy** button,  .
3. Select the step below the position where you want to place the copied step.
4. Click the **Paste** button,  .

   The step appears above the selected step.

❖ To undo a change you made to the LC method

In the LC Method Editor window, choose **Edit > Undo**.

The LC method appears as it did before the most recent change.

Tip You can undo up to ten of the most recent changes.

❖ To redo the most recent changes that you undid

In the LC Method Editor window, choose **Edit > Redo**.

The LC method appears as it did before you selected Undo.

Modifying Components in an LC Method Step

You can modify components in an LC Method step by using and of these procedures, as appropriate:

- To activate a step for editing
- To change the duration of the step
- To change the source of the flow through the TurboFlow column (Quick Elute Mode Technical)
- To change the direction of the flow through the TurboFlow column (Quick Elute Mode Technical)
- To change the Valve A position (Focus Mode Technical)
- To change the Valve B position (Focus Mode Technical)
- To copy information from one cell to all the selected cells below it (using Fill Down)
- To redo the most recent changes that you undid
- To change the pump flow rate
- To change the pump flow rate option from a step change to a flow rate ramp
- To change the composition of the mobile phase
- To change the composition of the mobile phase on systems that use a binary pump with an SSV
- To change the composition of the mobile phase on systems that use a Transcend Vanquish Flex binary pump with an SSV×3
- To change the composition of the mobile phase on systems that use an UltiMate binary pump with an SSV
- To select a ramp or step mobile phase change

❖ To activate a step for editing

1. In the LC Method Editor window, click the **Step Control** tab.

   The step information appears.

2. In the Method Step table, click anywhere in the step that you want to edit to highlight it. The step information appears in the upper portion of the window.

   You can now edit the step by clicking directly in the table cell that you want to edit, or in the boxes in the upper portion of the window.

   Note For a description of the LC Method Step table column headings, see "LC Method Step Table Columns" on page 174.

❖ To change the duration of the step

Do one of the following:

- In the top portion of the window, click the up or down arrow of the Length box, until the length you want appears.
- Click the sec value in the LC Method Step table and type the new length.

❖ To change the source of the flow through the TurboFlow column (Quick Elute Mode Technical)

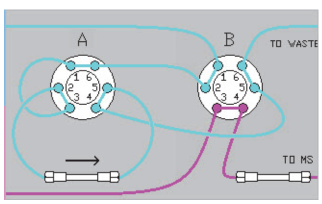
Note For a system that uses a divert valve, see "Changing Valve Positions When Using a Divert Valve (System Model 2303TX)" on page 158.

In the LC Method Editor, click **Valve B** in the valve diagram.

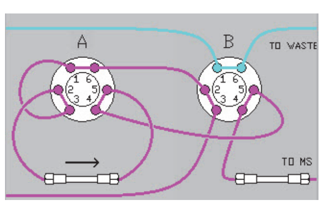
The following occurs:

- The diagram changes to indicate the tubing connections.
- The SD column value for the selected step switches to Loading or Eluting.

In the loading valve position, the loading pump mobile phase flows through the TurboFlow column and then to waste. The eluting pump mobile phase flows to the detector.



In the eluting valve position, the mobile phase from the loading pump flows to waste. The mobile phase from the eluting pump flows through the TurboFlow column and then to the detector.



In Quick Elute Mode, you can change the direction of the flow through the TurboFlow column. This is helpful if you want to add a wash or change the direction during the eluting step. You can change the direction of the TurboFlow column in both the loading and eluting valve positions.

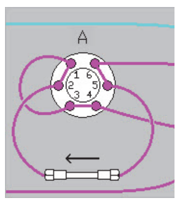
❖ To change the direction of the flow through the TurboFlow column (Quick Elute Mode Technical)

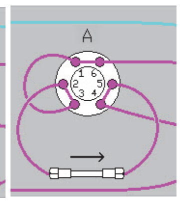
Note For a system that uses a divert valve, see "Changing Valve Positions When Using a Divert Valve (System Model 2303TX)" on page 158.

In the LC Method Editor, click **Valve A** in the valve diagram.

The following occurs:

- The arrow in the diagram changes to indicate the flow direction.
- The arrow in the CD column changes to indicate the flow direction.





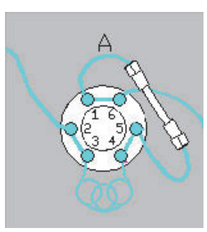
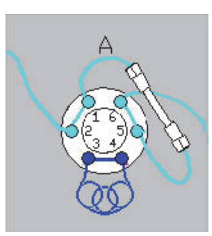
❖ To change the Valve A position (Focus Mode Technical)

Note Change the Valve A position to move the transfer loop in or out of the fluid path. The organic solvent in the loop elutes the compounds retained in the TurboFlow column. The loop must be in the fluid path during both the transfer step and the loop-filling step.

In the LC Method Editor, click **Valve A** in the diagram.

The valve in the diagram changes position, and the Loop column value in the Loop column switches to "In" or "Out." See Table 43.

Table 43. Valve A positions

Diagram	Loop column value	Description
	In	Loop is in the fluid path. When the loop is in the fluid path, the mobile phase from the loading pump flows through the loop to the TurboFlow column.
	Out	Loop is out of the fluid path. When the loop is out of the fluid path, the mobile phase from the loading pump bypasses the loop and flows directly to the TurboFlow column.

Note For a system that uses a divert valve, see “Changing Valve Positions When Using a Divert Valve (System Model 2303TX)” on page 158.

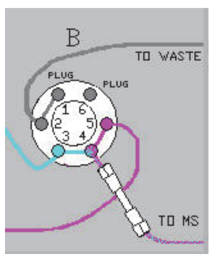
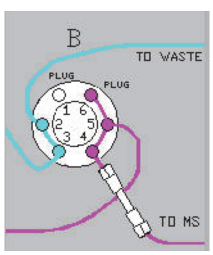
❖ To change the Valve B position (Focus Mode Technical)

Note Change the Valve B position to move the Tee in or out of the fluid path. When the Tee is in the fluid path, the aqueous mobile phase from the eluting pump combines with and dilutes the eluent from the TurboFlow column before it loads onto the analytical column. The Tee must be in the fluid path during the transfer step.

In the LC Method Editor, click **Valve B** in the diagram.

The valve position changes in the diagram, and the value in the Tee column switches to “T” or “====”. See Table 44.

Table 44. Valve B positions

Diagram	Tee column value	Description
	T	Tee is in the fluid path. When the Tee is in the fluid path, the flow from the TurboFlow column combines with the aqueous flow from the eluting pump, passes through the analytical column, and then enters the mass spectrometer.
	====	Tee is out of the fluid path. When the Tee is out of the fluid path, the flow from the TurboFlow column flows to waste. The eluting pump mobile phase flows undiluted through the analytical column and to the detector.

Note For a system that uses a divert valve, see “Changing Valve Positions When Using a Divert Valve (System Model 2303TX)” on page 158.

❖ To copy information from one cell to all the selected cells below it (using Fill Down)

1. Select the entry in the column that you want to copy.
2. Drag the cursor to the last entry in the column that you want to edit.

   The entries become highlighted.
3. Click the **Fill Down** button,  .

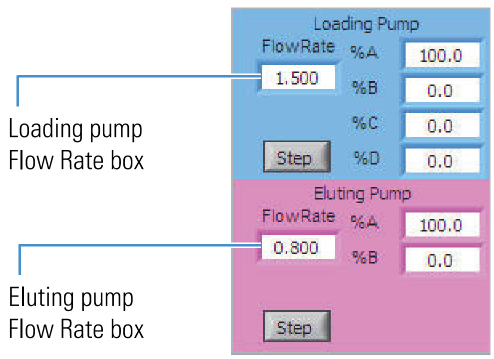
The value in the first entry appears in all the selected entries.

Tip You can also copy information from one entry in the column to the following entries. To do this, right-click to highlight the list of entries and choose **Fill Down**. The new values appear in the selected entries.

❖ To change the pump flow rate

Do either of the following:

- To change the loading pump flow rate, enter the new flow rate in the Flow Rate box in the blue Loading Pump area.
- To change the eluting pump flow rate, enter the new flow rate in the Flow Rate box in the pink Eluting Pump Area.



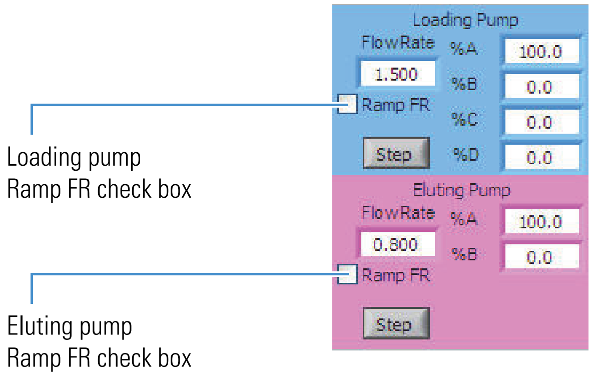
Tip You can also edit flow rate values within the LC Method Step table. To do this, select the value in the table that you want to edit and type the new value.

❖ To change the pump flow rate option from a step change to a flow rate ramp

Note With a ramp flow rate change, the step begins by using the loading pump flow rate that was entered in the previous step. This rate gradually changes to the loading pump flow rate that you entered for the current step. It achieves the flow rate at the end of the step.

Do one of the following:

- To change the loading pump flow rate to a ramp, select the **Ramp FR** check box in the Loading Pump area.
- To change the eluting pump flow rate to a ramp, select the **Ramp FR** check box in Eluting Pump area.



Tip If the Ramp FR check box does not appear, do the following:

1. In the LC Method Editor, choose **Edit > Method Configuration**.

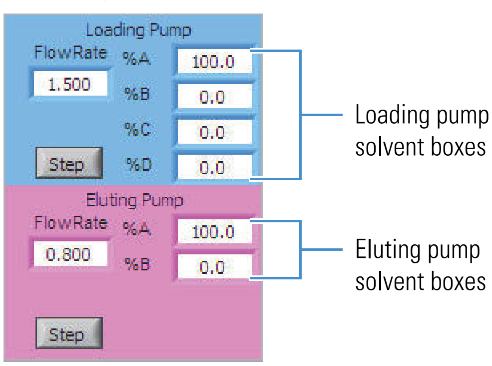
   The Method Configuration dialog box opens.

2. Select the **Flow Ramping** check box.
3. Click **OK**.

❖ To change the composition of the mobile phase

- If you want to change the composition of the loading mobile phase, enter the desired percentages of solvent A, B, C, or D in the %A, %B, %C, and %D fields in the Loading Pump area. The software adjusts values to ensure a total solvent percentage of 100.

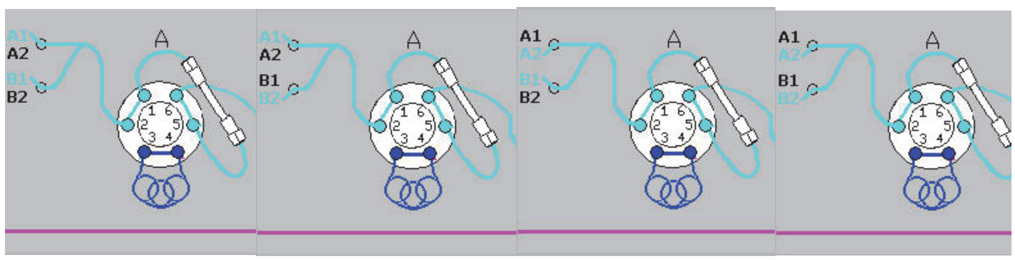
To change the composition of the eluting mobile phase, enter the desired percentage of solvent A in the %A box. The value in the % B box adjusts so that the total solvent percentages equal 100.



Note The number of loading pump and eluting pump solvent boxes that appear in the LC method table depends on the values entered in the LC Method Configuration dialog box. See "Changing the LC Method Configuration" on page 167.

You can edit the solvent percentages that are used directly in the LC Method Step table. To do this, select the value that you want to change in the table and type the new value.

In systems that use a binary pump with a solvent selector valve (excluding the UltiMate binary pump with SSV), one channel from each pump is in line with the flow during each step. The following figures show the loading pump flow for the four positions of the solvent selector valve.



To change valve positions or the percentage of flow in binary pumps with an SSV, follow this procedure.

❖ To change the composition of the mobile phase on systems that use a binary pump with an SSV

- To change the position of the solvent selector valve, select the step in the LC method table and then click anywhere in the solvent selector valve area on the diagram. The diagram changes to indicate which channels are active for the current solvent selector valve setting. Click through the valve positions until you reach the appropriate setting.

  The LSSV column in the LC method table indicates which channels flow to the injector and then to Valve A at each step.

- To change the percentage of flow for pump A or B, enter the value in the % A column and click anywhere outside the table.

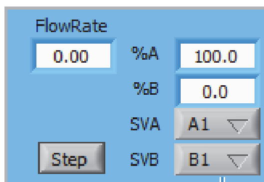
  The % B column automatically adjusts so that the total loading mobile phase percentage equals 100.

In systems that use the UltiMate binary pump with a solvent selector valve, one solvent from pump head 1 and one solvent from pump head 2 are combined to form the mobile phase. See Figure 83.

For the following procedure, solvents A and C are connected to pump head 1, and solvents B and D are connected to pump head 2.

❖ To change the composition of the mobile phase on systems that use a Transcend Vanquish Flex binary pump with an SSV×3

- From the Aria MX LC Method Editor window, choose from six different solvents in two solvent groups—designated as solvents grouped as A1 to A3 and B1 to B3—to use in separate method steps. For example, method step 1 might be configured to use A1/B1, and method step 2 might be configured to use A3/B2.
- From the LC Method Editor window, select which solvent group (number) combination that you want to set in your method. The following example shows the A1/B1 solvent combination selected from the SVA and SVB lists respectively.



Solvent group A list (A1 to A3), solvent A1 selected and set to 100%

Solvent group B list (B1 to B3), solvent B1 selected and set to 0.0%

- Use the same settings to purge the pumps.

You can select any of unique solvent combinations of A or B for the instrument method when running samples; however, the software does not allow using two solvents from the same solvent group in the *same* LC method step (for example, “A1/A2”). You can configure the method to “Allow SSV switching” between method steps.

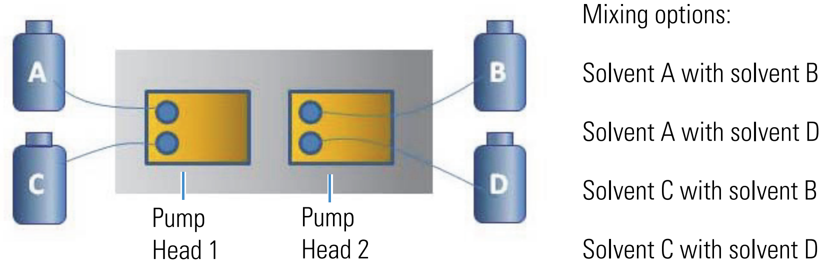
Note Thermo Fisher Scientific recommends using 100% of an A solvent for pump purge operations.

❖ To change the composition of the mobile phase on systems that use an UltiMate binary pump with an SSV

Mix the following solvents when you want to create your method in the LC Method Editor:

- Solvent A with solvent B
- Solvent A with solvent D
- Solvent C with solvent B
- Solvent C with solvent D

Figure 83. Diagram of a UltiMate binary pump with an SSV



While you are in the LC Method Editor, Aria MX software prevents you from mixing solvent A with solvent C, and mixing solvent B with solvent D.

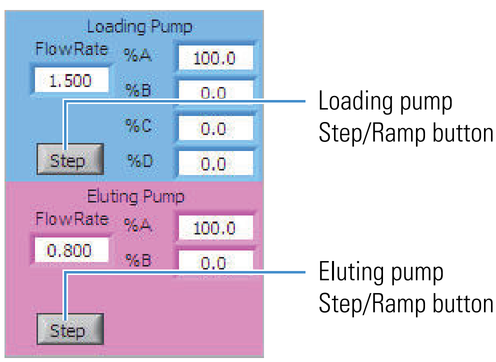
❖ To select a ramp or step mobile phase change

Click **Step/Ramp** to change the way in which the mobile phase composition changes. See Figure 84.

The following occurs:

- The button display changes to Ramp or Step.
- The entry in the Grad column changes to Ramp or Step.

Figure 84. Loading and eluting pump Step/Ramp buttons with "Step" showing



Note When you select Ramp, the mobile phase conditions in the beginning of the method step are the same as in the previous step. Throughout the length of the method, they gradually change to the mobile phase conditions entered for the current step. It achieves the new conditions by the end of the step.

When you select Step, the mobile phase conditions change in the beginning of the step. The time at which the mobile phase reaches the composition that was assigned for the current method step depends on the pump type you are using. Gradient delay times are usually provided with the pump specifications.

Recommended Valve Position Settings

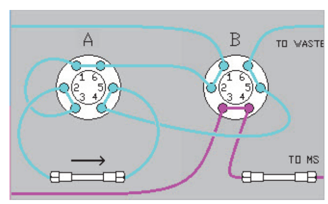
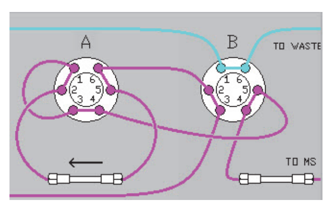
The following topics provide details on setting valve positions for Quick Elute Mode and Focus Mode.

- Setting Valve Positions in a Quick Elute Mode Method
- Setting Valve Positions in a Focus Mode Method
- Changing Valve Positions When Using a Divert Valve (System Model 2303TX)
- Assigning the Data Window

Setting Valve Positions in a Quick Elute Mode Method

Table 45 lists the recommended valve positions for Quick Elute Mode. Refer to your system's documentation for a description of Quick Elute Mode methods.

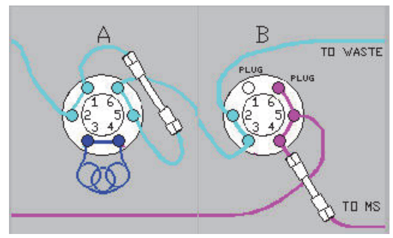
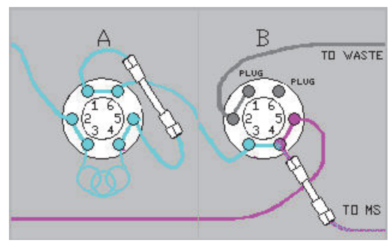
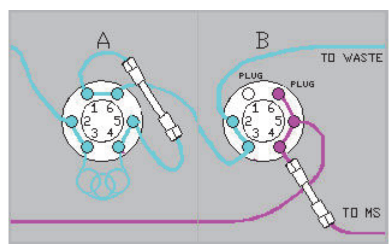
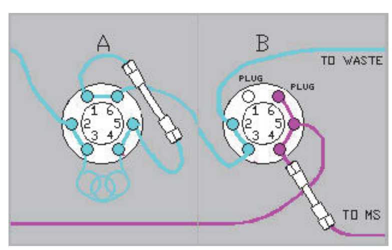
Table 45. Valve position recommendations for Quick Elute Mode

Step	Valve position recommendation
Loading, equilibrating, and wash	When entering a step to load the sample onto the TurboFlow column in Quick Elute Mode, switch the valve position to a loading valve position. In the loading valve position, the loading pump mobile phase flows through the TurboFlow column and then to waste. The eluting pump mobile phase flows to the detector. Also use this position to equilibrate or wash the TurboFlow column. 
Eluting	When entering a step to elute the analytes off the TurboFlow column in Quick Elute Mode, switch the valve position to an eluting valve position. In the eluting valve position, the loading pump mobile phase flows to waste. The eluting pump mobile phase flows through the TurboFlow column and then to the detector. 

Setting Valve Positions in a Focus Mode Method

Table 46 lists the recommendations for Valve A and B positions for each method step. Refer to your system's documentation for a description of Focus Mode methods.

Table 46. Valve position recommendations for Focus Mode

Step	Valve position recommendation	Figure
Loading	Loop—Out of the fluid path Tee—Out of the fluid path When loading sample onto the TurboFlow column in a Focus Mode method, change the Valve A and Valve B positions so that the loop and Tee are out of the fluid path. The loading pump mobile phase bypasses the loop and flows directly to the TurboFlow column and then to waste.	
Transfer	Loop—In the fluid path Tee—In the fluid path When eluting the analytes off the TurboFlow column and transferring them to the analytical column, change the Valve A and Valve B positions so that the loop and Tee are in the fluid path. The loading pump mobile phase flows through the loop to the TurboFlow column. The flow from the TurboFlow column combines with aqueous flow from the eluting pump, flows through the analytical column, and then enters the detector.	
Elution	Loop—In the fluid path Tee—Out of the fluid path When eluting the analytes off the analytical column, change the Valve A position so that the loop is in the fluid path. Change the Valve B position so that the Tee is out of the fluid path and the eluting mobile phase does not combine with the loading mobile phase.	
Loop-filling	Loop—In the fluid path Tee—Out of the fluid path The loop is in the fluid path to fill with mobile phase for the next sample. The Tee is out of the fluid path so that the organic loading mobile phase, which washes the TurboFlow column, does not pass through the analytical column.	
Equilibrate	Same as the loading step to prepare for the next sample.	–

Changing Valve Positions When Using a Divert Valve (System Model 2303TX)

Use the optional divert valve to direct the flow to the detector or to waste during the method. The flow diagram in the LC Method Editor appears differently in methods that are configured for use with the divert valve. For several examples of these altered flow diagrams, see Table 47.

This topic contains figures of the flow diagrams that appear when the method is configured for a divert valve.

❖ **To change the valve positions in your LC method for Valve A, Valve B, or the divert valve**

1. Configure the method for use with a divert valve as follows:
   a. From the LC Method Editor, choose **Edit > Method Configuration**.

      The Method Configuration dialog box appears.

   b. In the Plumbing Mode list, select one of the following:
      - If you are writing a Quick Elute Mode method, select **Single Column Divert**.
      - If you are writing a Focus Mode method, select **Dual Column Divert**.

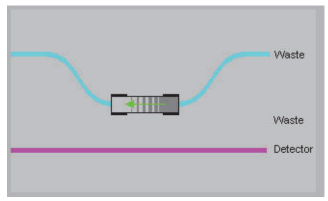
      Note Single Column Divert and Dual Column Divert options are available with a system that is configured for use with the divert valve. If these options do not appear, contact Technical Support.

   c. Click **OK**.
2. To create or edit a Quick Elute Mode method that uses a divert valve, choose an appropriate option from Table 47.

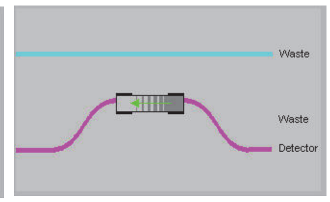
Table 47. Quick Elute Mode options

<table>
<tr><th>If you want to …</th><th>Then …</th></tr>
<tr><td>Change the source of the flow through the TurboFlow column to the loading or eluting pump (change the position of Valve B)</td><td>
Select the blue or pink tubing in the fluid diagram. The source changes.

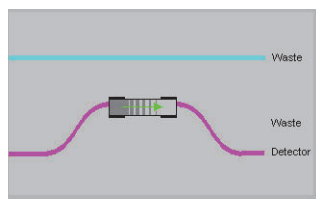
If the flow through the TurboFlow column was previously directed by the loading pump, the valve changes so that the flow is directed by the eluting pump. If the flow previously was directed by the eluting pump, the valve changes so that the flow is directed by the loading pump.



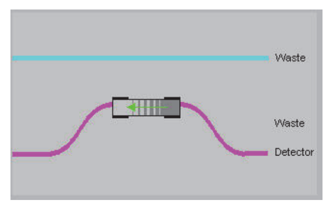
Valve position allows fluid from the loading pump to flow to the TurboFlow column.



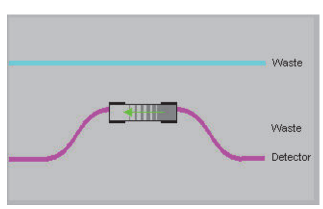
Valve position allows fluid from the eluting pump to flow to the TurboFlow column.
</td></tr>
<tr><td>Change the direction of the flow through the TurboFlow column (change the position of Valve A)</td><td>
Click the column in the fluid diagram. The valve changes the direction of flow through the TurboFlow column in the method.



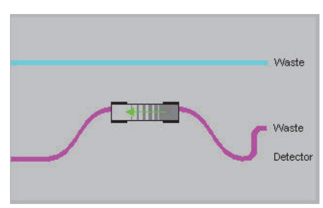
Fluid flows in a forward direction through the TurboFlow column.



Fluid flows in reverse direction through the TurboFlow column.
</td></tr>
<tr><td>Direct the flow of fluid as it leaves the TurboFlow column to either waste or to the detector (change the direction of the divert valve)</td><td>
Click **Waste** or **Detector**. The divert valve switches position. If the flow was previously sent to the detector, the flow is sent to waste. If the flow was previously sent to waste, the flow is sent to the detector.



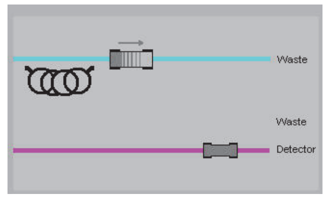
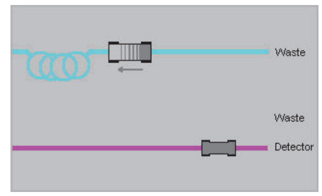
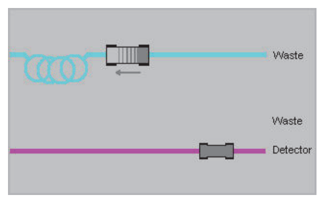
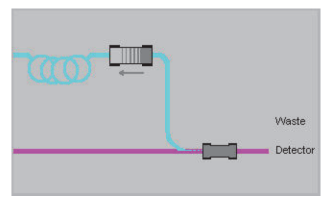
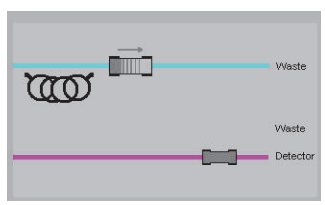
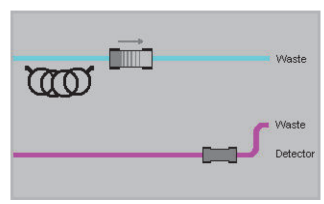
The divert valve directs flow to the detector.



The divert valve directs flow to waste.
</td></tr>
</table>

3. To create or edit a Focus Mode method that uses a divert valve, choose an appropriate option from the following table.

Table 48. Focus Mode options

If you want to …	Then …
Change the position of valve A so that the loop is in line or out of line (When the position of Valve A changes, the direction of flow through the TurboFlow column also changes.)	Click the loop in the diagram. The diagram changes.  The loop is out of line.  The loop is in line.
Change the position of Valve B so that the Tee is in line or out of line	Click the tubing that exits the TurboFlow column in the diagram. The diagram changes.  Tee is out of line.  Tee is in line.
Change the direction of the divert valve so that fluid from the analytical column flows to waste or to the detector	Click the tubing that exits the analytical column in the diagram. The diagram changes.  Fluid flows to waste.  Fluid flows to the detector.

Assigning the Data Window

The data window refers to the method time segment in which the mass spectrometer records data. If you run more than one LC channel with one mass spectrometer, set the data window start time and duration to maximize throughput.

❖ To assign the data window

1. Open the LC Method Editor. See “Accessing the LC Method Editor” on page 143.
2. In the Start box in the Data Window area, enter the time in the method that you want the data collection to start.

3. In the Duration box, enter the length of time that you want to collect the data.

4. To view a graphical representation of the data window and method timing, choose **Tools > Graph Display**. See "Viewing the Method Graph" on page 166.

5. If you are running samples cross-sequentially, the data window length can affect your throughput. To maximize throughput, consider the following recommendation for data window length. Larger than the recommended data window length might reduce your throughput.

   Table 49. Recommended data window lengths

System type	Recommended maximum data window length
X2 Instruments	No more than ½ total LC method time
X4 Instruments	No more than ¼ total LC method time

6. Enter the LC method data window duration into the mass spectrometer portion of the instrument method for the acquisition time. Refer to the application's documentation for information about entering the mass spectrometer acquisition time.

   IMPORTANT If the LC method length and the mass spectrometer acquisition length are not the same, system errors might occur during the run.

Assigning Channels to the Method

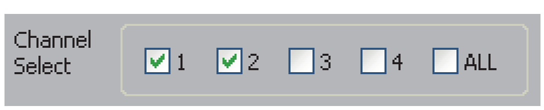
If one or more LC channels are assigned to a method, and no channels are assigned in the sample list, the method runs on the method-assigned channels. Assign the channels that can run this method if solvent or column conditions on any of the channels are not compatible with the method.

❖ To assign channels to the method

1. Open the LC Method Editor. See "Accessing the LC Method Editor" on page 143.

2. In the Channel Select area, select the channels that you want to use to run this method.

   Figure 85. Channel Select area in the Method Editor window



   Channels that you select in the sample list or batch file override channels that you select in the LC Method Editor.

Prelude System Prestart Method Parameters

The Prelude system has additional method parameters called Prelude Prestart and Temperature.

The Prelude prestart value equals the expected pump pressure when the autosampler injects the sample. The system pressurizes the solvent in the syringe to this value before the method starts to achieve the correct flow rate. You set both the target loading and eluting pump pressures from the Prelude Prestart dialog box.

The Prelude Temperature values set the temperatures that you want to use with the method you are creating or editing. You set temperature values that you want the method to use for each specified channel.

❖ To assign the Prelude Prestart values to a method

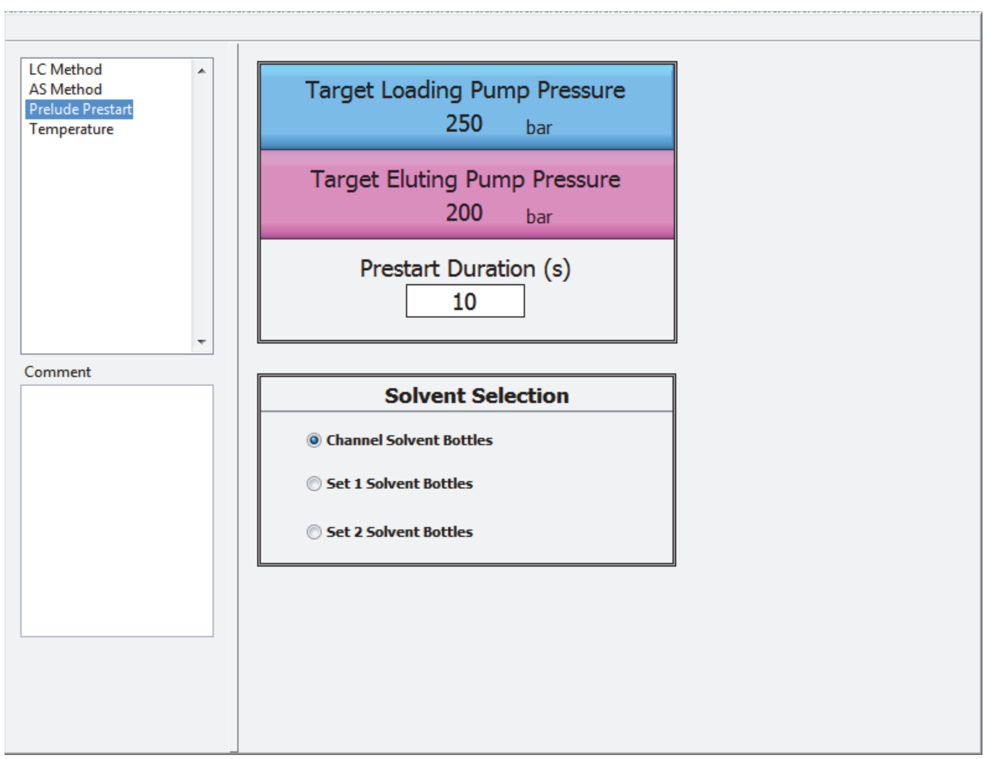
1. From your application's Instrument Setup window, click **Aria MX**.

   A list of Aria MX method types opens.

2. From the middle pane, click **Prelude Prestart**.

   The Target Loading Pump Pressure dialog box appears (Figure 86).

Figure 86. Prelude Prestart target pressure dialog box



3. Click the value in the Target Loading Pump Pressure (bar) box, and enter the new target value.

> **Note** The target loading pump pressure value refers to the expected loading pump pressure during the loading step of the method. To determine this value, do the following:
>
> 1. Install the appropriate TurboFlow and analytical columns.
> 2. In the Direct Control window, select the channel and set the flow rates to the flow rates in the loading step of the method.
> 3. Dispense the fluids and observe the loading pump pressure. This is the target loading pump pressure.

4. Click the value in the Target Eluting Pump Pressure (bar) box, and type the new target value.

> **Note** The target eluting pump pressure value refers to the expected eluting pump pressure during the loading step of the method. To determine this value, do the following:
>
> 1. Install the appropriate TurboFlow and analytical columns.
> 2. In the Direct Control window, select the channel and set the flow rates to the flow rates in the loading step of the method.
> 3. Dispense the fluids and observe the eluting pump pressure. This is the target eluting pump pressure.

4. Click the value in the Prestart Duration box, and enter the number of seconds that you want the flow rate to be stable at the target pressures before injecting the sample. Ten seconds is a typical value in this box.

> **Note** The total volume that is dispensed for the method displayed in the Solvent Use dialog box does not include the volume of solvent dispensed during the prestart. See "Determining the Method's Solvent Usage" on page 165.

5. In the Solvent Selection area, choose one of the following:

   - Select the **Channel Solvent Bottles** option if you want this method to use the bottles assigned to the channel that runs the sample.

     Channel 1 uses the top solvent bottles, and Channel 2 uses the bottom solvent bottles.

     > **Note** If you run the same method on both channels, Thermo Fisher Scientific suggests that you do not select this option. Using different solvent bottles might add variability to your run. Select the **Set 1 Solvent Bottles** or the **Set 2 Solvent Bottles** option so that all samples in the run use the same solvent bottles.

   - Select the **Set 1 Solvent Bottles** option if you want this method to always run using the solvents on the top shelf of the Prelude MD instrument system.

- Select the **Set 2 Solvent Bottles** option if you want this method to always run using the solvents on the bottom shelf of the Prelude MD instrument system.

Saving an LC Method

❖ To save an LC method

Choose **File > Save**, or to save the method under a different name, choose **File > Save As**.

Entering Information in the Method Info Pane

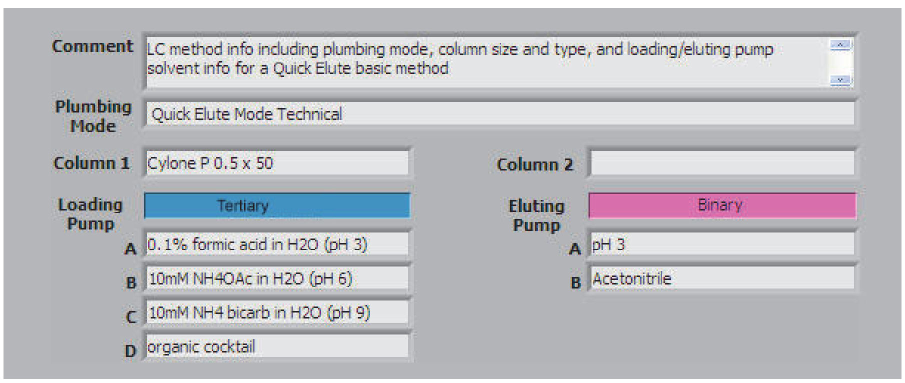
Use the Method Info pane to record method information.

❖ To enter information in the Method Info pane

1. In the LC Method Editor, click the **Method Info** tab.

   The Method Info pane opens.

   Figure 87. Method Info pane in the LC Method Editor window (generic view)



2. In the Comment box, type a description of the LC method.
3. In the Column 1 box, type the TurboFlow column information.
4. In the Column 2 box, type the information for the analytical column.
5. In the Loading Pump boxes, type information that identifies the loading pump solvents. The number of options that appear depends on the values entered in the LC Method Editor Configuration window.
6. In the Eluting Pump boxes, type information that identifies the eluting pump solvents. The number of boxes that appear depends on the values entered in the LC Method Editor Configuration window.
7. Choose **File > Save** to save the method, or choose **File > Save As** to save the method using a new name.

Determining the Method's Solvent Usage

As you develop a method, use the following procedure to determine or view the system solvent usage.

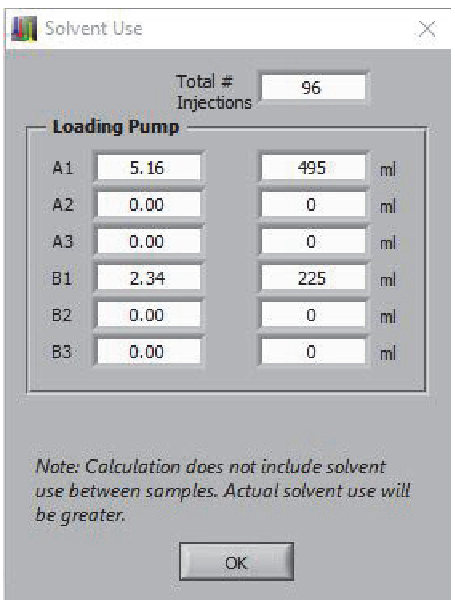
Note Allow additional mobile phase volume for priming and equilibrating the pumps, and for buffering time between samples.

❖ To calculate or view the amount of solvent used by the method

1. Open the LC method that you want to run. Refer to your data system's documentation.
2. In the LC Method Editor window, choose **Tools > Solvent Use**.

   The Solvent Use dialog box opens showing solvent volumes for 96 injections (see Figure 88).

   Figure 88. Solvent Use dialog box

3. To change the number of injections, select the current value in the Total # Injections box, and type a new number.
4. Click anywhere outside the Total # Injections box.

   The solvent volumes change to match the new value.

Viewing the Method Graph

With the method graph, you can see the method component changes in relation to the method timing.

❖ To view a graph of the LC method

In the LC Method Editor, choose **Tools > Graph Display**.

The method graph opens. For the graphic view of a Quick Elute Mode method with a ramp elution step, see Figure 89 and for Focus Mode, see Figure 90.

Figure 89. Graphic view of a Quick Elute Mode method with a ramp elution step (generic view)

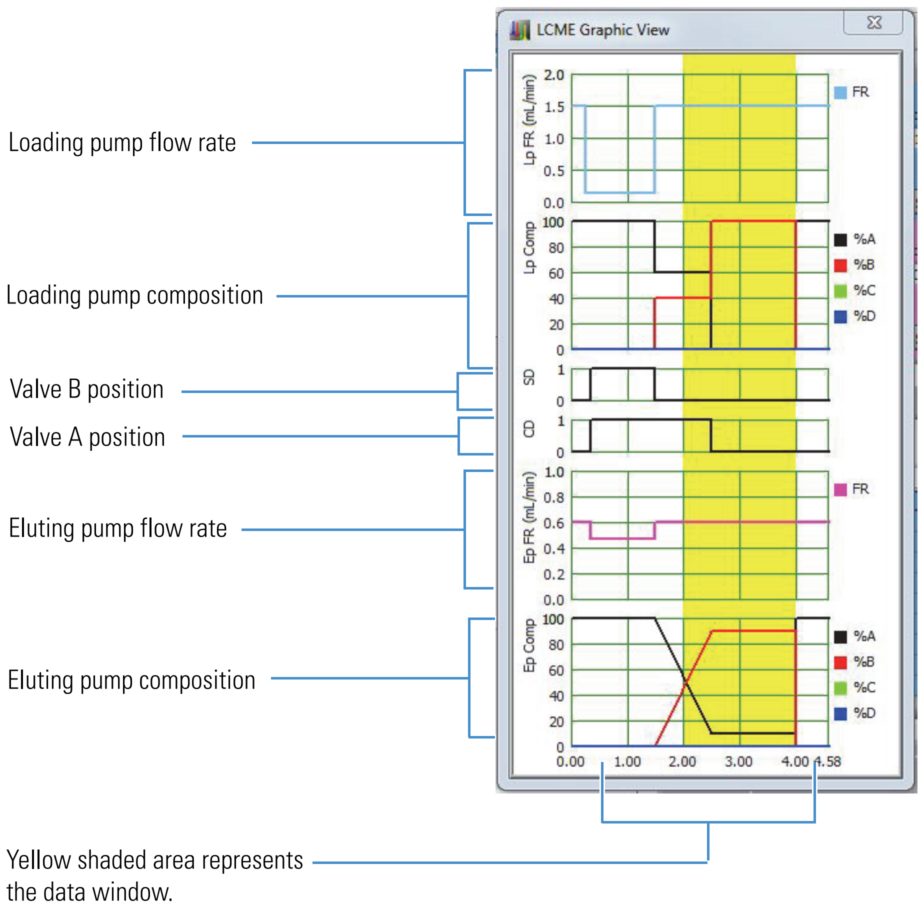
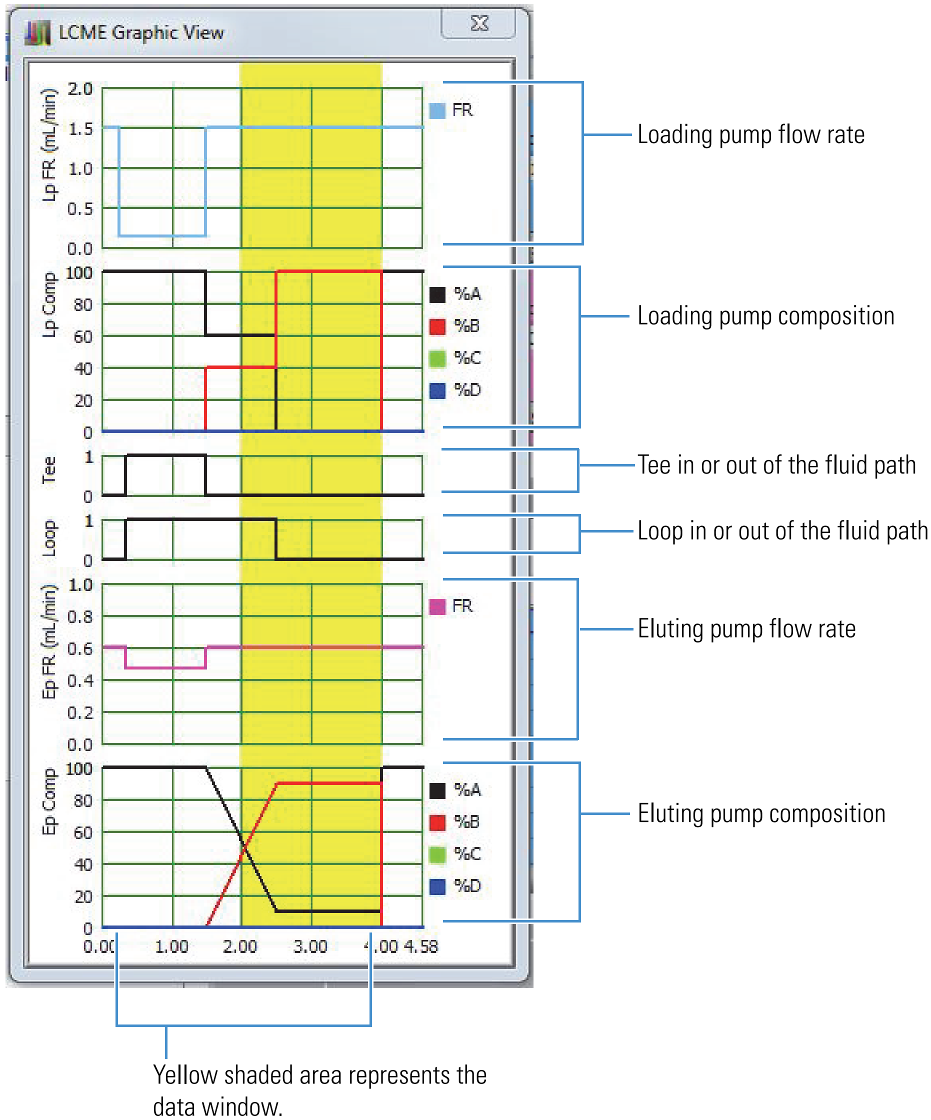


Figure 90. Graphic view of Focus Mode method (generic view)



Changing the LC Method Configuration

Change LC method configuration options if any of the following conditions apply:

- You changed the system plumbing.
- You want to change the appearance of the diagram in the LC Method Editor.
- You changed the type of your loading or eluting pump.
- You want to allow SSV switching (Vanquish binary SSVx3 pumps)

The changes that you make in the LC Method Configuration dialog box affect only the open LC method and are saved with that method. When you open a Quick Elute method and then open a Focus Mode or LX method, the appropriate diagram appears without having to change the configuration settings.

❖ To change the LC method configuration

1. From the LC Method Editor, choose **Edit > Method Configuration**.

   The Method Configuration dialog box appears showing the configuration of the open LC method.

   > **Note** The Method Configuration dialog box displays the additional SSV×3 parameter if the pump type selected in the Method Configuration dialog box is Binary SSV×3 (see Figure 91 and Figure 92). Method configuration parameters are described in Table 50.

   Figure 91. Method Configuration dialog box, binary pump type selected

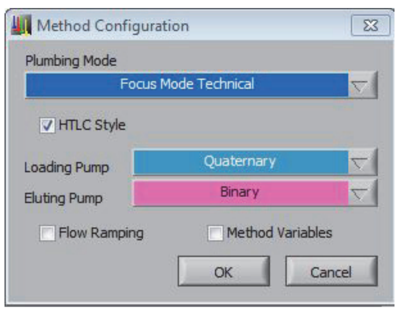
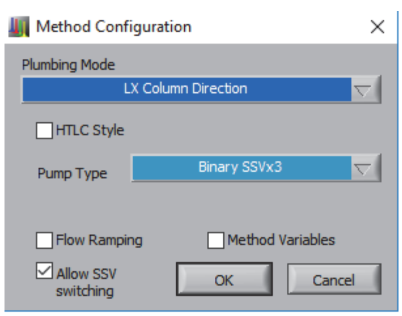
   

   Figure 92. Method Configuration dialog box, binary SSV×3 pump type selected

2. Set values for the parameters described in Table 50.

Table 50. Method Configuration dialog box parameters (Sheet 1 of 2)

Parameter	Description
Plumbing Mode	Select the appropriate plumbing mode for your system configuration. See "Selecting Plumbing Modes" on page 169 before changing this option.

Table 50. Method Configuration dialog box parameters (Sheet 2 of 2)

Parameter	Description
HTLC Style	Select this check box if you are running a TLX system, which requires both loading and eluting pumps. Clear this check box if you are running an LX system, which uses only one system pump. The eluting pump options are removed from the LC method table.
Loading Pump	Select the pump type that matches your instrument hardware. See "Selecting Pump Types" on page 170.
Eluting Pump	Select the pump type that matches your instrument hardware. See "Selecting Pump Types" on page 170.
Flow Ramping	Select this check box to enable flow ramping.
Method Variables	Select this check box to enable method variables.
Allow SSV switching	Select this check box to enable SSV switching on binary SSV×3 pump types (Figure 92). This option lets you configure different combinations of solvent sources across method steps.

Selecting Plumbing Modes

Select the appropriate plumbing mode for your system configuration. Changing the plumbing mode affects the diagram that appears in the LC Method Editor of the currently opened LC method. It does not change the system plumbing, nor the diagram for other methods. Choose the diagram that best matches your system plumbing:

- For an LX system, the valve diagram does not apply to your system. The valve changes are not programmed in the method.
- For a TLX system plumbed for Focus Mode, select any of the options for Focus Mode depending on the level of detail you want to see. Focus Mode Technical provides the most detail. Verify that your system plumbing matches the diagram.
- For a TLX system plumbed for Quick Elute Mode, select any of the options for Quick Elute Mode depending on how much detail you want to see in the diagram. Quick Elute Mode Technical and Quick Elute Dual Column Technical provide the most detail. Verify that your system plumbing matches the diagram.
- For a system that has a Vanquish binary pump, which uses an SSV×3, select an SSV diagram appropriate for your plumbing mode, depending on your system plumbing. If the Allow SSV Switching check box in the Method Configuration is selected, you can set different combinations of solvent sources—A1 to A3, and B1 to B3—across each method step (for example, method step 1 can be configured to use A1/B1, and method step 2 can be configured to use A3/B2). If the SSV plumbing modes are not available, contact Technical Support.

- For a system that has an Agilent binary pump with an SSV, which allows each side of a high pressure blending binary pump to deliver either of two solvents (not common), select an SSV diagram appropriate for Quick Elute Mode or Focus Mode, depending on your system plumbing. If the SSV plumbing modes are not available, contact Technical Support.
- For a TLX system that uses Transcend II pumps (which use SSV), select either a Quick Elute Mode or Focus Mode plumbing type, depending on your system plumbing. Do not select an SSV plumbing type.
- For a system using a divert valve, choose the appropriate divert valve option for your system.

Selecting Pump Types

Select the loading and eluting pump types in the Loading Pump and Eluting Pump lists. The selections that you make affect the solvent options in the Method Editor table for the currently opened LC method. Select the pump type that matches your instrument hardware by using the following table.

Table 51. Loading and eluting pump type selections

Pump type	Selection
Isocratic	Isocratic
Transcend Binary with SSV×3: • Vanquish Flex (VF-P10) • Vanquish Horizon (VH-P10)	Binary SSV×3
UltiMate binary with SSV, P/N HPG-3400RS	Binary SSV
Binary (excluding Transcend II Binary with SSV)	Binary
Agilent binary with SSV	Binary
Tertiary	Tertiary
Quaternary	Quaternary

Changing the LC Method Editor Options

Edit the LC Method Editor options if you want to change any of the following editing features for all LC methods.

- Change the time format that appears in the LC Method Editor.
- Set flow rate limits.
- Change the headings that appear in the LC Method Editor.

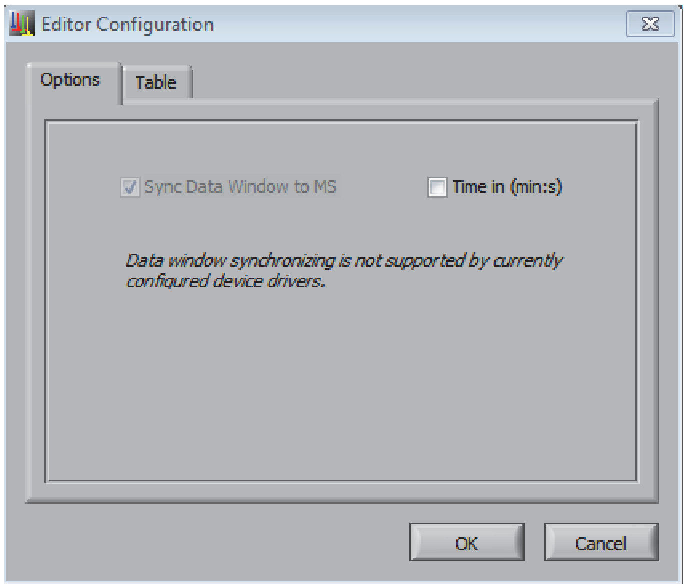
Changes that you make in the Editor Configuration dialog box affect all LC methods.

❖ To change the LC Method Editor options

1. In the LC Method Editor, choose **Tools > Select Preferences**.

   The Editor Configuration dialog box opens.

   Figure 93. Editor Configuration dialog box

2. Make entries and selections as shown in Table 52.

   Table 52. Editor Configuration dialog box parameters

Parameter	Description
Time In (min:s)	Select this check box if you want to view the method times in the **minute:seconds** format. Otherwise, the method times appear in the minutes format, with partial minutes appearing as a decimal.
Sync Data Window to MS	Select this check box if you want to sync the MS run time to the data window duration. This feature only works with TSQ Endura™ and TSQ Quantiva™ mass spectrometers.

3. If you want to change the headings that appear in the LC Method Step table, see "Editing the LC Method Step Table Columns."

4. Click **OK**.

Editing the LC Method Step Table Columns

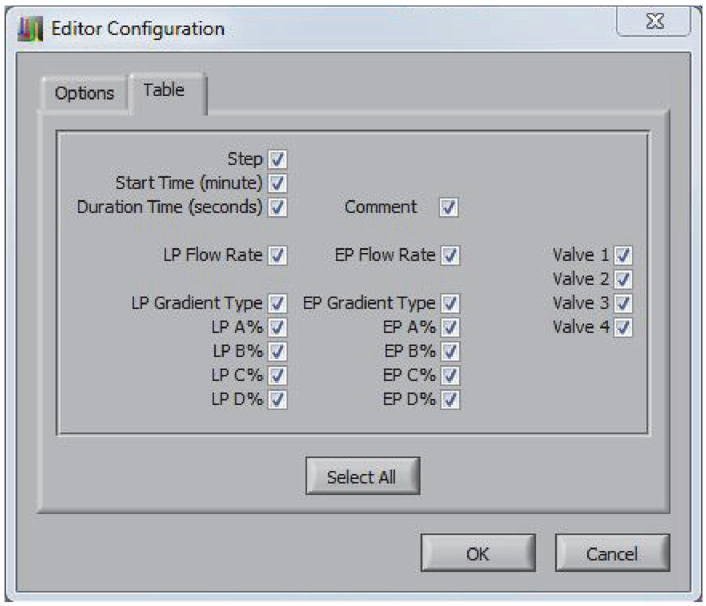
You can change the columns that appear in the LC Method Step table in the LC Method Editor. Columns you select in this window affect all LC methods, all Focus Mode methods, or all Quick Elute Mode methods.

❖ To edit the LC Method Step table columns

1. In the LC Method Editor, choose **Tools > Preferences**.

   The Editor Configuration dialog box opens (see Figure 94).

   Figure 94. Table tab in the Editor Configuration dialog box



2. Click the **Table** tab.

3. Select the check boxes corresponding to the headings that you want to see in the LC method table. For descriptions of the available headings, see Table 53.

Table 53. Table heading options (Sheet 1 of 3)

Heading	Description
Step	The step number.
Start Time (minute)	Starting time for the step in the unit format selected on the Options page.
Duration Time (seconds)	Length of the step.
LP Flow Rate	Flow rate of the loading pump (LP).
LP A/B Valve	A or B position for a loading pump with an added A/B valve.
LP Gradient Type	The gradient type of the loading pump (ramp or step).

Table 53. Table heading options (Sheet 2 of 3)

Heading	Description
LP A%	Percent loading pump flow that flows from channel A.
LP B%	Percent loading pump flow that flows from channel B.
LP C%	Percent loading pump flow that flows from channel C.
LP D%	Percent loading pump flow that flows from channel D.
Comment	Comment entered for the step.
EP Flow Rate	Flow rate of the eluting pump (EP).
EP A/B Valve	A or B position for an eluting pump with an added A/B valve.
EP Gradient Type	The gradient type of the eluting pump (ramp or step).
EP A%	Percent eluting pump flow that flows from channel A.
EP B%	Percent eluting pump flow that flows from channel B.
EP C%	Percent eluting pump flow that flows from channel C.
EP D%	Percent eluting pump flow that flows from channel D.
Valve 1	Valve B: In the Quick Elute Mode plumbing configuration, valve positions determine which pump flows mobile phase through the TurboFlow column. Valve positions are Loading or Eluting in the SD column in the LC Method Editor. In the Focus Mode plumbing configuration, valve positions determine whether the T is in line or out of line. Valve positions are T or ==== in the T column in the LC Method Editor.
Valve 2	Valve A: In the Quick Elute Mode plumbing configuration, valve positions determine the direction of mobile phase flow through the TurboFlow column. Valve positions are indicated with an arrow in the CD column in the LC Method Editor. In the Focus Mode plumbing configuration, valve positions determine if the transfer loop is on line or out of line. Valve positions are in or out in the Loop column in the LC Method Editor.

Table 53. Table heading options (Sheet 3 of 3)

Heading	Description
Valve 3	LSSV when a plumbing configuration mode with a solvent selector valve is selected in the Method Configuration dialog box.
Valve 4	Divert valve when a divert valve is used. ESSV when a plumbing configuration mode with a solvent selector valve is selected in the Method Configuration dialog box.

4. Click **OK** to save your changes.

LC Method Step Table Columns

Table 54 describes the columns in the Method Step table.

> **Note** The columns that appear in the LC Method table depend on the settings entered in the LC Method Configuration dialog box. Table 54 describes columns that appear in the LC Method table when you select typical LC Method configurations. See "Changing the LC Method Editor Options" on page 170.

Table 54. Method Step table headings (Sheet 1 of 3)

Heading	Description
Step	The step number.
Start	Starting time for the step (minutes/decimal minutes).
Sec	Length of the step (seconds).
Flow (appears blue)	Flow rate of the loading pump.
Comp	A or B position, for an isocratic pump with an A/B valve. Selects mobile phase source. This column appears in the LC method table when "Isocratic" appears in both the Loading Pump and Eluting Pump lists in the Method Configuration dialog box.

Table 54. Method Step table headings (Sheet 2 of 3)

Heading	Description
LSSV	• A1, A2/B1, or B2 positions for an UltiMate binary pump with a solvent selector valve. • A1-A3 and B1-B3 positions for Vanquish Flex or Horizon pumps. This column appears in the LC method table when any of the four SSV options are selected as the plumbing mode in the Method Configuration dialog box, and Valve 3 is selected in the Preferences dialog box.
ESSV	• A1, A2/B1, or B2 positions for an UltiMate binary pump with a solvent selector valve. • A1-A3 and B1-B3 positions for Vanquish Flex or Horizon pumps. This column appears in the LC method table when one of the SSVx2 options is selected as the plumbing mode in the Method Configuration dialog box, and Valve 4 is selected in the Preferences dialog box.
SD (Quick Elute only)	Source destination pump that provides fluid to the column (Load or Elute). Determined by the position of Valve B in Quick Elute Mode methods. This column appears if a Quick Elute plumbing mode is selected in the Configuration dialog box and Valve 1 is selected in the Preferences dialog box.
CD (Quick Elute only)	Column direction (← or →), determined by the position of valve A in Quick Elute Mode methods. This column appears in the LC method table if a Quick Elute plumbing mode is selected in the Configuration dialog box and Valve 2 is selected in the Preferences dialog box.
Loop (Focus Mode only)	Loop valve position (In or Out), determined by the position of Valve in Focus Mode methods. This column appears in the LC Method table.
T (Focus Mode only)	T valve position (In or Out), determined by the position of Valve B in Focus Mode methods. This column appears in the LC Method table.

Table 54. Method Step table headings (Sheet 3 of 3)

Heading	Description
DIV	Divert valve position, available on the 2303TX system model. This column appears in the LC method table if a divert valve plumbing mode is selected in the Configuration dialog box and Valve 4 is selected in the Preferences dialog box.
Flow (appears in pink)	Flow rate of the elution pump.
Grad	Type of gradient used: Step or Ramp. Step means that the flow rate and composition change immediately to the designated value. Ramp means that the flow rate and composition change gradually over the length of the step to the designated value.
%A, %B, %C,%D	Composition of the mobile phase. Columns for %A, %B, %C, and %D appear in the Method Step table when selected in the LC Method Configuration dialog box. The loading pump information appears in the blue area of the table and eluting pump information appears in the pink area of the table.
Comments	Add a note about a particular step.

Allowing Method Variables During a Run

The Method Variables feature is a convenient tool for changing variables in a method during method development. To use the Method Variables feature in Aria MX software, you must be able to create custom columns in the sample list using the software you use to schedule samples, such as the Xcalibur data system.

When you optimize method conditions during method development, you run a method several times, varying only one component in the method at a time to determine the optimal value for the analyte. For example, to determine the best solvent strength to fill the transfer loop, you vary the percentage of the solvent that fills the loop each time.

Add a method variable to the instrument method as a convenient way to vary a component in a method. When you create the method variable, specify the method component that you want to change, the step number in which you want to vary the component, and an acceptable value range. Then, enter the values that you want to use for each sample in the batch. By creating a method variable, you can use one method with varying values for a component.

Adding Method Variables to an LC Method

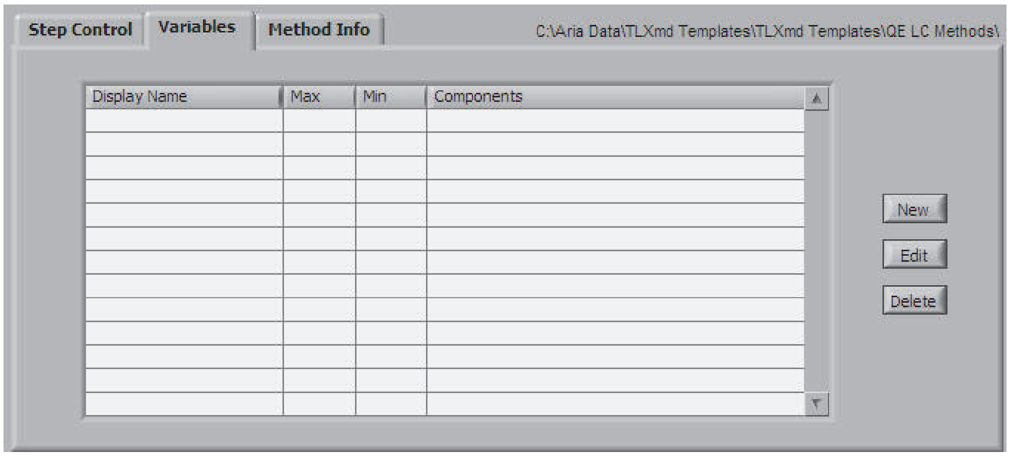
❖ To add a method variable to an LC method

1. Open the LC method where you want to add a variable.
2. In the LC Method Editor, click the **Variables** tab.

   The Variables pane appears (see Figure 95).

   Tip If the Variables pane does not appear, select the Method Variables option in the Editor Configuration dialog box. See "Changing the LC Method Editor Options" on page 170.

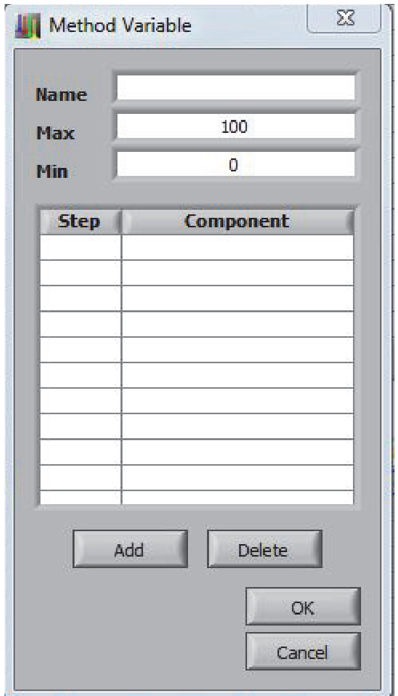
   Figure 95. Variables pane

3. Click **New**.

   The Method Variable dialog box opens (see Figure 96).

Figure 96. Method Variable dialog box



4. In the Name box, type a name that identifies the method variable.

5. In the Max box, type the maximum value for the variable. For example, to run your method with an eluting organic concentration of 20, 40, 60, and 80%, type **80**.

6. In the Min box, type the minimum value for the variable range. For example, to run your method with an eluting organic concentration of 20, 40, 60, and 80%, type **20**.

7. Click **Add**.

   A default step number and method component appear.

8. Select the step number and type the step number that you want to change. For example, to use a variable to evaluate the transfer loop contents, type **4** (for the pump filling the loop in the fourth step).

9. Click the default method component.

   A list of method components appears. Select the method component that you want to change. For example, to change the transfer loop contents, and the organic resides on the B channel for the loading pump, select **Loading B**.

10. If you want variables for additional steps, repeat step 7 through step 9. For example, to change the eluting mobile phase composition for an isocratic method, include all the relevant steps.

11. Click **OK**.

    The method variable that you entered appears in the Variables pane.

12. Choose **File > Save As** and type a name for the new LC method.

13. If you are creating an LC method to vary mobile phase composition, see “Changing Mobile Phase Composition Using Method Variables” on page 181.

Entering Values into the Sample List

Once a method variable exists for the method, create a column in the sample list and enter the method component value that you want to use for each sample. If your variables involve mobile phase composition, see “Changing Mobile Phase Composition Using Method Variables.”

Use these procedures:

- To enter values in the sample list
- To enter values in the sample list using the TraceFinder application
- To enter the method values using the Xcalibur application

❖ To enter values in the sample list

1. Create a sample list using the MS control application.

2. Create a custom column in the sample list for each method variable you created. Name the column the same name as what appears in the Method Variables dialog box.

3. See “To enter values in the sample list using the TraceFinder application” on page 179.In the sample list, enter the values that you want to use for each sample. See Figure 97.

Figure 97. Example of sample list showing the method variable column

	Sample ID	SampleName	Position	Inj Vol	Sample Type	Comment	Inst Meth	Path	File Name	LC_elution_B
1	Sample001	elution100 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			100
2	Sample002	elution100std01	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			100
3	Sample003	elution100std02	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			100
4	Sample004	elution100 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			100
5	Sample005	elution90 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			90
6	Sample006	elution90std01	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			90
7	Sample007	elution90std02	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			90
8	Sample008	elution90 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			90
9	Sample009	elution80 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			80
10	Sample010	elution80std01	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			80
11	Sample011	elution80std02	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			80
12	Sample012	elution80 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			80

❖ To enter values in the sample list using the TraceFinder application

1. From the sample list, create a custom column that has the same name as the variable. See the Direct Control window for the name of the column heaters.

2. Create a column for each column heater by doing the following:

   a. Click the **TraceFinder Configuration** icon, which appears in the upper right corner of any window in the application.

   b. From the list of options, select **Custom Columns.**

c. Select the **Enable** check box.

d. Select the first available custom column heading, and type the name of the new column. This field is case-sensitive.

e. Click **Apply**.

f. Verify that the new column appears in the sample list by creating a new batch in the Acquisition window and viewing the sample list.

❖ To enter the method values using the Xcalibur application

1. Create a sequence file in the Xcalibur data system as follows:

   a. Click the **Xcalibur** icon on your desktop.

   b. In the Xcalibur Roadmap view, click **Sequence**.

   A sequence file appears with one sample in the sample list.

   c. To add samples, right-click the sample list and choose **Insert Row**.

   d. Enter the appropriate vial position.

   e. Right-click the Path column and navigate to the location where you want to store the data.

   f. Right-click the Instrument Method column and navigate to the instrument method.

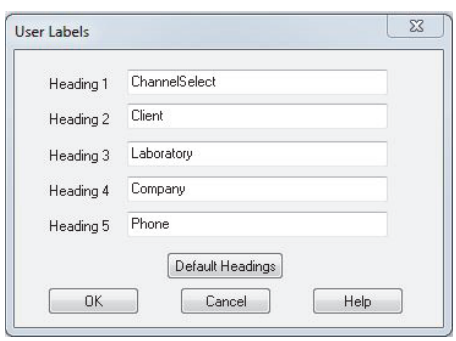
2. Add a column to the sequence file as follows:

   a. From the Xcalibur Roadmap view, click **Sequence Setup**.

   b. In the Sequence Setup window, choose **Change > User Labels**.

   The User Labels dialog box appears.

   Figure 98. User Labels dialog box

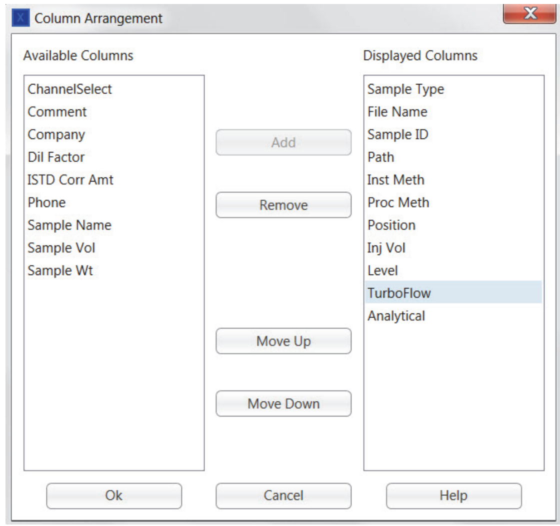
   

   c. In one of the Heading boxes, type the name of the method variable exactly as it appears in the Variables pane, and then click **OK**.

   d. Choose **Change > Column Arrangement**.

   The Column Arrangement dialog box appears. See Figure 99.

Figure 99. Column Arrangement dialog box



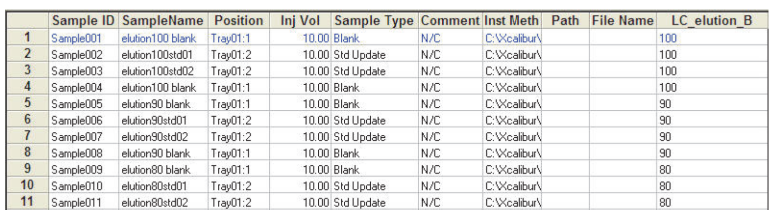
e. In the Available Columns list, select the new column and then click **Add**. The new column moves to the Displayed Columns list.

f. Click **OK**.

g. Verify that the new column appears in the sequence file.

3. From the sequence file in the new column, enter the value you want the method to use during the sample run for each sample (Figure 100).

Figure 100. Sequence file showing the column for the method variable with values entered



	Sample ID	SampleName	Position	Inj Vol	Sample Type	Comment	Inst Meth	Path	File Name	LC_elution_B
1	Sample001	elution100 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			100
2	Sample002	elution100std01	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			100
3	Sample003	elution100std02	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			100
4	Sample004	elution100 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			100
5	Sample005	elution90 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			90
6	Sample006	elution90std01	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			90
7	Sample007	elution90std02	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			90
8	Sample008	elution90 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			90
9	Sample009	elution80 blank	Tray01:1	10.00	Blank	N/C	C:\Xcalibur\			80
10	Sample010	elution80std01	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			80
11	Sample011	elution80std02	Tray01:2	10.00	Std Update	N/C	C:\Xcalibur\			80

For more information on adding columns to a sequence file, refer to your data system documentation or Help.

Changing Mobile Phase Composition Using Method Variables

If you want to vary the mobile phase composition of a pump using method variables, follow this procedure to ensure that the system uses the appropriate mobile phase composition.

❖ To change mobile phase composition using method variables

1. Open the LC Method Editor for the LC method that you want to edit. See "Accessing the LC Method Editor" on page 143.

2. Enter **100** in the % A column of the appropriate pump in all the steps for which you want to change solvent composition. Do this even if you intend to use 0% solvent from Channel A.

3. Open the Method Variable dialog box and select the pump channel that you want to change, for example, **Loading B**. Enter minimum and maximum values and a method variable name. See "Adding Method Variables to an LC Method" on page 177.

   Note If you want to vary the proportions of more than one channel (other than Channel A) for a sample, for example, Channels B and C, create a method variable for each channel that you want to vary.

4. In the sample list, create a custom column for each method variable you created. See "Entering Values into the Sample List" on page 179.

5. For each sample, enter the new percent value of the channel that you want to change.

6. If you have more than one method variable column for a sample, verify that the total value in the method variable columns does not exceed 100 for any pump.

When the method runs, the value of A automatically decreases as the value of the channel selected in the method variable increases.

Note The application changes solvent composition according to the rules described in "Aria MX Rules for Changing Mobile Phase Composition."

Aria MX Rules for Changing Mobile Phase Composition

The Aria MX application changes mobile phase composition based on the following rules. These rules apply to changes specified in the Method Variable dialog box, the LC Method Editor, and the Direct Control window.

- The total solvent percentage (A, B, C, and D) must equal 100 for each of the loading and eluting pumps.
- When you increase a solvent percentage through the Method Variable dialog box, the LC Method Editor, or the Direct Control window, the application changes the solvent percentage to the specified value and reduces the solvent A percentage by the same amount to maintain a total pump percentage of 100.
- If the application reduces solvent A to zero, and the total pump percentage is still greater than 100, the application reduces solvent B by the overage.
- When you decrease a pump channel percentage, the application decreases the solvent to the specified value and increases the percentage of solvent A by the same amount.

In the Method Variable dialog box, the application changes the solvent proportions based on the value specified in the method variable column for each sample in the sample list. For examples, see Table 55.

Table 55. Examples of mobile phase composition changes due to method variables

Example	Percentage of solvents dispensed
The LC method indicates 100% Loading A. The method variable specifies Loading C as the variable. The value in the method variable column in the Batch Editor window indicates 25.	The pumps dispense 75% Loading A and 25% Loading C.
The LC method indicates 10% Loading A and 90% Loading B. The method variable specifies Loading C as the variable. The method variable column in the Batch Editor window indicates 25.	The pumps dispense 0% Loading A, 75% Loading B, and 25% Loading C.
The LC method indicates 20% Loading A and 80% Loading C. The method variable specifies Loading C as the variable. The value in the method variable column in the Batch Editor window indicates 40.	The pumps dispense 60% Loading A and 40% Loading C.

Assigning a Pressure Profile

You can create a pressure profile from the recorded pressures of a previously run sample (or the average pressures of a group of samples) that represents a typical pressure profile for your method. The Aria MX application compares the pump pressures of the currently running method to the pressures in the stored profile. The application flags values that fall outside specified limits, or the system shuts down depending on the preferences you select.

You can use the pressure profile feature to monitor pressure changes that might indicate a system malfunction or an aging column.

Consider the following regarding effective selection and creation of a pressure profile:

- Choose a profile that accurately represents a typical run for the method and view the pressure profiles of previously run samples.
- Choose a method from a batch that was run using the same method and solvent conditions as the method to which you are assigning the profile.

- Consider normal fluctuations observed from batch to batch as well as from sample to sample, and enter limits that are not too tight or too wide.

❖ To assign a pressure profile

1. In the LC Method Editor, choose **Tools > Pressure > Add Profile**.

   A new window opens showing a list of files.

2. Navigate to the sequence file (.tslx extension) that contains the representative pressure profile of your LC method and select it.

   The Profile Select dialog box opens.

   Note Choose a batch that was run using the same method and solvent conditions as the method that you are assigning the profile to.

   The sequence files (.tslx) appear in the same path and folder in which the sample list is stored. In the TraceFinder application, this is the batch folder within the project or subproject folder.

3. Select a sample. If you want to select more than one sample, drag the cursor to select additional samples.

   When you select more than one sample, the application averages the pump pressure values.

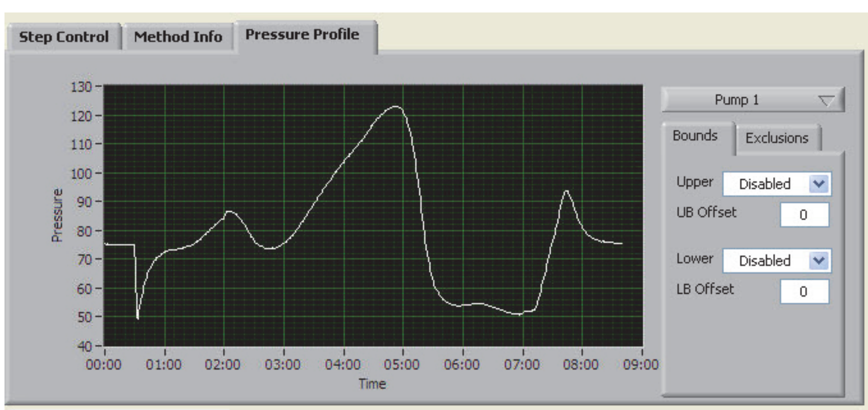
4. Click **OK**.

❖ To view the pressure profile and set limits

1. In the LC Method Editor, click the **Pressure Profile** tab.

   The graph shows the pressure profile you assigned to this method (see Figure 101).

   Figure 101. Pressure Profile pane



2. Select or edit any of the following limits.

Table 56. Pressure Profile pane limits (Sheet 1 of 2)

Limit	Description
Pump 1/Pump 2	Do one of the following: • For an LC channel with only one pump, select **Pump 1** in the pump list. • For an LC channel with a loading and an eluting pump, where you want to view or set limits for just the loading pump, select **Pump 1** in the pump list. • For an LC channel with a loading and an eluting pump, where you want to view or set limits for just the eluting pump, select **Pump 2** in the pump list. The graph shows the pressure profile for the selected pump. The options you select in this pane affect the pump you selected in the pump list.
Upper (visible if you click the Bounds tab)	Select one of the following options: • **Disabled**: Take no action when the pressure exceeds the upper limit of the profile. • **Sample Error**: Flag samples that have pressures that exceed the upper limit of this profile. • **System Error**: Flag LC systems with pressures that exceed the upper limit. The flagged LC system stops running samples and shuts down.
UB Offset (visible if you click the Bounds tab)	Type the upper boundary limit in bar. For example, if the UB Offset value is 10, values that fall beyond 10 bar higher than the profile value are considered outside the limit. Action taken depends on the option selected in the Upper list.

Table 56. Pressure Profile pane limits (Sheet 2 of 2)

Limit	Description
Lower (visible if you click the Bounds tab)	Select one of the following options: • **Disabled**: Take no action when the pressure exceeds the lower limit of this profile. • **Sample Error**: Flag samples that have pressures that exceed the lower limit of this profile. • **System Error**: Flag LC systems with pressures that exceed the lower limit. The flagged LC system stops running samples and shuts down.
LB Offset (visible if you click the Bounds tab)	Type the lower boundary limit in bar. For example, if the LB Offset value is 10, values that fall beyond 10 bar lower than the profile value are considered outside the limit. Action taken depends on the option selected in the Lower list.

3. As applicable, set the times in the method when you do not want the limits to apply. See "To exclude time segments in the method."

❖ To exclude time segments in the method

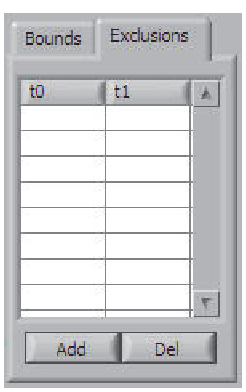
> **Tip** You can assign time segments within the method to which the profile limits do not apply. For example, you might want to exclude the moments when a valve change occurs to avoid flagging the system or sample unnecessarily.

1. In the LC Method Editor, click the **Pressure Profile** tab.

   The Pressure Profile pane appears.

2. Click the **Exclusions** tab to open the Exclusions table.

   Figure 102. Exclusions tab

3. Click **Add**.

Values appear in the T0 and T1 columns in the exclusions table, and two yellow lines appear on the left side of the graph. Do one of the following:

- Select the exclusion time segment that you want to edit. Select the value in the T0 column and type the time when you want to begin excluding. Select the value in the T1 column and type the time when you want to end the exclusion.
- Use the cursor to drag the yellow lines until they border the time in the method that you want to exclude.

4. If you want to add another exclusion time segment, repeat step 3.

❖ **To include a time segment that has been excluded (remove an exclusion)**

Select the time segment exclusion that you want to remove, and then click **Delete**.

Importing and Extracting Methods

Aria MX software can import and extract methods by various means, as follows:

- Aria OS LC methods
- LC methods from instrument methods
- Raw data files

The following topics describe how to import and extract a method from these various sources.

- Importing an Aria OS LC Method
- Importing the LC Method from an Instrument Method
- Using a Raw Data File to Extract Methods

Importing an Aria OS LC Method

You might want to import an Aria OS LC method into an instrument method when you use the development methods. When you import an Aria OS method, you import only the LC method. The MS and autosampler methods remain intact. You can also import an autosampler method. See "Importing the AS Method from an Instrument Method" on page 131.

❖ **To import an LC method**

1. Open the instrument method where you want to import the LC method.
2. In the Instrument Setup window, click **Aria MX**.
3. In LC Method Editor, choose **Edit > Import Aria Method (*.htc)**.
4. From the list of files, navigate to and select the method to import.

The LC Method information appears.

Note If the Aria OS method was developed using a different system type than your own, edit the method to accommodate your system hardware.

Importing the LC Method from an Instrument Method

You can import the LC method portion of an instrument method (.meth) into another instrument method. The AS method and MS method information do not import using this procedure. If you want to import the AS method portion of the instrument method, see "Importing the AS Method from an Instrument Method" on page 131. If you want to import the MS portion of the method, open the applicable method, save it using a different name, and then import the applicable AS and LC method information into the method.

❖ **To import the LC method information from an instrument method**

1. Open the instrument method where you want to add the LC method information.
2. Click **Aria MX**.
3. In the LC Method Editor, choose **Edit > Import from Inst Method (*.meth)**. Navigate to the instrument method with the applicable LC information to import and select the method.

   The LC method information appears in your open method.

Using a Raw Data File to Extract Methods

You can extract and save methods from raw data files (.raw extension) using the Aria MX software. This is helpful when you want to do one or both of the following:

- View or copy a method as it existed during a prior, successful acquisition.
- View or save a method that applies optimal LC method variables.

Extract and save a method from a raw data file using the Aria MX Sequence Log Viewer. View, copy, or modify the method using a method editor.

IMPORTANT Raw data files contain a copy of the instrument method used for acquisition. The hardware configuration must be the same as that used to produce the original method to view the method properly in an editor.

There are two options available for extracting a method from a raw data file.

❖ **(Option 1) To view a method from an Aria MX sequence log**

1. From the Windows taskbar, choose **Start > All Programs > Thermo Instruments > Aria MX > Sequence Log Viewer**.

2. In the Sequence Log Viewer window, choose **File > Open**.
3. Browse to locate a TSLX file of interest, and then double-click the file.

   The file opens in the Sequence Log Viewer window.
4. Right-click the relevant sample in the table and choose **View Actual Method**.
   - The tool attempts to locate the referenced raw data file and extract the method. Any LC method variables for the sample are applied automatically.
   - The extracted instrument method is saved and opened for viewing if the standard method editor can be located.
   - You are prompted to save the extracted file if the standard editor cannot be located. The default file name uses this format:

     Raw_File_Name_Original_Method_Name

IMPORTANT Take care not to accidentally overwrite existing raw data files.

❖ (Option 2) To extract a method from a specific raw data file

1. From the Windows taskbar, choose **Start > All Programs > Thermo Instruments > Aria MX > Sequence Log Viewer**.
2. Choose **Tools > Extract Method from Raw File**.

   The Select Raw File dialog box opens.
3. Browse to find the raw (.raw) data file from which to extract the method, select the file, and click **OK**.

   The Extract Method To dialog box opens.
4. Type a path for the extracted method file. The default file name uses this format:

   Raw_File_Name_Original_Method_Name

IMPORTANT Take care not to accidentally overwrite existing raw data files.

5. Type a new file name in the path, and then click **Save**.
   - The extracted instrument method is saved and opened for viewing if the standard method editor can be located.
   - If the instrument method includes LC method variables, at the prompt, click either **Yes** or **No** if you want to apply or not apply the variables.

Setting the Heater Temperature in an Instrument Method

You can set the temperature in a method for Transcend configurations that use either a MultiSLEEVE column heater or a Vanquish TCC module. For more detailed information. see Chapter 10, "Configuring Temperature Controllers."

Related Topics

- Setting the Heater Temperature in an Instrument Method (MultiSLEEVE Controller)
- Configuring the TCC Module in an Instrument Method
- Controlling the LC Column Heater Temperature (MultiSLEEVE Controller)
- Controlling the Column Heater Temperature (TCC Module)

7

Running Samples

This topics describe procedures that are required or recommended to run samples on the Transcend II, Transcend, and Aria systems.

Contents

Summary of Procedures for Running Your Samples

Table 57 summarizes the procedures that you perform each time you run samples.

Table 57. Procedures for running samples (Sheet 1 of 3)

Step	Description
Perform any necessary procedures listed in Chapter 2, "Getting Started."	To address the following questions, see Chapter 2, "Getting Started." • Do you have an instrument method? Does the instrument method contain the autosampler and LC method information? • If you want the Thermo Scientific data system to process the data, do you have a master method (if you are using TraceFinder) or a processing method (if you are using Xcalibur)? • Do you need to prime the pumps or wash stations? • Do you need to tune or calibrate the mass spectrometer? • Do you need to prepare fresh mobile phases?
Set the MS conditions.	Set the mass spectrometer conditions for your method. You can do this by opening the appropriate tune window and allowing the conditions to equilibrate. Refer to the MS documentation for information.
Prepare samples, calibrators, and controls.	Prepare samples, calibrators, and controls as appropriate for your method, or as indicated in your laboratory's standard operating procedure.
Verify that you have sufficient volume of mobile phases.	Use fresh LC/MS-grade solvents that are appropriate for your method. See "Calculating Required Solvent Volumes" on page 194. Do not add fresh mobile phase to standing mobile phase. Thermo Fisher Scientific recommends using fresh solvents daily.
Fill autosampler wash bottles with appropriate wash solutions.	Insufficient wash solutions can lead to precipitation or damage to the autosampler or system. For suggested autosampler wash solutions, see Chapter 5, "Creating an Autosampler Method."

Table 57. Procedures for running samples (Sheet 2 of 3)

Step	Description
Create a sample list using your operating software.	Refer to your operating software documentation for information on creating a sample list. The following are tips for creating a sample list to run using the Transcend system. • Before running your samples, run several replicates of an old QC or a calibrator as unknown samples on each channel using the method to ensure the column is equilibrated and to ensure the quality of the chromatography. • Schedule a matrix or solvent blank at the beginning of each batch to further ensure the column is equilibrated and the transfer loop is filled with the appropriate solvent. • To ensure proper calibration and quality control, assign calibrators, controls, and blanks to the appropriate LC channels by assigning the calibrator and QC samples to a channel. If your mass spectrometer software does not support custom channels in the sample list, create a calibration batch and assign the batch to an LC channel. See "Specifying the LC Channels on Multichannel Systems" on page 196. • If you are using an MCM, specify the appropriate port name for the column you want to use. See Chapter 9, "Using the MCM." • If the AS method indicates "Seq Injector" in the injector box of the Inject Sample, Clean Injector, Rinse Injector, or Infuse Sample step types, enter the injector you want to use in the sample list. See "Assigning the Injector (Accela Open and TriPlus)" on page 134. • If you want to assign sampling priority to a batch, see "Assigning Batch Priority" on page 196. • Assign where the data is to be stored, depending on your system's operating software. See "Workflows" on page 199 for suggested workflows based on your system software.
Precondition the LC pumps	Run the Precondition command to set the starting conditions for the sample batch.

Table 57. Procedures for running samples (Sheet 3 of 3)

Step	Description
Start the pumps and the run.	If the pumps are not already on, open the Aria MX Status window, right-click the channel you want to turn on, and choose On. Start the run using your system's operating software.
Monitor the method and system status.	Open the Aria MX Status window to view the pump pressures and method progress. See Chapter 8, "Monitoring the Pumps and Autosampler."
Review the data.	Refer to the Xcalibur documentation for information on processing data and printing reports.
Review the data and print reports.	Refer to the system's operating software documentation for information on reviewing the data and printing reports.
Shut down the LC pumps and set the MS or detector to standby.	The LC pumps shut down (stop pumping) automatically after the last sample has completed and the LC timeout time has elapsed. See "Changing the LC Timeout Value" on page 72. Set the MS or detector to standby during periods of extended inactivity. Refer to the MS or detector documentation for information.

Calculating Required Solvent Volumes

The Solvent Use feature helps you determine the amount of solvents required for both the loading and eluting pumps for the instrument method that is currently open. The solvent volumes are calculated based on the value that appears in the Total # Injections box.

Note Allow additional mobile phase volume for priming and equilibrating the pumps, and for buffering time between samples.

For more information on determining or viewing the solvent volumes required for your method, see "To calculate or view the amount of solvent used by the method" on page 165.

Starting the Run

Note Each mass spectrometer's operating software starts the run differently. Refer to your mass spectrometer documentation.

Once you select to run or submit the batch or sequence file, a dialog box appears with your run options. Make the following selections as they apply to your system software.

1. Select the check box for **Aria MX** for the Start Device.
2. Select the check boxes for **Aria MX** and the MS as systems to use in this run.
3. Select the **Start When Ready** check box.
4. If this is a priority batch or sequence, select the priority option (see "Assigning Batch Priority" on page 196).
5. Do not select any pre-run methods.
6. Ensure the Post-run System State is **On**.

Preconditioning the LC Channels

Preconditioning sets the initial LC pump starting conditions of your method and the temperature for any column heater—MultiSLEEVE or TCC module—configured in the system. You can precondition all of the LC channels in the system at one time by using the Precondition command.

Precondition the pumps at the start of each new run and when instructed to do so in a maintenance or troubleshooting procedure.

Note This feature preconditions the LC pumps to the initial conditions of a single method for all selected channels.

The Precondition command has two options:

- To Pending—Set the pumps and heaters to the starting conditions of the LC method for the pending sequence queue.
- To Method—Navigate to the instrument method that you want to use. The software updates all of the pump flow rates, compositions, and heater temperatures.

Preheat any configured column heaters once the precondition is set.

Use the All On command to start LC flow.

CAUTION Always preheat any column heaters that are in use to prevent column overpressure once flow is started.

Note To avoid the possibility of shutting off any column heaters that might be used in your method prior to running a sequence, set the LC Timeout value to 60 minutes.

❖ **To precondition all of the system LC channels**

1. Open the Direct Control window.

2. Choose **Systems > Precondition >** (either) **To Pending** (or) **To Method**.

> **Note** The To Pending option automatically loads the starting parameters for the next pending method on each channel if samples are in the sample queue.

3. (Optional) Turn on the column heaters and wait for the temperature to reach the set point.

4. Start the analysis by doing one of the following:

   - If you are using the To Pending option, start the analysis in the LCMS control application.

   - If you are using the To Method option, submit the sequence that you want to run.

Assigning Batch Priority

Depending on your system's operating software, you can assign a batch priority when you submit the batch. Refer to the software user documentation.

Also depending on your system's operating software, if you can create custom columns in the sample list, you can create a column to assign priority to the batch.

❖ **To assign sample priority**

1. Create a custom column titled "Priority" in the sample list. Note the capital "P" and lowercase letters. For information on creating custom columns, refer to your system's software documentation.

2. Type a number in the Priority column for any sample. You only need to enter a value for one sample to indicate the batch priority.

If you enter a Priority value for more than one sample, the batch is assigned the highest number entered.

Sampling priority for the batch is directly proportional to the Priority number. For example, a batch with a Priority value of 2 is sampled before a batch with a Priority value of 1.

A batch with no priority value assumes an entry of 0. For example, a batch with a Priority value of 1 is sampled before a batch with no entry.

Specifying the LC Channels on Multichannel Systems

You can specify the channels on which you want to run the samples. This is helpful for running calibrators and controls, or when you are processing different methods using multichannel LC technology.

There are a couple of different ways to specify the LC channel you want to use:

- You can specify which channels you want to run the method in the LC Method Editor. If no channels are selected in the sequence file, the channels you select in the LC Method Editor run the samples. Choose this option if you always run the method using the same LC channels.

- You can specify the LC channels in the sample list using your operating software. Entries in the sample list override entries in the Method Editor. This option requires custom columns as a feature of your system's operating software, or it must provide a column or field for entering multichannel LC processing information.

If you select more than one channel, the Aria MX software chooses one of the selected channels to run a sample or batch based on the channel's availability at the time the sample is injected, the method timing, and the options selected at the time the Aria MX software was configured.

❖ To specify the LC method

1. Open the LC Method Editor.

2. Select the check boxes of the LC channels that you want to run the method from the Channel Select area. To run the method using all channels, select the **All** check box.

   Note Any values entered in the Channel Select or Channel column in the sample list override the values you enter in the Channel Select area of the LC Method Editor.

❖ To specify the channel from the sample list

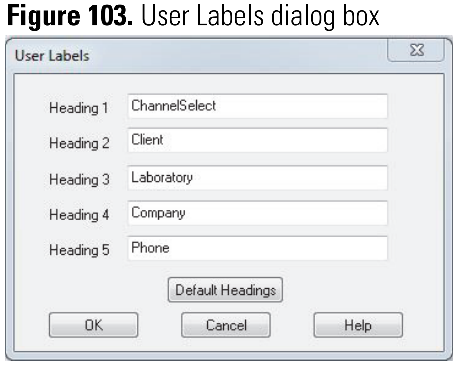
Note This procedure overrides any entries in the LC Method Editor.

1. Create a custom column named "ChannelSelect." For information on creating custom columns in the sample list, refer to your system's operating software documentation. If your system uses the Xcalibur data system, do the following:

   a. From the Xcalibur Roadmap view, click **Sequence Setup**.

   b. Choose **Change > User Labels**.

   Figure 103. User Labels dialog box

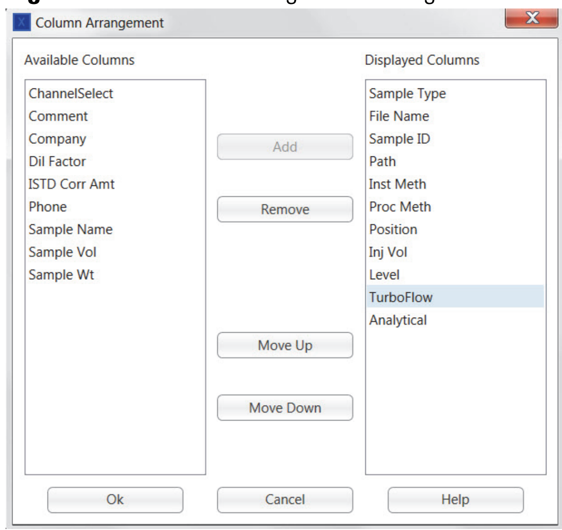
   

c. Highlight one of the Heading boxes and type **ChannelSelect**. These are case sensitive.

d. Click **OK**.

e. Choose **Change > Column Arrangement**. See Figure 104.

Figure 104. Column Arrangement dialog box



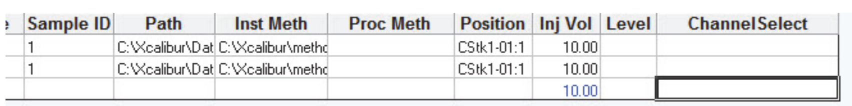
f. In the Available Columns list, select the new column and click **Add**.

The new column moves to the Displayed Columns list.

g. Click **OK**.

h. Verify that the new column appears in the sequence file.

Figure 105. Sequence file showing the ChannelSelect column



2. In the ChannelSelect column, enter the LC channel that you want to run the sample. Refer to the Xcalibur Help for more information.

   If you want to enter more than one channel, you can do so without using a separator. For example, enter 12 to specify Channels 1 and 2. The Aria MX software runs the samples using the first available channel that you enter.

Workflows

This topic describes recommended workflows for running samples using Aria MX software with various Thermo Scientific data systems.

Note The following workflows provide basic information regarding running samples using Thermo Scientific applications. This document does not provide detailed procedures for those applications. Refer to the user documentation and Help for the data system you are using.

Thermo Fisher Scientific recommends running a preview batch that contains 5 to 10 old calibrators or controls before running samples each day. Review the samples' peak shape, pressure trace, and retention time; compare the results with previous runs using the same preview samples; and note any significant changes, shifts, or trends.

For more information on the steps described in each workflow, refer to your data system's documentation.

Using the Xcalibur Data System

The following workflow for running samples with the Xcalibur data system assumes the following:

- An instrument method and processing method have been created and reside in the appropriate folders.
- Sequence file templates have been set up for running calibrators, unknown samples, and the shutdown procedure.

❖ To run a sample using an Xcalibur data system workflow

1. Import a sample list as follows:
   a. Click **Sequence Setup**.
   b. Choose **File > Select Import Sequence**. Click **Browse**, and navigate to the CSV file for running calibrators or unknown samples.
   c. If necessary, change the Path column to the location where you want to save the data.
2. Start the run as follows:
   a. Click the **Status** tab if it is not already showing.
   b. Right-click the mass spectrometer name, such as TSQ Quantum, and choose **Turn Device On**.

c. Choose **Aria MX > Direct Control > Pumps > All Pump Control**.

d. Select the appropriate pump settings, and then click **Apply** to turn the pumps on.

e. When all the status bars turn green in the Aria MX status window, click the **Start Analysis** button, which is the green triangle at the top of the window. The Run Sequence window appears.

f. In the After Sequence Set Systems area, select the **Start When Ready** option, select **On**, and then click **OK**.

g. Click the **Start Acquisition** button, which is the green triangle at the top of the window.

3. View the data as follows:

   a. From the Roadmap View, click the **Qual Browser** icon.

      The Xcalibur Qual Browser window appears.

   b. In the Open dialog box, navigate to the sequence file you want to view and click **Open**.

   c. In the sequence file, scroll through the sample list to view the data.

4. (Optional) View the LC channel used to acquire the data:

   a. From the Roadmap View, click the **Qual Browser** icon.

   b. In the Xcalibur Qual Browser window, choose **File > Open**.

   c. Navigate to the raw file that you want to view, and then click **Open**.

      The raw file opens in the default view.

   d. Choose **View > Report > Status Log**.

      The Status Log cell opens.

   e. Right-click inside the Status Log cell, and choose **Ranges**.

      The Status Log Range dialog box opens.

   f. From the Detector list, select **Status Device**, and then click **OK**.

      The channel used to acquire the data appears in the Status Log.

Note Refer to the data system software user guide or Help for detailed procedures.

Using the TraceFinder Application

The following workflow for running samples using the TraceFinder application assumes the following:

- You created appropriate Project and Subproject folders for storing data.
- You created an instrument method and saved it in the Xcalibur Methods folder.
- You created a master method that contains processing information and flagging rules.
- You created batch templates for running calibrators and unknown samples.
- Mobile phases are prepared and installed, and the mass spectrometer has been maintained and calibrated.

❖ To run a sample using a TraceFinder application workflow

1. Submit a batch as follows:
   a. From the TraceFinder dashboard, click **Acquisition**.
   b. Click **Create a New Batch**. In the Available Templates area, select the template for running primes, calibrations, or unknown samples, and then click **Next**.
   c. Verify the correct LC Channels are selected in the ChannelSelect area, and make changes if necessary.
   d. Add, import, or delete samples if necessary.
   e. Click **Next**.

      The System Status pane appears.
   f. Right-click each channel and choose **Turn Device On**. Wait for the status color to turn green for each channel.
2. Start the run:
   a. When all the status bars appear green in the Aria MX Status window, and the pumps have been on for at least one minute, click **Submit**.

      The Submit Options dialog box appears.
   b. For the Aria MX device, select the **Use** and **Start Device** check boxes. For the MS device, select the **Use** check box.
   c. Select the **Start When Ready** check box.
   d. In the Post-run System State list, select **On**.
   e. Click **OK** to start the run.

3. View the data as follows:

   a. Click **Analysis**.

   b. Choose **File** > **Open** > **Batch**, navigate to the batch file, and click **Open**.

   c. To print reports, click **Submit Batch** in the toolbar.

   d. In the Submit Options dialog box, clear the **Acquire Data** and **Process Data** check boxes, select the **Create Reports** check box, and click **OK**.

   e. To review the data, click **Data Review** and scroll through the samples.

   f. To view a chromatogram, click **Data Review** and select a sample and compound.

      The chromatogram appears in the sample-centric plot.

Note Refer to your data system user guide or Help for detailed procedures.

Applying Multichannel Technology to Different Methods

Use this workflow to apply multichannel LC technology to process four different methods on a TLX-4 or an LX-4 system at the same time, or two different methods on a TLX-2 or an LX-2 system.

❖ To use multichannel LC technology to process different methods

1. If you are using the TraceFinder application, configure it for multiplexing, which is the term that the application uses when applying multichannel LC technology. Refer to the appropriate TraceFinder user documentation.

2. Optimize the Aria MX logic setting to apply multichannel LC technology as follows:

   a. Access the Aria MX Logic Settings dialog box (see Figure 106). See "Editing Aria MX Logic Settings" on page 73.

   b. Make the Aria MX Logic Settings changes shown in Table 58. Leave all other fields unchanged.

Figure 106. Aria MX Logic Settings dialog box

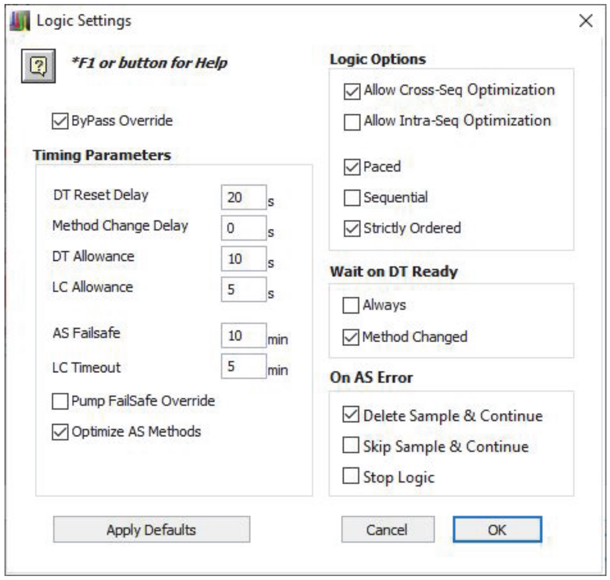


Table 58. Aria MX Logic Settings parameters

Parameter	Suggested setting
Optimize AS Methods	Select this check box.
Allow Cross-Seq Optimization	Leave this check box selected (active).
Paced	Do not select.
Strictly Ordered	Do not select.
Sequential	Do not select.
Wait on DT Ready: Always	Do not select.
Wait on DT Ready: Method Changed	Do not select.

3. In each method, enter the LC channel you want to use to run the method. Select a different channel for each method. See “Assigning Channels to the Method” on page 161, and see Figure 107.

   Figure 107. Channel Select area of the LC Method Editor window

4. Edit your batch or sequence file as follows, depending on your data system application:

   a. In the TraceFinder application, leave the Channel Selection area blank. Do not select a channel for the batch.

   b. In the TraceFinder application, edit the batch template so that the Channel column is set to **Auto** for all samples.

c. In the Xcalibur data system, do not create a Channel Select Column. If you already have a Channel Select column, leave it blank.

5. Submit the batch and run your samples.

Applying Multichannel LC Technology to the Same Methods

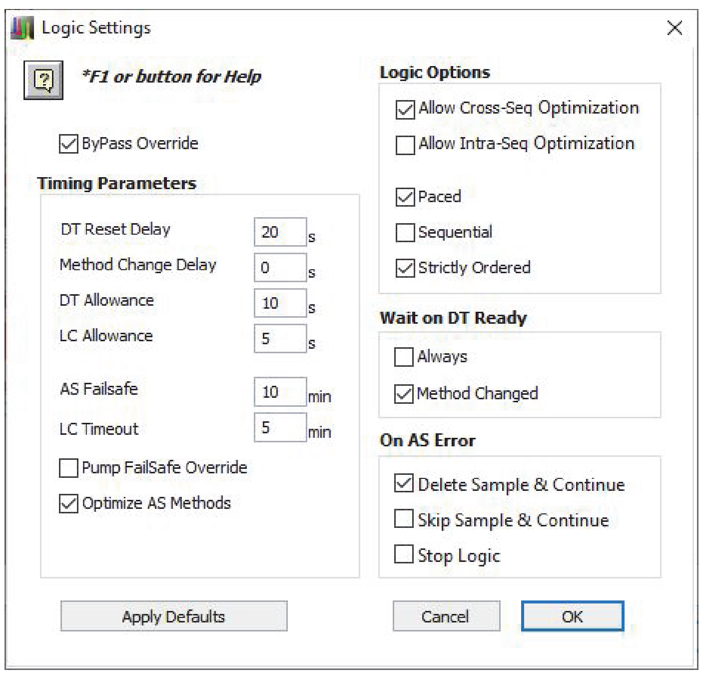
Use this workflow if you are using multichannel LC technology to process two or more of the same methods at the same time.

❖ To run a workflow for multiplexing the same methods

1. If you are running the TraceFinder application, configure it for multiplexing, which is the term that the application uses when applying multichannel LC technology, by referring to the appropriate TraceFinder user documentation.

   a. Access the Aria MX Logic Settings dialog box. See “Editing Aria MX Logic Settings” on page 73.

Figure 108. Aria MX Logic Settings dialog box



b. Make the Aria MX logic setting changes shown in Table 59. Leave all other values unchanged.

Table 59. Aria MX Logic Settings parameters

Parameter	Suggested setting
Optimize AS Methods	Select this check box.
Allow Cross-Seq Optimization	Leave this check box selected (active).
Paced	Do not select.
Strictly Ordered	Do not select.
Sequential	Do not select.
Wait on DT Ready: Always	Do not select.
Wait on DT Ready: Method Changed	Do not select.

2. For the TraceFinder application, edit your batch or batch template as described in the appropriate TraceFinder user documentation or Help.

3. For the Xcalibur data system to assign samples, edit the sequence file as described in the Xcalibur user documentation or Help.

4. If you want to schedule QC to run on all four channels, schedule each QC level on all four channels using the ChannelSelect Column in the Xcalibur Sequence Setup window. See Figure 109. Leave the ChannelSelect column blank for unknown samples.

Figure 109. Xcalibur Sequence Setup window

	Sample Type	File Name	Sample ID	Path	Inst Meth	Proc Meth	Position	Inj Vol
1	Blank	data0101	1	C:\Xcalibur\Data\			CStk1-01:1	10.00
2	Blank	data0102	2	C:\Xcalibur\Data\			CStk1-01:2	10.00
3	Blank	data0103	3	C:\Xcalibur\Data\			CStk1-01:3	10.00
4	Blank	data0104	4	C:\Xcalibur\Data\			CStk1-01:4	10.00
5	QC	data0105	5	C:\Xcalibur\Data\			CStk1-01:5	10.00
6	QC	data0106	6	C:\Xcalibur\Data\			CStk1-01:6	10.00
7	QC	data0107	7	C:\Xcalibur\Data\			CStk1-01:7	10.00
8	QC	data0108	8	C:\Xcalibur\Data\			CStk1-01:8	10.00
9	QC	data0109	9	C:\Xcalibur\Data\			CStk1-01:9	10.00
10	QC	data0110	10	C:\Xcalibur\Data\			CStk1-01:10	10.00
11	QC	data0111	11	C:\Xcalibur\Data\			CStk1-01:11	10.00
12	QC	data0112	12	C:\Xcalibur\Data\			CStk1-01:12	10.00
13	Unknown	data0113	13	C:\Xcalibur\Data\			CStk1-01:13	10.00
14	Unknown	data0114	14	C:\Xcalibur\Data\			CStk1-01:14	10.00
15	Unknown	data0115	15	C:\Xcalibur\Data\			CStk1-01:15	10.00
16	Unknown	data0116	16	C:\Xcalibur\Data\			CStk1-01:16	10.00
17	Unknown	data0117	17	C:\Xcalibur\Data\			CStk1-01:17	10.00
18	Unknown	data0118	18	C:\Xcalibur\Data\			CStk1-01:18	10.00
19	Unknown	data0119	19	C:\Xcalibur\Data\			CStk1-01:19	10.00
20	Unknown	data0120	20	C:\Xcalibur\Data\			CStk1-01:20	10.00
21	Unknown	data0121	21	C:\Xcalibur\Data\			CStk1-01:21	10.00
22	Unknown	data0122	22	C:\Xcalibur\Data\			CStk1-01:22	10.00
23	Unknown	data0123	23	C:\Xcalibur\Data\			CStk1-01:23	10.00
24	Unknown	data0124	24	C:\Xcalibur\Data\			CStk1-01:24	10.00
25	Unknown	data0125	25	C:\Xcalibur\Data\			CStk1-01:25	10.00
26	Unknown	data0126	26	C:\Xcalibur\Data\			CStk1-01:26	10.00

5. Submit the batch and run your samples.

8

Monitoring the Pumps and Autosampler

These topics describe how to check the pump and probe status, and monitor the pump pressure.

Contents

Accessing the Aria MX Status Pane

The Aria MX Status pane provides details on the autosampler, channel, and pump status of the system.

❖ **To access the Aria MX Status pane**

1. Open the system status window. Refer to your data system documentation.
2. Click **Aria MX**.

   The Aria MX Status pane appears (Figure 110).

Figure 110. Aria MX Status pane showing status bars

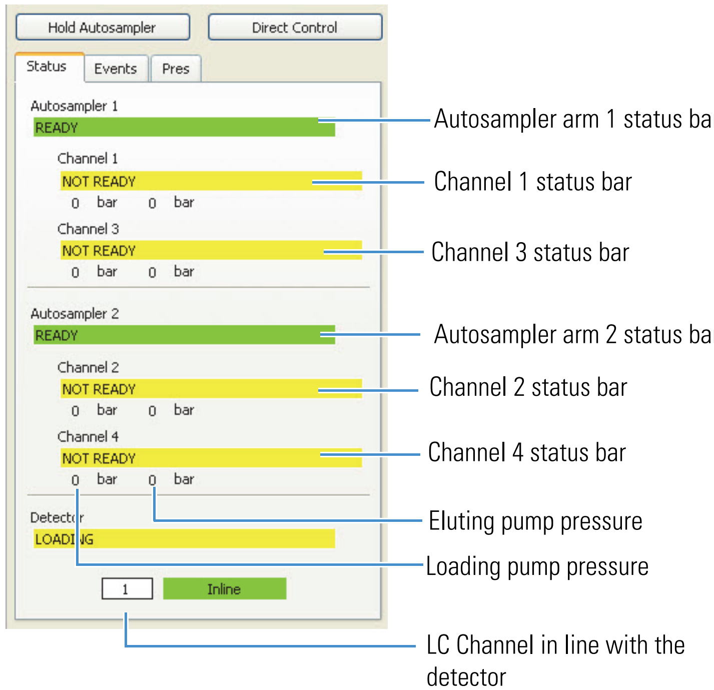


Table 60 describes the information in the Aria MX Status pane.

Table 60. Status pane information

Item	Description
Status bars for autosamplers and channels	The color of the bar indicates the pump or probe status. A status message appears in the bar to provide specific information on the pump or probe condition. For a definition of the status colors, see Table 57. Right-click a status bar to access a list of step types.
Pump pressure	This item displays the current loading and eluting pump pressure in bar.

Table 61 lists the colors corresponding to the pump's status and explains what they mean.

Table 61. Pump status messages

Color	Status	Meaning
Gray	Offline	Appears when the application cannot establish a communication link with one or more pumps. This usually indicates that the pumps are turned off.
Yellow	Not Ready	Appears when normal communication between the application and the pumps has been established, but the pumps are not ready to begin. The status changes to green when the pumps turn on.
Green	Ready	Appears when the pumps are ready to run methods.
Blue	Running	Appears when the pumps are currently running a method.
Red	Error	Appears when an error occurred during the run.

Monitoring the Pump Pressure

The following sections describe viewing the pump pressures (which are in bar by default) on the Aria MX status area, viewing the pressure trace in the Aria MX status area, viewing the pressure trace in the Direct Control window for current and previous samples, and using pressure profiles.

You can set the pump pressure units that are displayed by the Aria MX software in accordance with your laboratory's requirements.

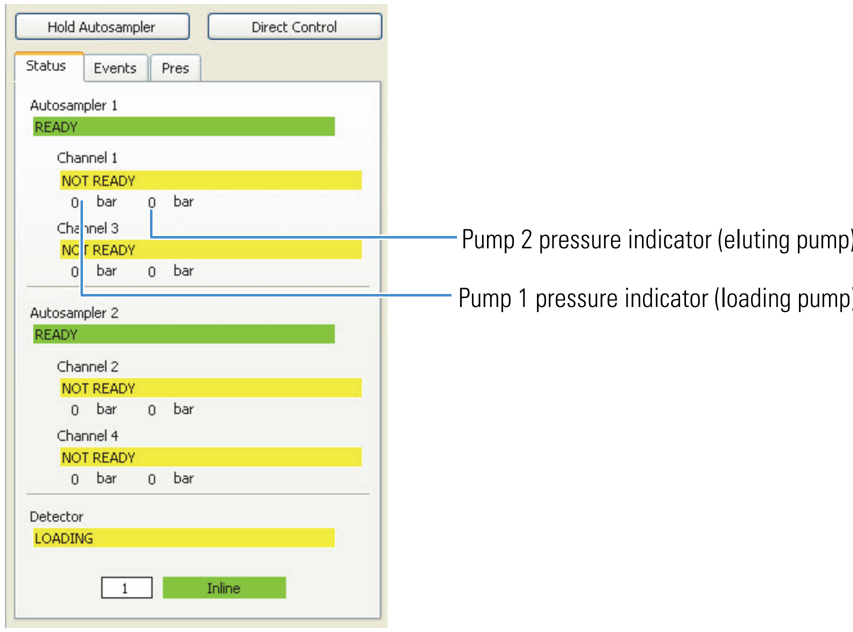
Follow these procedures:

- To view the pump backpressure in bar
- To view the pressure trace for the current sample
- To view a larger image of the pressure trace
- To change the displayed pump pressure units of measure

❖ To view the pump backpressure in bar

Open the Aria MX Status pane, where you can view the current pressure in bar, which is the default pressure unit setting, for the loading and eluting pumps (Figure 111).

Figure 111. Aria MX Status showing the pump pressure indicator



❖ To view the pressure trace for the current sample

Note

- The backpressure of the LC pumps changes throughout the method as flow rates and mobile phase compositions change, and as the valves change positions. A plot of the backpressure for the loading pump over the duration of the method appears to be similar from sample to sample if the operating conditions remain the same. Similarly, a plot of the eluting pump over the duration of the method appears similar from sample to sample.

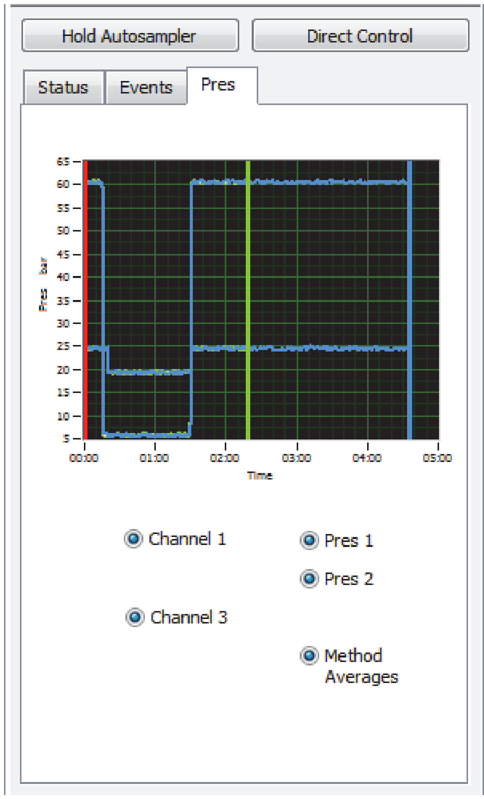
- A fluctuation or change in the pump pressure graph can indicate a change in your chromatography conditions. On the Pres page in the Aria MX status area, you can view the pressure trace for the current method.

1. Open the Aria MX status pane.

2. Click the **Pres** tab.

   The pressure trace for the currently running sample opens. See Figure 112.

Figure 112. Pressure trace in the Pres tab pane



3. Select the channel that you want to view.

4. Select the pumps that you want to view.

   The pressure trace opens for the selected pumps.

You can also view a larger image of the pressure trace, which provides more details on the sample processing, related time stamps, and additional viewing options.

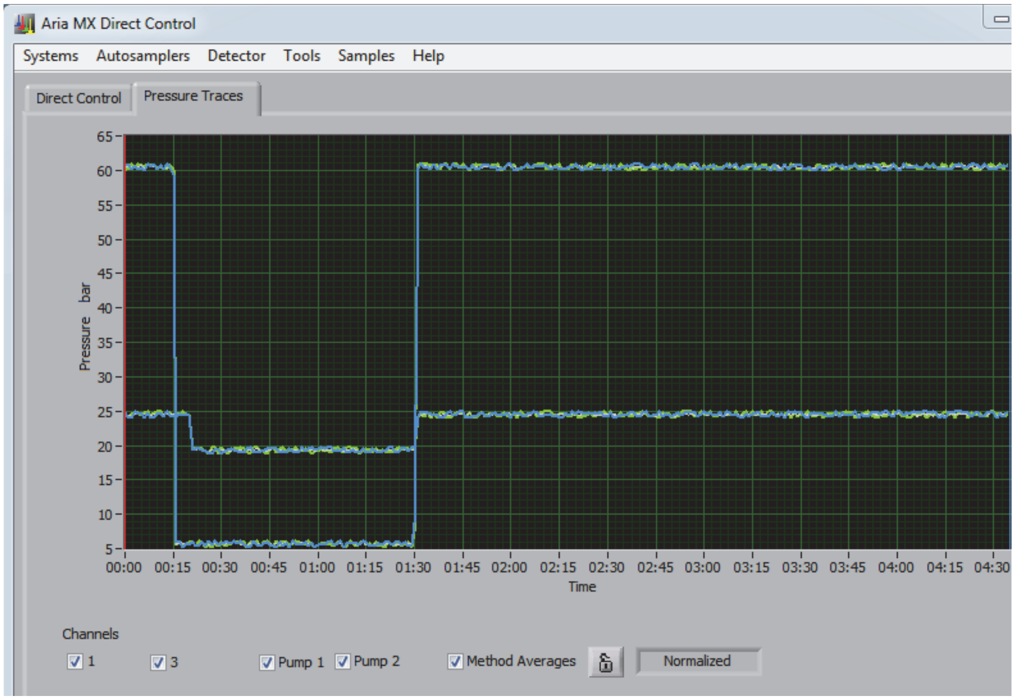
❖ To view a larger image of the pressure trace

1. Open the Direct Control window. See "Accessing the Direct Control Window" on page 38.

2. Click the **Pressure Traces** tab.

   The current pressure trace opens. See Figure 113.

Figure 113. Direct Control window, Pressure Traces tab



3. Select the channels that you want to view in the Channels area.
4. To view the pressure for the loading pump, select the **Pump 1** check box.
5. To view the pressure for the eluting pump, select the **Pump 2** check box.
6. To view an average trace of the selected channels, select the **Method Averages** check box.
7. Click **Normalized/Real Time** to switch between Normalized and Real-time views. See "Normalized Versus Real Time" on page 212.
8. Select the **Lock** icon, , if you want to access the pan and zoom features.

   The image no longer updates, and the zoom and pan icons appear. See "Using the Zoom and Pan Tools on the Pressure Trace" on page 218.

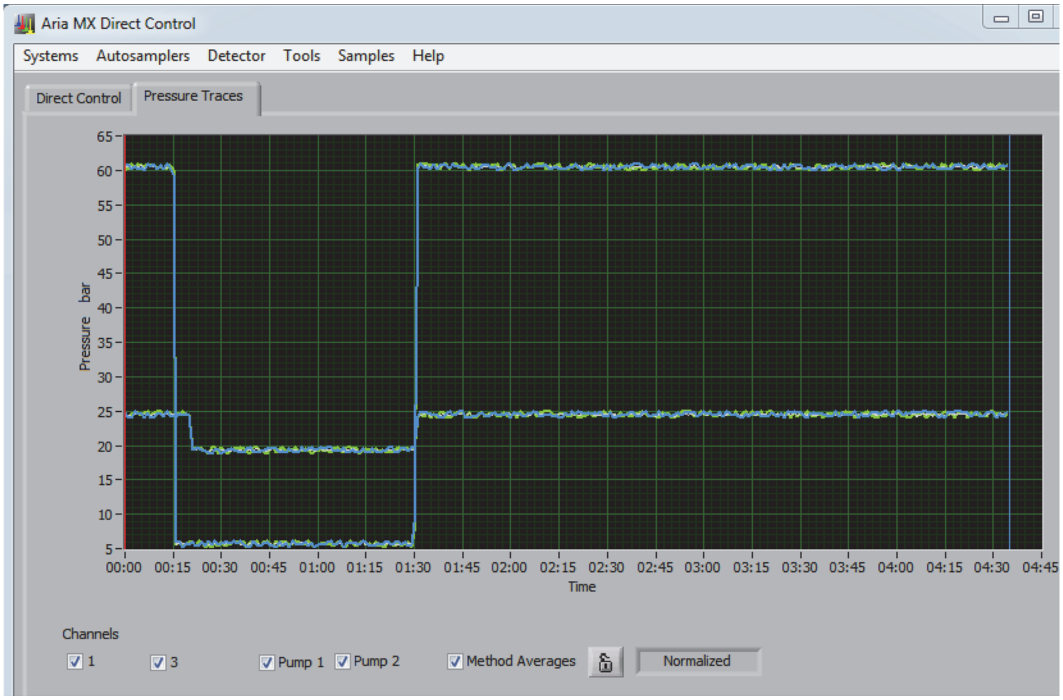
Related Topics

- Pressure Profiles
- Customizing System Pressure Readout Units

Normalized Versus Real Time

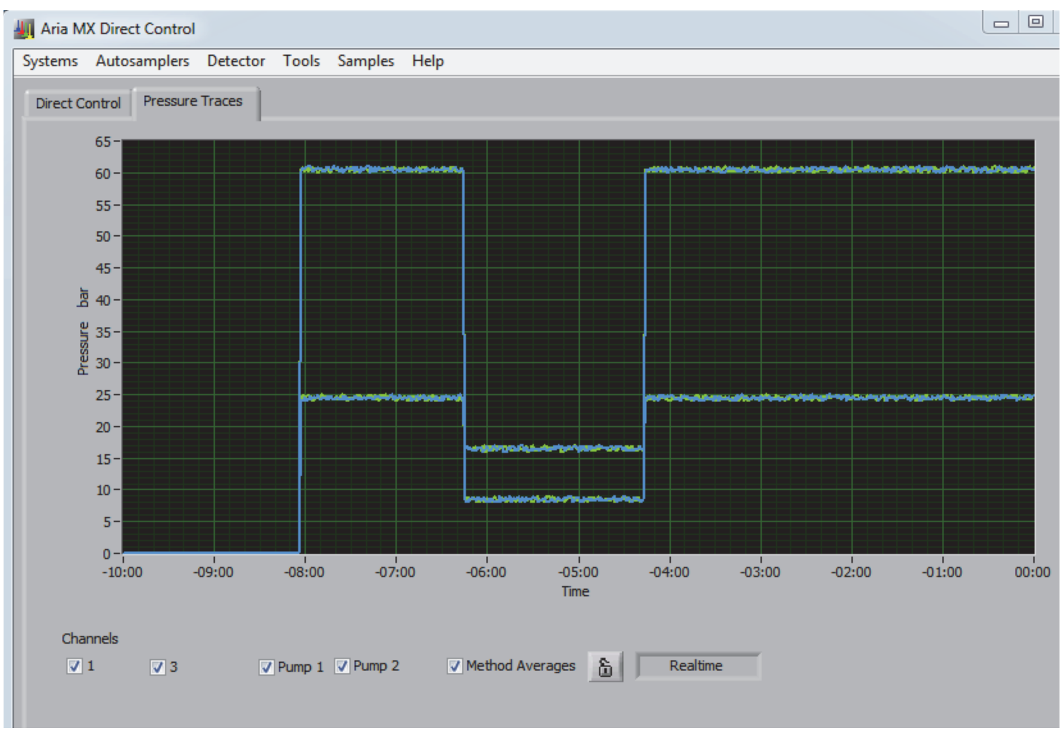
If the Normalized button appears, the graph displays the selected pump pressures with the method clock normalized to zero. Even if the methods did not run at the same time, the zero on the graph represents the start of all the displayed methods. Figure 114 shows the normalized view of the loading and eluting pumps' backpressures throughout a run.

Figure 114. Normalized view of the loading and eluting pumps' backpressures for LC system 1



If the Real Time button appears, the graph displays the selected pump pressures in the current time and up to 10 minutes of elapsed time, with 0.00 representing the current time. Figure 115 shows the real-time view of the eluting and loading pumps' backpressures for the previous minute of the run.

Figure 115. Real-time view of the loading and eluting pumps' backpressures for LC system1



❖ To use the zoom and panning tools on the pressure trace

1. Click the **Lock** icon,  .

   The icon appears locked, the display stops updating, and the zoom and panning icons appear. See Figure 116.

   Figure 116. Lock, panning, and zoom icons

2. Continue with "Using the Zoom and Pan Tools on the Pressure Trace" on page 218.

❖ To view the pressure trace for completed samples

1. Open the Direct Control window.
2. Choose **Tools > Sequence Log Viewer**.

   The Sequence Log Viewer window opens.

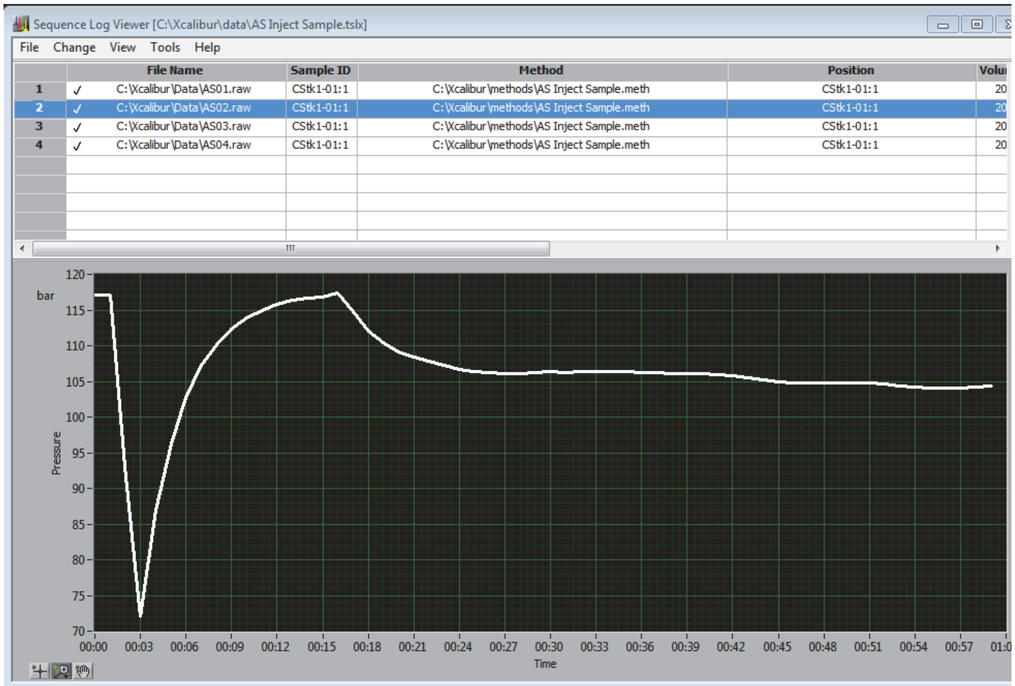
3. Choose **File > Open**, and navigate to the sequence file that you want to view.

   The sample information for the samples associated with the sequence appears in the upper portion of the window.

4. Choose **View > Pressure View**.

   The pressure graph view opens (see Figure 117).

Figure 117. Pressure graph view



5. Select a sample.

   The sample pressure trace opens.

6. To view the pressure trace of more than one sample at a time, select a sample name, hold down the CTRL key, and then select the additional samples that you want to view.

7. To use the pan or zoom features, see "Using the Zoom and Pan Tools on the Pressure Trace" on page 218.

Related Topics

- Customizing System Pressure Readout Units
- Customizing the Sequence Log Viewer Columns

Pressure Profiles

You can establish a pressure profile for each method, and use the pressure profile to automatically monitor the system for unexpected pump pressure readings. The application compares the current pump pressure and method time to that of the method's saved pressure profile. The system flags samples or stops the channel's pumps when the pump pressure falls outside assigned limits.

See "Assigning a Pressure Profile" on page 183.

Customizing System Pressure Readout Units

You can set the pump pressure units that are displayed according to your laboratory's requirements. Changes in units take effect after you close and then reopen application windows that display pressure values.

> **Note** Pump pressure unit display settings are saved and persist for each Windows user account.

You can configure the following units of pressure displayed in the Direct Control window, Sequence Log Viewer, and all pressure plot windows:

- bar (default setting)
- psi (pounds/square inch)
- kPa (kilopascal)
- MPa (Megapascal)

❖ To change the displayed pump pressure units of measure

> **Note** Changes to the pressure units take effect after closing and then reopening application windows that display pressure readings.

1. Open the Direct Control window.
2. Choose **Tools > Preferences**.

   The Preferences dialog box appears.

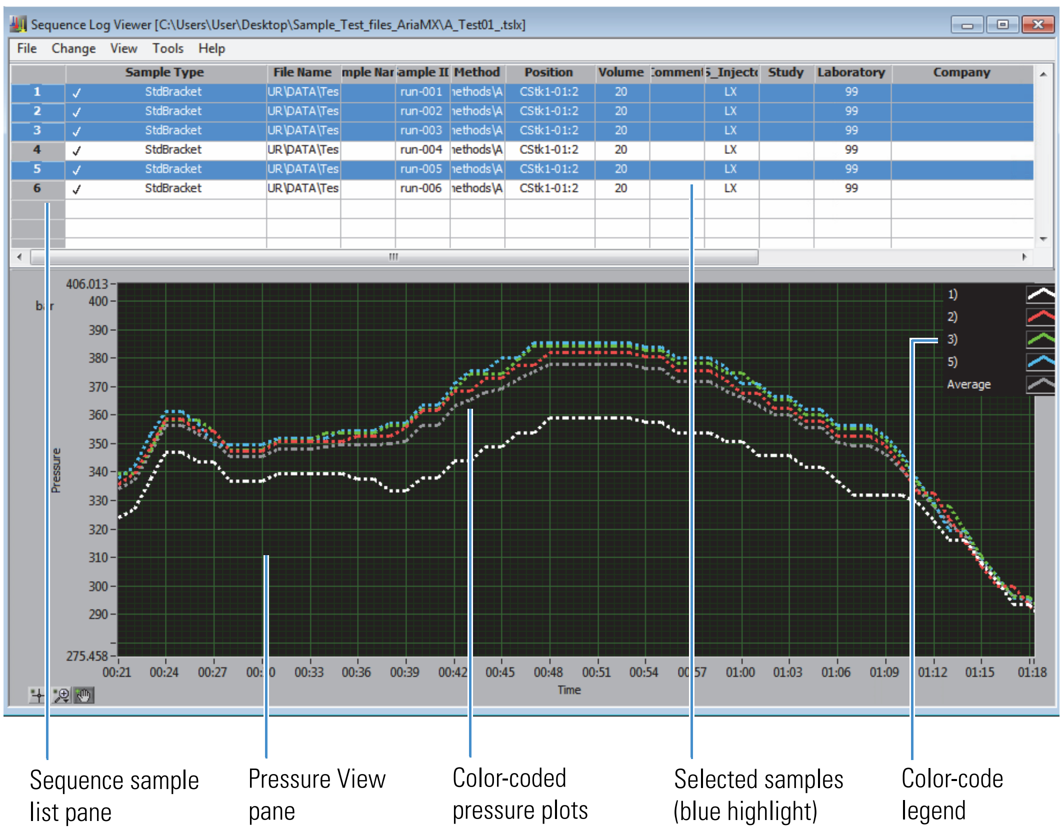
3. From the Display Pressure Units list, select a unit of measure that you want to display, and then click **OK**.
4. For your changes to take effect, close and restart all open Thermo Scientific applications that display pressure readouts.

Applying Color-coded Overlays to Pressure Plots

You can apply a color-coded overlay for the pressure plots of up to 10 sequence samples in the Sequence Log Viewer and distinguish them from one another using the color-code legend. Color-coded pressure plots help you to focus on sequence samples of interest and quickly compare them to each other. The plot colors are automatically assigned in the order selected, beginning with white (see Figure 118).

Note The colors applied to the selected sequence samples repeat if you select more than 10 samples to view.

Figure 118. Selected sample color-coding in the Sequence Log Viewer



General attributes of the color-coding feature are as follows:

- The Pressure View pane displays individual pressure plots and their associated colors (see Figure 118).
- The color-code legend appears in the upper right corner of the Pressure View pane and displays the corresponding sample name or sample number. Right-click inside the Pressure View pane to change between the use of Sample ID or Sample Name in the legend.

- The color-code legend is on by default. Turn this feature off by right-clicking inside the Pressure View pane and then clearing the check mark next to the legend.

> **Tip** Right-click the Pressure View pane to see additional options for display of the color-code legend and for exporting.

- The gray plot line represents the average plot from all of the selected sequence samples.

❖ To select specific sequence samples to view with the color-coded legend

1. Open the Direct Control window.
2. Choose **Tools > Sequence Log Viewer**.

   The Sequence Log Viewer opens.
3. Choose **File > Open**.
4. Navigate to the TSLX file that you want to review, and then click **Open**.

   The TSLX file opens and displays the sequence log data (top) pane.
5. Choose **View > Pressure View**.

   The pressure plot pane is displayed below the sequence log data pane.
6. From the sequence log pane, select the sequence samples that you want to color code.

   Each sequence sample selected is assigned a unique color for its pressure plot.

Using the Zoom and Pan Tools on the Pressure Trace

You can adjust the views on a pressure trace by using the zoom and pan tools.

❖ To use the zoom and pan tools

1. Do one of the following:
   - If you are viewing the pressure trace in the Direct Control window, click the **Lock** icon, . The icon appears locked, the display stops updating, and the zoom and panning icons appear. Continue with step 2.
   - If you are viewing the pressure trace in the sequence file viewer, continue with step 2. See Figure 116.
2. To zoom the pressure trace, do the following:

   a. Click the **Zoom** icon, .

   b. Select the appropriate tool and complete the procedure as described in Table 62.

Table 62. Zoom tools (Sheet 1 of 2)

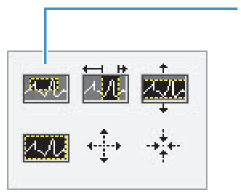
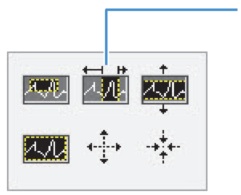
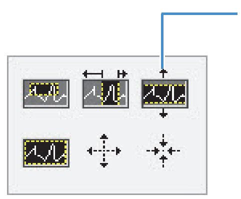
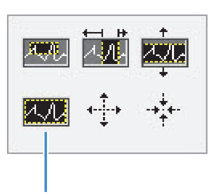
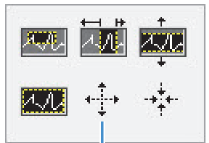
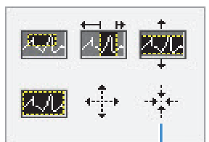
Tool	Procedure
	If you want to change the *x*- and *y*-axis scales, do the following: 1. Select the area on the graph that shows the lower end of the *x*- and *y*-axes that you want to view and hold down the mouse button. 2. Drag the cursor to the higher end of the *x* and *y* axes that you want to view, and release the mouse button. The highlighted area appears on the graph.
	If you want to change the *x*-axis scale to enlarge the data, do the following: 1. Click the lower end of the range that you want to view and hold down the mouse button. 2. Drag the cursor to the higher end of the range that you want to view and release the mouse button. The scale changes to reflect the highlighted range.
	If you want to change the *y*-axis scale to enlarge the data, do the following: 1. Click the lower end of the range that you want to view, and hold down the mouse button. 2. Drag the cursor to the higher end of the range that you want to view, and release the mouse button. The scale changes to reflect the highlighted range.
	If you want to adjust the *x* and *y* axes to fit the data into the window, select this tool.

Table 62. Zoom tools (Sheet 2 of 2)

Tool	Procedure
	To zoom in on an area of the data, do the following: 1. Click the point on the graph where you want to position the center of your graph and hold down the mouse button. The data enlarges around the point you clicked. 2. Release the mouse button when the data appears the size that you want.
	To zoom out on an area of the data, select this tool: 1. Click the point on the graph where you want to position the center of your graph and hold down the mouse button. The data decreases in size around the point you clicked. 2. Release the mouse button when the data appears the size that you want.

3. To view an area of the pressure trace that falls outside the viewing area, do the following:
   a. Click the pan icon,  .
   b. Hold down the left mouse button in the pressure trace and drag the cursor up or down.
4. To return to the standard cursor, click the standard cursor icon,  .

Assigning and Using Pressure Profiles to Monitor the Pressure

You can establish a pressure profile for each method and use the pressure profile to automatically monitor the system for unexpected pump pressure readings. The software compares the current pump pressure and method time to that of the method's saved pressure profile. The system flags samples or shuts down systems when the pump pressure falls outside assigned limits. See "Assigning a Pressure Profile" on page 183.

Viewing the MultiSLEEVE Column Heater Status

If your system uses column heaters, you can review the status of the heaters from the Aria MX Direct Control window by using the following procedure.

❖ To view the heater status

1. Open the Direct Control window.
2. In the middle pane, select the heater to assign a temperature to.

   Figure 119 shows the Direct Control window displaying temperature options, and Table 63 describes these options.

Figure 119. Temperature options in the Direct Control window

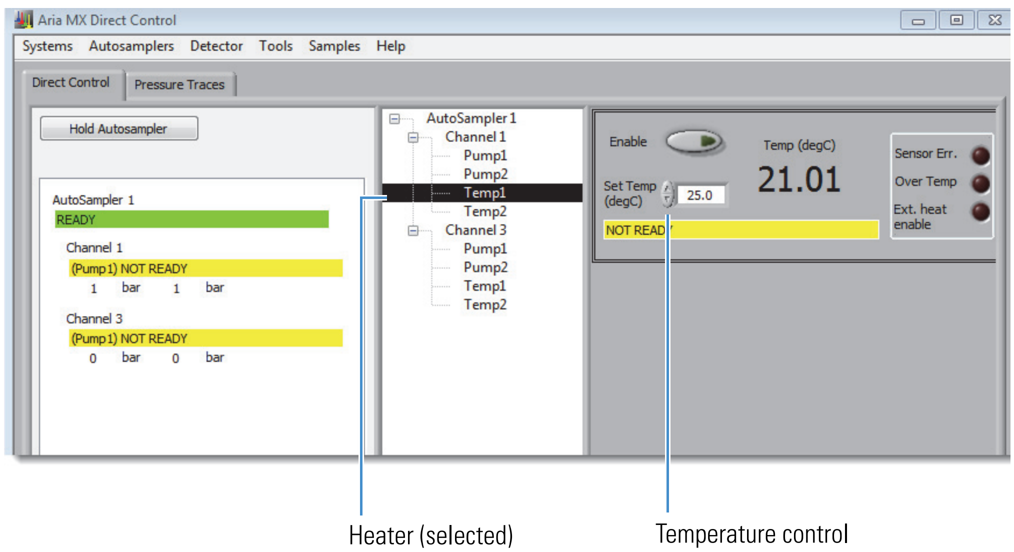


Table 63. Temperature options (Sheet 1 of 2)

Option	Description
Enable	When the heater is on, the Enable button appears light green. When the heater is off, the Enable button appears dark green.
Set Temp	The assigned temperature in Celsius.
Temp (degrees Celsius)	The actual temperature reading in Celsius as indicated by the heater feedback.
Sensor Err.	A bright red button indicates communication from the heater to the controller has failed. Call Technical Support. See “Contacting Us” on page xv. A dark button indicates no sensor error state was detected by the controller.

Table 63. Temperature options (Sheet 2 of 2)

Option	Description
Over Temp	A bright red button indicates an error condition. Call Technical Support. See "Contacting Us" on page xv. A dark button indicates no error state has been detected.
Ext. heat enabled	A bright red button indicates that the heater can be turned on or off by using the controller, which is not the preferred condition. Call Technical Support. See "Contacting Us" on page xv. A dark button indicates that the heater can be turned on or off only in the Aria MX Direct Control window (preferred).
Ext. Heat Enable	When the button is red, verify that the contact terminal strip is connected to the back of the controller.
Status bar	If the heater temperature falls within the tolerance range set during configuration, the status bar appears green. If the heater temperature falls outside the tolerance range, the status bar appears yellow.

Note The heater readout appears below its associated system channel as Temp 1, Temp 2, Temp 3, or Temp 4, depending on how many heaters reside on the channel.

Viewing the TCC Module Heater Status

View the status of the TCC module in a Transcend Duo LX-2 configuration from the Aria MX Direct Control window as follows.

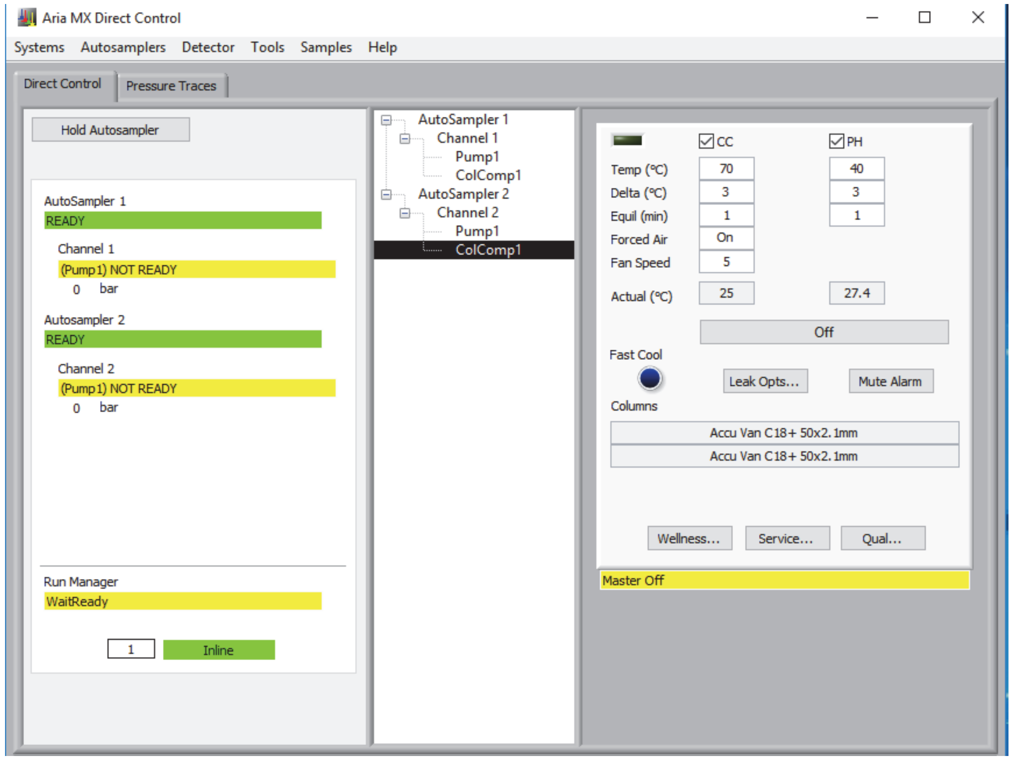
❖ **To view the TCC module heater status from Aria MX Direct Control**

1. Open the Direct Control window.
2. In the middle pane, select the TCC module from any channel.

   The TCC module controls and heater information appear in the right pane.

3. Review the TCC module information. You can also change the heater settings, or turn the heater on or off, by using the TCC module controls in the right pane.

Figure 120. TCC module controls with system default (“ColComp1”) reference selected



Related Topics

- Controlling the TCC Module from the Aria MX Direct Control Window
- Configuring the Vanquish TCC Module
- Configuring the TCC Module in an Instrument Method

UltiMate and Vanquish Seal Wash Systems

The Thermo Scientific Vanquish and UltiMate pump piston seal wash systems keep the pistons wet and rinse the piston seals automatically. This process helps to prevent unwanted crystallization and particle deposits from forming on the piston surfaces and seals.

In the Vanquish Dual Split Sampler autosampler equipped with Vanquish Horizon Pumps, the flow path of the seal wash system passes through both metering device heads in the autosampler and the pump heads in the pumps.

Thermo Fisher Scientific recommends that you always use a seal wash, which is turned on by default. You can also set this feature to “standby” (UltiMate pumps) or “disabled” (Vanquish pumps and Vanquish AS).

Note Refer to the UltiMate pump, Vanquish pump, and the Vanquish AS operating manuals located on the Aria MX DVD for more detailed information regarding the seal wash systems.

Seal Wash Pump Standby (Power Save Mode) for UltiMate Pumps

You can configure Thermo Scientific UltiMate pumps to go into standby mode when they are not actively running LC samples. Doing so has the added benefit of turning off the rear seal wash system, which helps to reduce wash solvent consumption and save power.

When placed in standby mode, the pumps, including the LED control screens, turn off. You can turn the pumps back on using the Aria MX software.

Set up the standby feature using the Thermo Foundation Instrument Configuration window.

Configuring Seal Wash Standby

Use the Foundation Instrument Configuration window to configure the rear seal wash standby mode for UltiMate pumps.

Note You must close all other Thermo Scientific data system applications before performing the following procedure.

❖ To set the rear seal wash standby mode

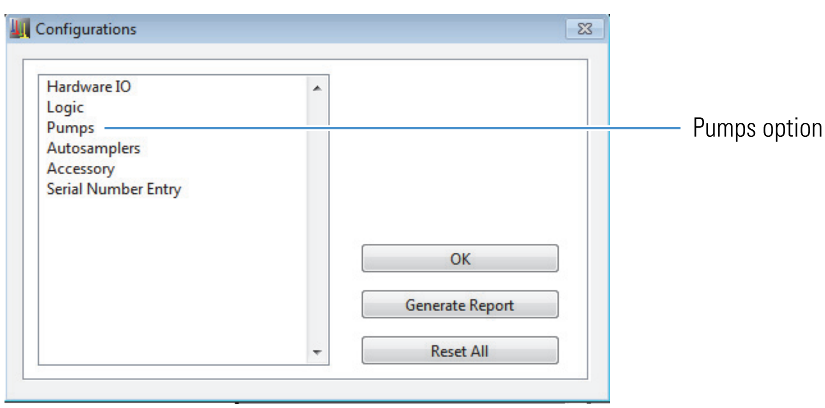
1. Choose **Start > All Programs > Thermo Foundation *x.x* > Instrument Configuration**.

   The Instrument Configuration window opens.

2. From the Configured Devices pane, select **Aria MX**, and then click **Configure**.

   The Configurations dialog box opens.

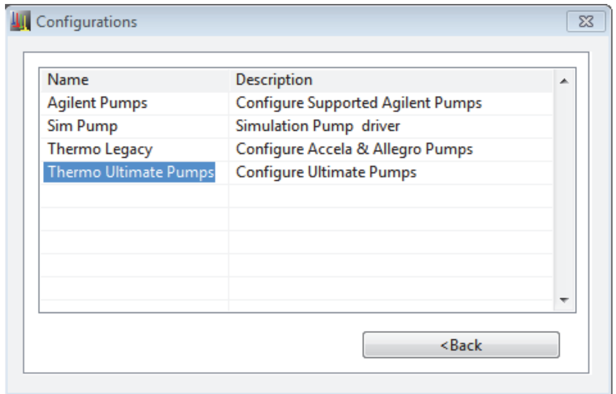
   Figure 121. Configurations dialog box, Pumps option

3. Click **Pumps**.

The (pumps) Configurations dialog box appears (see Figure 122).

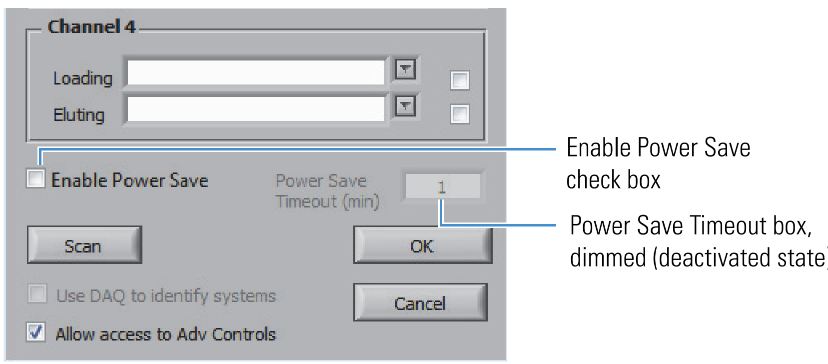
Figure 122. Configurations dialog box, Thermo Ultimate Pumps option (selected)



4. Click **Thermo Ultimate Pumps**.

   The Ultimate Pump configuration dialog box appears (Figure 123).

   Figure 123. Bottom area of the Ultimate Pump configuration dialog box



5. Select the **Enable Power Save** check box.

   The Power Save Timeout (min) box is activated.

6. Type the number of minutes that you want to set as the timeout time in the Power Save Timeout box, and then click **OK**.

Note The Power Save Timeout timer starts after the LC timeout setting has been reached.

Seal Wash Standby Options

The Power Save configuration parameters for the UltiMate pumps are set in the Ultimate Pump Configuration dialog box using the Thermo Foundation Instrument Configuration window.

The Power Save Timeout feature has the following configuration options (see Table 64).

Table 64. Power Save configuration options

Item	State	Description
Enable Power Save check box	Check box clear	(Default) The Power Save feature is off.
	Check box selected	The Power Save feature is on.
Power Save Timeout (min) box	Dimmed	(Default) This option is unavailable because the Power Save feature is off.
	Available	This option is active. Type a positive integer (1, 2, 3, and so on) to indicate the number of minutes that the UltiMate LC pumps are inactive before the pumps are put into Power Save (standby) mode.

Configuring Seal Wash for Vanquish Pumps

Use the Foundation Instrument Configuration window to configure the rear seal wash for Vanquish pumps. This feature is on by default.

Note

- You must first close all other Thermo Scientific data system applications.
- On Transcend Duo LX-2 configurations that use Vanquish Horizon pumps the seal wash system also flows solution through the metering device heads on the AS.

❖ To enable or disable the rear seal wash

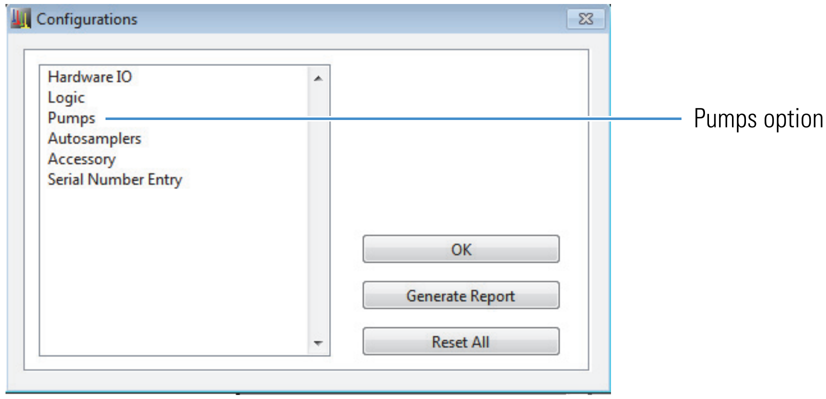
1. Close all Thermo Scientific applications.
2. From the Start menu, choose **All Programs > Thermo Foundation *x.x* > Instrument Configuration**.

   The Thermo Foundation Instrument Configuration dialog box opens.
3. On the right side of the dialog box, select the **Aria MX** icon and click **Configure**.

   The Configurations dialog box appears.
4. From the Configured Devices pane, select **Aria MX**, and then click **Configure**.

   The Configurations dialog box opens.

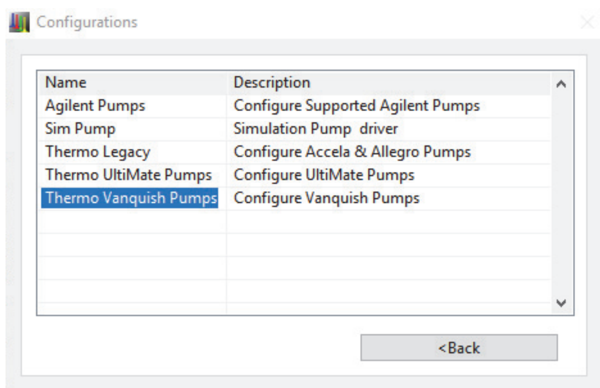
Figure 124. Configurations dialog box, Pumps option



5. Click **Pumps**.

   The (pumps) Configurations dialog box appears (Figure 125).

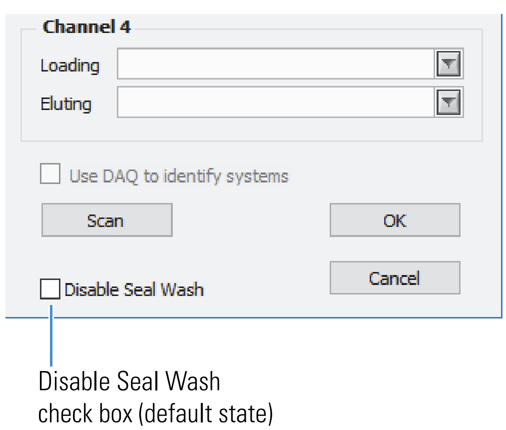
Figure 125. Configurations dialog box, Thermo Vanquish Pumps option (selected)



6. Click **Thermo Vanquish Pumps**.

   The Vanquish Pump configuration dialog box appears (Figure 126).

Figure 126. Bottom area of the Vanquish Pump configuration dialog box



7. Clear the **Disable Seal Wash** check box (if selected).

The Vanquish seal wash is enabled.

Note The piston seals will not be rinsed until this setting is changed.

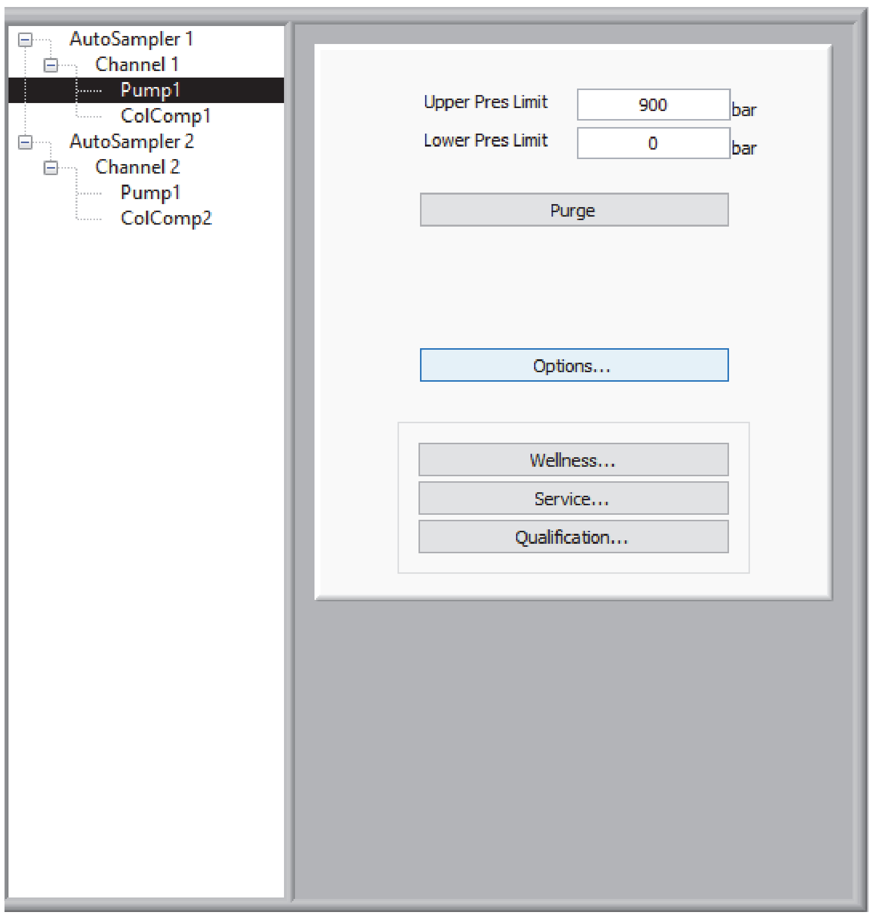
You can disable the drop counter (seal wash detector) functionality by turning off the rear seal wash monitoring from the Pump Options dialog box, Rear Seal Wash area. Disabling drop detection does not turn off the seal wash system; however, seal wash system messages or alerts will not appear (for example, if the system runs out of wash solvent).

❖ To monitor the seal wash

1. From Aria MX Direct Control, click the pump that you want to change.

   The pump controls and advanced pump features appear in the right pane of the Aria MX Direct Control.

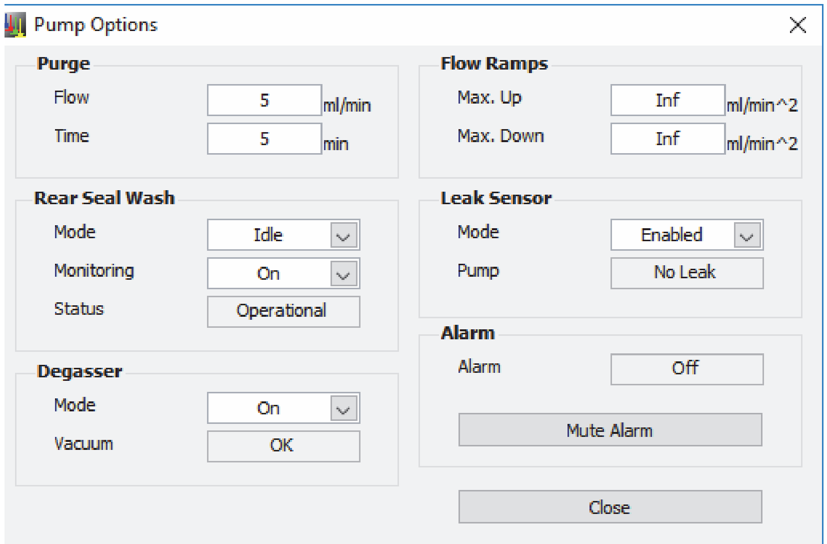
   Figure 127. Aria MX Direct Control, right pane options (Horizon pump example)

2. Click **Options**.

   The Pump Options dialog box opens.

Figure 128. Pump options dialog box



3. In the Rear Seal Wash area, click the Monitoring list and select **On**.
4. Click **Close** to save your changes.

   Repeat this procedure for the other pump, as needed.

You can also manually start—or stop—the seal wash operation when necessary.

❖ To manually start (or stop) the pump seal wash

1. Follow steps 1–2 in the above procedure, To monitor the seal wash, and then do one of the following for the Mode option of the Rear Seal Wash area (see Figure 128):
   - If the Mode option displays Idle, select **Active** from the list to start a wash cycle.
   - If the Mode option displays Active, select **Idle** from the list to stop the in-progress wash cycle.
2. Click **Close** to save your changes.

   Repeat this procedure for the other pump, as needed.

About Aria MX Event Logs

The software logs all system events that occur during a session and are stored in a file named Aria.log, which is located in the following path on a Windows system:

C:\ProgramData\Thermo\Aria MX

Some key aspects about the event logs are as follows:

- All session events are appended to the Aria.log file and are viewable using the Event Log Viewer.
- The most recent session events are displayed in the event pane located in the bottom of the Direct Control window.

You can use the Sequence Log Viewer to review past events by sample and to examine sample pressure traces.

Viewing the Event Log

The Event Log displays the most recent events that occurred on the system. The application continuously updates the event log and logs any significant event. Examples of events that might appear in the Event Log follow:

- Adding a batch for analysis
- Running a specific sample in a particular batch
- Current system triggering for a specific sample
- Assigned probe for sample pickup
- Assigned valve for sample injection
- Arrival of sample at a particular channel for analysis

Follow these procedures:

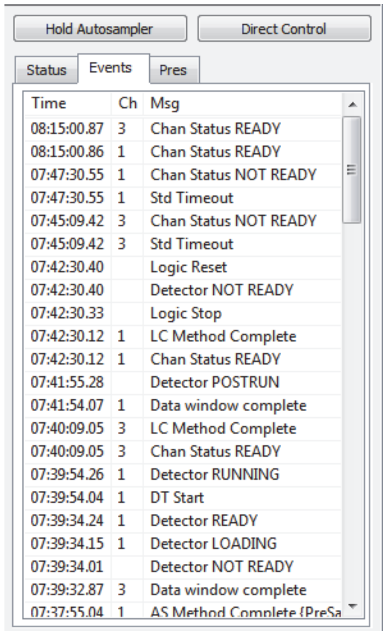
- To view the Aria MX event log
- To view past events
- To view past events by sample

❖ To view the Aria MX event log

1. Open the Aria MX status area.
2. Click the **Events** tab.

   The Event Log page appears.

Figure 129. Event Log page



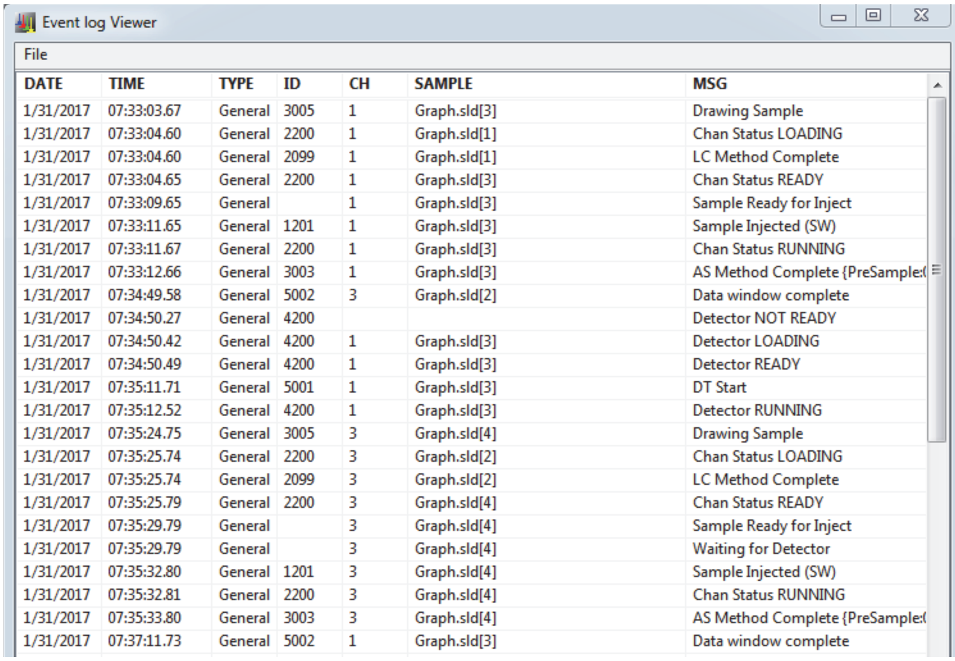
3. To view information on a specific event, point to the event and wait one second.

❖ To view past events

1. Open the Direct Control window.
2. Choose **Tools > Event Log Viewer.**

   The Event Log Viewer opens showing the current event log. See Figure 130.

Figure 130. Event Log Viewer window



DATE	TIME	TYPE	ID	CH	SAMPLE	MSG
1/31/2017	07:33:03.67	General	3005	1	Graph.sld[3]	Drawing Sample
1/31/2017	07:33:04.60	General	2200	1	Graph.sld[1]	Chan Status LOADING
1/31/2017	07:33:04.60	General	2099	1	Graph.sld[1]	LC Method Complete
1/31/2017	07:33:04.65	General	2200	1	Graph.sld[3]	Chan Status READY
1/31/2017	07:33:09.65	General		1	Graph.sld[3]	Sample Ready for Inject
1/31/2017	07:33:11.65	General	1201	1	Graph.sld[3]	Sample Injected (SW)
1/31/2017	07:33:11.67	General	2200	1	Graph.sld[3]	Chan Status RUNNING
1/31/2017	07:33:12.66	General	3003	1	Graph.sld[3]	AS Method Complete {PreSample:(
1/31/2017	07:34:49.58	General	5002	3	Graph.sld[2]	Data window complete
1/31/2017	07:34:50.27	General	4200			Detector NOT READY
1/31/2017	07:34:50.42	General	4200	1	Graph.sld[3]	Detector LOADING
1/31/2017	07:34:50.49	General	4200	1	Graph.sld[3]	Detector READY
1/31/2017	07:35:11.71	General	5001	1	Graph.sld[3]	DT Start
1/31/2017	07:35:12.52	General	4200	1	Graph.sld[3]	Detector RUNNING
1/31/2017	07:35:24.75	General	3005	3	Graph.sld[4]	Drawing Sample
1/31/2017	07:35:25.74	General	2200	3	Graph.sld[2]	Chan Status LOADING
1/31/2017	07:35:25.74	General	2099	3	Graph.sld[2]	LC Method Complete
1/31/2017	07:35:25.79	General	2200	3	Graph.sld[4]	Chan Status READY
1/31/2017	07:35:29.79	General		3	Graph.sld[4]	Sample Ready for Inject
1/31/2017	07:35:29.79	General		3	Graph.sld[4]	Waiting for Detector
1/31/2017	07:35:32.80	General	1201	3	Graph.sld[4]	Sample Injected (SW)
1/31/2017	07:35:32.81	General	2200	3	Graph.sld[4]	Chan Status RUNNING
1/31/2017	07:35:33.80	General	3003	3	Graph.sld[4]	AS Method Complete {PreSample:(
1/31/2017	07:37:11.73	General	5002	1	Graph.sld[3]	Data window complete

The Event Log Viewer window displays the current and past recorded LC, autosampler, user, and MS events that occurred during operation.

3. To open previously stored event log data, open the Aria.old.log file as follows:

   a. Choose **File > Browse** and navigate to this directory:

      C:\ProgramData\Thermo\Aria MX

   b. Locate and select **Aria.old.log**.

   c. Click **Open**.

See About Aria MX Event Logs for more information on the Aria MX log files.

❖ To view past events by sample

1. Open the Direct Control window.
2. Choose **Tools > Sequence Log Viewer**.

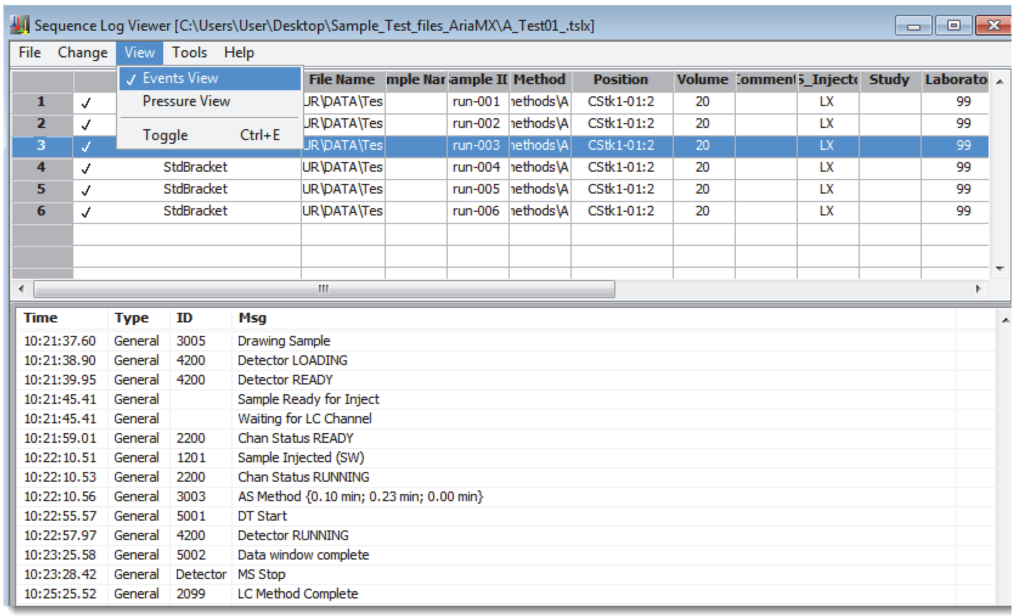
   The Sequence Log Viewer window appears.

3. Choose **File > Open**, and navigate to the sequence file that contains the sample that you want to view.

   The sample information for the samples associated with the sequence appears in the upper portion of the window.

4. Choose **View > Events View**.

   The sample events appear.



Using the Sequence Log Viewer

You can view details regarding logged sample acquisition events—including pressure traces—using the Sequence Log Viewer.

Sequence log files have a .tslx file name extension.

❖ To view a sequence log file

From Windows Explorer, navigate to the TSLX file that you want to view and double-click it.

The sequence log opens in the Sequence Log Viewer.

> **Tip** You can also open TSLX files directly from the Sequence Log Viewer, which displays recently created and viewed log files.

Customizing the Sequence Log Viewer Columns

You can customize the columns that are displayed in the Sequence Log Viewer. This feature is useful when, for example, you want to display sequence data captured in the sequence log in a specific order that is important for your lab's sample processing and reviewing needs.

❖ To rearrange columns in the Sequence Log Viewer

1. Do one of the following:

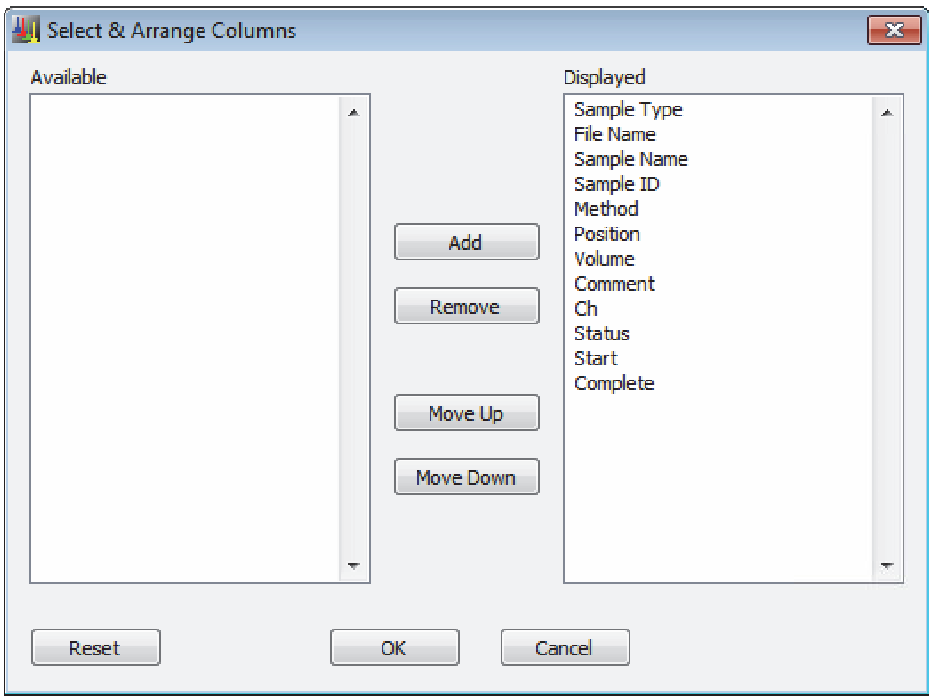
   - From the Direct Control window, choose **Tools > Sequence Log Viewer**.
   - From the Windows Start menu, choose **Start > All Apps > > Sequence Log Viewer**.

   The Sequence Log Viewer opens.

2. Choose **Change > Column Arrangement**.

   The Select & Arrange Columns dialog box appears.

   Figure 131. Select & Arrange Columns dialog box, default setting



3. Use the Add/Remove and Move Up/Move Down buttons to customize the column view according to your lab's requirements.

4. Click **OK**.

Tip Click **Reset** to return to the default column arrangement setting as shown in Figure 131.

Aria Log File Size Limits

The events log file, **Aria.log**, records all software events. The default file location follows this path on a Windows system:

C:\ProgramData\Thermo\Aria MX

The log files have the following size limits and behavior:

- The Aria.log file records a maximum limit of 10 MB of event log data.
- When the size limit of 10 MB is reached, the events data are written to a file named **Aria.old.log**, and Aria.log is reset to 0 MB.

Note Thermo Fisher Scientific recommends that you make regular, iterative backups of the log files according to your IT organization's backup protocols if long-term storage of event log data is required.

9

Using the MCM

These topics describe the multiple column module (MCM) for evaluating up to 12 TurboFlow or HPLC columns in one overnight run. This saves you time when evaluating TurboFlow or analytical columns using various mobile phases.

Contents

MCM Overview

The MCM uses two valve sets to accommodate up to 12 TurboFlow or HPLC columns. You can install up to 6 TurboFlow columns and 6 analytical columns, or up to 11 of either all TurboFlow columns or all analytical columns. The MCM simplifies the selection of appropriate TurboFlow and analytical columns for your method.

You can install one MCM on each LC channel, which allows you to install up to four MCM modules on one Transcend system.

Table 65 describes the available MCM models and lists their part numbers.

Table 65. MCM types and part numbers

MCM model (P/N)	Description
CH-953004	MCM for Aria Systems with Agilent pumps
CH-953347	MCM for Transcend systems with Agilent 1200SL or 1260 pumps
CH-953499	MCM for Transcend systems with Accela 600 or 1250 pumps - System Enclosure (TLX-2/4 and LX-4)
CH-953437	MCM for Transcend system with Accela 600 or 1250 pumps - Modular Enclosure (TLX-1 and LX-2)
60500-98006	MCM for Transcend II systems with UltiMate pumps

Installing the MCM

❖ To install the MCM

1. Attach the MCM to the LC system using the supplied null modem cable (CH-106233).
2. Insert one end of the null modem cable into the output on the back of the MCM. See Figure 132.
3. Insert the other end of the null modem cable into one of the following (see Figure 132):
   - The supplied NI 2-port serial card if used on the data system computer
   - A serial port on the data system computer

Figure 132. The null modem cable attaching the MCM to the TLX system

4. Turn on the Transcend or Aria system.

Configuring the MCM

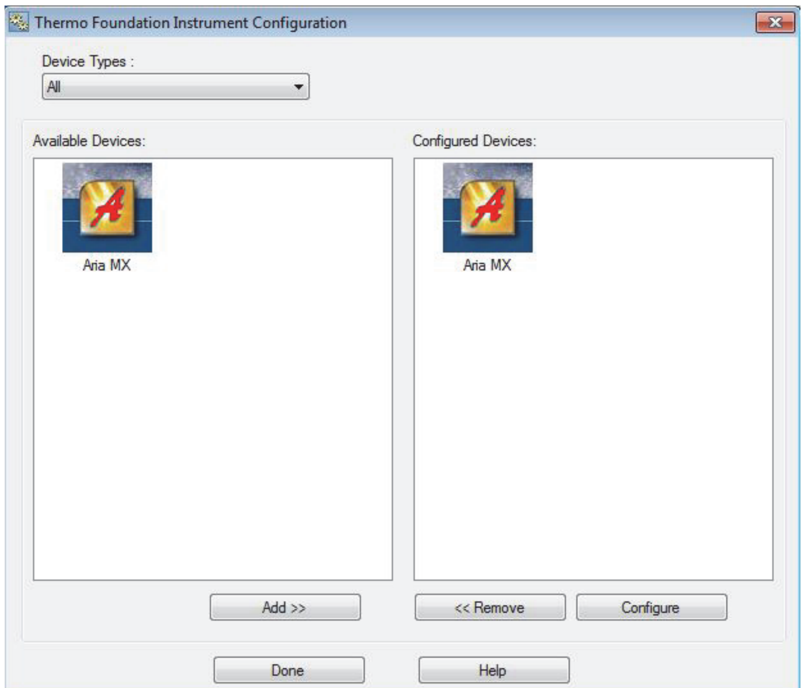
To configure the MCM in the Aria MX software, you must first open the instrument configuration window for the Foundation platform.

❖ To access the instrument configuration window for Aria MX

1. From the Windows taskbar, choose **Start > All Apps** (Windows 10) **or All Programs** (Windows 7) **> Thermo > Thermo Foundation *x.x* > Instrument Configuration**.

   The Thermo Foundation Instrument Configuration window appears (see Figure 133).

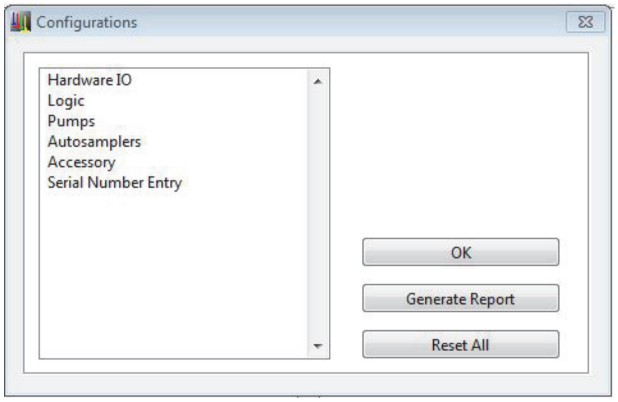
   Figure 133. Thermo Foundation Instrument Configuration window

2. In the Configured Devices list, select the **Aria MX** icon, and then click **Configure**.

   The Configurations dialog box appears (Figure 134).

Figure 134. Configurations dialog box

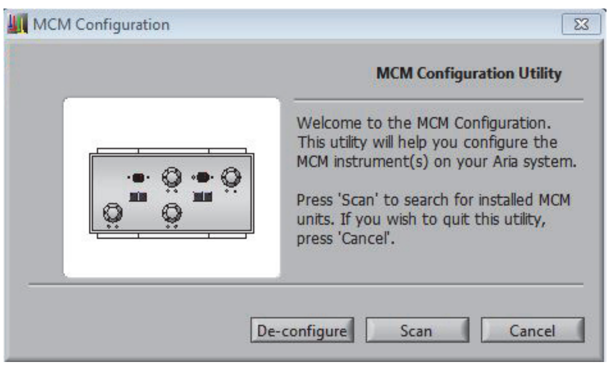


❖ To configure the MCM

1. In the Configurations dialog box, click **Accessory**, and click **MCM**.

   The MCM Configuration Utility appears.

   Figure 135. MCM Configuration Utility

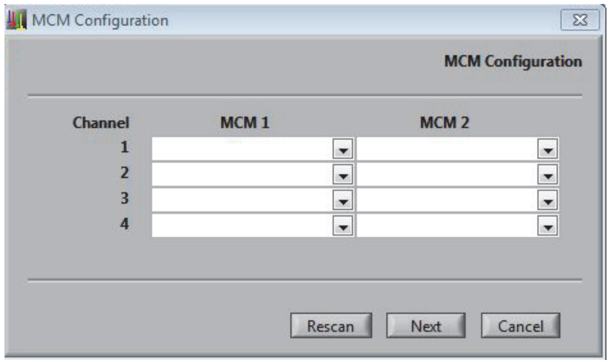
2. Click **Scan**.

   The area to the left shows the ports that connect to an MCM.

3. Click **Next**.

   The next page of the MCM Configuration Utility shows the LC channels to which you can assign each MCM valve set (see Figure 136).

Figure 136. MCM Configuration Utility – LC channel selection



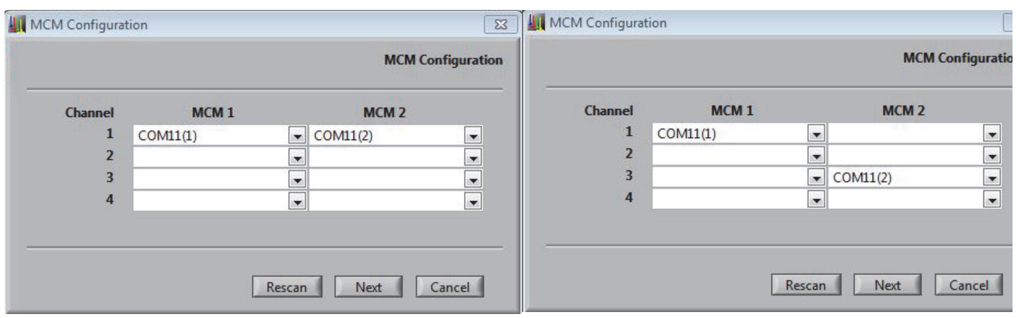
4. Open the list in the MCM 1 column of the LC channel that you want to configure for valve set 1. Select *valve set 1* (**COM11(1)** in Figure 137).

   The communication port name appears, followed by (1).

5. Open the list in the MCM 2 column of the LC channel that you want to configure for valve set 2. Select *valve set 2* (**COM11(2)** in Figure 137).

   The communication port name appears, followed by (2).

Figure 137. MCM valve set configuration examples



Valve set 1 (MCM1) and Valve set 2 (MCM 2) are configured for the same LC channel.

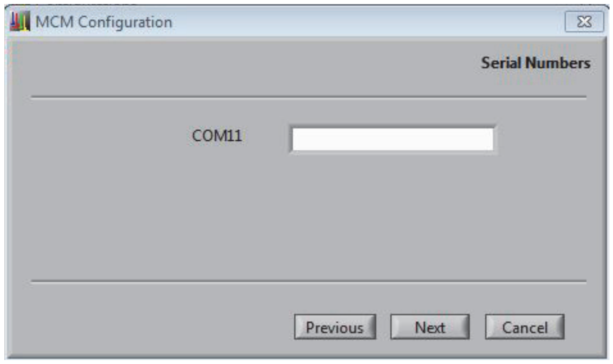
Valve set 1 (MCM1) is configured for LC channel 1, and Valve set 2 (MCM 2) is configured for LC channel 3.

6. Repeat step 4 and step 5 for each additional MCM installed on your system.

7. Click **Next**.

   The Serial Numbers page opens where you enter the MCM serial number (Figure 138).

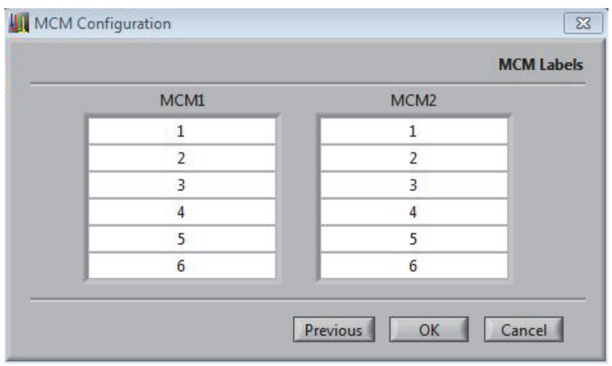
Figure 138. MCM Configuration utility – Serial Numbers



8. Type the MCM serial number for each MCM you installed, and click **Next**.

   The MCM Labels page appears.

Figure 139. MCM port labels



9. If you want to edit the MCM port name, click the box for the appropriate port and type the new name. For example, the default names are 1 through 6 for the MCM 1 ports and 1 through 6 for the MCM 2 ports, but you might want to change the port names to indicate the column type.

> **Note**
> - If one of the valve sets appears gray and is inaccessible, click **Previous**, and verify that the MCM valve sets were selected using the appropriate valve set columns.
> - The column names you enter for valve set 1 (MCM1) and valve set 2 (MCM 2) apply to all MCMs installed on your system.

10. Click **OK** to close the utility.
11. Click **OK** to close the Configurations dialog box.
12. In the Thermo Foundation Instrument Configuration window, click **Done**.

Installing Columns onto the MCM

If you are installing from one to six columns— both TurboFlow columns and analytical columns—or you are using more than one TLX system with your MCM, see Installing Up to Six Columns.

If you are installing more than six columns of the same type (TurboFlow or analytical), see “Installing More than Six Columns” on page 244.

Installing Up to Six Columns

Install columns of the same type (TurboFlow or analytical) on the same MCM valve set. For example, if you are installing both TurboFlow and analytical columns, install TurboFlow columns on MCM 1, and install analytical columns on MCM 2. Figure 140 and Figure 141 show two different valve sets for MCM 1 and MCM 2.

Figure 140. MCM showing valve sets MCM 1 and MCM 2

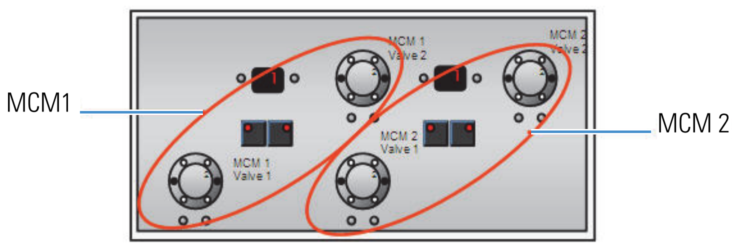
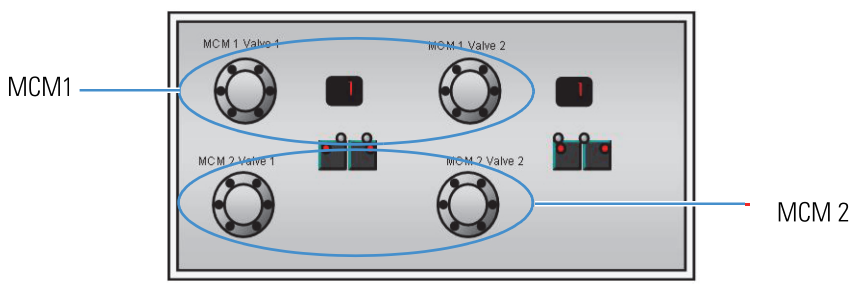


Figure 141. Alternative MCM setup showing valve sets MCM 1 and MCM 2



Use appropriate tubing depending on the column type and system type. Table 66 lists the tubing requirements.

Table 66. Tubing requirements (Sheet 1 of 2)

Specification	Requirement
TurboFlow columns	Use 0.010 inch ID tubing (blue).
Analytical column	Use 0.005 inch ID tubing (red).

Table 66. Tubing requirements (Sheet 2 of 2)

Specification	Requirement
Transcend system	Use stainless steel tubing.
Aria system	PEEK tubing is acceptable; however, stainless steel tubing might provide a better hold than PEEK tubing and provides easier identification of the columns.

❖ To install columns onto the MCM

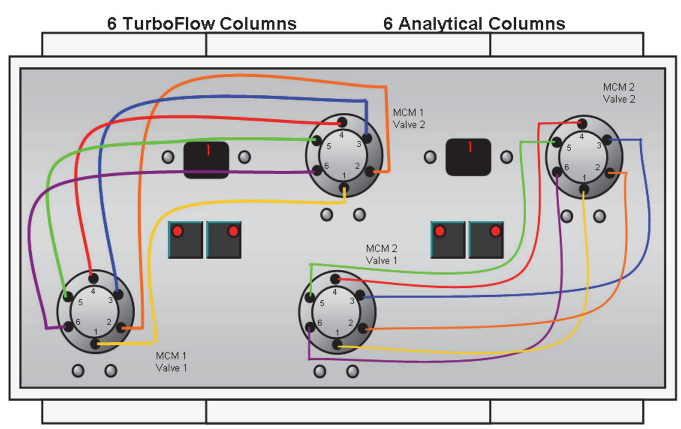
1. Using the appropriate tubing and fittings, connect one end of the columns you want to install onto each Valve 1 port of the MCM. See Figure 142.

   Note If you are installing both TurboFlow and analytical columns, install TurboFlow columns onto the MCM 1 valve set and the analytical columns onto the MCM 2 valve set.

2. Connect the other end of each column onto the matching port number of Valve 2 on the MCM 1 valve set. For example, if one end of the column is installed on port 1 on Valve 1, install the other end of the column on port 1 of Valve 2.

   Note For the correct flow direction, refer to the column label. Mobile phase flows on the MCM from Valve 1 to Valve 2.

Figure 142. Tubing connections for MCM 1 and MCM 2 valve sets



Installing More than Six Columns

You can install up to 11 columns of the same type (all TurboFlow columns or all analytical columns). When you install more than six column on the MCM, install five columns onto the valves on MCM 1 and install six columns onto the valves on MCM2 as described in the following procedure.

❖ To install more than six columns

1. Using the appropriate tubing and fittings, connect five columns to Ports 1 through 5 on Valve 1 of the valve set (MCM 1) on the left side of the MCM. Do not install a column on port 6. Port 6 is used to direct the flow to MCM 2. Record the port position of each column as you install it. See Table 66 for the appropriate tubing.

   Note For the correct flow direction, refer to the column label.

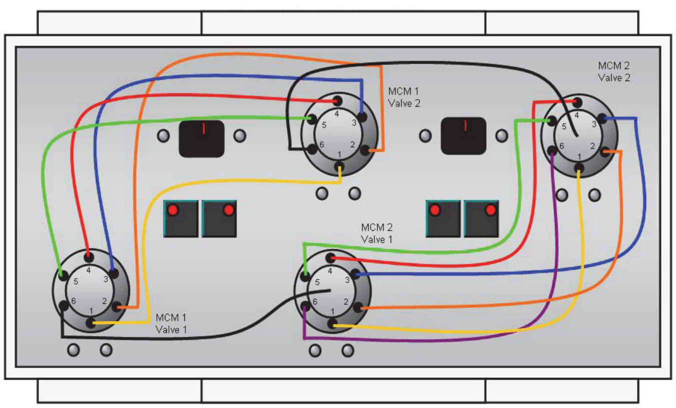
2. Install the other end of the columns to matching port numbers 1 through 5 on Valve 2 of the valve set MCM 1.

3. Connect the valve set MCM1 (left side) to valve set MCM 2 (right side) as follows (see Figure 143):

   a. Attach a length of tubing to port 6 of MCM1, Valve 1, and connect the other end to the center port on MCM2, Valve 1.

   b. Attach a length of tubing to port 6 of MCM1, Valve 2, and connect the other end to the center port on MCM2, Valve 2.

Figure 143. Eleven columns of the same type installed on the MCM—MCM 1 valve set and MCM2 valve set are connected.



Connecting and Disconnecting the MCM to the VIM

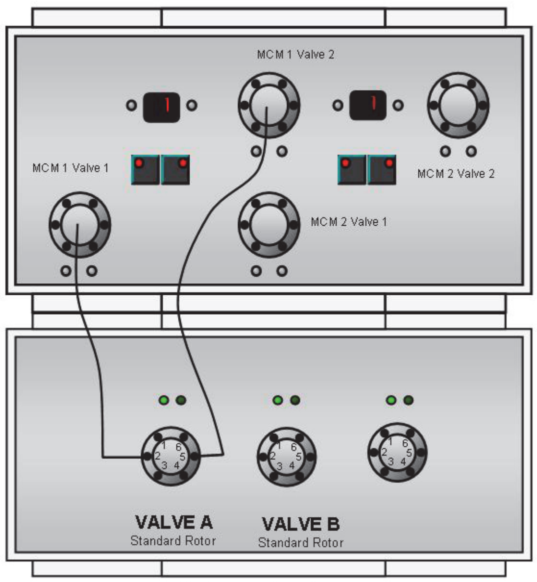
The connections from the MCM to the VIM are different between Quick Elute Mode and Focus Mode. Follow the appropriate procedure.

- To connect an MCM to the VIM that is plumbed for Quick Elute Mode
- To connect an MCM with all TurboFlow columns to a VIM plumbed for Focus Mode
- To connect an MCM that contains both TurboFlow and analytical columns to a VIM
- To disconnect the MCM from the VIM

❖ To connect an MCM to the VIM that is plumbed for Quick Elute Mode

1. Remove the TurboFlow column from the VIM.
2. Connect VIM Valve A, port 2, to the center port on MCM1, Valve 1.
3. Connect VIM Valve A, port 5, to the center port of MCM1, Valve 2. See Figure 144.

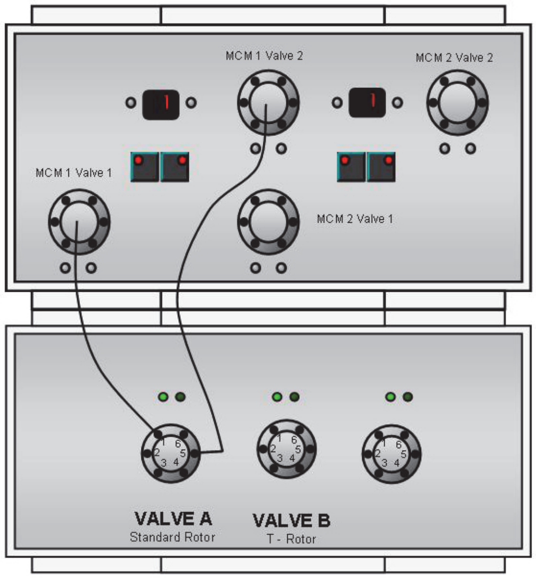
Figure 144. MCM and VIM connections with the MCM plumbed for TurboFlow columns and with the VIM plumbed for Quick Elute Mode



❖ To connect an MCM with all TurboFlow columns to a VIM plumbed for Focus Mode

1. Connect VIM Valve A, port 1, to the center port of MCM1, Valve 1.
2. Connect VIM Valve A, port 5, to the center port of MCM1, Valve 2.

Figure 145. MCM and VIM connections with the MCM plumbed for TurboFlow columns and with the VIM plumbed for Focus Mode

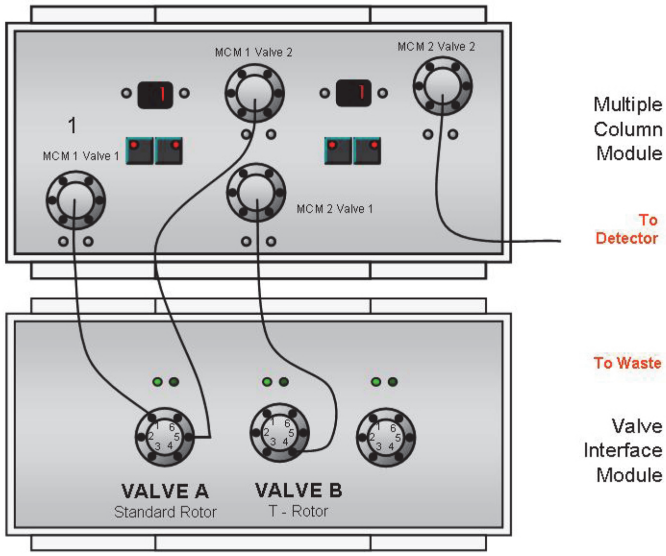


❖ To connect an MCM that contains both TurboFlow and analytical columns to a VIM

> **Note** This procedures assumes that MCM 1 contains TurboFlow columns and MCM 2 contains analytical columns.

1. Connect VIM Valve A, port 1, to the center port of MCM1, Valve 1.
2. Connect VIM Valve A, port 5, to the center port of MCM1, Valve 2.
3. Connect VIM Valve B, port 4, to the center port of MCM2, Valve 1.
4. Connect the center port of Valve 2, MCM2, to the detector or selector valve.

Figure 146. MCM connections when the MCM is plumbed for both TurboFlow and analytical columns and the VIM is plumbed for Focus Mode



❖ **To disconnect the MCM from the VIM**

1. Disconnect the MCM tubing from the VIM.
2. Install the TurboFlow column onto the VIM.
   - For Quick Elute, install the TurboFlow column on Valve A, ports 2 and 5.
   - For Focus Mode, install the TurboFlow column on Valve A, ports 1 and 5.

Priming and Purging the Lines and Checking for Leaks

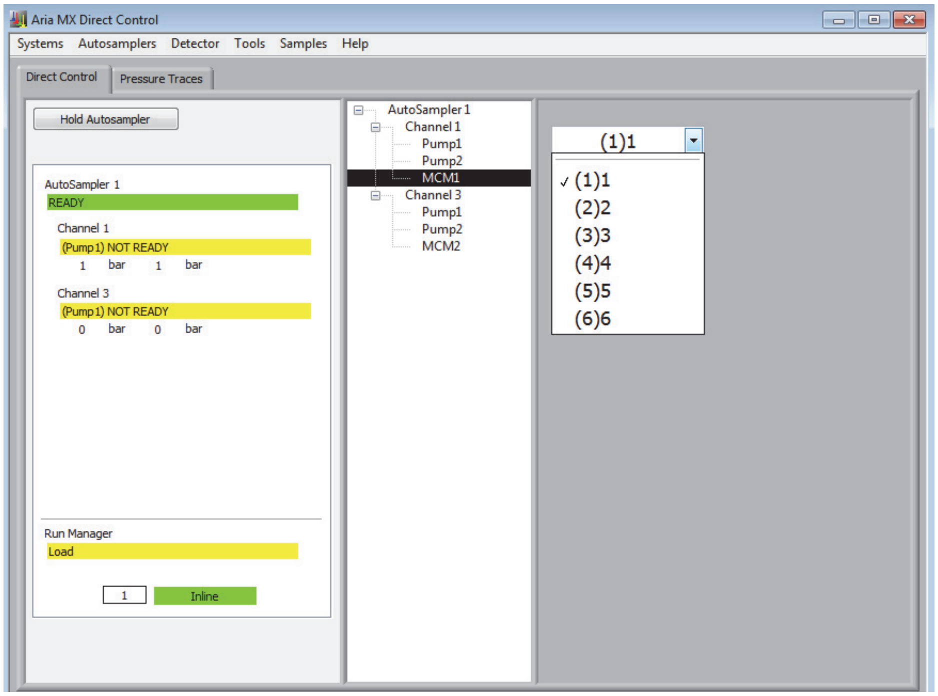
Use the Aria MX Direct Control window to cycle solvent from the appropriate pump through each column on the MCM.

❖ **To purge the lines, prime the line, or check for leaks**

1. Open the Direct Control window. See "Accessing the Direct Control Window" on page 38.
2. Select **MCM 1**.

   A list appears to the right showing the MCM 1 port that is in line with the LC flow.
3. Open the MCM list and select a port on which a column is installed.

Figure 147. Direct Control window showing MCM 1 ports



4. In the middle pane, select the LC channel on which MCM 1 is installed.
5. Turn on the appropriate pump.

   The pumps turn on and flush the appropriate column with mobile phase.

   - If MCM 1 is plumbed for TurboFlow columns, turn on the loading pump.
   - If MCM 1 is plumbed for analytical columns, turn on the eluting pump.
6. Inspect the system for leaks.
7. When the pressure value in the status bar for the appropriate pump displays a steady pressure range, click the MCM 1 box and select the next port to flush the next column.
8. Flush the remaining columns on MCM 1 and MCM 2. As you cycle through the columns, verify that there are no leaks in the system.

Specifying the MCM Port Number

Specify the MCM port to have in line during the run. You can specify the port in the sample list or in the instrument method.

- If you specify a port in the sample list and a value exists in the instrument method, the port value specified in the sample list is used.
- If you do not enter a port in the sample list, the port values specified in the instrument method are used.

Specify the MCM port in the sample list if your system software supports custom columns in the sample list.

❖ To specify the MCM port in the sample list

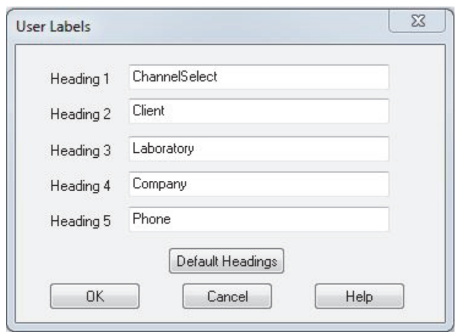
1. Create two custom columns named **MCM1** and **MCM2**.

> **Note** The following instructions assume MCM ports 1 through 5 and ports 7 through 11 house all TurboFlow or all analytical columns on the same system channel, with port 6 used to connect MCM 1 to MCM2. Note any exceptions in the procedure.

   a. From the Xcalibur Roadmap view, click **Sequence Setup**.

   b. Choose **Change > User Labels**.

   Figure 148. User Labels dialog box



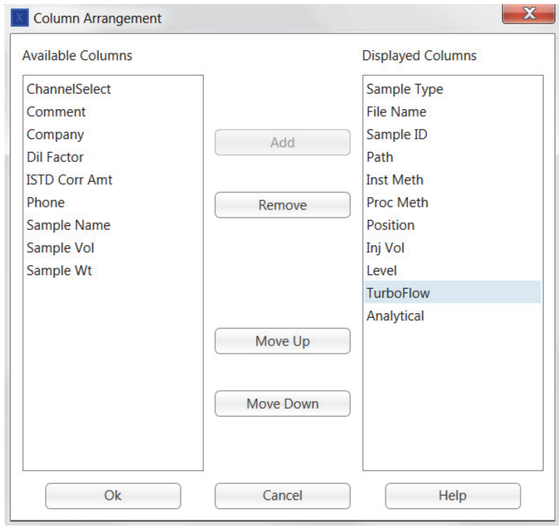
   c. Click in one of the Heading boxes and type **MCM1**. There is no space after MCM and the field is case sensitive.

   d. Click in a second Heading box and type **MCM2**.

   e. Choose **Change > Column Arrangement**.

   The Column Arrangement dialog box appears (see Figure 149).

Figure 149. Column Arrangement dialog box



f. In the Available Columns list, select the new columns and click **Add**.

   The new columns move to the Displayed Columns list.

g. Click **OK**.

h. Verify that the new columns appear in the sequence file.

2. In the MCM 1 column for each sample, enter one of the following:

   - If the column you want to run resides on MCM 1 (ports 1 through 6), type the appropriate MCM port number in the MCM 1 column, and leave the MCM 2 column blank.

   - If the column you want to run resides on MCM 2 (ports 7 through 12), type **6** in the MCM 1 column, and type the appropriate port number in the MCM 2 column. See Table 67.

Table 67. MCM port number and sample mappings (Sheet 1 of 2)

Sample	MCM1	MCM2
1	1	–
2	2	–
3	3	–
4	4	–
5	5	–
6	6	1
7	6	2
8	6	3
9	6	4

Table 67. MCM port number and sample mappings (Sheet 2 of 2)

Sample	MCM1	MCM2
10	6	5
11	6	6

Note If MCM 1 houses TurboFlow columns and MCM 2 houses analytical columns, or MCM 1 and MCM 2 are plumbed to different channels, enter the appropriate port numbers in the MCM 1 and MCM 2 columns.

Specifying the MCM Port in the Instrument Method

Specify the MCM port in the instrument method if your data system application does not support custom columns in the sample list. Create a new instrument method each time you want to change the MCM port. The following procedure applies to the TraceFinder data system.

❖ To specify the MCM Port in the instrument method

1. From the TraceFinder navigation pane, click **Method Development**.
2. In the Instrument View, choose **File > Open Instrument Method** and navigate to the instrument method you want to view. Or, choose **File > New Instrument Method** if you want to create a new method.
3. Click **Aria MX**.

   The LC Method Editor appears.
4. Click **MCM**.

   The MCM port options appear (see Figure 150 on page 253).
5. Open the MCM area of the instrument method as follows:
   a. From the Xcalibur Roadmap view, click **Instrument Setup**.

      The Instrument Method Setup window appears.

   b. Choose **File > Open**, navigate to the instrument method you want to view, and click **Open**. Or, choose **File > New** if you want to create a new method.

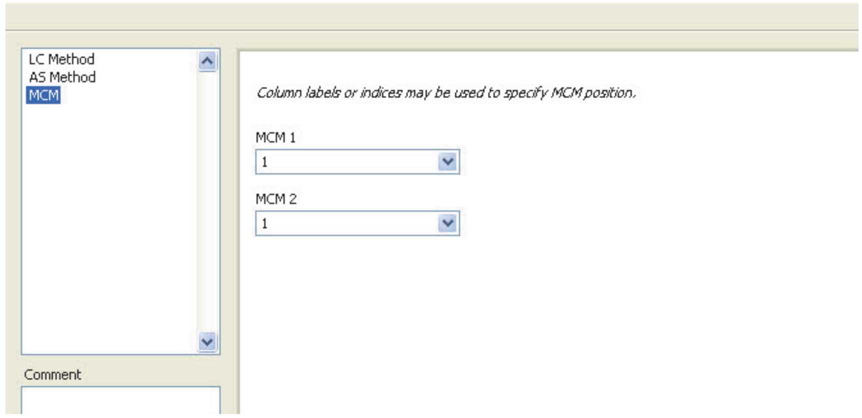
   c. Click **Aria MX**.

      The LC Method Editor appears.

   d. Click **MCM**.

      The MCM port options appear (see Figure 150).

Figure 150. MCM port options



Note The MCM port names appear in the lists for MCM 1 and MCM 2. The default port names for MCM 1 and MCM 2 are 1 through 6. Your MCM port names might have been changed during the MCM configuration procedure.

6. In the MCM 1 and MCM 2 lists, select the following appropriate option.

If …	Then …
The MCM contains all TurboFlow or all analytical columns, and the column you want to run resides on MCM 1 (valve set on the left side of the MCM).	Select the port number to which the column is connected in the MCM 1 list.
The MCM contains all TurboFlow or all analytical columns and the column you want to prime resides on MCM 2 (valve set on the right side of the MCM).	Select **6** in the MCM 1 list, and select the port number to which the column is connected in the MCM 2 list.
MCM 1 (valve set on the left side of the MCM) contains TurboFlow columns and MCM 2 (valve set on the right side of the MCM) contains analytical columns.	Select the port number to which the TurboFlow column is connected in the MCM 1 list, and select the port number to which the analytical column is connected in the MCM 2 list.

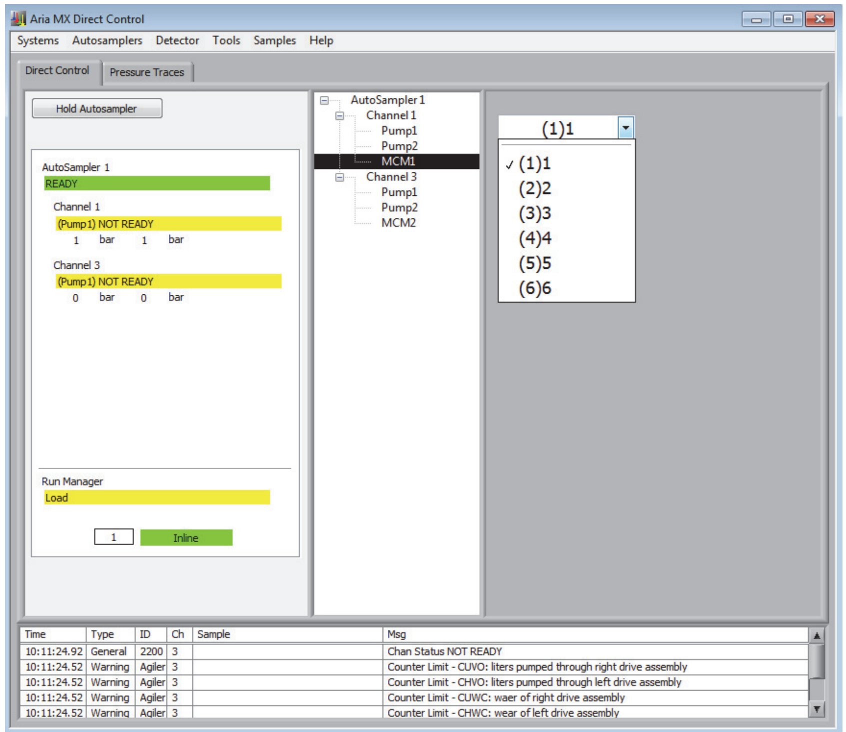
Changing a Port That Is In Line with the Flow

❖ **To change the MCM port that is in line**

1. Open the Direct Control window.
2. Click **MCM1** or **MCM2** for the appropriate channel.

   A list appears in the right pane showing the MCM port that is in line with the flow (Figure 151).

Figure 151. Direct Control window showing MCM1 ports



3. From the list, select a port on which a column is installed.

10

Configuring Temperature Controllers

These topic s describe how to configure the column temperature with either the MultiSLEEVE controller or the Vanquish TCC module in the Aria MX software.

Contents

MultiSLEEVE Controller

The MultiSLEEVE Controller from Analytical Sales and Services is an optional controller that manages up to four heating zones in an LC system. You can use it to control the IntelliSLEEVE and AgileSLEEVE PLUS heaters.

Refer to the MultiSLEEVE controller user documentation for safety information, instructions on installing the controllers and heaters, and a list of compatible column heaters.

Table 68. Additional documentation

Part number	Description
CH-953594	The MultiSLEEVE column heater controller (controls up to 4 column heaters). Order sleeves separately.
00203-99-00048	The IntelliSLEEVE column heater sleeve, 5 cm
CH-953597	The IntelliSLEEVE column heater sleeve, 10 cm

CAUTION Do not bend sleeves backward or flex them excessively in any direction. Doing so could break the thin wires embedded within the sleeve and cause the heater to stop heating properly.

CAUTION Operate the temperature controller away from liquids so as not to accidentally spill solvents on the top cover. Do not immerse or operate any part of the column heater in liquids. In the event of solvent leakage, wipe the sleeve clean before further use.

CAUTION Column heaters can become extremely hot and, therefore, unsafe to handle. Allow heated components to cool before you touch them. If removed from their heating sleeves, columns may be hot enough to burn skin. Allow sufficient time for cooling—approximately 15 minutes—before attempting to remove columns from heaters.

CAUTION Always power down the MultiSLEEVE controller before installing a new column heater to ensure the new heater is calibrated and controlled properly. Allow sufficient time for cooling—approximately 15 minutes—before installing a new column heater. Failure to do so can result in improper heating and burns.

Related Topics

- Configuring the MultiSLEEVE Controller
- Setting the Heater Temperature in an Instrument Method (MultiSLEEVE Controller)
- Setting the Heater Temperature from the Sample List (MultiSLEEVE Controller)
- Viewing the Heater Status (MultiSLEEVE Controller)

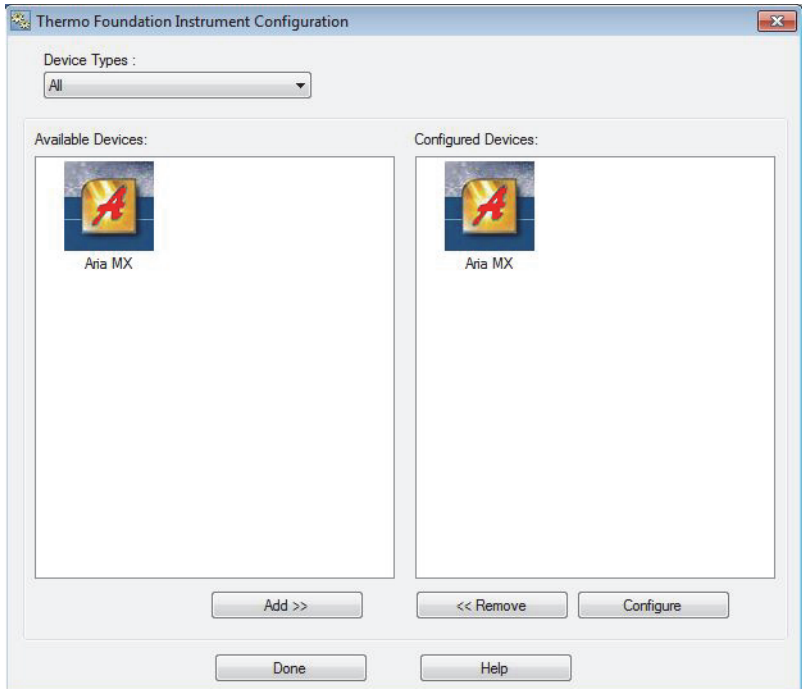
Configuring the MultiSLEEVE Controller

You must configure the MultiSLEEVE controller before using it for the first time.

❖ To configure the MultiSLEEVE controller

1. From the Windows taskbar, choose **Start > All Apps** (Windows 10) **or All Programs** (Windows 7) **> Thermo > Thermo Foundation *x.x* > Instrument Configuration** (see Figure 152).

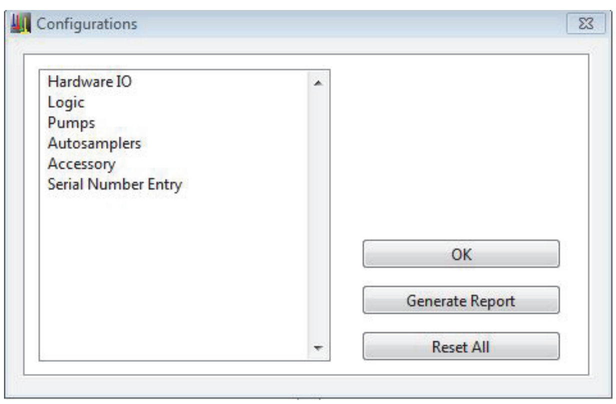
Figure 152. Thermo Foundation Instrument Configuration window



2. In the Configured Devices area, select the **Aria MX** icon and click **Configure**.

   The Configurations dialog box appears.

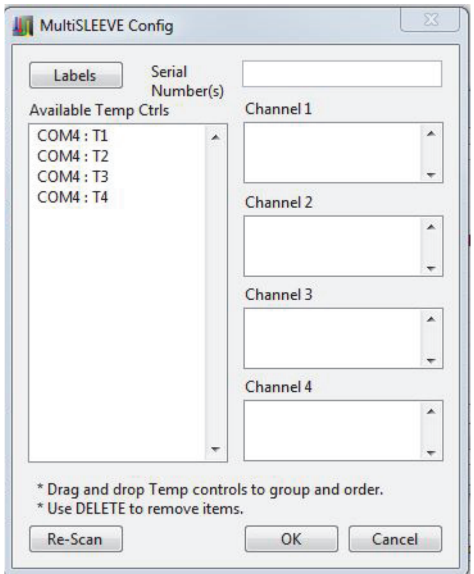
   Figure 153. Configurations dialog box



3. Click **Accessory**, and then click **MultiSLEEVE**.

   The MultiSLEEVE Config dialog box appears (Figure 154).

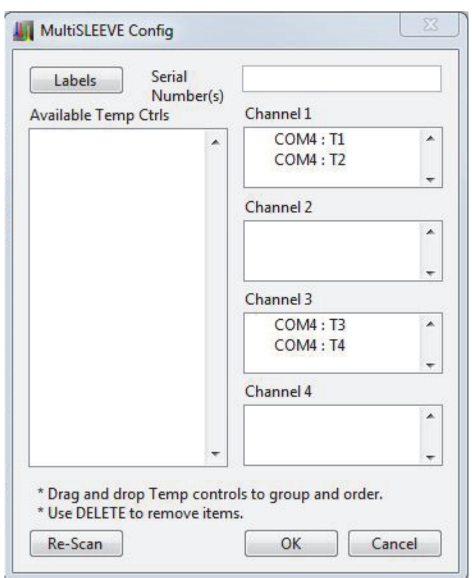
Figure 154. MultiSLEEVE Config dialog box



4. In the Available Temp Ctrls list, select a heater and drag it to the appropriate Channel box on the right side of the dialog box (see Figure 155).

> **Note** If the expected heaters are not available, confirm that the controllers are connected to the computer and are powered on, and then click **Re-Scan**.

Figure 155. MultiSLEEVE Config dialog box showing two column heaters configured to Channel 1 and Channel 3



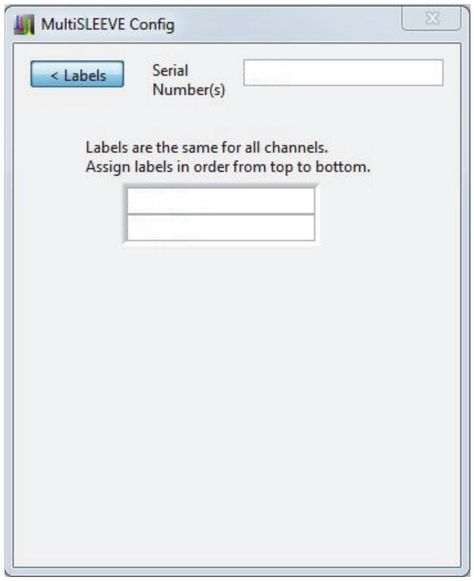
5. Repeat step 4 for each column heater you want to configure.

   You can configure multiple column heaters to the same channel, as you would do if you had heaters for both the TurboFlow and analytical columns. See Figure 155.

6. To enter a name for a column heater, do the following:
   a. Click **Labels**.

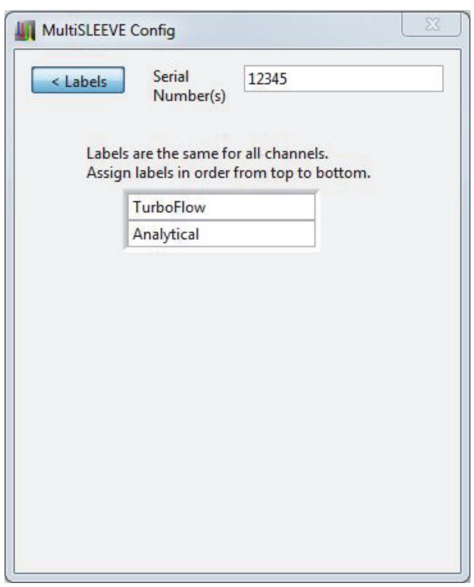
      The MultiSLEEVE Config dialog box opens showing a text box for each column heater you have configured (Figure 156).

      Figure 156. MultiSLEEVE Config dialog box



   b. In the Serial Numbers box, type the serial number of the heater controller.
   c. In each text box, type the name you want to use to identify the column heaters (Figure 157).

      Figure 157. MultiSLEEVE Config dialog box showing two heaters with new labels



7. Click **Labels** again.

The dialog box shows the heater port names.

8. Click **OK**.

   The heater names appear in the Aria MX Direct Control window.

Setting the Heater Temperature in an Instrument Method (MultiSLEEVE Controller)

❖ To set the heater temperature in an instrument method

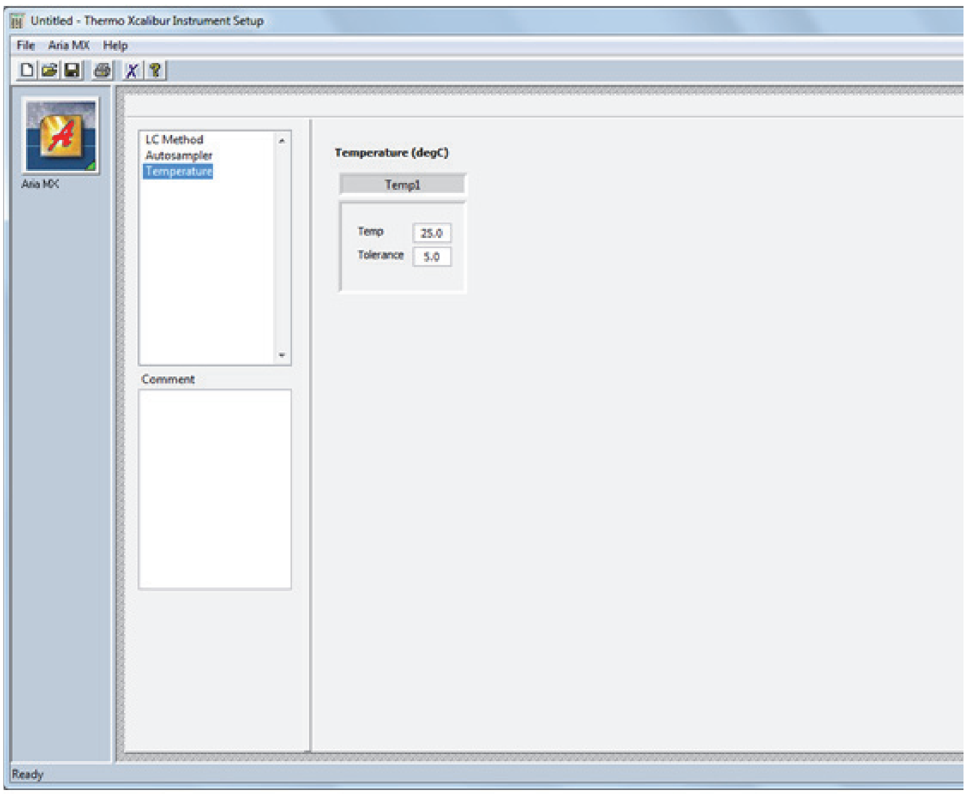
1. Open the Temperature area of the instrument method as follows:

   a. Open the LC Method Editor for the instrument method where you want to add temperature control. See "Accessing the LC Method Editor" on page 143.

   b. Click **Temperature**.

   The Temperature options appear (Figure 158).

   Figure 158. Temperature options in the instrument method showing one heater



2. In the Temp box, type the temperature that you want the column heater set to during the instrument method.

3. In the Tolerance box, set the tolerance limits.

> **Note** The tolerance value sets a temperature range above or below the set temperature value. If the heater temperature exceeds this range or falls below it, the following occurs:
>
> - A warning appears in the Aria MX event log (see "About Aria MX Event Logs" on page 230).
> - The system continues to run the injected sample.
> - The system does not inject another sample until the temperature has returned to a value that is within the tolerance range.
>
> The temperature might fall outside the tolerance range due to a sudden change in laboratory temperature or a malfunctioning component in the heating mechanism or thermostat.

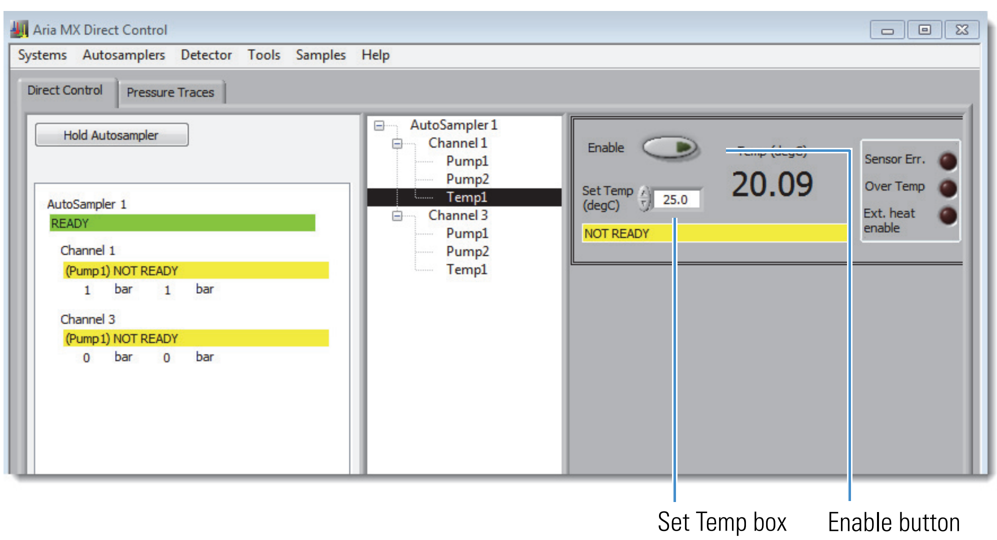
❖ To change a column heater temperature

1. Open the Direct Control window. See "Accessing the Direct Control Window" on page 38.
2. In the middle pane, select the heater that you want to control. See Figure 159.

   The heater options appear in the right pane.

> **Note** The heater appears below its associated system channel as Temp 1, Temp 2, Temp 3, or Temp 4, depending on how many heaters reside on the channel. You can also change the names of the heaters during configuration.

Figure 159. Temperature options in the Direct Control window showing one heater on Channel 1 and one heater on Channel 3 (TLX-2 system)



3. In the Set Temp box, select or type the temperature in degrees Celsius that you want the heater to reach and press ENTER.

   The heater begins adjusting to the new temperature setting.

4. Click the **Enable** button to turn on the heater if it is currently off.

   When the heater is on, the Enable button appears light green. When the heater is off, the Enable button appears dark green.

Figure 160. Enable button showing on and off states

Heater on   Heater off

Note The heaters turn off according to the LC timeout setting, which includes the pumps, unless a method is running. Thermo Fisher Scientific recommends that you preheat your columns and then start the LC flow.

Setting the Heater Temperature from the Sample List (MultiSLEEVE Controller)

If your system software supports custom columns in the sample list, you can assign a heater You can assign a temperature for each sample by entering the temperature into the sample list. This is useful if you want to evaluate different temperatures in a method without creating a new method for each temperature.

CAUTION Be aware that the heater operates at different temperatures during the run and can, at times, be too hot to handle depending on the settings you enter.

Note When you assign the temperature in the sample list, consider the following:

- The system injects the sample after the temperature has reached the entered value. However, it is a good practice to allow more time for the temperature to equilibrate. You can do this by adding a wait time to the autosampler method before the sample injection and by scheduling multiple injections of the same sample.
- Enter samples into the sample list with lower heater temperatures first, before entering samples in order of increasing temperatures.

You can assign a temperature from the sample list using the Xcalibur data system.

❖ To assign a temperature in the sample list

1. From the sample list, create a custom column that has the same name as the column heater. Refer to your software documentation for information on creating a custom column.

2. Create a column for each column heater as follows:

   a. From the Xcalibur Roadmap view, click **Sequence Setup**.

      The Sequence Setup window opens.

   b. Choose **Change > User Labels**.

      The User Labels dialog box appears.

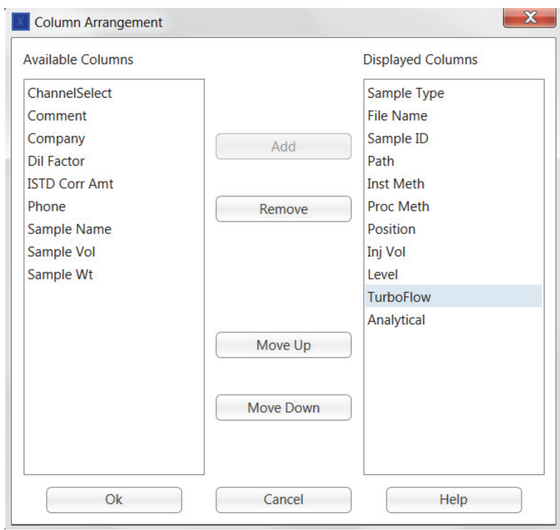
   c. Highlight one of the Heading boxes and type a heater name. The label name is case-sensitive.

   d. Highlight a second Heading box and type the other heater name.

   e. Choose **Change > Column Arrangement**.

      The Column Arrangement dialog box appears (Figure 161).

Figure 161. Column Arrangement dialog box



   f. In the Available Columns list, select the new columns and click **Add**.

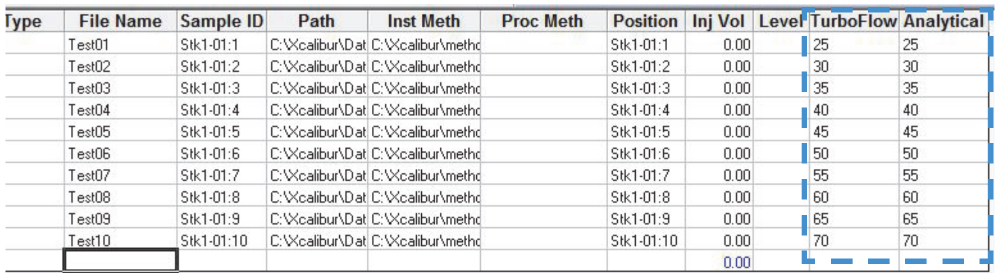
      The new columns move to the Displayed Columns list.

   g. Click **OK**.

   h. Verify that the new columns appear in the sequence file.

3. In the new column, enter the temperature for running each sample (Figure 162).

Figure 162. Sample list showing entered temperatures for column heaters named TurboFlow and Analytical



Type	File Name	Sample ID	Path	Inst Meth	Proc Meth	Position	Inj Vol	Level	TurboFlow	Analytical
	Test01	Stk1-01:1	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:1	0.00		25	25
	Test02	Stk1-01:2	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:2	0.00		30	30
	Test03	Stk1-01:3	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:3	0.00		35	35
	Test04	Stk1-01:4	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:4	0.00		40	40
	Test05	Stk1-01:5	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:5	0.00		45	45
	Test06	Stk1-01:6	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:6	0.00		50	50
	Test07	Stk1-01:7	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:7	0.00		55	55
	Test08	Stk1-01:8	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:8	0.00		60	60
	Test09	Stk1-01:9	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:9	0.00		65	65
	Test10	Stk1-01:10	C:\Xcalibur\Dat	C:\Xcalibur\methc		Stk1-01:10	0.00		70	70
							0.00			

Viewing the Heater Status (MultiSLEEVE Controller)

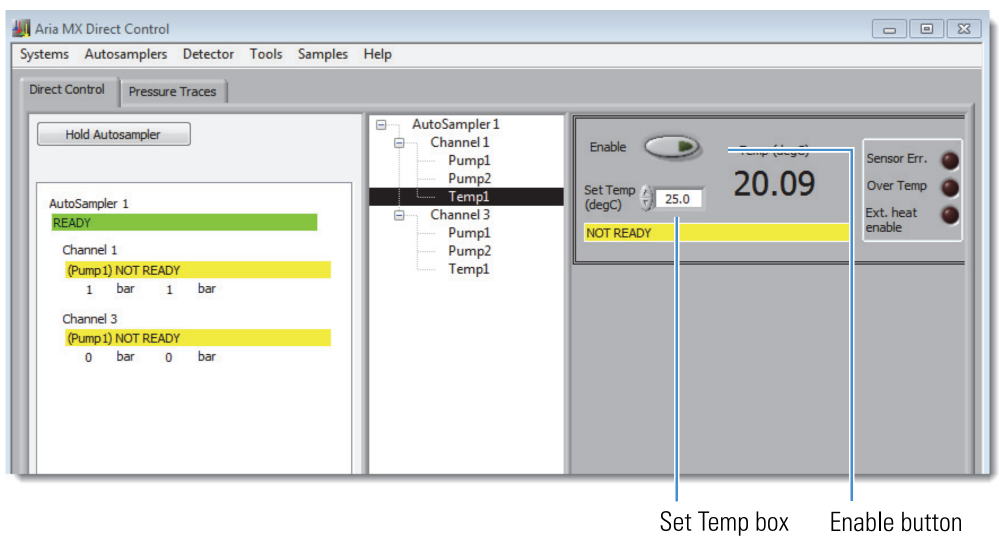
❖ To view the heater status

1. Open the Direct Control window. See "Accessing the Direct Control Window" on page 38.
2. In the middle pane, select the heater to assign a temperature to.

   The heater options appear (Figure 163).

> **Note** The heater appears below its associated system channel as Temp 1, Temp 2, Temp 3, or Temp 4, depending on how many heaters reside on the channel.

Figure 163. Temperature options in the Direct Control window



3. Review the following temperature-related settings, as needed (see Table 69).

Table 69. Temperature-related parameters (MultiSLEEVE controller)

Parameter	Description
Enable	When the heater is on, the Enable button turns light green. When the heater is off, the Enable button turns dark green.
Set Temp	The assigned temperature in Celsius.
Temp (degC)	The actual temperature reading in Celsius as indicated by the heater feedback.
Sensor Err	Bright red indicates that communication from the heater to the controller has failed. Verify that the heater device is connected to the controller, or refer to the MultiSLEEVE documentation for troubleshooting the error. Dark red indicates that no sensor error state was detected by the controller.
Over Temp	If this button is bright red, refer to the MultiSLEEVE documentation to troubleshoot the error. Dark red indicates that no error state has been detected.
Ext. Heat Enable	If this button is red, verify that the contact terminal strip is connected to the back of the controller.
Status bar	When the heater temperature is within the tolerance range set during configuration, the status bar is green. If the heater temperature is outside the tolerance range, the status bar is yellow.

Vanquish Thermostatted Column Compartment (TCC)

The Vanquish Thermostatted Column Compartment (TCC module) is a configurable module that can control the temperature of up to two LC columns. The TCC module is supported in Transcend configurations that employ the Vanquish Dual Split Sampler (Vanquish AS) with Vanquish Horizon pumps in an LX-2 mode.

You can set the Vanquish TCC component (column chamber, preheaters, or cooler options, if present) temperature required for your method using the Aria MX software.

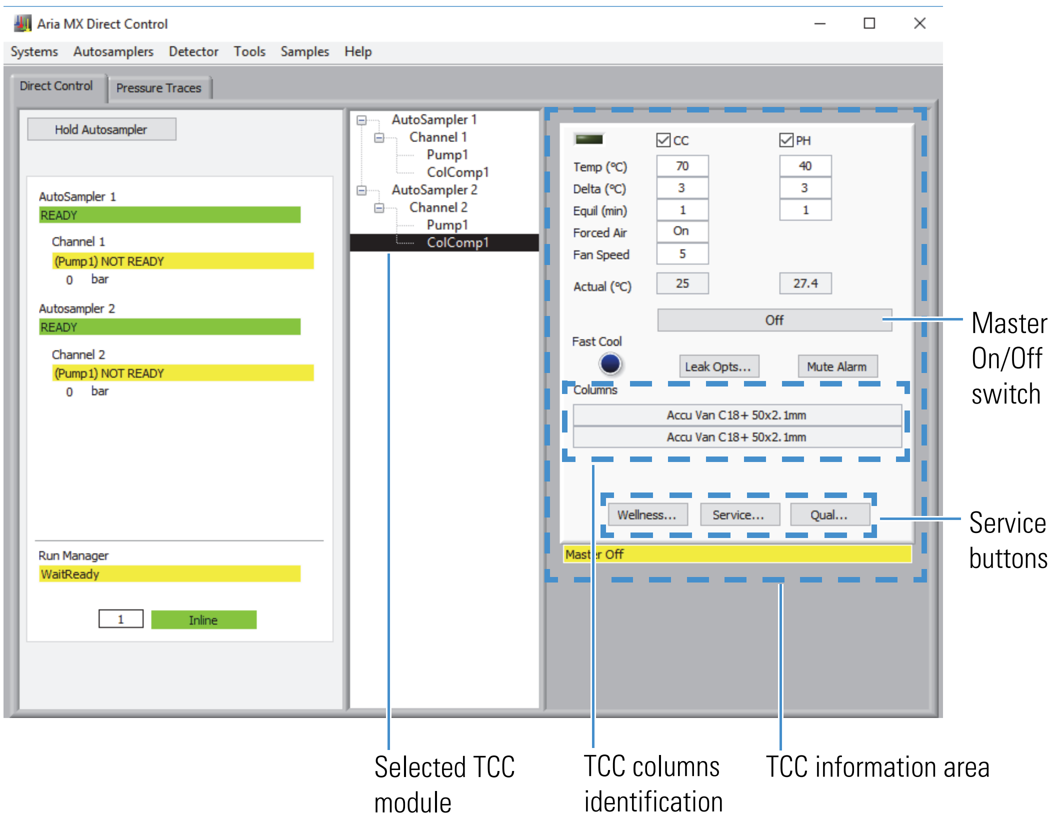
Other features and functions unique to the TCC include the following:

- A single TCC module can be shared, or an additional (optional) TCC can be configured, which allows independent temperature control across the two channels.

- One TCC module contains Selector (upper) and ByPass (lower) valves to allow for Channel selection and bypass of the detector.

Figure 164 shows the TCC module information and controls in the right pane of the Aria MX Direct Control window.

Figure 164. Aria MX Direct Control window showing configuration of a single, shared TCC module (labeled as "ColComp1") in the middle pane, and TCC module information and controls in the right pane



Note Column identification in Aria MX Direct Control as shown in Figure 164 is supported only for the Vanquish Accucore HPLC columns.

CAUTION Operate the temperature controller away from liquids so as not to accidentally spill solvents on the top cover. Do not immerse or operate any part of the column heater in liquids. In the event of solvent leakage, wipe the component clean and fix the source of the solvent leak before further use.

CAUTION Column heaters can become extremely hot and, therefore, unsafe to handle. Allow heated components to cool before you touch them. If removed from their heating sleeves, columns may be hot enough to burn skin. Allow sufficient time for cooling—approximately 15 minutes—before attempting to remove columns from heaters.

CAUTION Always power down the TCC controller before installing a new column. Allow sufficient time for cooling—approximately 15 minutes—before installing a new column. Failure to do so can result in burns.

IMPORTANT Refer to and review the detailed TCC safety information in the *Vanquish Column Compartments (VH-C10) Operating Manual* located on the Aria MX DVD in PDF format and also provided as a printed document with the hardware.

Note Refer to the *Vanquish Column Compartments (VH-C10) Operating Manual* for more information on the TCC module.

Related Topics

- Controlling System Module Temperatures
- Configuring the Vanquish TCC Module
- Configuring the TCC Module in an Instrument Method
- Controlling the TCC Module from the Aria MX Direct Control Window

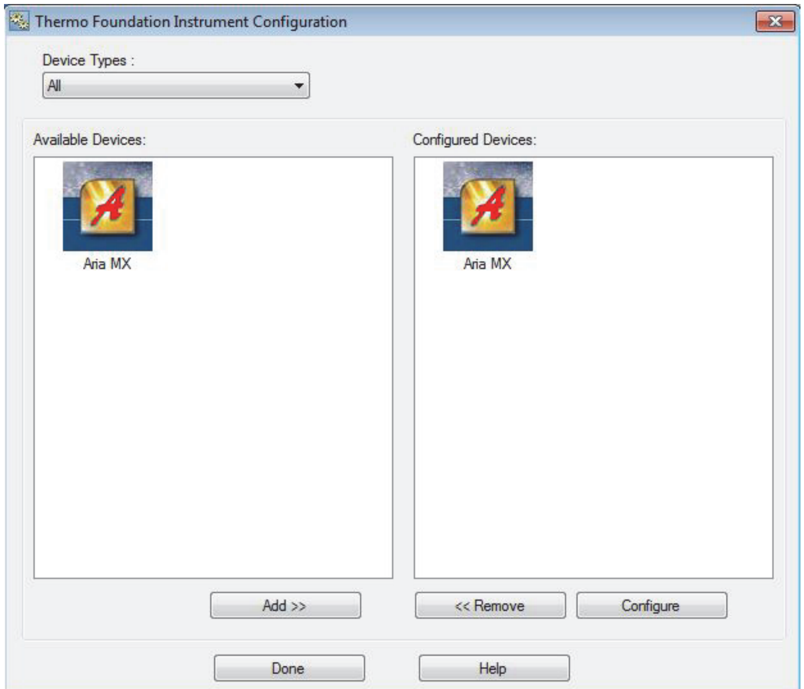
Configuring the Vanquish TCC Module

You must configure the Vanquish TCC module before using it for the first time.

❖ **To configure the Vanquish TCC module**

1. From the Windows taskbar, choose **Start > All Programs > Thermo Foundation *x.x* > Instrument Configuration** (see Figure 165).

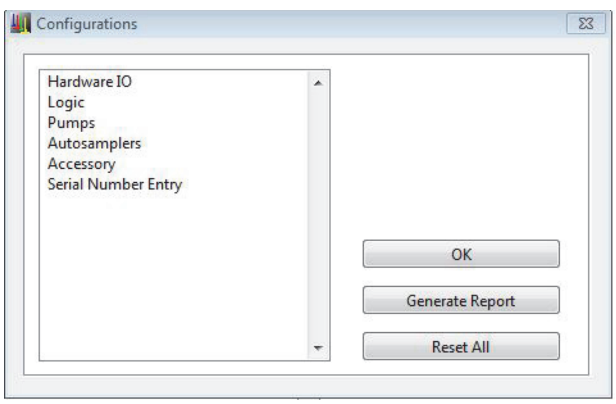
Figure 165. Thermo Foundation Instrument Configuration window



2. In the Configured Devices area, select the **Aria MX** icon and click **Configure**.

   The Configurations dialog box appears.

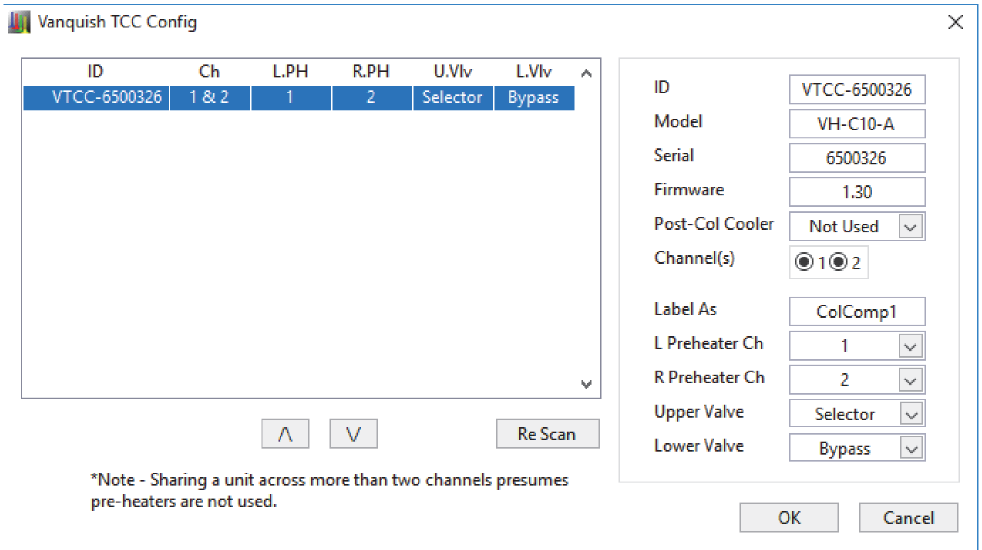
Figure 166. Configurations dialog box



3. Click **Accessory**, and then click **Vanquish CC**.

   The Vanquish TCC Config dialog box appears, and the TCC module should appear in the left-side TCC module list (Figure 154), which lists the TCC module ID number, channel(s) where used, left preheater (L.PH) channel, right preheater (R.PH), upper valve (U.Vlv), and lower valve (L.Vlv) information.

Figure 167. Vanquish TCC Config dialog box



Tip Use the Label As box to enter a custom label for the TCC module. The label you enter appears in the Direct Control window. See .

4. Enter information as required for Post-Col cooler, Channel(s), Label As, L Preheater Ch, R Preheater Ch, Upper Valve, and Lower Valve.

Note If the expected modules are not available, confirm that the controllers are connected to the computer and are powered on, and then click **Re-Scan**.

5. Repeat step 4 to configure a second TCC module. Each TCC can be configured independently to control the compartment temperature for one of the two LC channels.

6. Click **OK**.

   The TCC configuration is complete.

Table 70 lists the configuration parameters for the Vanquish TCC Config dialog box.

Table 70. Vanquish TCC dialog box configuration parameters (Sheet 1 of 2)

Parameter	Description
Post-Col cooler	Configures the post-column cooler.
Channel(s)	Specifies the channel. You can select either Channel 1, Channel 2, or both.
Label As	Specifies a user-defined label, as needed. Default label: **TCC1** (the number increments if an additional TCC module is registered)

Table 70. Vanquish TCC dialog box configuration parameters (Sheet 2 of 2)

Parameter	Description
L Preheater Ch	Specifies the channel assigned to the left preheater. Default: Not Used
R Preheater Ch	Specifies the channel assigned to the right preheater. Default: Not Used
Upper Valve	Specifies the function for the upper valve (U.Vlv) as either Selector, Bypass, Ch1B, or Ch2B. Settings are configured from the list options. Standard setting (single TCC module): **Selector** **Note** The Ch1B and Ch2B options are for valves plumbed to allow for a change of flow direction through the HPLC column.
Lower Valve	Specifies the function for the lower valve (L.Vlv) as either Selector, Bypass, Ch1B, or Ch2B. Settings are configured from the list options. Standard setting (single TCC module): **Bypass** **Note** The Ch1B and Ch2B options are for valves plumbed to allow for a change of flow direction through the HPLC column.
Rescan (button)	Scans for the TCC modules that are connected to the system and culls module information. Certain module information automatically populates key TCC parameter boxes (see below).
Automatically-populated TCC Config parameters	
Note The following parameter boxes are populated automatically with TCC module information when registered by the software. Do not make any changes in these boxes.	
ID	Specifies the TCC module ID number.
Model	Specifies the TCC model number.
Serial	Specifies the TCC serial number.
Firmware	Specifies the TCC module firmware version currently running.

Configuring the TCC Module in an Instrument Method

IMPORTANT Refer to and review the detailed TCC safety information in the *Vanquish Column Compartments (VH-C10) Operating Manual* located on the Aria MX DVD in PDF format and also provided as a printed document with the hardware.

Configure the Vanquish TCC module for your instrument method.

Tip You can create separate methods for each TCC module configured on your system.

❖ To configure Vanquish TCC module settings in an instrument method

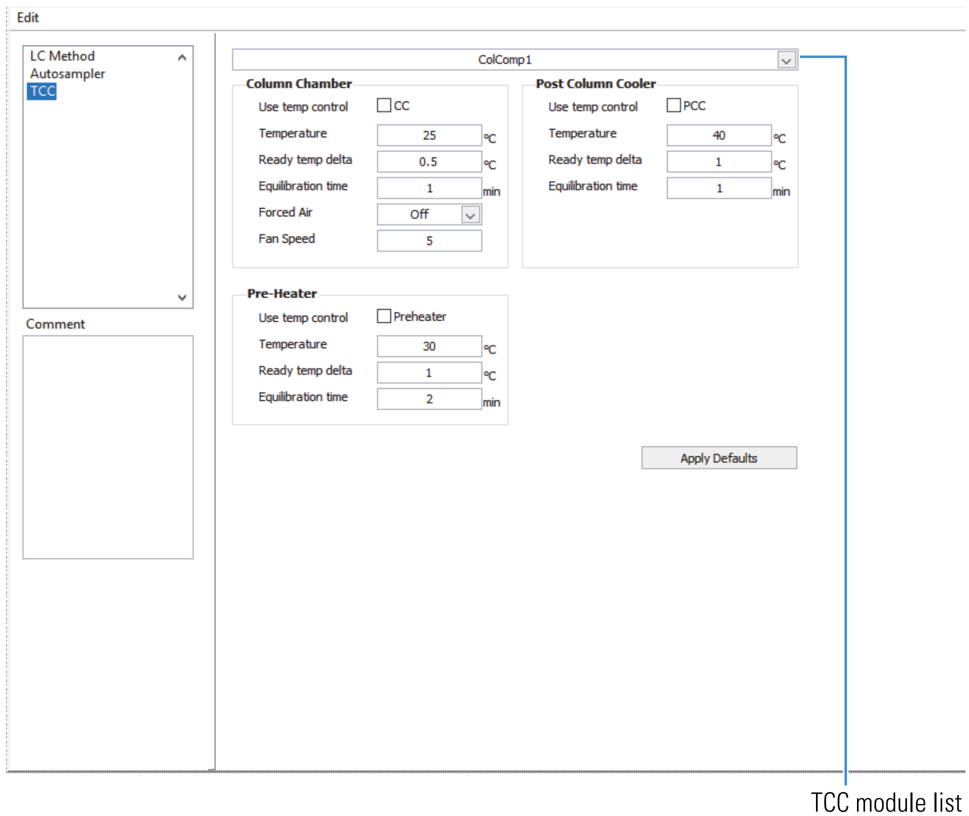
1. Open the TCC area of the instrument method as follows:

   a. Open the LC Method Editor for the instrument method where you want to add temperature control. See "Accessing the LC Method Editor" on page 143.

   b. Click **TCC**.

   The TCC module method options appear showing the available method parameters for the option(s) that have been registered (Figure 168).

   Figure 168. TCC module method options in the instrument method (TCC module user label "ColComp1" selected)



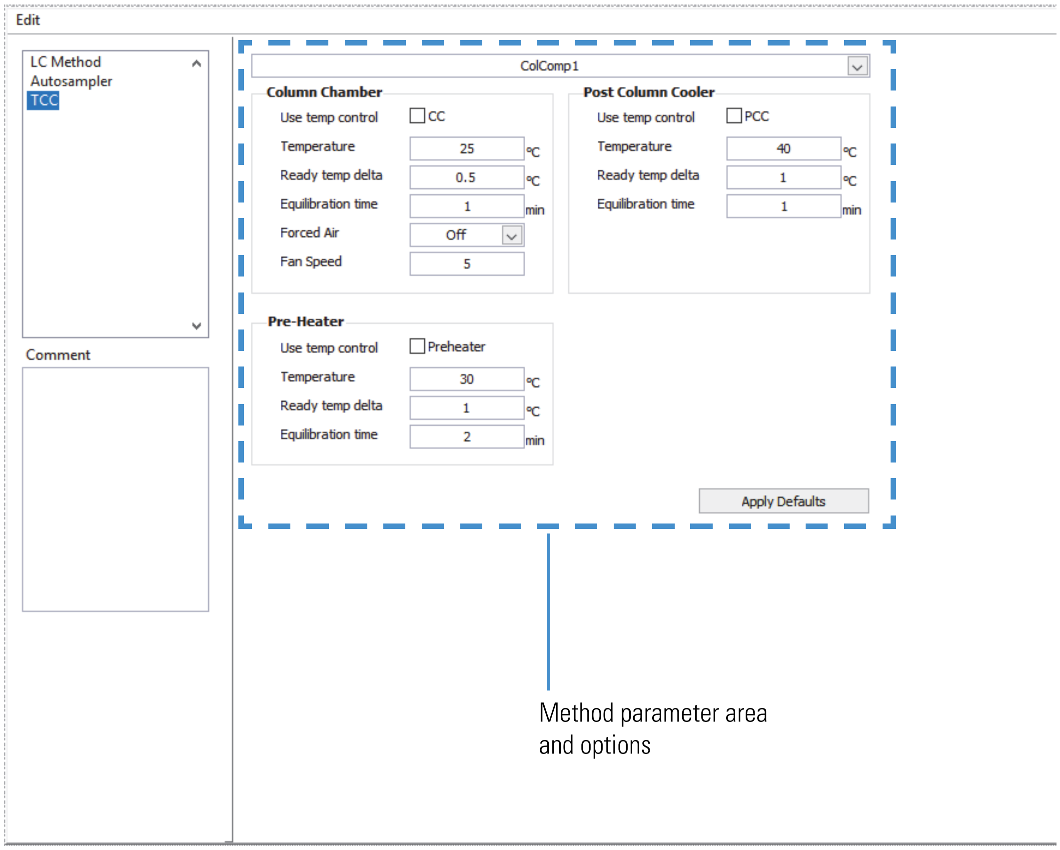
   > **Note** The TCC module method options that are displayed can change depending on the instrument configuration.

2. Place a check in the box for the TCC component that you want to enable, and then make changes that you want to the component parameters.

3. Click **File > Save** to save the method.

Figure 169 shows the TCC module method editor window. Table 71 lists the available options and parameter descriptions for the TCC module.

Figure 169. Vanquish TCC module method parameters



Note Click **Apply Defaults** to reset the TCC parameters to the default factory settings.

Table 71. Vanquish TCC module method parameters (Sheet 1 of 2)

Related area	Parameter	Function
Column Chamber		
	Use Temp Control (CC check box)	Configures the heater.
	Temperature	Specifies the method temperature setting.
	Ready Temp Delta	Specifies the number of degrees Celsius (±)from the set method temperature when the system signals it is ready.
	Equilibration Time	Specifies the time to hold when the ready temp delta is reached before signaling that the system is ready.
	Force Air	Sets the internal fan to turn on or off.
	Fan Speed	Specifies the internal fan speed when the Forced Air option is set to on. Range is 1–7 (low to high).
Pre-Heater[a]		
	Use Temp Control (Preheater check box)	Configures the preheater.
	Temperature	Specifies the method temperature setting.
	Ready Temp Delta	Specifies the number of degrees Celsius (±) from the set method temperature when the system signals it is ready.
	Equilibration Time	Specifies the time to hold when the ready temp delta is reached before signaling that the system is ready.

Table 71. Vanquish TCC module method parameters (Sheet 2 of 2)

Related area	Parameter	Function
Post Column Cooler[a]		
	Use Temp Control (PCC check box)	Configures the post column cooler.
	Temperature	Specifies the method temperature setting.
	Ready Temp Delta	Specifies the number of degrees Celsius (±)from the set method temperature when the system signals it is ready.
	Equilibration Time	Specifies the time to hold when the ready temp delta is reached before signaling that the system is ready.

[a] The Pre-Heater and Post-Column Cooler areas and options are available in the Aria MX method editor only if they have been configured from the Vanquish TCC Config dialog box, which is accessed using the Thermo Foundation Instrument Configuration.

Controlling the TCC Module from the Aria MX Direct Control Window

IMPORTANT Refer to and review the detailed TCC safety information in the *Vanquish Column Compartments (VH-C10) Operating Manual* located on the Aria MX DVD in PDF format and also provided as a printed document with the hardware.

❖ **To change the TCC module settings from the Aria MX Direct Control Window**

1. Open the Direct Control window. See “Accessing the Direct Control Window” on page 38.
2. In the middle pane, select TCC module that want to control. See Figure ?.

   The TCC module options appear in the right pane.

   Note If you have a two-channel system with one TCC module configured, the settings between channels are global and apply to both.

3. Make your selections and changes.

   Your changes are immediately active if the master switch is turned on from the Aria MX Direct Control window (Figure 164).

Table 72 lists the TCC module control options from the Aria MX Direct Control window (see Figure 164).

Table 72. TCC module control options from the Aria MX Direct Control window (Sheet 1 of 2)

Option	Type	Description
CC	Check box	Turns on the column compartment (CC), when the master On/Off button is in the On position.
PH	Check box	Turns on the preheater (PH), when the master On/Off button is in the On position.
PCC	Check box	Turns on the post column cooler (PCC), when the master On/Off button is in the On position.
Temp (°C)	Set box	Specifies the target chamber temperature.
Delta (°C)	Set box	Specifies the range above or below the set temperature when the system signals that it is ready to run samples.
Equil (min)	Set box	Specifies the amount of time, in minutes, that the temperature is within the Delta setting before the system signals that it is ready to run samples. If the Delta parameter set to None, then this parameter applies to the set chamber temperature as configured in the Temp parameter.
Forced Air	Set box (toggle)	Turns the TCC module fan on or off.
Fan Speed	Set box	Specifies the TCC module fan speed. Range: 1–7.
Actual (°C)	N/A	Displays the current temperature of the column compartment (CC) or preheater (PH).
On (Off)	Button	TCC module master On/Off switch, which turns the TCC module on or off. Default: Off
Fast Cool	Button	Accelerates the Vanquish TCC chamber cooling to allow quicker access to the chamber and columns. To turn on the fast cool feature, click button to turn on (the button icon changes to bright blue). Default: Off

Table 72. TCC module control options from the Aria MX Direct Control window (Sheet 2 of 2)

Option	Type	Description
Columns	N/A	Displays the column type installed (for example, "Accu Van C18+ 50x2.1mm". **Tip** Hover the mouse over a labeled column and then right-click to show detailed column information.
Leak Opts...	Button	Opens the (TCC) Leak Options dialog box. Set the leak sensor sensitivity and turn gas and liquid sensors on or off from this dialog box.
Mute Alarm	Button	Turns off the TCC alarm.
Wellness...	Button	Opens the Wellness information box. Specifies the overall operating heating and cooling workloads for the TCC module. Workloads are recorded in kilojoules (kJ).
Service...	Button	Opens the Service dialog box. **Note** This dialog is intended to be used by qualified Thermo Fisher service personnel.
Qual...	Button	Opens the Qualification dialog box. **Note** This dialog is intended to be used by qualified Thermo Fisher service personnel.

Refer to the *Vanquish Column Compartments (VH-C10) Operating Manual* on the Aria MX DVD for more information.

❖ To change a TCC module leak sensor settings

1. Open the Direct Control window. See "Accessing the Direct Control Window" on page 38.
2. In the middle pane, select the **TCC** TCC module that want to control. See Figure 164.

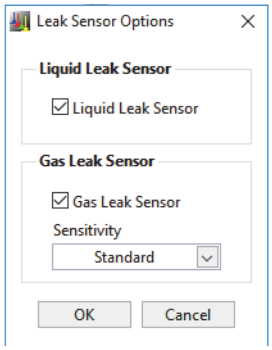
   The TCC module options appear in the right pane.

   Note If you have a two-channel system with one TCC module configured, the settings between channels are global and apply to both.

3. Click **Leak Opts**.

   The Leak Sensor Options dialog box appears.

Figure 170. TCC module Leak Sensor Options dialog box



4. Make your selections and changes, and then click **OK**.

For details on the leak sensor options, see Table 73.

Table 73. TCC module leak sensor option details

Item	Type	Description
Liquid Leak Sensor	Check box.	Turns the liquid leak sensor on or off (on by default).
Gas Leak Sensor	Check box.	Turns the gas leak sensor on or off (on by default). This item checks for vaporized organic compounds inside the module.
Sensitivity	List (selection).	Specifies the sensitivity level of the gas leak sensor (item is on by default). There are three levels of sensitivity available from the list: • Low • Standard (default) • High

Refer to the *Vanquish Column Compartments (VH-C10) Operating Manual* on the Aria MX DVD for more information.

Aria MX Software Error and Warning Messages

This appendix provides detailed information on the various Aria MX software messages that you might receive during an active session. To help you determine the cause of an error and its possible solution, use the codes, descriptions, and explanations listed in the following table.

Note For system messages specific to the Vanquish hardware—Vanquish Dual Split Sampler, Vanquish Charger module, Vanquish TCC module, Vanquish Flex pumps, and Vanquish Horizon pumps—refer to the Thermo Fisher Scientific manuals provided in hard copy with each Vanquish shipment or in PDF format on the Aria MX DVD.

Table 74. Aria MX error and warning message descriptions and explanations (Sheet 1 of 6)

Code	Type	Description	Explanation
AMX_SWException	Error	A low-level software exception was generated.	Details are provided in message content. Generally, not serious, with the exception occurring most often in the communication libraries. These events might be useful in providing context for other system events or problems.
AMX_LogicLoop	Warning	The logic was unable to execute for more than a second.	Occurs when processing time is extremely limited, usually signaling that the system has resource issues.
AMX_SampleError	Warning	An error was experienced that might have affected sample data.	Indicates that an error occurred after the sample was obtained by the autosampler and prior to the end of the data window. The sample is marked as having an error in the Aria sequence data. Review and discard, as needed.
AMX_HWInjBeforeInjRdy	Warning	AS HW indicated an injection before SW reported Ready for Injection.	The system hardware indicates that an injection has been made when no injection was expected. Might indicate an issue with hardware signaling, cabling, and so on.

Table 74. Aria MX error and warning message descriptions and explanations (Sheet 2 of 6)

Code	Type	Description	Explanation
AMX_ASFailsafeWaitLC	Error	The AS timed out waiting for the LC to become ready.	The autosampler was waiting to make an injection but the LC system never reported "Ready". Check for LC issue.
AMX_ASFailsafeWaitDT	Error	The AS timed out waiting for the DT to become ready.	The autosampler was waiting to make an injection but the detector never reported "Ready". Check for detector issue.
AMX_ASFailsafeWaitInj	Error	System timed out waiting for the AS to make injection.	The system signaled for the autosampler to make the injection, but the autosampler never completed it. Indicates possible hardware signaling, cabling, or configuration issue.
AMX_NoInjConfirmation	Error	No injected signal was seen.	Can occur with injection syncing. The LC system started but the autosampler never completed the injection. Will likely not occur before other errors cause the autosampler to cancel the sample injection within the designated amount of failsafe time.
AMX_ASState	Error	The AS experienced an unexpected state change.	Occurs when the autosampler operational state changes unexpectedly during a sample run. Generally accompanied by autosampler communication/command errors.
AMX_ASAbort	Warning	The AS aborted its method.	Occurs when the autosampler method is canceled for any reason, including canceling by the user.
AMX_LCState	Error	The LC channel experienced an unexpected state change.	Occurs when the LC channel operational state changes unexpectedly during a sample run. Generally accompanied by LC device communication or command errors.
AMX_LCNoStart	Error	The LC channel did not start.	A start trigger was sent, but the LC channel did not start. Might be a cabling, signaling, or configuration issue.

Table 74. Aria MX error and warning message descriptions and explanations (Sheet 3 of 6)

Code	Type	Description	Explanation
AMX_LCNoStartSW	Error	The LC channel SW status never reported running though hardware did.	Because an LC channel can be composed of more than one pump/device, it is possible that not all devices started running as expected. The hardware might have shown a start, but not the software. Check which device did not start. Might be a cabling issue.
AMX_DTNotReady	Error	The detector was not ready at the time required.	Detector device(s) was not "Waiting for Contact Closure" when the software required it to be, resulting in sample loss.
AMX_DTBypassed	Error	The detector was in bypass during a data window.	Generated when the bypass valve is engaged during a sample data window. Might indicate that sample was not flowing to the detector, resulting in sample loss.
AMX_DTLateTrigger	Error	An issue caused the detector to be triggered more than a second late.	The system was unable to trigger the detector on time. Indicates that the data time frame is likely to be offset. Unlikely to occur except following AMX_LogicLoop.
AMX_DTNoStart	Error	The detector did not start after a trigger was sent.	The system issued the start signal for the detector, but the software did not recognize it within the allowed time frame. If the detector did start, you might need to adjust the DT Allowance time in the Aria MX Logic Settings dialog box to provide more time for the software to reflect changes. If the detector never started, it might be a signaling, cabling, or configuration issue.
AMX_DTState	Error	The detector experienced an unexpected state change.	The detector's acquiring state dropped prematurely.
AMX_DTAbort	Warning	The detector aborted the run.	The run was canceled by the detector. This occurs when Foundation platform cancels a sample.

Table 74. Aria MX error and warning message descriptions and explanations (Sheet 4 of 6)

Code	Type	Description	Explanation
AMX_DTFailsafeAbort	Error	An abort was issued but the detector was in an ambiguous state.	Might occur if the detector cancels the sample run while Foundation platform is still preparing to run it. It might be unclear whether the sample was started by Foundation. In such an ambiguous state, the system after a time attempts to delete the sample.
AMX_UserLimit	Warning	User configurable limit exceeded.	Sample count limit exceeded for user-configured maintenance.
AMX_P1UnderProfile	Warning	Pump 1 fell under method pressure profile.	These are user-configured method pressure profiles.
AMX_P1OverProfile	Warning	Pump 1 went over method pressure profile.	These are user-configured method pressure profiles.
AMX_P2UnderProfile	Warning	Pump 2 fell under method pressure profile.	These are user-configured method pressure profiles.
AMX_P2OverProfile	Warning	Pump 2 went over method pressure profile.	These are user-configured method pressure profiles.
AS_M0301	Error	The autosampler barcode reader is unable to read a vial barcode	Generally, this results from a missing or compromised vial label.
AS_M0302	Error	The autosampler barcode reader has detected a mismatched barcode	Details are provided in the message content. Generally, this results from an incorrect entry in the Sample ID column, but may also occur if the wrong vial has been addressed.
AS_M9049	Error	The autosampler has detected an air bubble at the LCP tool (bubble detection feature is turned on).	This may occur when the autosampler senses a loss of wash solvent during a Clean Injector or Clean Syringe step
HTR_Temp	Warning	Temp out of range	May indicate faulty sleeve or environmental issue.
HTR_IO	Warning	Heater communication IO error. Most likely USB connection issue.	Check USB connection to Prelude heater.
HTR_COM	Warning	Heater communication timeout error. Most likely heater power.	Check Heater power connection.

Table 74. Aria MX error and warning message descriptions and explanations (Sheet 5 of 6)

Code	Type	Description	Explanation
HTR_Sensor	Error	Sensor Malfunction	Faulty sleeve or sleeve connection. This error might also be reported if heater is power cycled.
HTR_OverTemp	Error	Controller over temp	Controller over temp.
HTR_HwDisable	Error	Heater disabled	Check heater controller HW jumpers.
UltiMate_Pump#	–	UltiMate Pump firmware code	Dionex™ pump firmware error code. Reference integer # against the UltiMate pump documentation.
EE #	Error	Agilent Pump firmware code	Agilent™ pump firmware error code. Reference integer # against pump documentation.
EF #	Warning	Agilent Pump firmware code	Agilent™ pump firmware warning code. Reference integer # against pump documentation.
PreludeCOM	Error	Communication lost	Communication between PC and Prelude lost. Check state of instrument network cables and switch.
PreludeIO	Warning	Communication lost	Indicates loss of communication with primary Prelude controller which also controls ByPass and Selector valves.
PreludeSCFAIL	Warning	Seal Check failed	Check pump seals.
Prelude5002	Error	Over Pressure	Pressure exceeded the 1000 bar max limit.
Prelude5003	Error	Lose Steps	Pump stepper motor is missing steps which can affect performance. Contact service.
Prelude5004	Error	Leakage Detected	Leakage internal to system.
Prelude5102	Error	Over Pressure User Limit	Indicates that the pump exceeded the user set pressure limit.
Prelude6001	Warning	Pre Compress Fail	The pump was unable to attain the method target pressure. Check solvent lines and check seals.
Prelude6002	Warning	PCA Fail	System was unable to align system pressure during method transfer step. Check solvent lines.

Table 74. Aria MX error and warning message descriptions and explanations (Sheet 6 of 6)

Code	Type	Description	Explanation
Prelude6005	Warning	Seal Check Pres not reached	Pump was unable to pressurize properly at start of seal check. Check solvent lines and seals.
Prelude6007	Warning	Pump finish early for the method	Indicates that a pump reached full stroke prior to the end of the method. This is often due to the design of the method and compressibility effects.

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