SCIEX
The Power of Precision

Analyst MD Software

Peripheral Devices Setup Guide

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EC REP

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Contents

Introduction 1

This guide is intended for customers and Field Service Employees (FSEs) who are responsible for configuring devices to work with the mass spectrometer. Devices are controlled automatically during LC-MS/MS data acquisition through the Analyst MD software. The software supports LC pumps, autosamplers, column ovens, switching valves, detectors, and analog-to-digital converters from several manufacturers. Where available, SCIEX recommends the use of medical device accessories and hardware with our medical device mass spectrometers.

This guide lists optional hardware that may be configured to communicate with the mass spectrometer. The combination of mass spectrometer and optional hardware has not been verified to IEC 61010-2-101 or IEC 61326-2-6 and their regional or national harmonized equivalent standards. It is the responsibility of the user to verify and validate the suitability of the optional hardware with the mass spectrometer prior to use. Contact the hardware manufacturer for operating instructions.

Some hardware setup and configuration is required so that the supported peripheral devices and the mass spectrometer can communicate properly. Use the procedures in this guide to connect and configure the peripheral devices and the system.

System Components

The following figures are examples of how to connect some peripheral devices. For more information on how to configure peripheral devices to communicate with the computer, refer to the section in this guide specific to each device.

Table 1-1 Figure Legend

Item	Description
	RS-232 cable
	(LAN) Ethernet cable; GPIB (for SCIEX 3200MD systems)
	CAN cable
	USB cable
	Custom cable, supplied with the system
1	Computer
2	Mass spectrometer
3	Autosampler

Table 1-1 Figure Legend (continued)

Item	Description
4	Thermostatted column compartment
5	Pump
6	Detector
7	USB-to-Serial-Converter
8	Ethernet switch
9	Valve drive

Figure 1-1 ExionLC 2.0 System Configuration

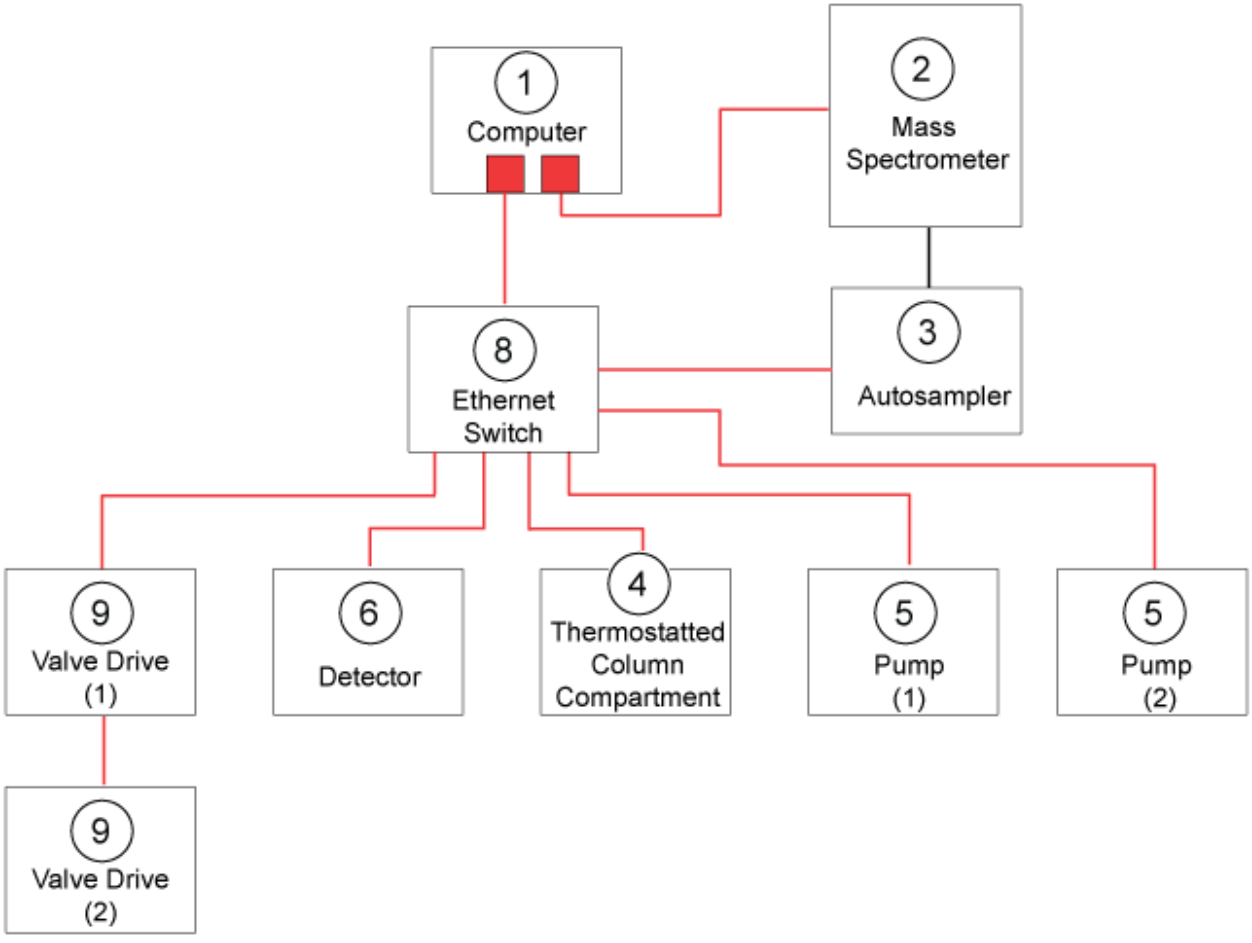


Figure 1-2 Other Systems: Configuration Example One

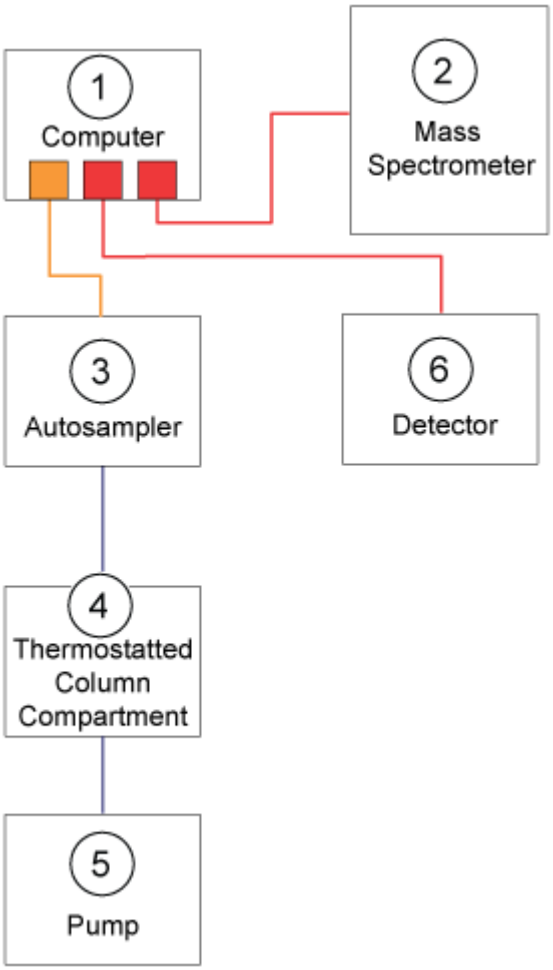


Figure 1-3 Other Systems: Configuration Example Two

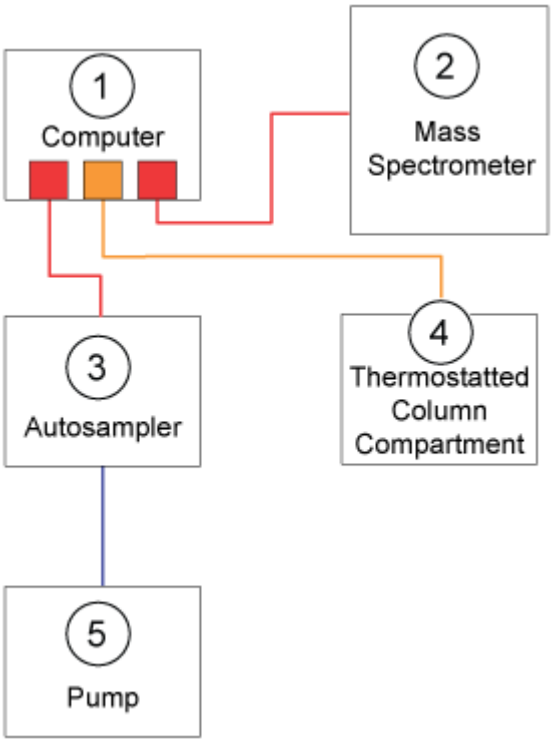
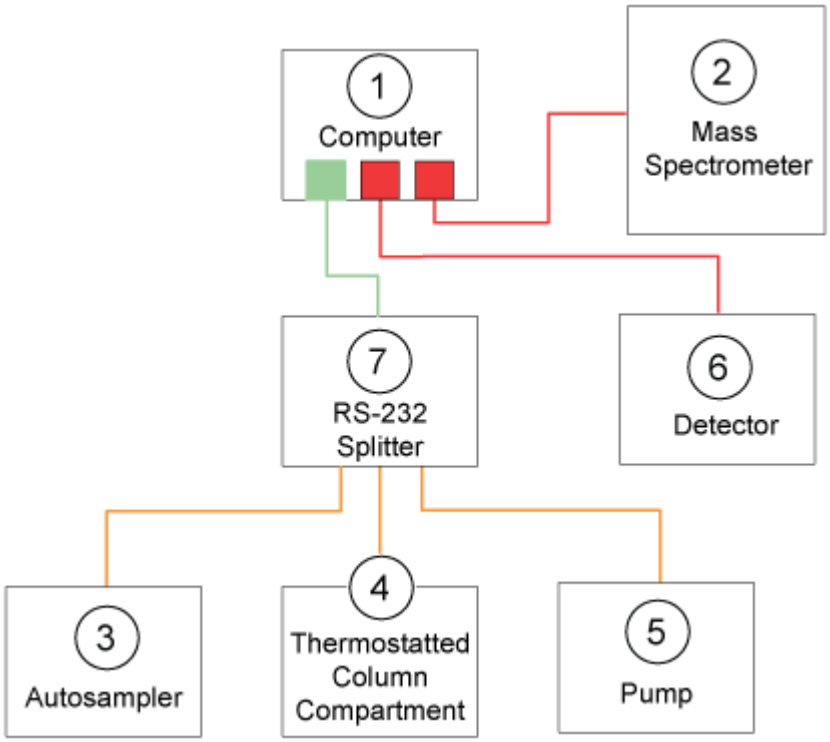


Figure 1-4 Other Systems: Configuration Example Three



Supported Devices

For a current list of the peripheral devices and firmware supported by the Analyst MD software, refer to the current document: *Software Installation Guide*.

Peripheral Device Software Plug-in Vendors

The Analyst Access Object (AAO) is an interface to the Analyst MD software that allows peripheral device vendors to develop device control software that can be plugged into the Analyst MD software to enable integrated LC-MS control. In addition to SCIEX, the following vendors have released AAO software that the Analyst MD software supports:

- Eksigent Technologies
- Shimadzu
- Waters Corp.

Note: The Shimadzu PDA module, SPD–M20, can only be controlled through Shimadzu AAO, unless it is configured through **Integrated System Shimadzu LC-20/30 Controller** when creating a hardware profile.

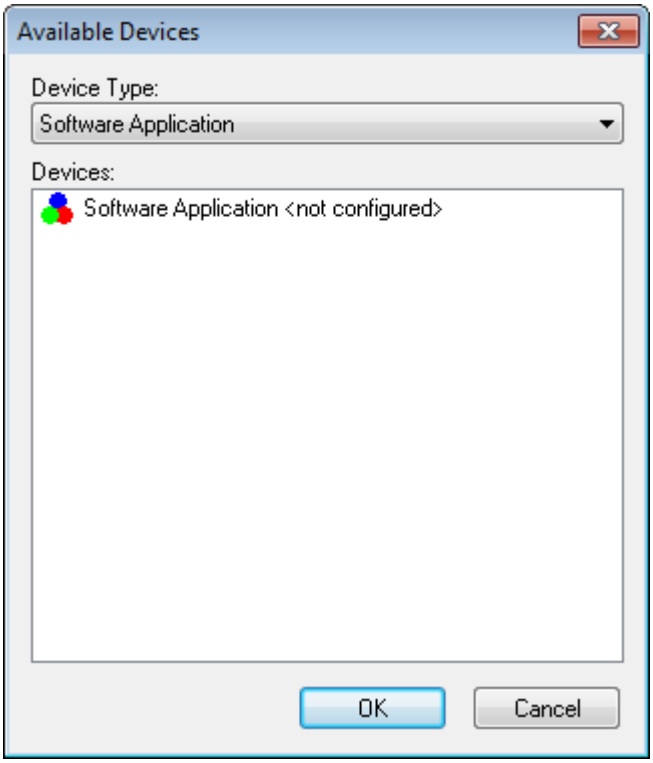
Refer to the vendor documentation or contact the vendors directly for AAO device software information, including latest releases, installation instructions, and information on device hardware set up and configuration.

Adding AAO-Controlled Devices to the Hardware Profile

Use this procedure to add AAO-controlled devices to the hardware profile after the AAO software has been installed.

1. Create or edit a hardware profile. Refer to the document: *Help*.
2. Click **Add Device**.

Figure 1-5 Available Devices Dialog



3. In the Available Devices dialog, in the **Device Type** list, click **Software Application**. The list of AAO software applications installed on the computer are shown in the **Devices** box.
4. Click the AAO software applications to be added, and then click **OK**.

Jasper System 2

WARNING! Electrical Shock Hazard. Refer to the guides for Jasper system modules before configuring any mains-powered equipment. The guides are available on the DVD: *Jasper Systems Customer Reference*.

The following devices comprising the Jasper system are supported by the Analyst MD software:

- Two LC pumps (SCIEX Dx Pump)
- An autosampler (SCIEX Dx Sampler)
- A column oven (SCIEX Dx Oven)
- An LC controller (SCIEX Dx Controller)
- A degasser (SCIEX Dx Degasser)
- A reservoir tray (Jasper Reservoir)

For more information, refer to document: *Jasper System User Guide* available on the Jasper System Customer DVD.

Jasper Device Configuration

Use the SCIEX Dx controller to connect to and control the Jasper system using the Analyst MD software.

The SCIEX Dx controller uses Ethernet connectivity. For more information on controlling the Jasper system, contact a SCIEX Field Service Employee (FSE).

Connect the Jasper Devices to the Controller

The SCIEX Dx Sampler, SCIEX Dx Pump, and SCIEX Dx Oven can be connected to the SCIEX Dx Controller.

1. Press the **On/Off** button to turn off the devices.
2. Press the **On/Off** button to turn off the controller.
3. Connect the fiber optic cable from the device to an appropriate connection at the back of the controller.
    - Connect the autosampler to the fiber optic port 1.
    - Connect the pumps and column oven to any of the fiber optic ports, 3 to 8.

Restart the Controller

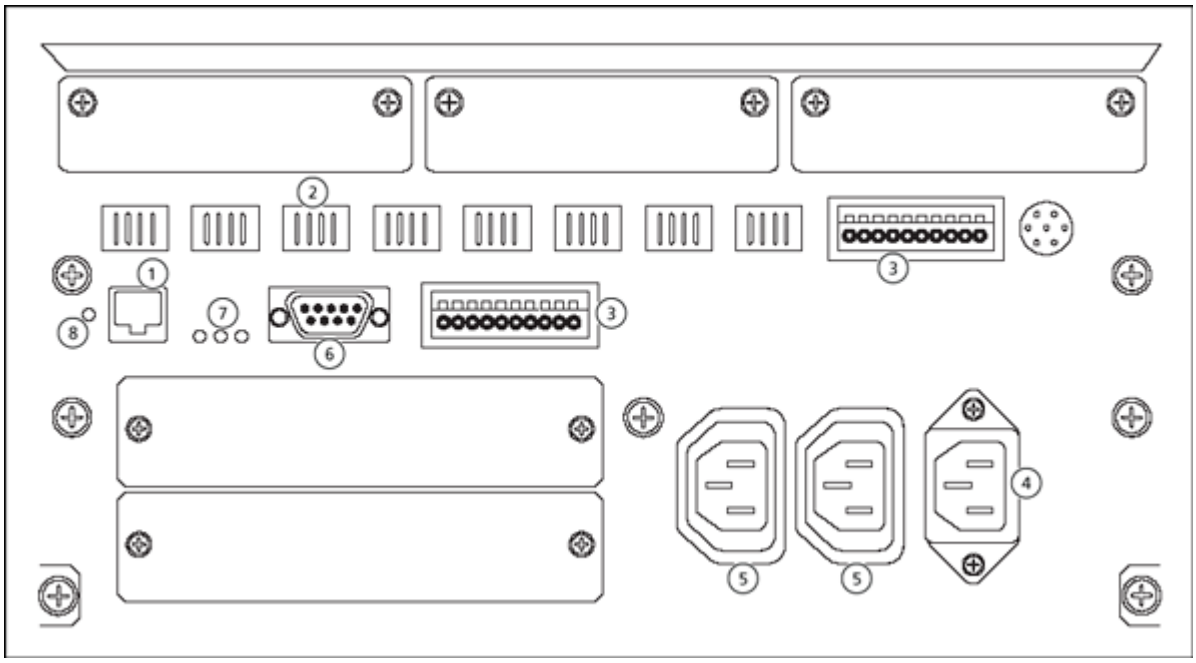
To enable the controller to detect the connected modules, turn off the controller and other modules, wait two seconds, and then turn on all of the modules, turning on the controller last.

Note: The model number for each connected module is shown on the System Configuration screen. The message Remote is shown on any connected pump.

Connect the SCIEX Dx Controller to the Computer

1. Shut down the computer.
2. Press the **On/Off** button to turn off the SCIEX Dx Controller.
3. Connect the Ethernet cable from the Ethernet port at the back of the system controller to the Ethernet port on the computer. Refer to the figure: Figure 2-1.

Figure 2-1 Back of the SCIEX Dx Controller



Item	Description
1	Ethernet port
2	Remote Connector Channels 1 to 8 (fiber optic ports)

Item	Description
3	External I/O connectors
4	Power connector (AC IN)
5	AC output connectors (AC OUT)
6	RS-232 connector (not used)
7	Network indicators (100M/ACT/LINK)
8	Initialization button (INIT)

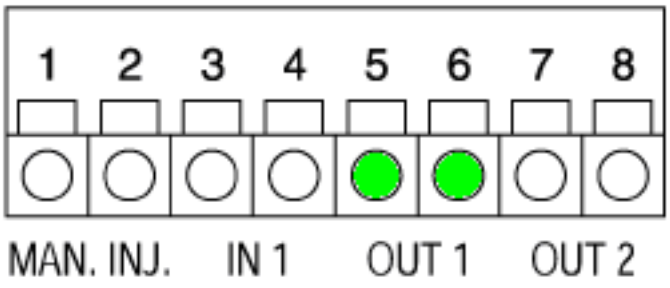
Connect the SCIEX Dx Controller to the Mass Spectrometer

The AUX I/O cable (PN 5055426) is used to connect the SCIEX Dx Controller to the mass spectrometer.

1. Connect the AUX I/O sync cable from the AUX I/O connection at the back of the mass spectrometer to the OUT1 connection on the system controller.

   Note: The AUX I/O sync cable contains two wires: a green wire with a black stripe and a white wire with a black stripe. Insert either of the two wires in the OUT1 terminals. Refer to the following figure.

   Figure 2-2 System Controller OUT

2. Connect the other end of the AUX I/O cable to the mass spectrometer AUX I/O connector.
3. Make sure that RELAY 1 is set to START when the controller is configured in the Analyst MD software.

Shimadzu CL Device 3

WARNING! Electrical Shock Hazard: Refer to the Shimadzu CBM System Controller Safety Instructions before configuring any AC mains-powered equipment.

The Analyst MD software supports the following Shimadzu CL series of devices:

Table 3-1 Devices

Shimadzu CL 20XR series of LC system	Shimadzu CL 30 series of LC system
• CBM-20A CL • CBM-20A Lite CL • SIL-20AC CL • SIL-20ACHT CL • SIL-20AHT CL • SIL-20ACXR CL • LC-20ADXR CL • LC-20AD CL • CTO-20AC CL • SPD-M20A CL • SPD-20A CL • SPD-20AV CL	• SIL-30AC CL • SIL-30ACMP CL • CTO-30A CL • SPD-M30A CL • LC-30AD CL

Use the following controllers to connect to and control a Shimadzu CL system using the Analyst MD software:

- CBM-20A CL
- CBM-20A lite CL

Communications settings are similar for all modules.

The CBM is required for the Analyst MD software to communicate with and control any Shimadzu CL device. The CBM uses serial or TCP/IP (Ethernet) connectivity, with TCP/IP being the preferred mode of communication. For more information on controlling Nexera

and Prominence devices using the Analyst MD software, contact a SCIEX Field Service Representative.

The following table lists the required hardware. For the latest version of supported firmware, refer to the current document: *Software Installation Guide*.

Table 3-2 Required Hardware for Shimadzu Devices

Cable	Other Parts Needed
RS-232 cable (PN WC24736) or LAN cable (with Prominence devices)	• Shimadzu fiber optic cables (one for each device connected) • Shimadzu event cable

Configure a Shimadzu CL System Controller

Use the following procedures to configure a Shimadzu CL system controller.

Connect Shimadzu CL Devices to the Shimadzu CL System Controller

The Shimadzu CL autosampler, UV detector, column oven, or pump can be connected to the Shimadzu CL system controller.

Note: Up to four pumps can be controlled using the Shimadzu CL CBM system controller. For more information, contact a local Shimadzu Representative.

Connect the Devices

1. Press the **On/Off** button to turn off the Shimadzu CL device.
2. Press the **On/Off** button to turn off the Shimadzu CL system controller.
3. Connect the fiber optic cable from the device to an appropriate connection at the back of the CBM-20A Lite CL.
    - Connect the autosampler to fiber optic port 1.
    - Connect pumps to any fiber optic ports 3 to 8 (ports 2 to 4 for CBM-20A Lite CL).
    - Connect detectors to any fiber optic ports 3 to 8 (ports 2 to 4 for CBM-20A Lite CL).
    - Connect any other accessories to any fiber optic ports 3 to 8 (ports 2 to 4 for CBM-20A Lite CL).

Connect a Shimadzu CL Valve Interface Unit to the Shimadzu CL System Controller

Follow the procedures in this section in the order given.

Connect the Valve Interface Unit to the System Controller

1. Press the power button to turn off the controller.
2. Connect the valves to the valve interface unit (Option Box-L, or Subcontroller VP).
3. Connect the fiber optic cable from the valve interface unit to an address connector at the back of the controller.

   Use Address Connectors 3 through 8.
4. Set the DIP switches at the back of the valve interface unit according to the information provided at the back of the unit. The DIP switch setting must match the pump address number used to connect the valve interface unit to the controller.

Configure the System Controller for the Valve Interface Unit

If the system controller is not already turned on, then press the power button to turn it on.

Note: The model number for each connected module is shown on the System Configuration screen. The message Remote is shown on any connected valve.

Restart the System Controller

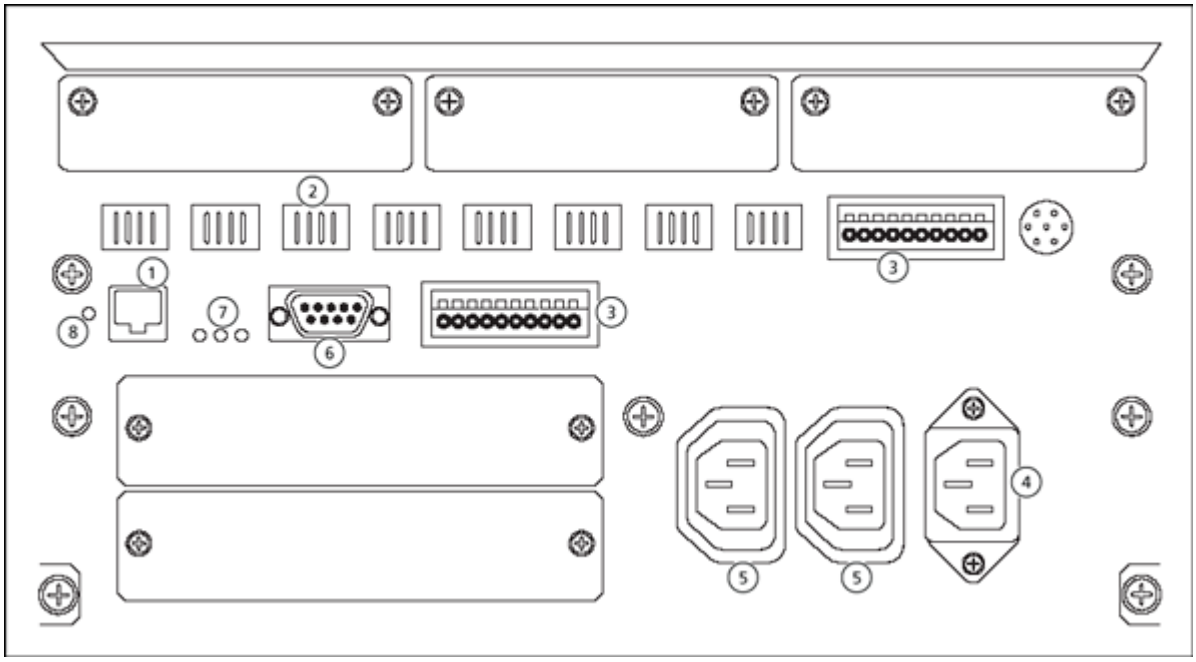
To enable the controller to detect the connected modules, turn off the system controller and other modules, wait two seconds, and then turn on all of the modules, turning on the system controller last.

Note: The model number for each connected module is shown on the System Configuration screen. The message Remote is shown on any connected pump.

Connect the Shimadzu CL System Controller to the Computer

1. Shut down the computer.
2. Turn off the Shimadzu CL system controller by pressing the On/Off button.
3. Connect the RS-232 cable from the serial port at the back of the system controller to any available serial port on the computer, noting the port number. Refer to the figure: Figure 3-1.

Figure 3-1 Back of the Shimadzu CL CBM System Controller



Item	Description
1	Ethernet port
2	Remote Connector Channels 1 to 8 (fiber optic ports)
3	External I/O connectors
4	Power connector (AC IN)
5	AC output connectors (AC OUT)
6	RS-232 connector
7	Network indicators (100M/ACT/LINK)
8	Initialization button (INIT)

Connect the System Controller to the Mass Spectrometer

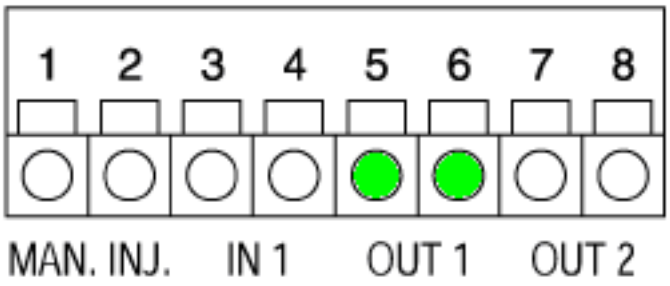
Use the following procedure when using the CBM-20A or CBM-20A Lite CL system controller.

The AUX I/O cable (PN 5055426) is used to connect the system controller to the mass spectrometer.

1. Connect the AUX I/O sync cable from the AUX I/O connection at the back of the mass spectrometer to the OUT1 connection on the system controller.

Note: The AUX I/O sync cable contains two wires: a green wire with a black stripe and a white wire with a black stripe. Insert either of the two wires in the OUT1 terminals. Refer to the following figure.

Figure 3-2 System Controller OUT



2. Connect the other end of the AUX I/O cable to the mass spectrometer AUX I/O connector.
3. Make sure that RELAY 1 is set to START when the controller is configured in the Analyst MD software.

Fault Recovery

The manufacturer recommends that the devices attached to the system controller be identical to those configured in the Analyst MD software hardware profile. Differences between the two configurations can result in communication issues between the software, the system controller, and the attached devices.

If the vial detection sensor is ON, then during an autosampler rinse, if any autosamper vials are missing or if a run is aborted, a fault condition occurs. To correct these errors, users must manually intervene before the Analyst MD software can continue functioning normally. To recover Analyst MD software control, perform the task indicated on the device screen. Alternatively, follow the Fault Recovery procedure to clear all of the conditions.

The preset run time is 10 minutes. If required, change the duration in the method.

Note: The needle height in the method must match that of the current tray. The preset value is not valid for all of the trays.

The LC equipment can generate three different error conditions that cause the Analyst MD software to stop: warning, error, and fatal error.

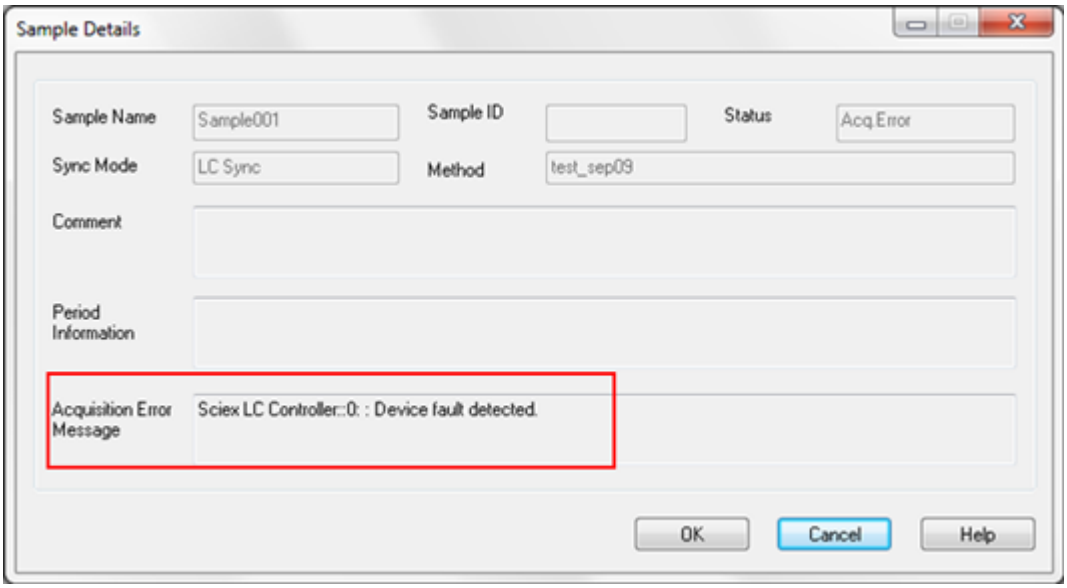
Errors from the system controller are shown in the Windows/Analyst MD event logs as VIxxxx errors, for example: VIRUN.

Errors

Any error condition on the LC system stops the Analyst MD software batch, except for a missing vial error which will not stop the batch if the **Fail whole batch in case of missing vial** box is cleared in the Analyst Queue Options. The LC system typically sounds an audible alarm in the event of an error until the user acknowledges the error. Some errors that may be encountered and the recommended actions include the following:

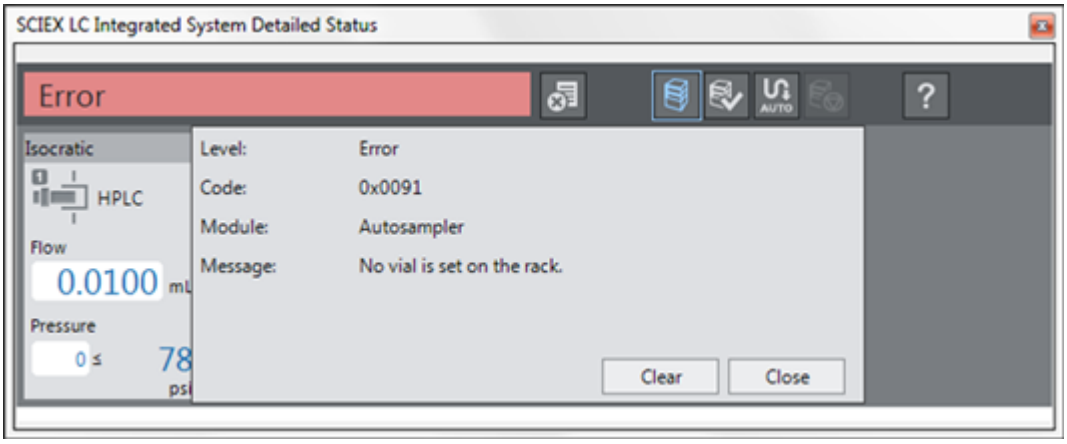
- LEAK DETECT: Press **CE** to stop the alarm. Find and address the problem. Thoroughly dry the area around the leak sensor of the affected module, and possibly any module below it in the stack due to the internal drain system. Recover using the following procedure: Recover From a Fault for Systems Equipped with a CBM-20A Lite CL System Controller.
- PRESSURE OVER PMAX: Press **CE** to stop the alarm. Correct the problem. Recover using the following procedure: Recover From a Fault for Systems Equipped with a CBM-20A Lite CL System Controller.
- NO VIAL DETECTED: This error shows on the autosampler if it does not find a vial it is asked to inject. The current sample is aborted and the remaining batch is suspended. Double-click the sample with acquisition error in the Analyst MD software to view the acquisition error message. Refer to the figure: Figure 3-3.

Figure 3-3 Acquisition Error Message



To view the cause of the error that stopped the batch, double-click the icon on the Status bar in the Analyst MD software window to open the SCIEX LC Integrated System Detailed Status dialog. Refer to the figure: Figure 3-4.

Figure 3-4 SCIEX LC Integrated System Detailed Status Dialog



To resolve this error, fix the problem. Recover using the following procedure step 5 onwards: Recover From a Fault for Systems Equipped with a CBM-20A Lite CL System Controller. Then, resubmit the batch.

Fatal Errors

The final level of error generated by this equipment is a fatal error. Fatal errors are normally generated by a mechanical failure and are generally associated with the autosampler injection mechanism. The only way to recover from a fatal error is to power cycle the entire system. If, after power cycling, the error occurs again, contact the manufacturer for assistance.

Recover From a Fault for Systems Equipped with a CBM-20A Lite CL System Controller

For warnings and typical errors, the module experiencing the issue shows the condition on its front panel screen and the module and CBM show a RED status LED bar. The connect LED on the CBM is no longer lit. The CBM-20A Lite CL system controller works in the same way but has no indication of the error because it is installed in a module.

1. Press **CE** to stop the alarm and clear the error.
2. Correct the cause of the error.
3. Press the black **INIT** button at the back of the CBM-20A Lite CL for no longer than five seconds. Refer to the figure: Figure 3-1.
   The CBM status LED bar changes to green and the connect LED illuminates, thus confirming that communication with the software has been restored.
4. If either the status LED does not change to green or the connect LED fails to illuminate, then proceed with the following steps.

Note: In the event of a device fault, either within the Analyst MD software or at the device itself, it may be difficult to reactivate or run the devices. If this occurs, then perform the following reboot sequence to regain control.

5. Deactivate the hardware profile in the Analyst MD software.
6. Turn off all of the Shimadzu CL devices, including the system controller.
7. Turn on allof the devices attached to the system controller and allow them to finish initialization.
8. Turn on the system controller.
9. Make sure that all of the devices for the Shimadzu CL configured in the Analyst MD software hardware profile match the Shimadzu CL devices connected to the computer and the mass spectrometer.
10. Activate the hardware profile in the Analyst MD software.

Configure the Shimadzu CL Devices in the Analyst MD Software

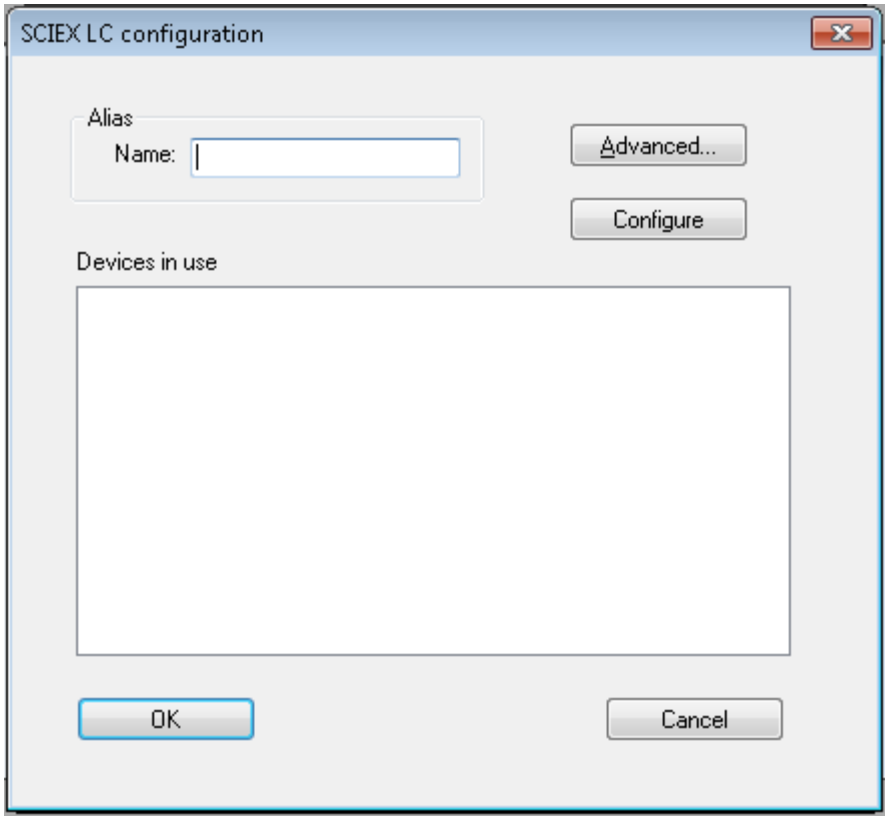
Create a Hardware Profile for the Shimadzu CL Devices

Prerequisite Procedures
• Make sure that the Analyst MD software is open and the computer is connected to the Shimadzu CL series of devices.

1. Create a hardware profile and then add a mass spectrometer. Refer to the applicable document: *System User Guide*.
2. Click **Add Device**.
   The Available Devices dialog opens.
3. Select **Integrated System** in the **Device Type** list.
4. Click the **Integrated System Sciex LC Controller** or the **Integrated System Shimadzu LC-20/30 Controller** option and then click **OK**.

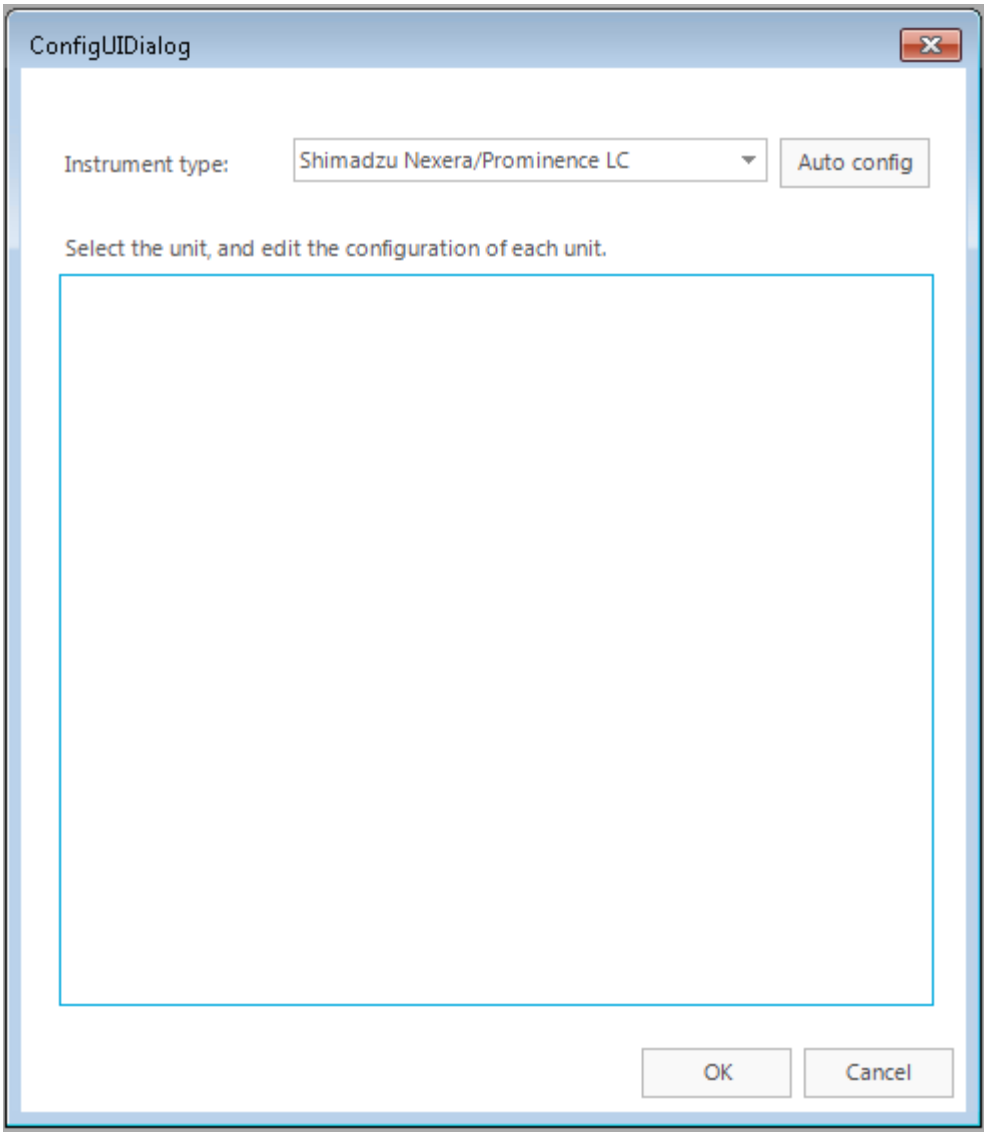
   Note: The Shimadzu CL series can be controlled through either the Integrated System SCIEX LC Controller or the Integrated System Shimadzu LC-20/30 Controller option. If an existing hardware profile containing a Shimadzu CL LC device was created in the Analyst MD 1.6.3 software, then continue to use that hardware profile and configuration to maintain the backwards compatibility of the methods.
5. Click **Setup Device**.

Figure 3-5 SCIEX LC configuration Dialog



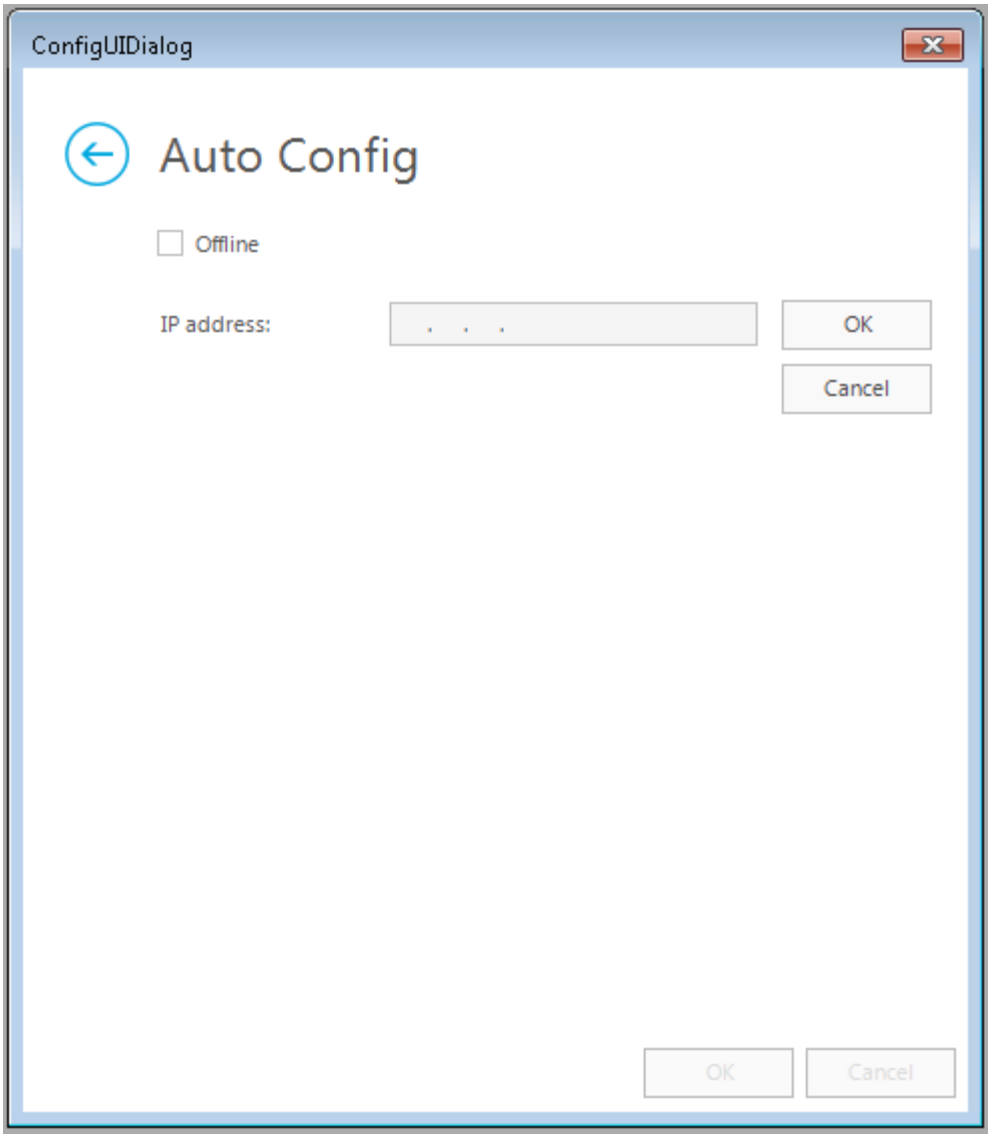
6. Click **Configure**.

Figure 3-6 ConfigUI Dialog



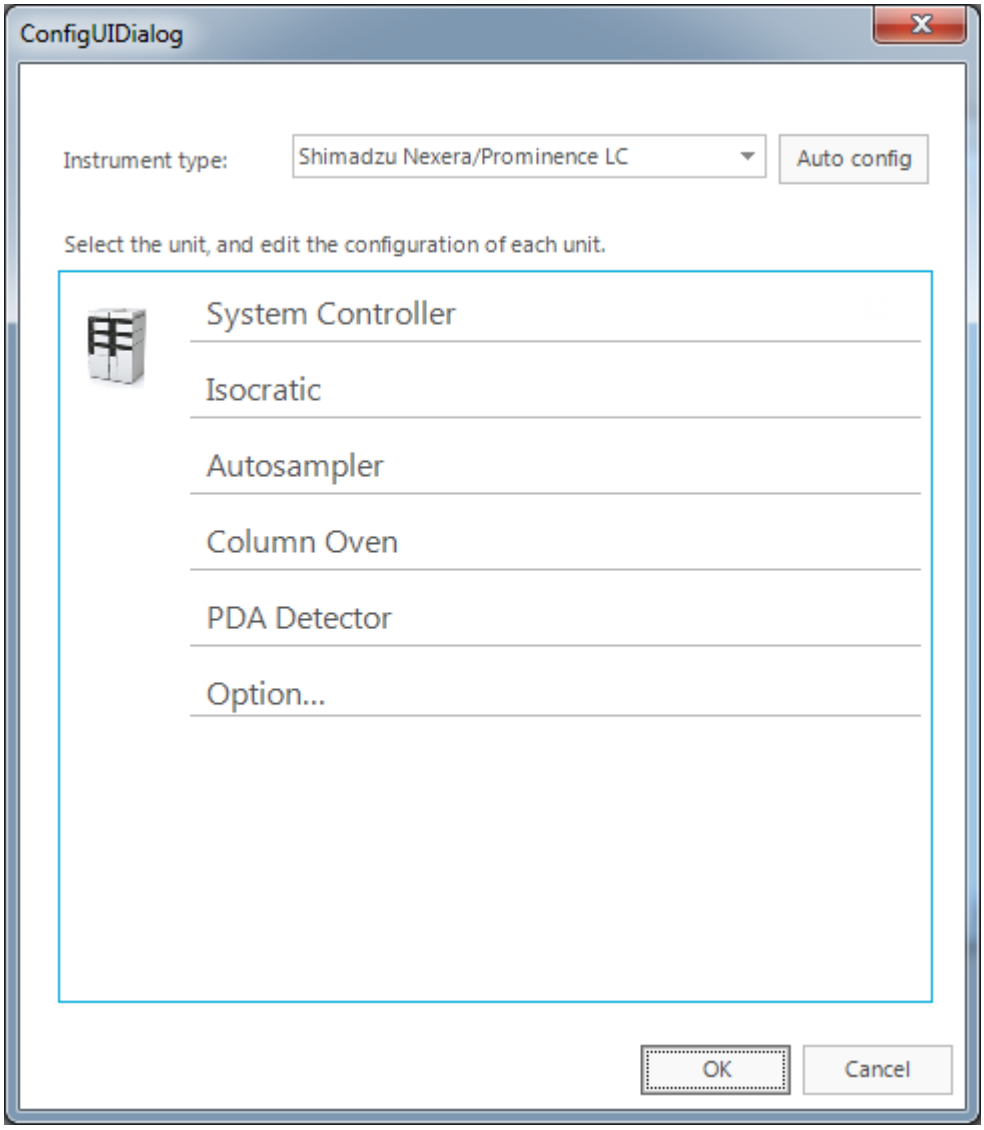
7. Make sure that **Shimadzu Nexera/Prominence LC** is selected in **Instrument type** and then click **Auto config**.

Figure 3-7 Dialog for Auto Configuration



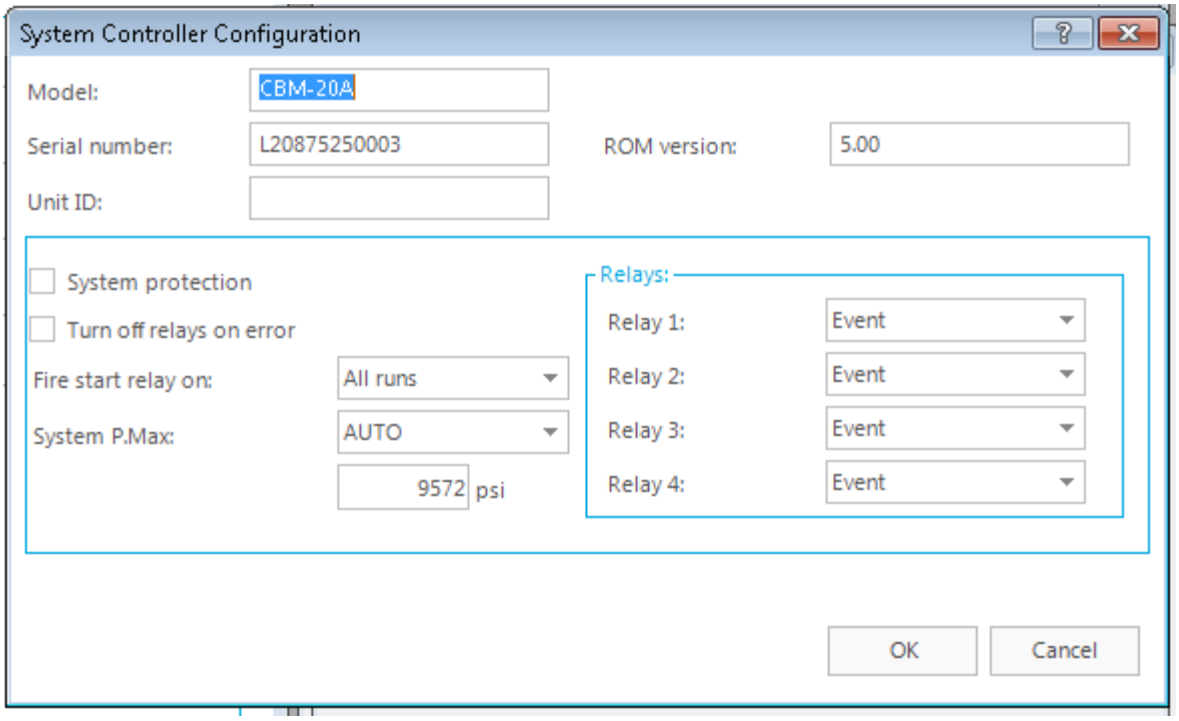
8. Type the **192.168.200.99** for the Shimadzu CL system controller in the **IP address** field and then click **OK** next to the **IP address** field.
   The ConfigUIDialog opens again. All of the devices configured in the Shimadzu CL LC system are shown in the dialog. These devices can be further configured in this dialog.

Figure 3-8 ConfigUIDialog



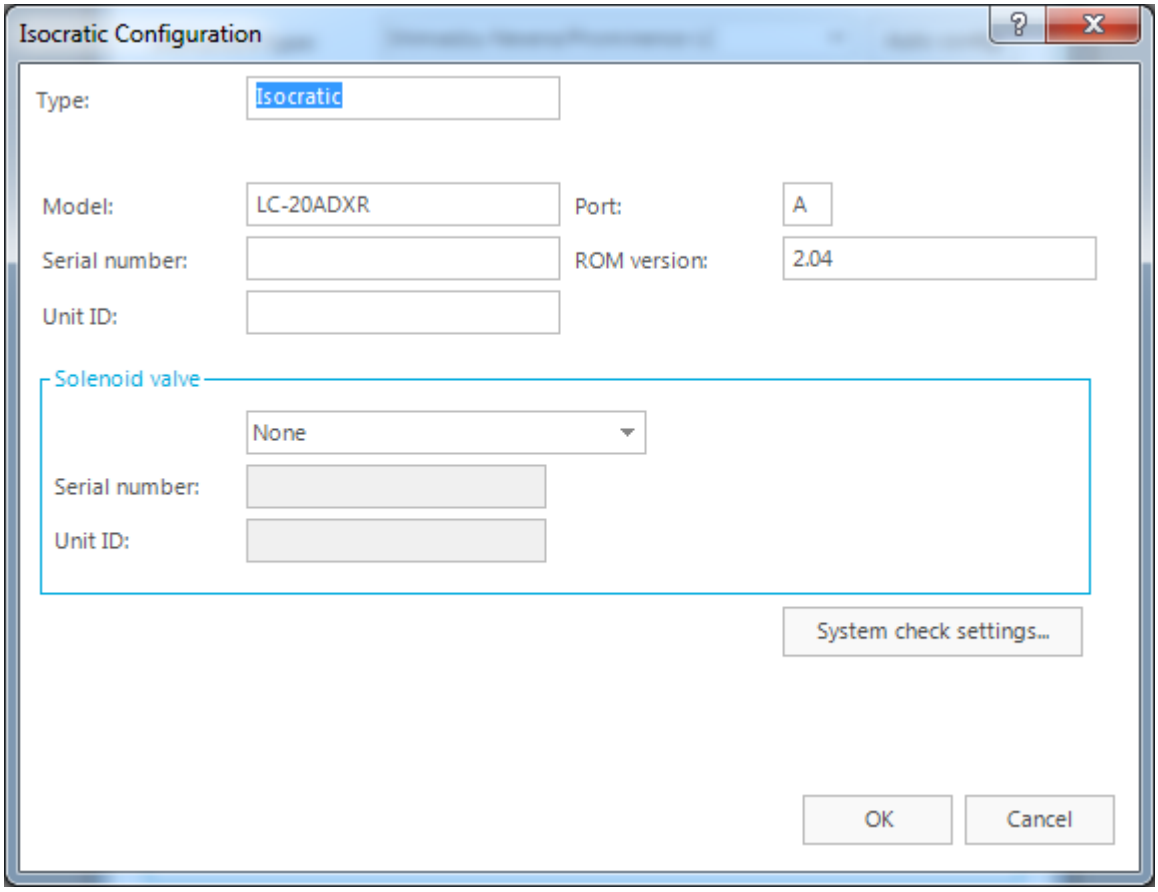
9. Click **System Controller**.

Figure 3-9 System Controller Configuration Dialog



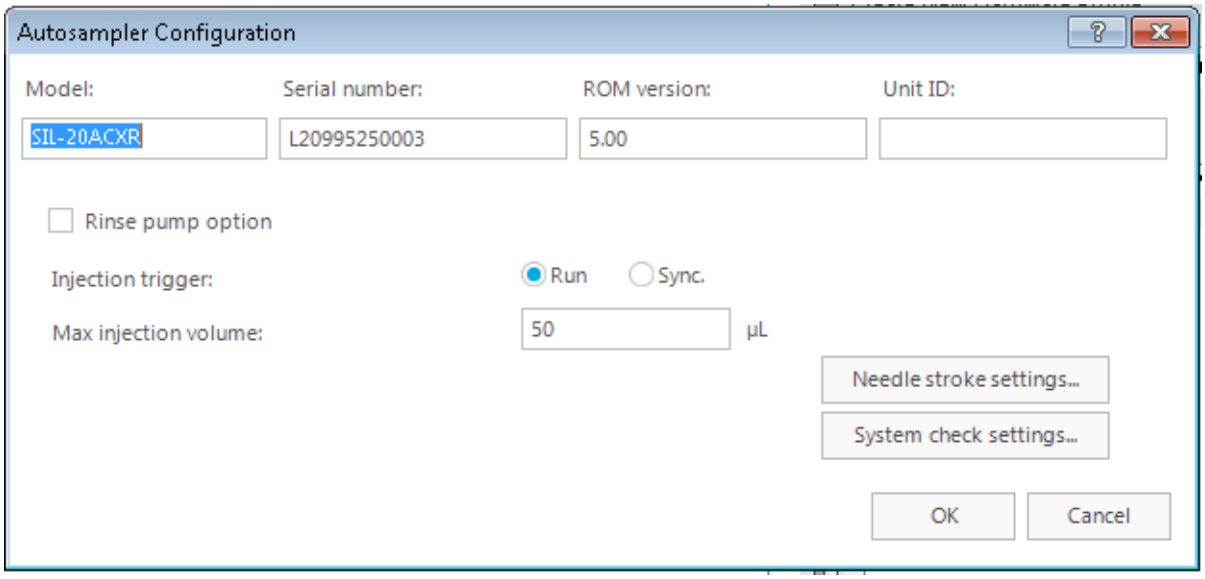
10. Change the values of the different fields if required and then click **OK**. Press **F1** to open the Shimadzu CL help.
    The ConfigUIDialog opens.
11. Click **Isocratic**.
    The Isocratic Configuration dialog opens. The parameters for the pump are shown.

Figure 3-10 Isocratic Configuration Dialog



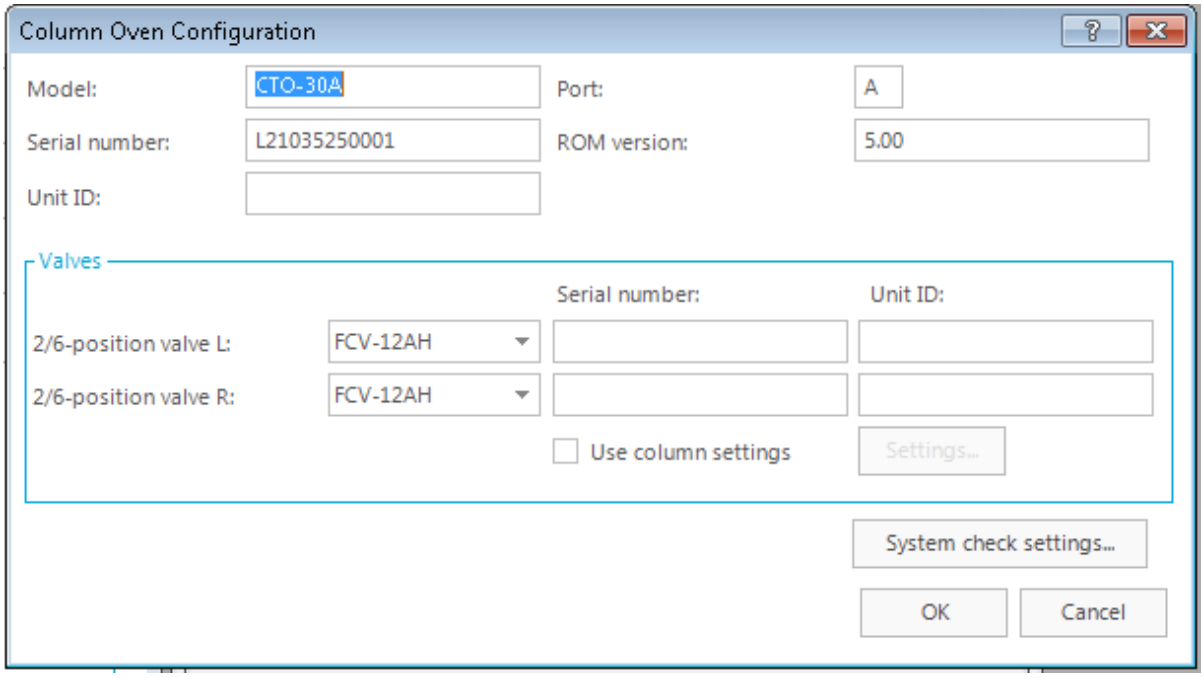
12. Change the values of the different fields if required and then click **OK**. Press **F1** to open the Shimadzu CL help.
    The ConfigUIDialog opens.
13. Click **Autosampler**.

Figure 3-11 Autosampler Configuration Dialog



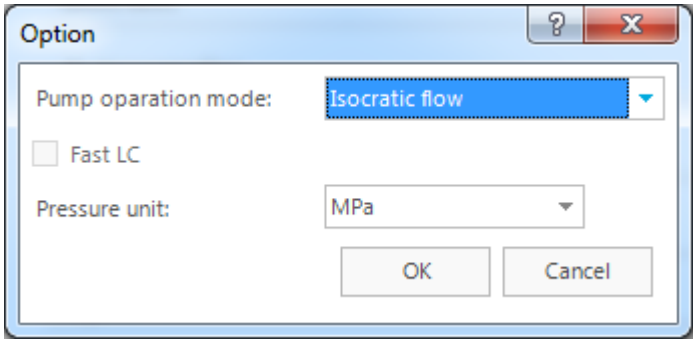
14. Change the values of the different fields if required and then click **OK**. Press **F1** to open the Shimadzu CL help.
    The ConfigUIDialog opens.
15. Click **Column Oven**.

Figure 3-12 Column Oven Configuration Dialog



16. Change the values of the different fields if required and then click **OK**. Press **F1** to open the Shimadzu CL help.
    The ConfigUIDialog opens.
17. Click **Option**.

Figure 3-13 Option Dialog



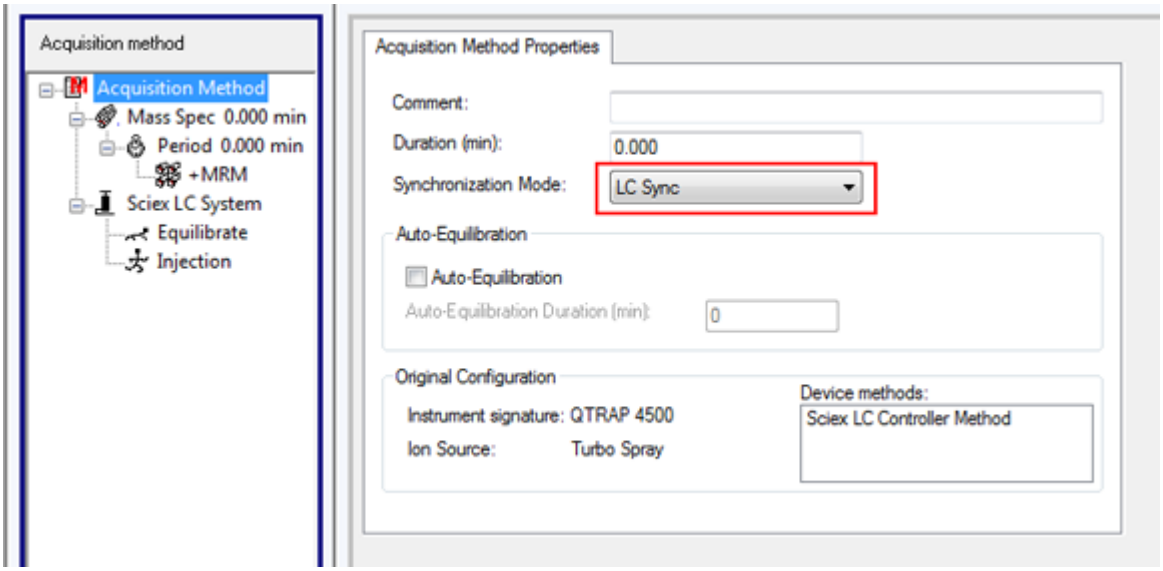
18. Change the values of the different fields if required and then click **OK**. Press **F1** to open the Shimadzu CL help.
    The ConfigUIDialog opens.
19. Click **OK**.
    All of the configured devices are shown in the **Devices in use** box in the SCIEX LC configuration dialog.
20. Click **OK**.
    The Create New Hardware Profile dialog opens.
21. Click **OK**
    The Hardware Configuration Editor opens.
22. Click **Activate Profile**.

Create an Acquisition Method for the Shimadzu CL Devices

Prerequisite Procedures
• Make sure that the Analyst MD software is open and the computer is connected to the Shimadzu CL series of devices. • Make sure that the hardware profile for the Shimadzu CL series of devices and a SCIEX MD mass spectrometer is activated.

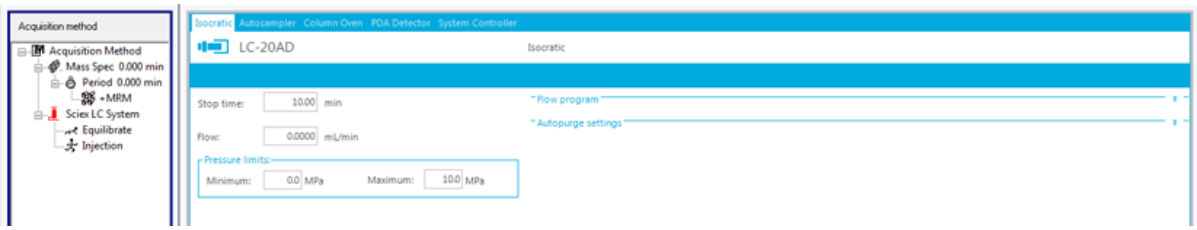
1. On the Navigation bar, under **Acquire**, double-click **Build Acquisition Method**.
2. In the **Acquisition Method Properties** tab, make sure that the **Synchronization Mode** is set to **LC Sync**.

Figure 3-14 Acquisition Method Editor



3. Click **Sciex LC System** in the Acquisition method pane.
   Parameters for all of the Shimadzu CL devices connected to the computer are shown on different tabs. The Isocratic tab shows the parameters for the isocratic pump.

Figure 3-15 Parameters for the Shimadzu CL Isocratic Pump

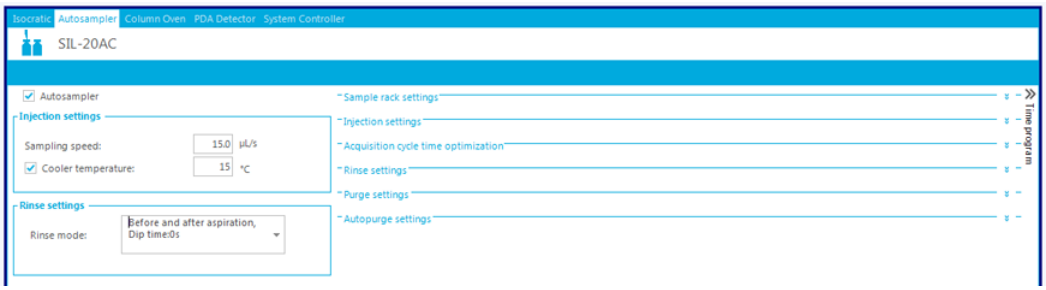


   Modify the parameters if required. Press **F1** for help.

4. Click ˅ next to **Flow program** and **Autopurge settings** to view the corresponding parameters.
   Modify the parameters if required. Press **F1** for help.

5. Open the Autosampler tab.
   The parameters for the Shimadzu CL autosampler are shown. If required, modify the parameters. Press **F1** for help.

Figure 3-16 Parameters for the Shimadzu CL Autosampler



6. Click ▼ in the **Rinse mode** field to view and modify values for this field.
   The pane to set the values for the Rinse mode field is shown.

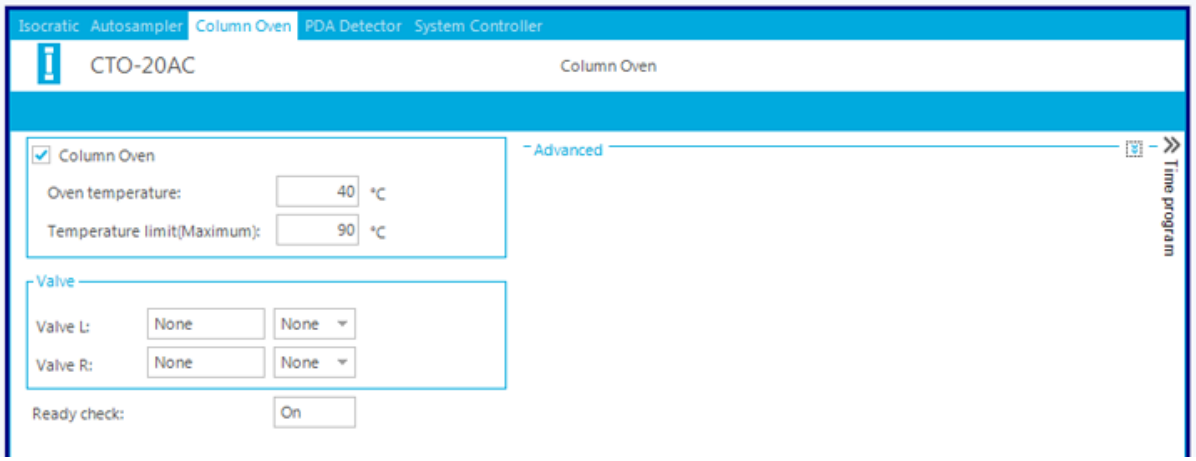
7. Click » next to **Sample rack settings**, **Injection settings**, **Acquisition cycle time optimization**, **Rinse settings**, **Purge settings**, and **Autopurge settings** to view the corresponding parameters.
   The parameters are shown.

8. Click ⊠ to close the parameters.

9. Click » above **Time program** to program the time for the autosampler.

10. Open the Column Oven tab.
    The parameters for the Shimadzu CL column oven are shown. Press **F1** for help.

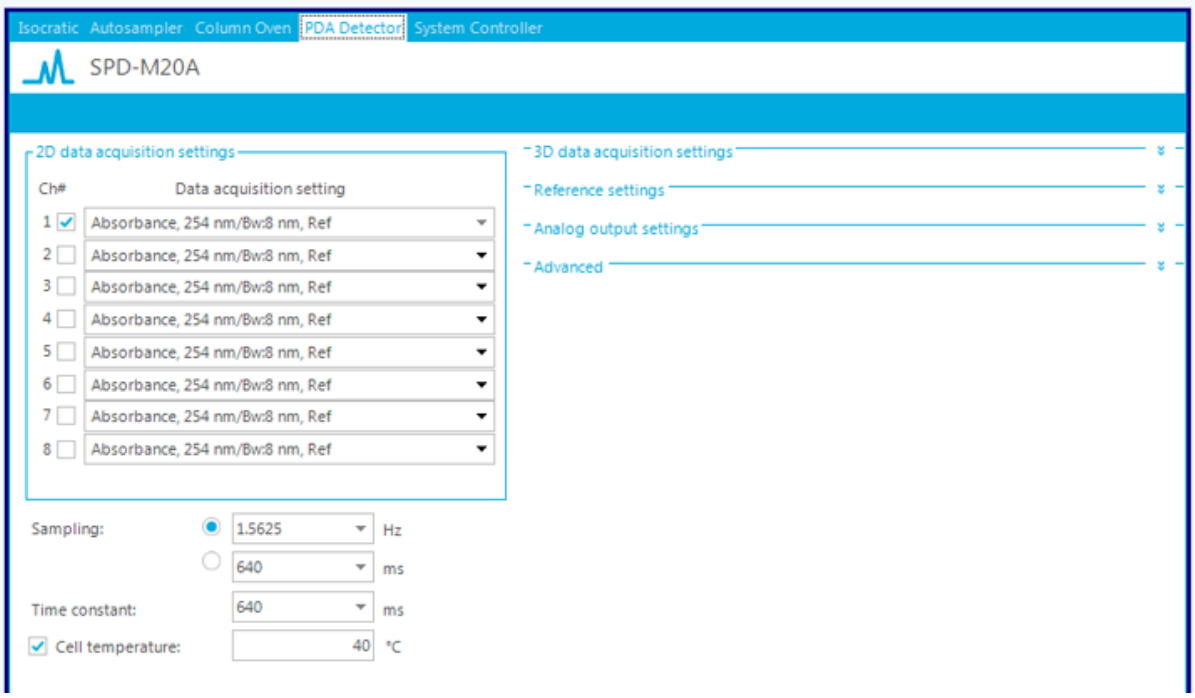
Figure 3-17 Parameters for the Shimadzu CL Column Oven



11. Modify the parameters in the Advanced and Time program sections if required. Press **F1** for help.

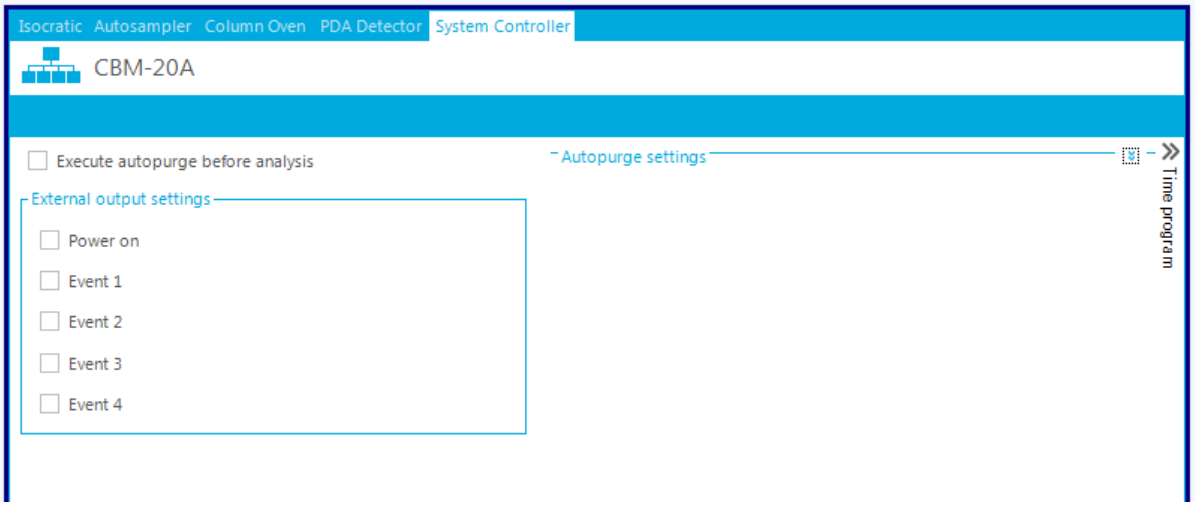
12. Open the PDA Detector tab.
    The parameters for the Shimadzu CL PDA Detector are shown. Press **F1** for help.

Figure 3-18 Parameters for the Shimadzu CL PDA Detector



13. Modify the parameters in the **3D data acquisition settings**, **Reference settings**, **Analog output settings** and **Advanced** sections if required. Press **F1** for help.
14. Open the System Controller tab.
    The parameters for the Shimadzu CL system controller are shown. Press **F1** for help.

Figure 3-19 Parameters for the Shimadzu CL System Controller



15. Modify the parameters in the **Autopurge Settings** and **Time program** sections if required. Press **F1** for help.
16. Click **Equilibrate** in the Acquisition method pane.
    The parameter for pump is shown. Modify the parameter value if required.
17. Click **Injection** in the Acquisition method pane.
    The parameter for autosampler is shown. Modify the parameter value if required.
18. Click **Mass Spec** in the Acquisition method pane.
    The MS and Advanced MS tabs are shown.
19. If required, populate the different fields on the MS and Advanced MS tabs.
20. Save the acquisition method by clicking **File** > **Save As**.

Batch Creation, Data Acquisition, and Data Processing

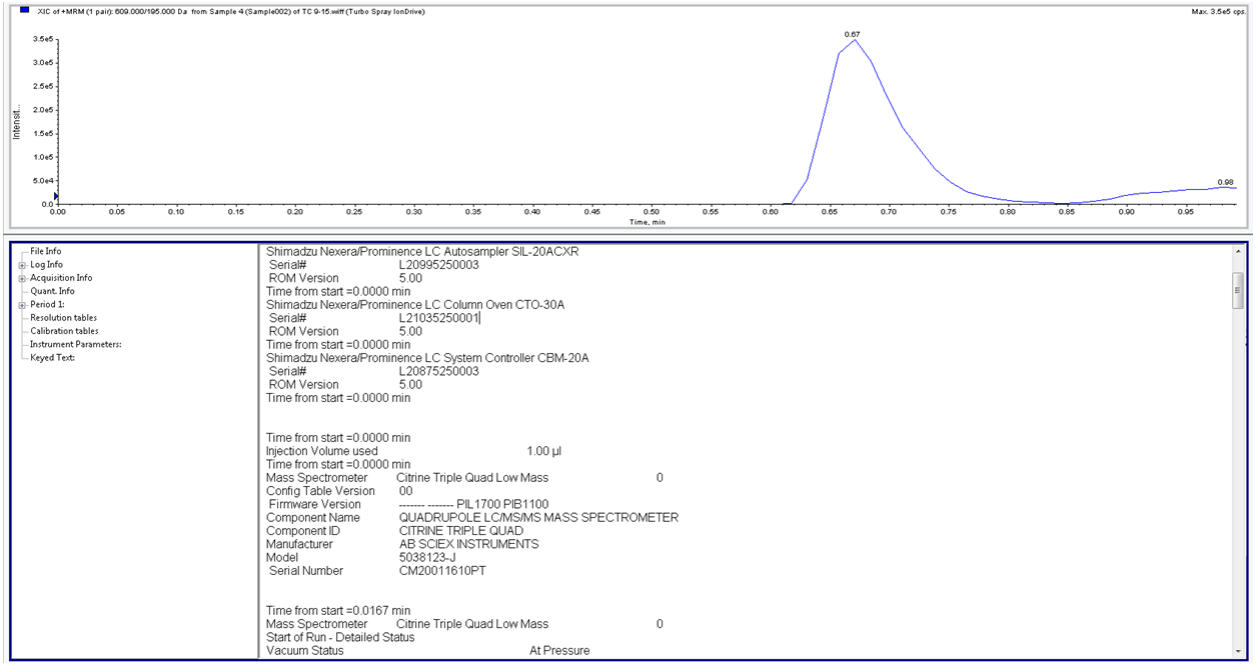
Using the methods created in the section: Create an Acquisition Method for the Shimadzu CL Devices, create batches, submit samples for acquisition, and process data. Refer to the document: *Software User Guide*.

View Shimadzu CL LC Series-Related Information in File Info

When a sample is acquired using devices in the Shimadzu CL LC Series, information about the LC devices can be viewed in the File Info of the wiff file.

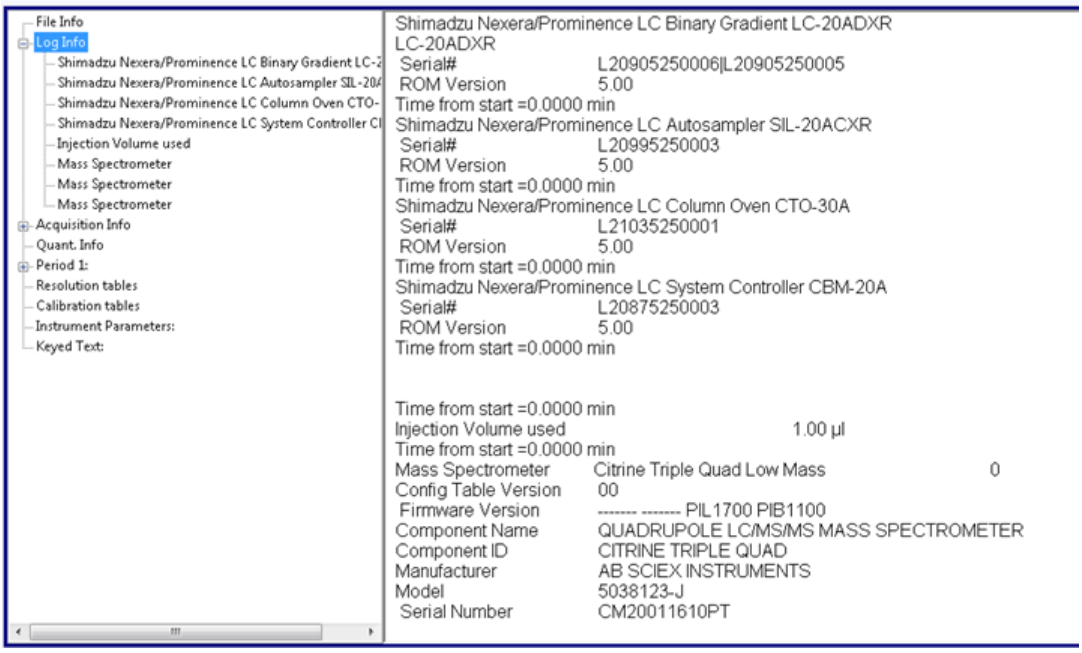
1. In the Analyst MD software, on the Navigation bar, under **Explore**, double-click **Open Data File**.
   The Select Sample dialog opens.
2. Select the wiff file to be opened, and then select a sample. Click **OK**.
   The wiff file opens and the chromatogram for the selected sample is shown.
3. Click the  on the toolbar of the Analyst MD software window.
   The File Info opens under the chromatogram.

Figure 3-20 TIC for a Sample wiff File and the Related File Info



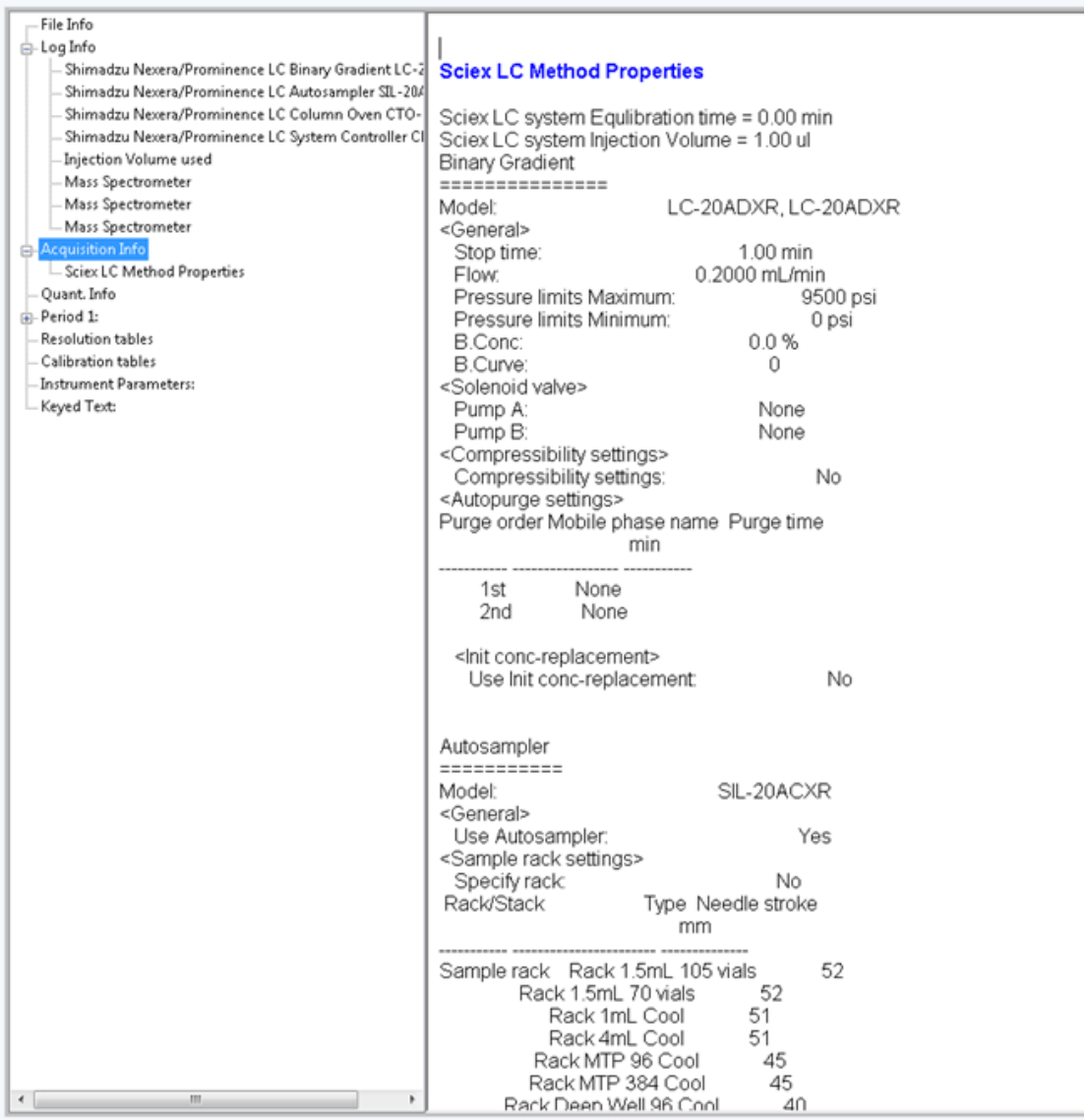
4. In the left pane of File Info, click  next to the **Log Info** to expand it.
   The Shimadzu CL LC series-related information is shown in the right pane of File Info. Scroll up or down in the right pane to view the information.

Figure 3-21 Shimadzu CL LC Series-Related Information in Log Info Section of File Info



5. In the left pane of **File Info**, click  next to **Acquisition Info** to expand it.
   LC method-related information is shown in the right pane of File Info. Scroll up or down in the right pane to view the information.

Figure 3-22 LC Method-Related Information in Acquisition Info Section of File Info

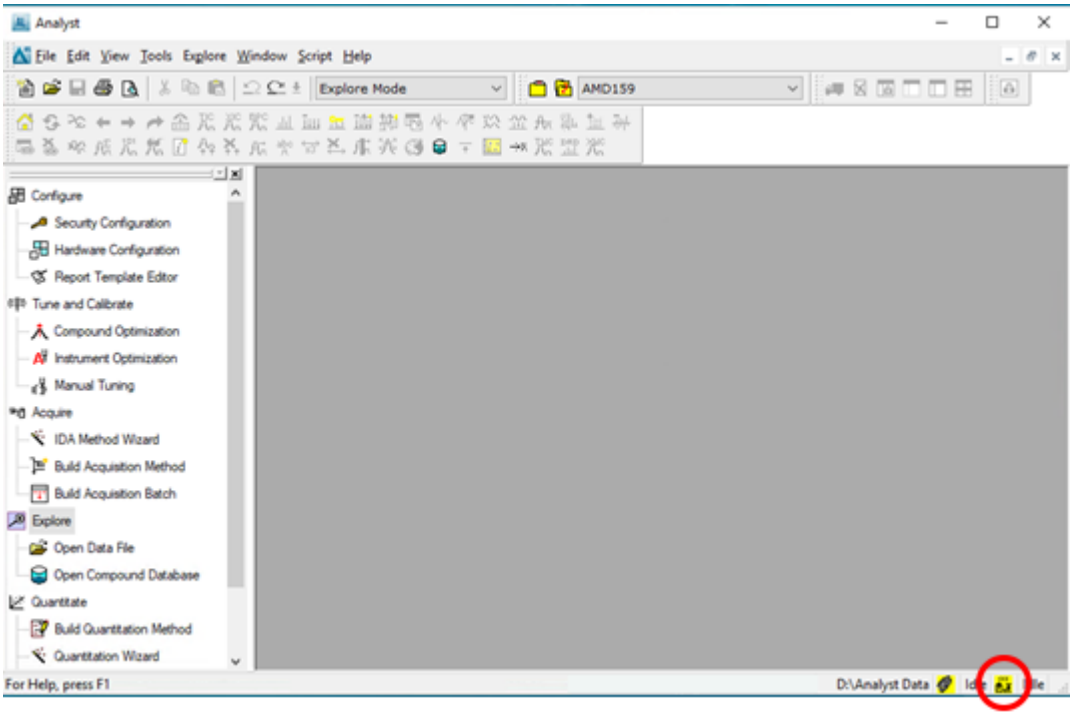


View the Status of Shimadzu CL LC Series of Devices

In the Analyst MD software, the status of the devices in the Shimadzu CL LC Series can be viewed in real time in the Status window while batch acquisition is in process.

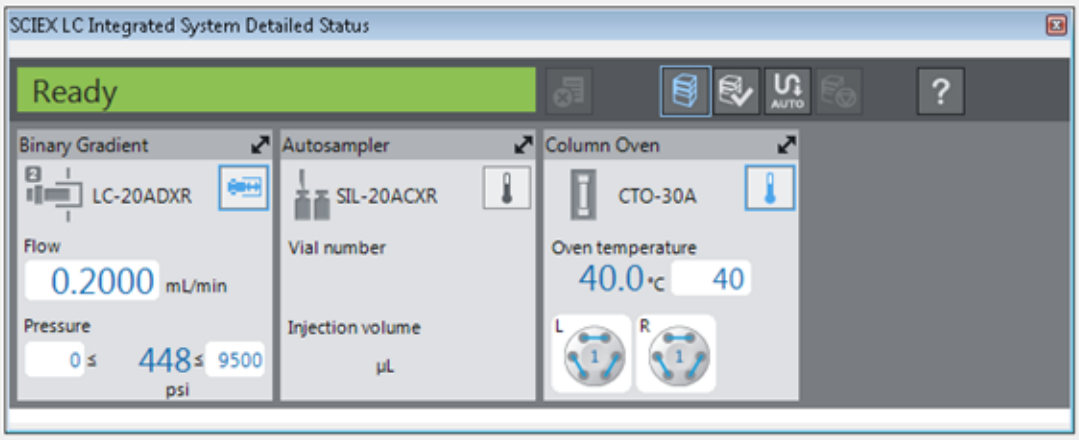
1. In the Analyst MD software window, on the Status bar, double-click  to open the Sciex LC Controller status dialog.

Figure 3-23 LC System Status in the Analyst MD Software



The SCIEX LC Integrated System Detailed Status Dialog opens. The realtime status of the devices is shown. Press **F1** for help.

Figure 3-24 SCIEX LC Integrated System Detailed Status Dialog



2. Click ⤢ in any of the sections to expand that section.
   Press **F1** for help.

3. Click  in any of the sections to return the section to the original size.

ExionLC 2.0 Systems 4

WARNING! Electrical Shock Hazard. Refer to the guides for ExionLC 2.0 system modules before configuring any mains-powered equipment. The guides are available on the DVD: *ExionLC 2.0 Systems Customer Reference*.

For information about the ExionLC 2.0 system modules supported by the Analyst MD software, and the latest tested firmware version, refer to the document: *Software Installation Guide* for a major release or the applicable document: *Release Notes*.

ExionLC 2.0 System Configuration

The ExionLC 2.0 modules are connected to an Ethernet switch. This switch is, in turn, connected to the acquisition computer.

A synchronization (AUX I/O) cable connects the autosampler to the mass spectrometer.

Connect the Computer to the Ethernet Switch

1. Connect the mains supply cable for the switch to the mains supply outlet.
2. Connect a LAN cable from the computer to port 1 on the switch.

Connect Modules to the Ethernet Switch

The autosampler, pump, column oven, detectors, and valve drives are connected to the Ethernet switch.

1. Press the power button on each module to turn off the module.
2. Connect the LAN cable from the modules to the appropriate ports at the back of the switch.
   - Connect the pump to port 2 on the switch.
   - Connect the autosampler to port 3 on the switch.
   - Connect the column oven to port 4 on the switch.
   - (Optional) Connect LAN 1 port on the valve drive to port 5 on the switch.
   - (Optional) Connect the diode array detector (DAD) to port 6 on the switch.
   - (Optional) Connect the multiwavelength detector (MWD) to port 7 on the switch.
   - (Optional) Connect the second pump to port 8 on the switch.

- (Optional) Connect the wash system to port 8 on the switch unless the second pump is also configured. If the pump is configured, then connect the wash system in one of these ways:
  - If the ExionLC 2.0 system has eight modules, then use a switch with 16 ports, and connect the wash system to port 9.
  - If the ExionLC 2.0 system has seven or fewer modules, then connect the wash system to any port available for an optional module that is not part of the current configuration.
- (Optional) If multicolumn switching that includes two valve drives is used, then connect LAN 1 port on the second valve drive to LAN 2 port on the first valve drive.

Note: This is the recommended configuration, for consistency and optimal serviceability. However, alternate port connections can be used, if required.

Connect the System to the Mass Spectrometer

The AUX I/O cable (PN 5082716) is used to connect the autosampler to the mass spectrometer.

1. Connect the DB-9 end of the AUX I/O cable to the I/O port on the autosampler.
2. Connect the DB-25 end of the AUX I/O cable to the AUX I/O port on the mass spectrometer.

Configure the Software

1. Make sure that the Ethernet port of the LC system on the computer has the IP address 192.168.150.100, with a subnet mask of 255.255.255.0.
2. After connecting and turning on the system, configure a hardware profile in the Analyst MD software. Refer to the document: *ExionLC 2.0 System Software User Guide*.

   After the automatic configuration is complete, make sure that the modules have the IP addresses listed in the following table. If the IP addresses do not match the ones in the table, then contact the local SCIEX representative.

Table 4-1 ExionLC 2.0 Modules and IP Addresses

Device	Model	IP Address
Pump	LPGP-200	192.168.150.101
Pump	BP-200	192.168.150.101
Pump	BP-200+	192.168.150.101
Second pump	BP-200, BP-200+ or LPGP-200	192.168.150.107
Wash System	WS-200	192.168.150.109
Autosampler	AS-200	192.168.150.102

Table 4-1 ExionLC 2.0 Modules and IP Addresses (continued)

Device	Model	IP Address
Autosampler	AS-200+	192.168.150.102
Valve drive	DR-200	192.168.150.106
Second valve drive	DR-200	192.168.150.108
Column oven	CO-200	192.168.150.103
Detector	MWD-200	192.168.150.105
Diode Array Detector	DAD-200 or DADHS-200	192.168.150.104

Fault Recovery Guidelines

The following guidelines are provided so that some fault conditions can be avoided.

Warnings

A warning is an informational notification of conditions such as an open door on a temperature controlled module, a low solvent level, or temperature not ready. These conditions do not prevent the system from operating properly. However, the software treats some of the warnings as error conditions, generates an error, and then stops the batch. Contact SCIEX for more information on how these conditions might be minimized.

Errors

Any error condition on the system stops the batch. To view the reason for the error that caused the batch to stop follow these steps.

1. Double-click  on the Status bar in the Analyst MD software window.
   The LC Integrated System Detailed Status dialog opens.

Figure 4-1 LC Integrated System Detailed Status Dialog

2. Click **Err** to show the last error.
3. Fix the issue that caused the error. For example, a solvent leak has occurred or one or more solvent levels has dropped below the shutdown level.
4. Deactivate the hardware profile and then activate it again.

Fatal Errors

The final level of error generated by the LC system is a fatal error. Fatal errors are usually generated by a mechanical failure, such as the failure of the autosampler injection mechanism. However, fatal errors can occur with any of the modules.

To recover from a fatal error, perform the following steps, in order, as required.

1. Click **Standby** ( ) in the LC Integrated System Detailed Status window to turn off the modules, and then click it again to turn them on.
2. If the error persists, then deactivate and activate the hardware profile.
3. If the error occurs again, then perform these steps:
   a. Deactivate the hardware profile.
   b. Shut down the computer.
   c. Turn on the computer.
   d. Turn off the LC system, wait 5 seconds, and then turn it back on.

e. Start the Analyst MD software and activate the hardware profile.

f. Activate the device.

4. If the error occurs after the system is restarted, then contact the local SCIEX representative for assistance.

ExionLC AC/ExionLC AD Systems 5

WARNING! Electrical Shock Hazard. Refer to the guides for ExionLC AC/ExionLC AD system modules before configuring any mains-powered equipment. The guides are available on the DVD: *ExionLC Systems Customer Reference*.

For information about the ExionLC AC/ExionLC AD system modules supported by the Analyst MD software, and the latest tested firmware version, refer to the most current version of the document: *Software Installation Guide*.

ExionLC AC/ExionLC AD System Configuration

Use the following controllers to connect to and control ExionLC AC/ExionLC AD systems using the Analyst MD software:

- ExionLC CBM
- ExionLC CBM Lite

The communications settings are similar for both.

Both of the system controllers use Ethernet connectivity. For more information on controlling the ExionLC AC/ExionLC AD system modules, contact a SCIEX Field Service Employee (FSE).

Configure the ExionLC Controller

Use the following procedures to configure the ExionLC controller.

Connect Modules to the Controller

The autosampler, pump, column oven, or UV detector can be connected to the controller.

Note: The PDA Detector requires a switching hub to connect to the controller and the acquisition computer.

Refer to the documentation that comes with the devices.

1. Press the power button on each module to turn off the module.
2. Press the power button to turn off the controller.
3. Connect the fiber optic cable from the module to an appropriate port at the back of the controller.

- Connect the autosampler to fiber optic port 1.
- Connect the pumps to any of the fiber optic ports, 3 to 8 (ports 2 to 4 for CBM Lite).
- Connect the UV detectors to any of the fiber optic ports, 3 to 8 (ports 2 to 4 for CBM Lite).
- Connect any other accessories to any of the fiber optic ports, 3 to 8 (ports 2 to 4 for CBM Lite).

Connect the Valve Interface Unit to the Controller

1. Press the power button to turn off the controller.
2. Connect the valves to the valve interface unit (Option Box-L, or Subcontroller VP).
3. Connect the fiber optic cable from the valve interface unit to an address connector at the back of the controller.

   Use Address Connectors 3 through 8.
4. Set the DIP switches at the back of the valve interface unit according to the information provided at the back of the unit. The DIP switch setting must match the pump address number used to connect the valve interface unit to the controller.

Restart the Controller

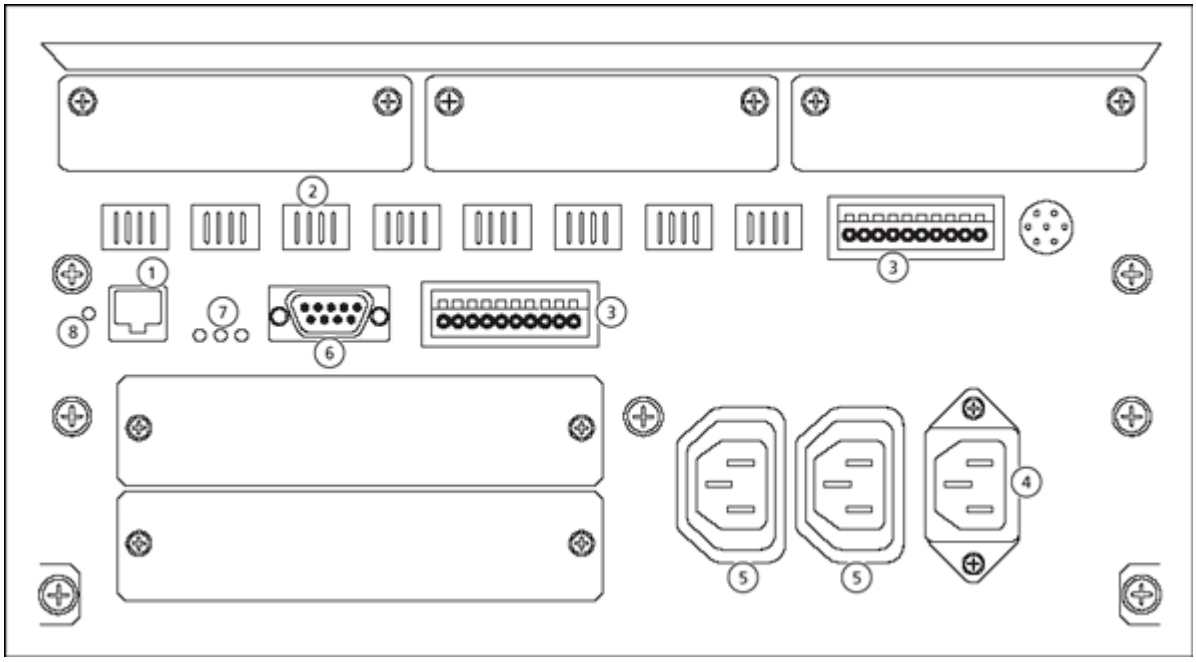
To enable the controller to detect the connected modules, turn off the controller and other modules, wait two seconds, and then turn on all of the modules, turning on the controller last.

Note: The model number for each connected module is shown on the System Configuration screen. The message Remote is shown on any connected pump.

Connect the Controller to the Computer

1. Shut down the computer.
2. Press the power button to turn off the controller.
3. Connect the Ethernet cable from the Ethernet port at the back of the controller to the Ethernet port on the computer.

Figure 5-1 Back of the ExionLC Controller



Item	Description
1	Ethernet port
2	Remote Connector Channels 1 to 8 (fiber optic ports)
3	External I/O connectors
4	Power connector (AC IN)
5	AC output connectors (AC OUT)
6	RS-232 port (not used)
7	Network indicators (100M/ACT/LINK)
8	Initialization button (INIT)

Connect the ExionLC Controller to the Mass Spectrometer

The AUX I/O cable (PN 014474 or 5056951) is used to connect the ExionLC controller to the mass spectrometer.

1. Connect the AUX I/O cable to the controller. If the cable PN 014474 is being used, then follow these steps:
2. Press the power button to turn off the controller.

3. Connect the following wires from the free end of the AUX I/O cable to the OUT 1 ports on the back of the controller by pressing the button above the terminal with a flat-bladed screwdriver and pushing the wire inside. Make sure that the wire is held securely inside the terminal. Refer to the table: Table 5-1.

Table 5-1 AUX I/O Wire Connected to Controller

AUX I/O Cable wires	Connect to OUT 1 Connectors on the Back of the Controller
White with black stripe (wire 22)	Connection 5 or 6 in I/O terminal
Green with black stripe (wire 21)	Connection 5 or 6 in I/O terminal

   a. On the free end of the AUX I/O cable, short together the following wires but do not connect them to anything else:
      - Red with black stripe (wire 9)
      - Orange with black stripe (wire 10)
   b. Isolate all of the other wires so that they do not contact any other wires or metal.

   Note: If the cable PN 5056951 is being used, then the cable can be connected directly to the controller.

4. Connect the other end of the AUX I/O cable to the AUX I/O port on the mass spectrometer.
5. Make sure that RELAY 1 is set to START when the ExionLC system controller is configured in the Analyst MD software.

Set the ExionLC Device Communications for the ExionLC Controller and the ExionLC CBM/CBM Lite

This method is the most reliable way to communicate with the ExionLC series LC systems. To have network access with the computer for data back-up, then install a second network card into the computer. This additional network card is then configured to communicate exclusively with the ExionLC controller interface.

From the front panel of the autosampler or any pump that is properly connected (fiber optic cable installed, proper address set, and REMOTE LED lit) to the CBM or from the front panel of the unit in which the CBM/CBM Lite is installed, do the following:

1. Press **VP** key 4 times to show **CALIBRATION**.

2. Press **FUNC** to show **INPUT PASSWORD**.
3. Type **00000** (five zeros) and then press **ENTER** to show **FLOW COMP**.
4. Press **BACK** to show **CBM PARAMETER**.
5. Press **ENTER** and the Serial Number is shown (or serial number of the installed CBM lite).
6. Press **FUNC** 2 times to show **INTERFACE** and do the following:
   a. Press **2** for Ethernet (preferred) and then press **ENTER**.
   b. Ethernet Speed: Press **0** (zero) for auto-detect and then press **ENTER**.
7. Set the following parameters. The parameters are needed to set up the peer-to-peer network with the computer:
   - **USE GATEWAY: 0** (zero) for NO and then press **ENTER**.
   - **IP ADDRESS: 192.168.200.99** (default) and then press **ENTER**.
   - **SUBNET MASK: 255.255.255.0** (default) and then press **ENTER**.
   - **DEFAULT GATEWAY: ---.---.---.---** (default) and then press **ENTER**.
8. Use the **TRS MODE** to set the communications protocol parameters to CLASS-VP. Press **2** and then press **ENTER**.
9. **POWER OFF** the unit to accept and save the changes.
10. On the computer desktop, right-click **My Network Places** and then click **Properties**.
11. Right-click the network connection that will be dedicated to ExionLC Controller communications and then click **Properties**.
12. Click **Internet Protocol (TCP/IP)** and then click **Properties**.
13. Click **Use the following IP** address and then type the following:
    - **IP ADDRESS: 192.168.200.90**
    - **SUBNET MASK: 255.255.255.0**
    - **DEFAULT GATEWAY**: Leave blank
14. Click **OK** to accept the changes.
15. Click **CLOSE**.
16. Shut down the computer.
17. (Only applicable if using a LAN connection) Using a CAT 5 network cable, connect the ExionLC CBM/CBM Lite to the computer using the network card that was configured for use with the ExionLC series LC system.

Note: If using a PDA, then connect the network cable from the CBM/CBM Lite to a network switch. The PDA will also be connected to the network switch that is connected to the computer.

18. Turn on the computer and the ExionLC CBM/CBM Lite and wait for them to complete their respective boot-up routines.
19. To determine whether proper communications have been established between the computer and ExionLC CBM/CBM Lite, start Microsoft Internet Explorer, other browsers might not be shown properly, type the ExionLC CBM/CBM Lite IP address in the address bar (**192.168.200.99**), and then click **GO**.

    Note: Make sure that all pop-up blockers are turned off.

    The ExionLC Controller screen is shown for a few seconds followed by the Status screen.
20. Make sure that the serial number listed for the LC system under the **System Name** matches that of the unit to which it is connected and that its status is Ready.
21. Close Internet Explorer.
22. Start the Analyst MD software and then configure the LC system.

Fault Recovery Guidelines

If the vial detection sensor is ON, then during an autosampler rinse, if any autosamper vials are missing or if a run is aborted, a fault condition occurs.

- To correct these errors, intervene manually before the Analyst MD software can continue functioning normally.
- To recover Analyst MD software control, perform the task indicated on the module screen. Alternatively, follow the Fault Recovery procedure to clear all conditions. Refer to the section: Recover from a Fault for ExionLC AC/ExionLC AD Systems Equipped with the ExionLC Controller or the ExionLC CBM/CBM Lite

The following guidelines are provided so that some fault conditions can be avoided.

- Make sure that the modules attached to the controller are identical to those configured in the hardware profile. Differences between the two configurations can result in communication issues between the software, the controller, and the attached devices.
- If required, change the duration in the method. The preset run time for ExionLC AC/ExionLC AD systems is 10 minutes.
- Make sure that the needle height in the method matches that of the current tray. The preset value is not valid for all trays.

The LC equipment can generate three different error conditions that cause the Analyst MD software to stop: warning, error, and fatal error.

Errors from controller modules are shown in the Windows or Analyst MD software event logs as VI*xxxx* errors, for example: VIRUN.

Warnings

A warning is an informational notification of conditions such as an open door on a temperature controlled module, a low solvent level, or temperature not ready. These conditions do not prevent the system from operating properly. However, the software treats some of the warnings as error conditions, generates an error, and then stops the batch. Contact SCIEX for more information on how these conditions might be minimized.

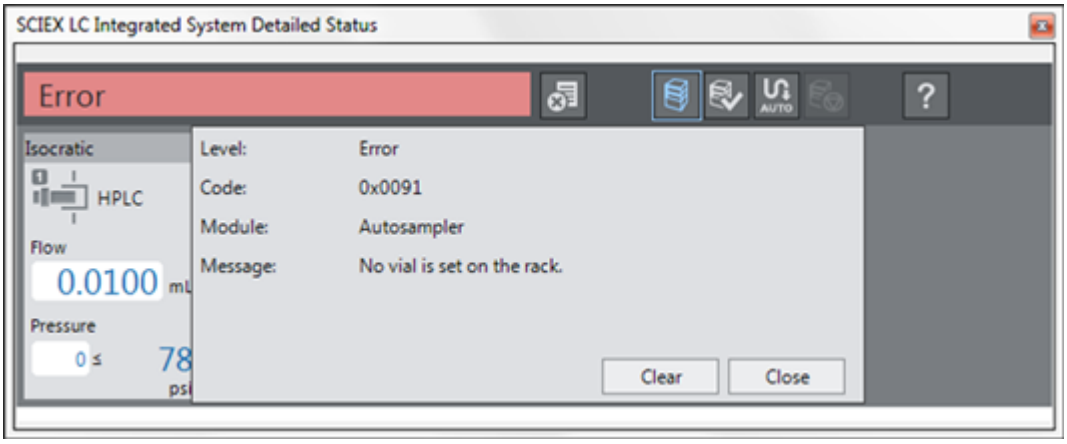
Note: For some events acquisition will continue. For example, if the autosampler door is opened after a sample injection is completed but before the next sample injection starts, then acquisition and batch processing continues.

Errors

Any error condition on the system stops the Analyst MD software batch.

To view the precise reason for the error that caused the batch to stop, double-click the icon on the Status bar in the Analyst MD software window to open the SCIEX LC Integrated System Detailed Status dialog.

Figure 5-2 SCIEX LC Integrated System Detailed Status Dialog



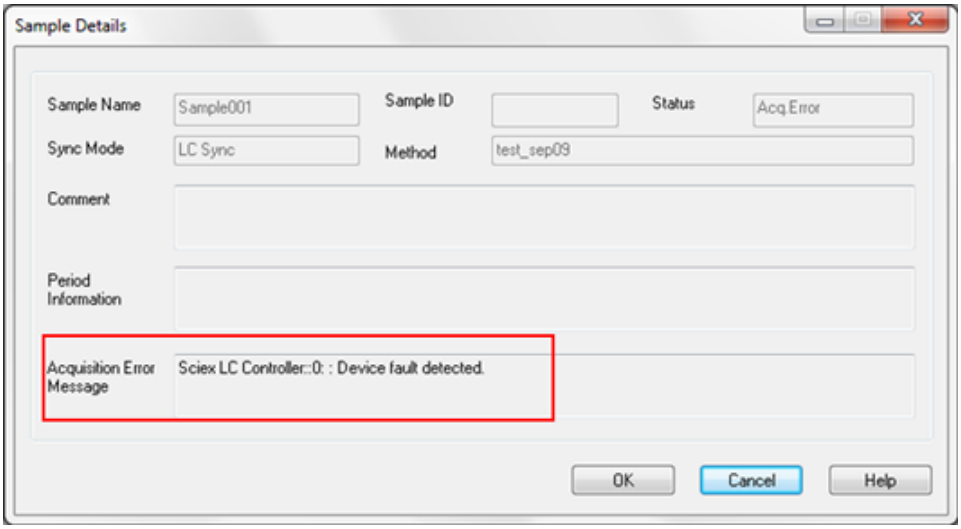
When an error occurs, the ExionLC system typically sounds an alarm until the error is acknowledged. Some errors that might be encountered and the SCIEX suggested action include the following:

- ERR LEAK DETECT: Press **CE** to stop the alarm. Find and then address the issue. Thoroughly dry the area around the leak sensor of the affected module. If necessary, dry any modules stacked below the affected module. Recover with the following procedure: Recover from a Fault for ExionLC AC/ExionLC AD Systems Equipped with the ExionLC Controller or the ExionLC CBM/CBM Lite.
- ERROR P-MAX: Press **CE** to stop the alarm. Correct the issue. Recover with the following procedure: Recover from a Fault for ExionLC AC/ExionLC AD Systems Equipped with the ExionLC Controller or the ExionLC CBM/CBM Lite.
- NO VIAL DETECTED: This error shows on the autosampler if it does not find the vial to be injected. Batch acquisition stops.

Note: An unexpected vial height might also be the cause of this issue.

Double-click the sample with acquisition error in the Analyst MD software to view the acquisition error message.

Figure 5-3 Acquisition Error Message



Fatal Errors

The final level of error generated by the LC system is a fatal error. Fatal errors are normally generated by a mechanical failure, such as the failure of the autosampler injection mechanism. However, fatal errors can occur with any of the modules. The only way to recover from a fatal error is to restart the entire system. If, after restarting, the error occurs again, contact the local SCIEX representative for assistance.

Recover from a Fault for ExionLC AC/ExionLC AD Systems Equipped with the ExionLC Controller or the ExionLC CBM/CBM Lite

For warnings and typical errors, the module experiencing the problem shows the condition on its status panel and the module and ExionLC controller shows a RED status LED bar. The **Connect** LED on the ExionLC controller is no longer lit. ExionLC CBM/CBM Lite works in the same way, but has no indication of the error because it is installed in a module.

1. Press **CE** on the affected module to stop the alarm and clear the error.

   For errors such as leaks, the alarm stops only if the error has been resolved.

2. Correct the cause of the error.
3. Press the black **INIT** button at the back of the ExionLC Controller or ExionLC CBM/CBM Lite for no longer than five seconds. Refer to the figure: Figure 5-1.

   The ExionLC controller or ExionLC CBM/CBM Lite LED status bar changes to green and the connect LED illuminates, thus confirming that the communication with the Analyst MD software has been restored.

   If either the status LED does not change to green or the connect LED fails to illuminate, then proceed with the following steps.

   Note: In the event of a device fault, either within the Analyst MD software or at the module itself, it might be difficult to reactivate or run the modules. If this occurs, then perform the following reboot sequence to regain control.

   ---

4. Deactivate the hardware profile.
5. Turn off all of the LC modules, including the system controller.
6. Turn on all of the modules attached to the system controller and allow them to finish initialization.
7. Turn on the system controller.
8. Activate the hardware profile.
9. (Optional) If the hardware profile fails to activate, then close the software and restart the computer. Re-configure the LC devices in the hardware profile setup and then try to activate the hardware profile again.

Shimadzu Systems 6

WARNING! Electrical Shock Hazard. Refer to the safety instructions for the Shimadzu modules before configuring any mains-powered equipment.

In addition to the Shimadzu LC devices that are supported in the Analyst MD software, the Analyst MD software supports the LC-20 and LC-30 devices through the new integrated system controller, and the LC-40 devices. For a list of supported modules, refer to the document: *Software Installation Guide*.

Note: To configure a Shimadzu LC-20 or LC-30 system when creating a hardware profile, select **Integrated System Shimadzu LC Controller** to use the system with the Shimadzu legacy driver.

Note: To configure a Shimadzu LC-40 system, select **Integrated Systems** > **Integrated System Shimadzu LC-40 Controller** when creating a hardware profile.

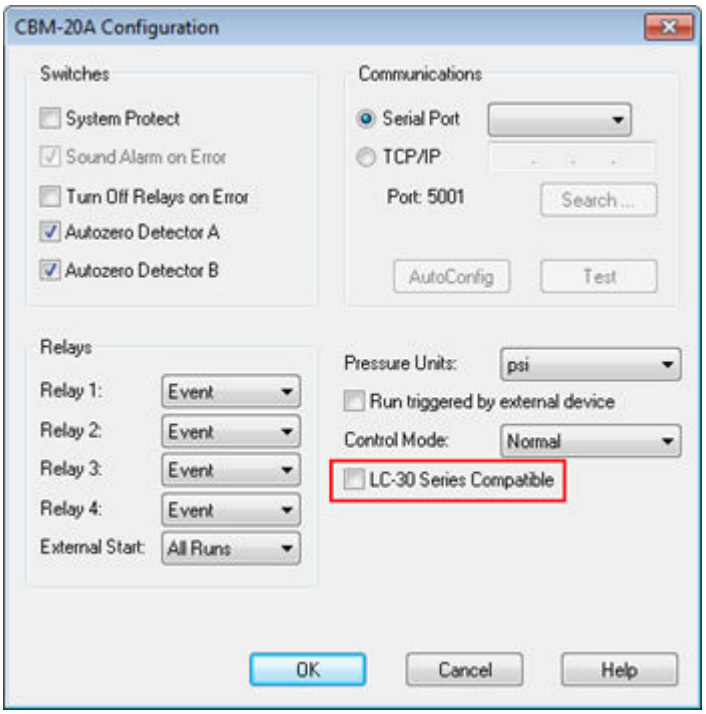
To configure a Shimadzu LC-20 or LC-30 system when creating a hardware profile, do one of the following:

- Select **Integrated Systems** > **Integrated System Shimadzu LC-20/30 Controller** to use the system with the new Shimadzu driver.
- Select **Integrated System Shimadzu LC Controller** to use the system with the Shimadzu legacy driver.

The CBM-20A system controller with a new ROM is used to connect to Shimadzu LC-30 series devices. The LC-30 devices are branded as Nexera.

Note: If a Shimadzu LC-30 device configured through the Integrated System Shimadzu LC Controller is being used, then remember to select the **LC-30 Series Compatible** check box on the CBM-20A Configuration dialog. The following figure only applies to Shimadzu LC-30 controlled through MIMIC1, the Integrated System Shimadzu LC Controller.

Figure 6-1 CBM-20A Configuration



For information about the Shimadzu devices supported by the Analyst MD software, and the latest tested firmware version, refer the document: *Software Installation Guide*.

Note: For Shimadzu LC-40 autosamplers, plate 3 on the 3-plate rack cannot be used for sample acquisition if a plate changer is installed with the system. This plate position is reserved for moving sample trays to and from the plate changer. For Shimadzu LC-40 pumps, if the Mobile Phase Monitor is used, then make sure to configure it properly. However, it is not supported by the Analyst MD software. To configure the Mobile Phase Monitor, refer to the *Mobile Phase Monitor Instruction Manual*, available from Shimadzu.

Shimadzu System Configuration

Use the following system controllers to connect to and control a Shimadzu LC system using the Analyst MD software:

- CBM-20A

- CBM-20A Lite
- CBM-40 or CBM-40 Lite
- SCL-40

Communication settings are similar for all of these system controllers.

The system controller is required for the Analyst MD software to communicate with and control any Shimadzu module. The system controller uses serial or TCP/IP (Ethernet) connectivity, with Ethernet being the preferred mode of communication.

The following table lists the required hardware. For the latest version of tested firmware, refer to the document: *Installation Guide* for the current Analyst MD software.

Table 6-1 Required Hardware for Shimadzu Modules

Cable	Other Parts Needed
RS-232 cable (PN 24736) or LAN cable (with Prominence modules)	• Shimadzu fiber optic cables (one for each module connected) • Shimadzu event cable

Note:

- For Shimadzu LC-20/30 modules configured as an **Integrated System Shimadzu LC-20/30 Controller** in the hardware profile, and for Shimadzu LC-40 modules, an Ethernet cable must be used.
- For Shimadzu LC-20/30 modules configured as an **Integrated System Shimadzu LC Controller** with the Shimadzu legacy driver, either an RS-232 cable or an Ethernet cable can be used.

Configure the Shimadzu System Controller

Use the following procedures to configure the Shimadzu system controller.

Connect Modules to the Shimadzu System Controller

The Shimadzu PDA detector, fluorescence detector (only applicable to Shimadzu LC-40), autosampler, UV detector, column oven, and pump can be connected to the Shimadzu system controller.

Note: Up to four pumps can be controlled by the Shimadzu system controller.

Note: A switching hub is required to connect a PDA detector to the system controller and the acquisition computer.

Connect the Modules

1. Press the power button on each module to turn off the Shimadzu modules.
2. Press the power button to turn off the Shimadzu system controller.
3. Connect the fiber optic cable from the module to an appropriate connection at the back of the system controller.
   - Connect the autosampler (SIL-XX) to fiber optic port 1/SIL.
   - Connect pumps to any fiber optic ports 3 to 8 (ports 2 to 4 for CBM-20 Lite and CBM-40 Lite).
   - Connect detectors (excluding the PDA detector) to any fiber optic ports 3 to 8 (ports 2 to 4 for CBM-20 Lite and CBM-40 Lite).
   - Connect any other accessories to any fiber optic ports 3 to 8 (ports 2 to 4 for CBM-20 Lite and CBM-40 Lite).

Connect a Shimadzu Valve Interface Unit to the Shimadzu System Controller

Follow the procedures in this section in the order given.

Connect the Valve Interface Unit to the Controller

1. Press the power button to turn off the controller.
2. Connect the valves to the valve interface unit (Option Box-L, or Subcontroller VP).
3. Connect the fiber optic cable from the valve interface unit to an address connector at the back of the controller.

   Use Address Connectors 3 through 8.
4. Set the DIP switches at the back of the valve interface unit according to the information provided at the back of the unit. The DIP switch setting must match the pump address number used to connect the valve interface unit to the controller.

Configure the System Controller for the Valve Interface Unit

If the system controller is not already turned on, then press the power button to turn it on.

Note: The model number for each connected module is shown on the System Configuration screen. The message Remote is shown on any connected valve.

Restart the System Controller

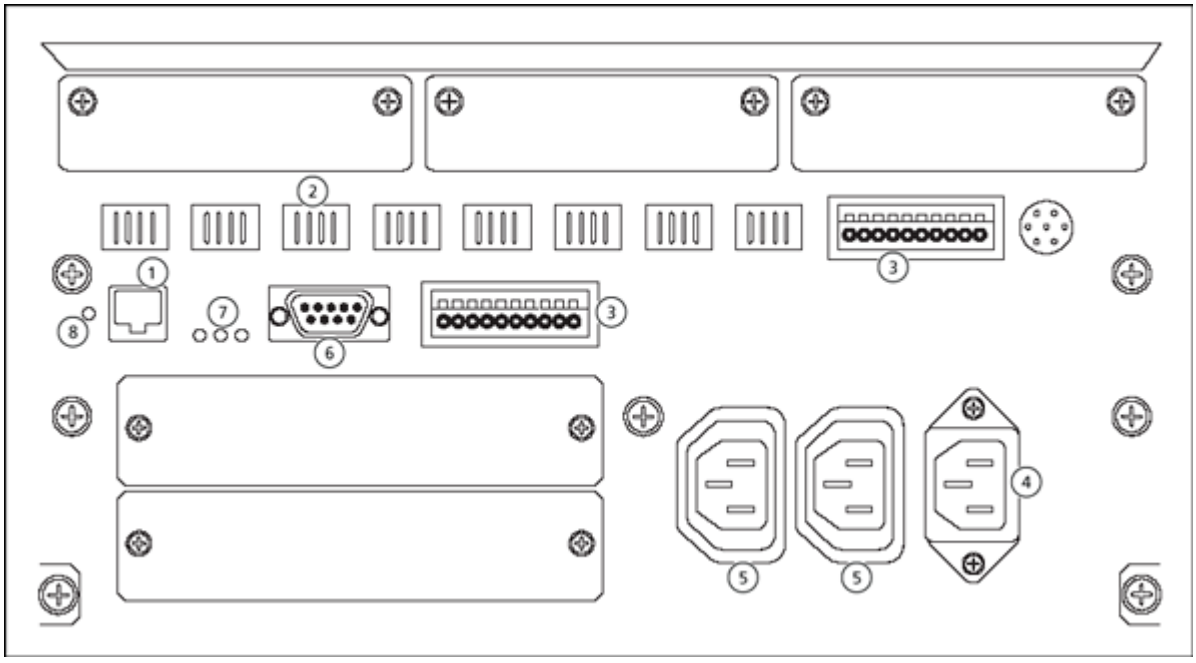
To enable the controller to detect the connected modules, turn off the system controller and other modules, wait two seconds, and then turn on all of the modules, turning on the system controller last.

Note: The model number for each connected module is shown on the System Configuration screen. The message Remote is shown on any connected pump.

Connect the Shimadzu CBM/CBM Lite to the Computer

1. Shut down the computer.
2. Turn off the Shimadzu system controller by pressing the power button.
3. Connect the RS-232 cable from the serial port at the back of the system controller to any available serial port on the computer, noting the port number. Refer to the following figure.

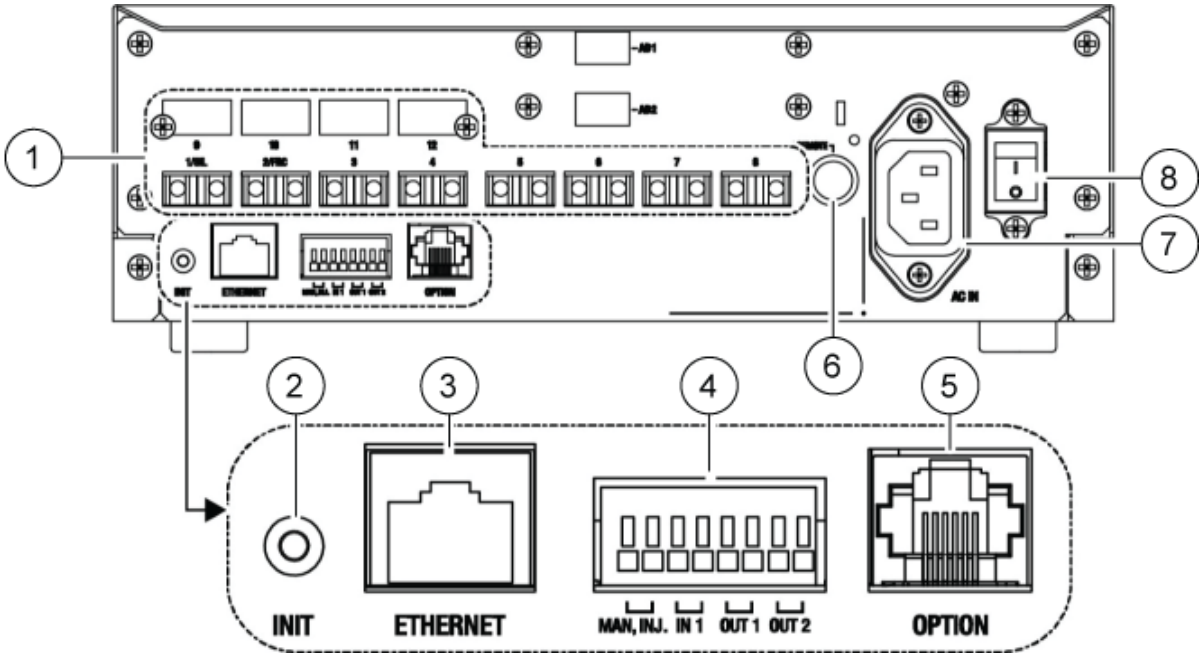
Figure 6-2 Back of the Shimadzu CBM-20 System Controller



Item	Description
1	Ethernet port
2	Remote Connector Channels 1 to 8 (fiber optic ports)
3	External I/O connectors

Item	Description
4	Power connector (AC IN)
5	AC output connectors (AC OUT)
6	RS-232 connector
7	Network indicators (100M/ACT/LINK)
8	Initialization button (INIT)

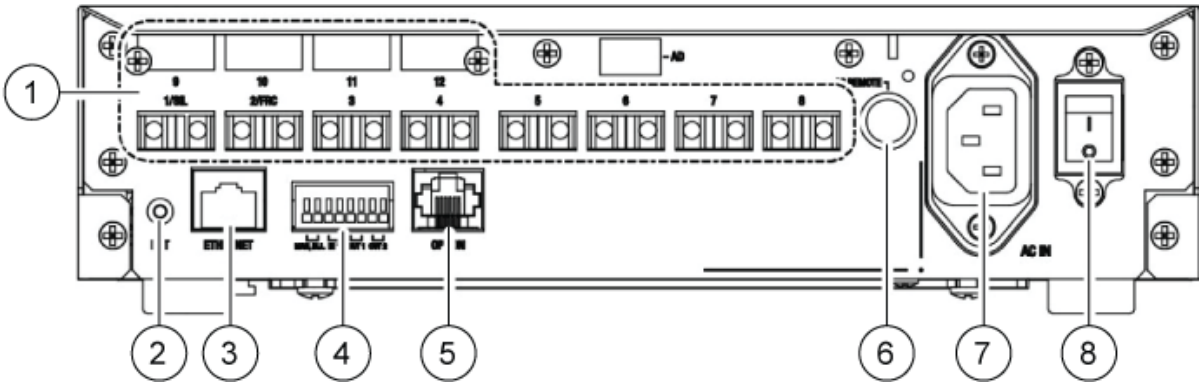
Figure 6-3 Back of the Shimadzu SCL-40 System Controller



Item	Description
1	Remote connectors, 1/SIL, 2/FRC, and Channel 3 to 8 (fiber optic ports)
2	**INIT**: Initialization button, used to perform a factory reset
3	**ETHERNET**: Ethernet port
4	External I/O connectors
5	**OPTION**: Connector, used to connect an optional unit
6	**AC REMOTE**: AC output connector
7	**AC IN**: Power connector

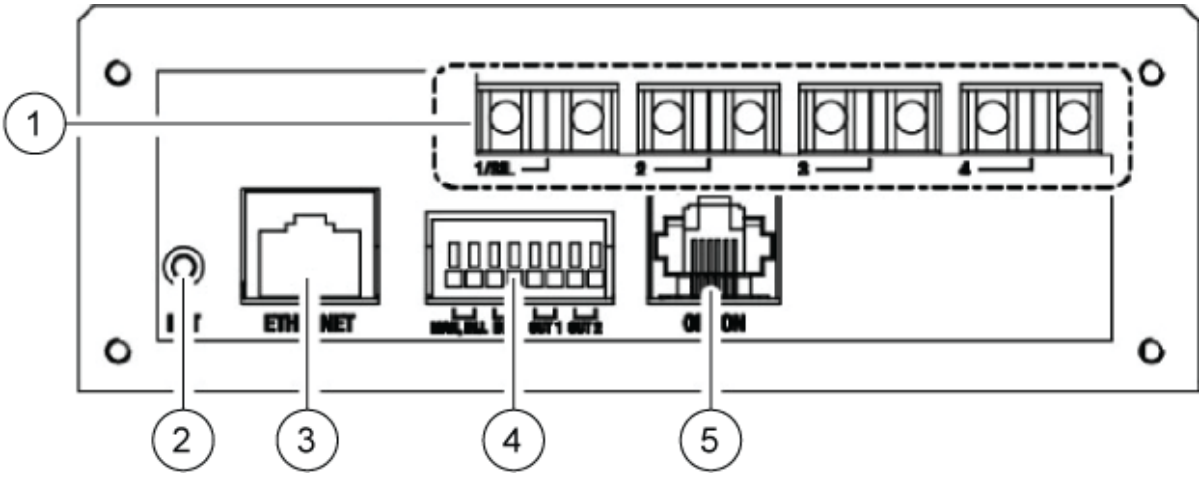
Item	Description
8	Main Power switch

Figure 6-4 Back of the Shimadzu CBM-40 System Controller



Item	Description
1	Remote connectors, 1/SIL, 2/FRC, and Channel 3 to 8 (fiber optic ports)
2	**INIT**: Initialization button, used to perform a factory reset
3	**ETHERNET**: Ethernet port
4	External I/O connectors
5	**OPTION**: Connector, used to connect an optional unit
6	**AC REMOTE**: AC output connector
7	**AC IN**: Power connector
8	Main Power switch

Figure 6-5 Back of the Shimadzu CBM-40 Lite System Controller



Item	Description
1	Remote connectors, 1/SIL, and Channel 2 to 4 (fiber optic ports)
2	**INIT**: Initialization button, used to perform a factory reset
3	**ETHERNET**: Ethernet port
4	External I/O connectors
5	**OPTION**: Connector, used to connect an optional unit

Connect the System Controller to the Mass Spectrometer

The AUX I/O cable (PN 014474 or 5056951) is used to connect the system controller to the mass spectrometer.

Note: If the AUX I/O cable (5056951) is being used, then the following steps are not required. The cable can be directly used to connect the system controller to the mass spectrometer.

1. Connect the following wires from the free end of the AUX I/O cable to the OUT 1 ports on the back of the controller by pressing the button above the terminal with a flat-bladed screwdriver and pushing the wire inside. Make sure that the wire is held securely inside the terminal. Refer to the table: Table 5-1.

Table 6-2 AUX I/O Wire Connected to Controller

AUX I/O Cable wires	Connect to OUT 1 Connectors on the Back of the Controller
White with black stripe (wire 22)	Connection 5 or 6 in I/O terminal
Green with black stripe (wire 21)	Connection 5 or 6 in I/O terminal

a. On the free end of the AUX I/O cable, short together the following wires but do not connect them to anything else:

   - Red with black stripe (wire 9)
   - Orange with black stripe (wire 10)

b. Isolate all of the other wires so that they do not contact any other wires or metal.

Note: If the cable PN 5056951 is being used, then the cable can be connected directly to the controller.

2. Connect the other end of the AUX I/O cable to the mass spectrometer AUX I/O connector.
3. Make sure that RELAY 1 is set to START when the system controller is configured in the Analyst MD software.

Configure Shimadzu Device Communications for Use With the SCL-40, CBM-40, and CBM-40 Lite

Perform this procedure on the front panel of the autosampler or any pump that is properly connected to the CBM, or from the front panel of the module in which the CBM Lite is installed. Make sure that each module is connected properly with fibre optic cable, that the IP address is properly set, and that the Remote LED is illuminated.

1. Touch the touchscreen to activate it.
2. Press the right arrow, then the down arrow, and then the right arrow again, to enter VP mode.
3. Press the up and down arrows to scroll through the options to show **CALIBRATION**.
4. Press the right arrow to show **INPUT PASSWORD**.
5. Type **00000** (five zeros) and then press **ENTER** to show **Operation Mode**.
6. Press the up and down arrows to scroll through the options to show **CBM PARAMETER**.
7. Press the right arrow to show the serial number of the installed system controller.

8. Press the up and down arrows until **INTERFACE** is shown, select one of the following options, and then press **ENTER**:
   - **0: OPT**, Optical cable connection
   - **1: RS**, Serial communication (RS-232C) connection, use only while performing an update or troubleshooting (this function is reserved for service)
   - **2: ETH**, Ethernet (preferred) connection
9. (If required) to set up the system for remote monitoring, configure the network parameters with information from the customer IT specialist. Use the down arrow to navigate to the next four parameters. For each parameter, type the value and then press **ENTER**.

Table 6-3 Parameters

Field	Value
USE GATEWAY	**0** (zero) for NO and then press **ENTER**
IP ADDRESS	**192.168.200.99** (default) and then press **ENTER**.
SUBNET MASK	**255.255.255.0** (default) and then press **ENTER**.
DEFAULT GATEWAY	**---.---.---.---** (default) and then press **ENTER**.

10. Turn each LC module OFF and then ON to accept and save the changes.
11. On the computer desktop, right-click **My Network Places** and then click **Properties**.
12. Right-click the network connection that will be dedicated to the Shimadzu CBM communications and then click **Properties**.
13. Click **Internet Protocol (TCP/IP)** and then click **Properties**.
14. Click **Use the following IP** address and then type the following:
    - **IP ADDRESS: 192.168.200.90**
    - **SUBNET MASK: 255.255.255.0**
    - **DEFAULT GATEWAY**: Leave blank
15. Click **OK** to accept the changes.
16. Click **CLOSE**.
17. Shut down the computer.
18. (Only applicable if using LAN connection) Using a CAT 5 network cable, connect the Shimadzu CBM/CBM Lite to the computer.

Note: If using a PDA, then connect the network cable from the CBM/CBM Lite to a network switch. The PDA is also connected to the network switch.

19. Turn on the computer and the CBM/CBM Lite and then wait for them to complete their respective boot-up routines.
20. To determine whether proper communications have been established between the computer and CBM/CBM Lite, start Microsoft Internet Explorer (other browsers might not display properly), type the CBM/CBM Lite IP address in the address bar (**192.168.200.99**), and then click **GO**.

Note: Make sure that all pop-up blockers are turned off.

21. Make sure that the serial number listed for the LC system under **System Name** matches that of the unit that is connected and that its status is Ready.
22. Close Internet Explorer.
23. Start the Analyst MD software and then configure the LC system.

Configure Shimadzu Device Communications for Use With the CBM-20A and CBM-20A Lite

This method is the most reliable way to communicate with the Shimadzu system. To also have network access with the computer for data back-up, install a second network card into the computer. This additional network card is then configured to communicate exclusively with the Shimadzu CBM interface.

From the front panel of the autosampler or any pump that is properly connected (fiber optic cable installed, proper address set, and REMOTE LED lit) to the CBM or from the front panel of the unit in which the CBM Lite is installed, do the following:

1. Press **VP** key 4 times to display **CALIBRATION**.
2. Press **FUNC** to display **INPUT PASSWORD**.
3. Type **00000** (five zeros) and then press **ENTER** to display **FLOW COMP**.
4. Press **BACK** to display **CBM PARAMETER**.
5. Press **ENTER** and the Serial Number is shown (or serial number of the installed CBM lite).
6. Press **FUNC** 2 times to show **INTERFACE** and then type the following parameters:
    a. Press **1** for RS-232C and then press **ENTER**.
    b. Press **2** for Ethernet (preferred) and then press **ENTER**.
    c. Ethernet Speed: Press **0** (zero) for auto-detect and then press **ENTER**.

7. Set the following parameters. The parameters are needed to set up the peer-to-peer network with the computer:
   - **USE GATEWAY: 0** (zero) for NO and then press **ENTER**.
   - **IP ADDRESS: 192.168.200.99** (default) and then press **ENTER**.
   - **SUBNET MASK: 255.255.255.0** (default) and then press **ENTER**.
   - **DEFAULT GATEWAY: ---.---.---.---** (default) and then press **ENTER**.
8. Use the **TRS MODE** to set the communications protocol parameters to **CLASS-VP**. Press **2** and then press **ENTER**.
9. **POWER OFF** the unit to accept and save the changes.
10. On the computer desktop, right-click **My Network Places** and then click **Properties**.
11. Right-click the network connection that will be dedicated to the Shimadzu CBM communications and then click **Properties**.
12. Click **Internet Protocol (TCP/IP)** and then click **Properties**.
13. Click **Use the following IP** address and then type the following:
    - **IP ADDRESS: 192.168.200.90**
    - **SUBNET MASK: 255.255.255.0**
    - **DEFAULT GATEWAY**: Leave blank
14. Click **OK** to accept the changes.
15. Click **CLOSE**.
16. Shut down the computer.
17. (Only applicable if using a LAN connection) Using a CAT 5 network cable, connect the Shimadzu CBM/CBM Lite to the computer using the network card that was configured for use with the Shimadzu LC system.

    Note: If using a PDA, then connect the network cable from the CBM/CBM Lite to a network switch. The PDA is also connected to the network switch, which is connected to the computer.
18. Turn on the computer and the CBM/CBM Lite and then wait for them to complete their respective boot-up routines.
19. To determine whether proper communications have been established between the computer and CBM/CBM Lite, start Microsoft Internet Explorer (other browsers may not display properly), type the CBM/CBM Lite IP address in the address bar (**192.168.200.99**), and then click **GO**.

Note: Make sure that all pop-up blockers are turned off.

20. Make sure that the serial number listed for the LC system under **System Name** matches that of the unit that is connected and that its status is Ready.
21. Close Internet Explorer.
22. Start the Analyst MD software and then configure the LC system.

Fault Recovery

The manufacturer recommends that the modules attached to the system controller be identical to those configured in the hardware profile. Differences between the two configurations can result in communication issues between the software, the system controller, and the attached modules.

If the vial detection sensor is ON, then during an autosampler rinse, if any autosamper vials are missing or if a run is aborted, a fault condition occurs. To correct these errors, intervene manually to allow the Analyst MD software to continue functioning normally. To recover software control, perform the task indicated on the module screen. Alternatively, follow the Fault Recovery procedure to clear all of the conditions.

The preset run time is 90 minutes. If required, change the duration in the acquisition method.

Note: The needle height in the method must match that of the current tray. The preset value is not valid for all of the trays.

The LC equipment can generate three different error conditions that cause the Analyst MD software to stop: warning, error, and fatal error.

Errors from the system controller are shown in the Windows/Analyst event logs as VI*xxxx* errors, for example: VIRUN.

Warnings

A warning is an informational notification of conditions such as a door open on a temperature controlled module, solvent level, or temperature not ready. These conditions do not prevent the LC system from operating properly. However, the Analyst MD software does not recognize these warnings, generates an error, and then stops the batch. Contact the manufacturer for information on how to minimize these conditions.

Errors

Any error condition on the LC system stops the Analyst MD software batch, except for a missing vial error which will not stop the batch if the **Fail whole batch in case of missing vial** box is cleared in the Analyst Queue Options. The LC system typically sounds an audible alarm in the

event of an error until the user acknowledges the error. Some errors that may be encountered and the recommended actions include the following:

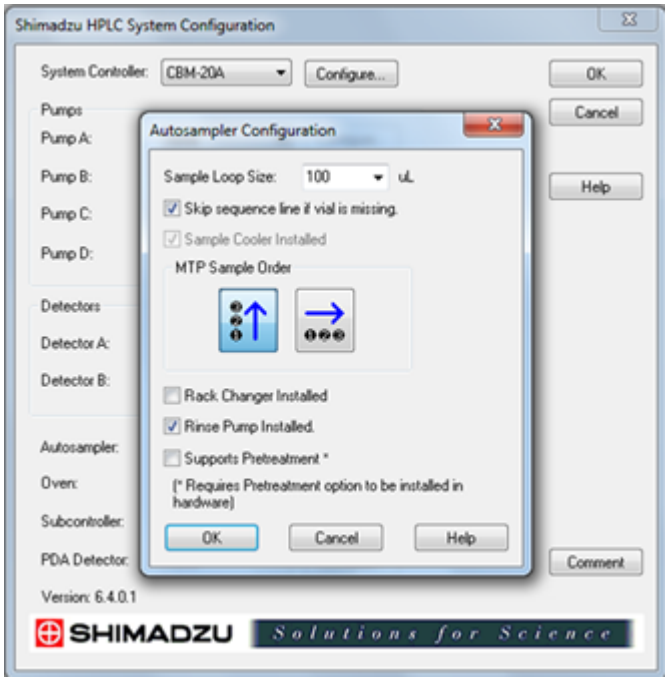
- LEAK DETECT: Press **CE** to stop the alarm. Find and address the problem. Thoroughly dry the area around the leak sensor of the affected module (and possibly any module below it in the stack due to the internal drain system). Recover using the following procedure: Recover from a Fault on page 70.
- PRESSURE OVER PMAX: Press **CE** to stop the alarm. Correct the problem. Recover using the following procedure: Recover from a Fault
- MISSING VIAL: This error appears on the autosampler if it does not find a vial it is asked to inject. The result of this condition can be dealt with in one of two ways through the Analyst MD software in the hardware profile.

  If the system is configured as follows:

  - (Shimadzu LC–20/30 systems configured through **Integrated System Shimadzu LC Controller**)

    Select the autosampler model from the list and then click **Configuration** to show the Autosampler Configuration dialog.

    Figure 6-6 Autosampler Configuration Dialog



    Select the **Skip sequence line if vial is missing** check box and then click **OK**. The Analyst MD software skips that vial and continues running. If the check box is not selected, then the software reports an error and stops the batch.

The Skipped Vial notification is shown on the autosampler status panel and the vial number skipped is shown. Be sure to reconcile the data obtained in subsequent runs.

- (Shimadzu LC–20/30 systems configured through **Integrated System Shimadzu LC-20/30 Controller** and Shimadzu LC–40 systems)

  Note: There is no missing vial setup option in the hardware profile configuration for Shimadzu LC-20/30 systems configured through **Integrated System Shimadzu LC-20/30 Controller** and Shimadzu LC-40 systems. The setup for these systems is done on the autosampler module.

  Vial detection is set on the LC hardware with Vialdet setting on Shimadzu LC–20/30 systems and the VIAL/PLATE SENSOR setting on Shimadzu LC–40 systems.

  Both of these system settings are enabled by default which allows the LC detailed status window to show error messages when an error occurs. However, the **Fail whole batch in case of missing vial** option in the Analyst Queue Options is what determines if the error shown in the status window will also stop the LC system and batch acquisition.

Fatal Errors

The final level of error generated by the system is a fatal error. Fatal errors are normally generated by a mechanical failure, such as the failure of the autosampler injection mechanism. However, fatal errors can occur with any of the modules. The only way to recover from a fatal error is to restart the entire system. If, after restarting, the error occurs again, contact the manufacturer for assistance.

Recover from a Fault

For warnings and typical errors, the module experiencing the issue shows the condition on its status panel and the module and CBM show a RED status LED bar. The connect LED on the CBM is no longer lit. The CBM-20A Lite system controller works in the same way but has no indication of the error because it is installed in a module.

1. Press **CE** on the affected module to stop the alarm and clear the error.

   For errors such as leaks, the alarm stops only if the error has been resolved.

2. Correct the cause of the error.
3. Press the black **INIT** button at the back of the CBM-20A Lite for no longer than five seconds. Refer to the figure: Figure 6-2.

   The system controller status LED bar changes to green and the connect LED illuminates, thus confirming that communication with the Analyst MD software has been restored.

4. If either the status LED does not change to green or the connect LED fails to illuminate, then continue with steps 5 to 10.

5. Deactivate the hardware profile.
6. Turn off all of the LC modules, including the system controller.
7. Turn on all of the modules attached to the system controller and allow them to finish initialization.
8. Turn on the system controller.
9. (Only applicable to Shimadzu LC-20/30 systems configured through Integrated System Shimadzu LC-20/30 Controller) Make sure that all of the modules selected in the Shimadzu HPLC System Configuration screen in the hardware profile setup match the ones that were turned on. If they do not match, reselect the modules or only turn on the required modules. If necessary, restart the system controller.
10. Activate the hardware profile.
11. (Optional) If the hardware profile fails to activate, then close the software and restart the computer. Re-configure the LC devices in the hardware profile setup and then try to activate the hardware profile again.

Agilent Systems 7

WARNING! Electrical Shock Hazard. Refer to the Agilent autosampler safety instructions before configuring any mains-powered equipment.

For information about the Agilent devices supported by the Analyst MD software, and the latest tested firmware version, refer to the most current version of the document: *Software Installation Guide*.

Note: The Agilent G4212A and G4212B DADs have one lamp source instead of two, as in previous DADs. As a result, the usable wavelength range has been changed to 190 nm to 640 nm.

Note: The G4212A DAD supports slit widths up to 8 nm, and the G4212B DAD has a fixed slit width of 4 nm.

Device Communication Configuration

This section provides information about configuring the Agilent series peripheral devices using a standard serial (RS-232) port, GPIB (general purpose interface bus), or LAN (Ethernet) communication, with or without CAN cables. An overview of each type of communication is provided for the Agilent 1260 (G and K models) and 1290 series LC Systems.

Note: Use CAN cables with an RS-232, GPIB, or Ethernet cable when configuring multiple Agilent devices in a stack configuration. Refer to the section: Configuration of CAN Communication.

Configure Serial Communication

Connect the Agilent series autosamplers, pumps, and column oven to the computer with a standard RS-232 cable (PN 024736).

Note: Connect the diode array detector (DAD) to the computer using a GPIB or LAN (Ethernet) communication.

If an Agilent module (except a DAD) is connected to the computer with a RS-232 cable, then set the DIP switches at the back of the device. The DIP switches configure parameters for the communication protocol and instrument initialization procedures.

The following table shows the appropriate DIP switch settings for a baud rate of 19 200 bps for the Agilent 1260 and 1290 series devices. If a hardware profile that includes an Agilent 1260 or

1290 Infinity series device is created, or if an Agilent device is added to an existing hardware profile, then set the DIP switches for a baud rate of 19,200, and then set the baud rate to 19,200 in the Hardware Configuration Editor.

Note: Restart the devices to apply the new baud rate.

Set the DIP switches as indicated in the following table.

Table 7-1 Agilent 1260 and 1290 DIP Switch Settings (19,200 Baud Rate)

For This Switch (Baud Rate 19,200)	1	2	3	4	5	6	7	8
Set as...	Down (Off)	Up (On)	Up (On)	Up (On)	Down (Off)	Up (On)	Down (Off)	Down (Off)

Configuration of Ethernet Communication

Connect the Agilent system to the computer through Ethernet communication. Use the Agilent PN 5183-4649 crossover cable for a direct connection from the module to the computer, or use the Agilent PN 8121-0940 cable for hub connections.

Install a network interface card in the Agilent module. Refer to the Agilent documentation.

Note: The 1290 and 1290 Infinity II modules are shipped with all switches Down (Off). For any LAN configuration, SW1 and SW2 must be Down. For all modules with an on-board LAN, the default is all switches Down. For specific LAN modes, switches 3 to 8 must be set as required. For boot or test modes, switches 1 and 2 must be Up (On).

Configuration of CAN Communication

Use CAN cables in conjunction with a RS-232 cable, GPIB (general purpose interface bus) cable, or Ethernet cable to configure a stack of Agilent modules. In an Agilent stack configuration, a single module is connected to the computer with a RS-232 cable, GPIB cable, or Ethernet cable. Any additional Agilent modules are then connected to each other (in series) with CAN cables. For serial communication in CAN stacks, set all of the Agilent CAN-linked modules to the same serial port in the hardware profile.

Note: The GPIB interface is not available in all modules.

Note: If a DAD is connected to the computer using an Ethernet connection and the rest of the stack is connected to the computer using a single RS-232 cable, then the DAD cannot be connected to the rest of the stack with a CAN cable.

To monitor and control the stack manually, connect a handheld Agilent series control module to one of the CAN connections at the back of any Agilent device. The modules connected by CAN

cables in the stack must match the devices in the Analyst MD software hardware profile. If a fault occurs in the CAN-linked stack, then restart all of the devices in the stack.

Note: If a stack is switched from CAN to another communication mode in the Analyst MD software, then the CAN cables must be disconnected from the device.

Note: All modules connected by CAN cables must be on the same suite of firmware.

For more information on configuring Agilent devices with CAN cables, refer to the Agilent documentation.

Connect Cables to the Infinity II Modules

Note: On the Agilent 1260 Infinity II or 1290 Infinity II system, an Agilent column compartment can be connected to the stack with CAN cables.

Note: An LC device controlled by the Analyst Device Driver (ADD) software requires a LAN connection between the LC and the computer. No Aux I/O cable is required.

1. Confirm that the DIP switches on all modules are set correctly.
   - For MCT modules, which have two DIP switches, both switches must be up.
   - For modules with six DIP switches, all switches must be down.
   - For modules with eight DIP switches, the first six should be down. If the module will be connected to the LAN, then the last two switches must be up.
2. If the system contains a DAD, then follow these steps to connect the communication cables.
   a. If the system contains an Infinity II autosampler, then connect a CAN cable from the autosampler to the DAD.
   b. Connect a CAN cable from the DAD to the pump.
   c. Connect a CAN cable from the pump to the MCT.
   d. Connect a LAN cable from the DAD to the computer.
3. If the system does not contain a DAD, then follow these steps to connect the communication cables.
   a. If the system contains an Infinity II autosampler, then connect a CAN cable from the autosampler to the pump.
   b. Connect a CAN cable from the pump to the MCT.
   c. Connect a LAN cable from the Infinity II autosampler, if present, or the pump, to the computer.

4. Remove the tape covers from the power connector on the back of each module.
5. Attach the power cable to each module.

Autosampler Configuration

This section provides information on the required autosampler hardware, how to connect the autosampler to the computer and the mass spectrometer, and how to configure the current autosampler for external control.

The cables for the Agilent autosamplers are included with the mass spectrometer.

Note: Configure autosamplers that are not supported by the Analyst MD software to communicate with the mass spectrometer through analog signals or through AAO–type software. For information on configuring unsupported autosamplers to operate with a mass spectrometer, refer to the section: Peripheral Device Analog Synchronization.

The following table lists the required hardware. For the latest version of firmware supported, refer to the document: *Software Installation Guide* the Analyst MD software.

Table 7-2 Required Hardware for the Agilent Autosamplers

Cable	Other Parts Needed
• RS-232 cable (PN 024736) • GPIB cable (PN 021365) **Note:** The GPIB interface is not available in all modules. • AUX I/O cable (PN 014474)	• Network interface card if using a LAN (Ethernet) connection • Agilent PN 5183-4649 (for a direct LAN connection) • Agilent PN 8121-0940 (for a LAN connection using a hub)

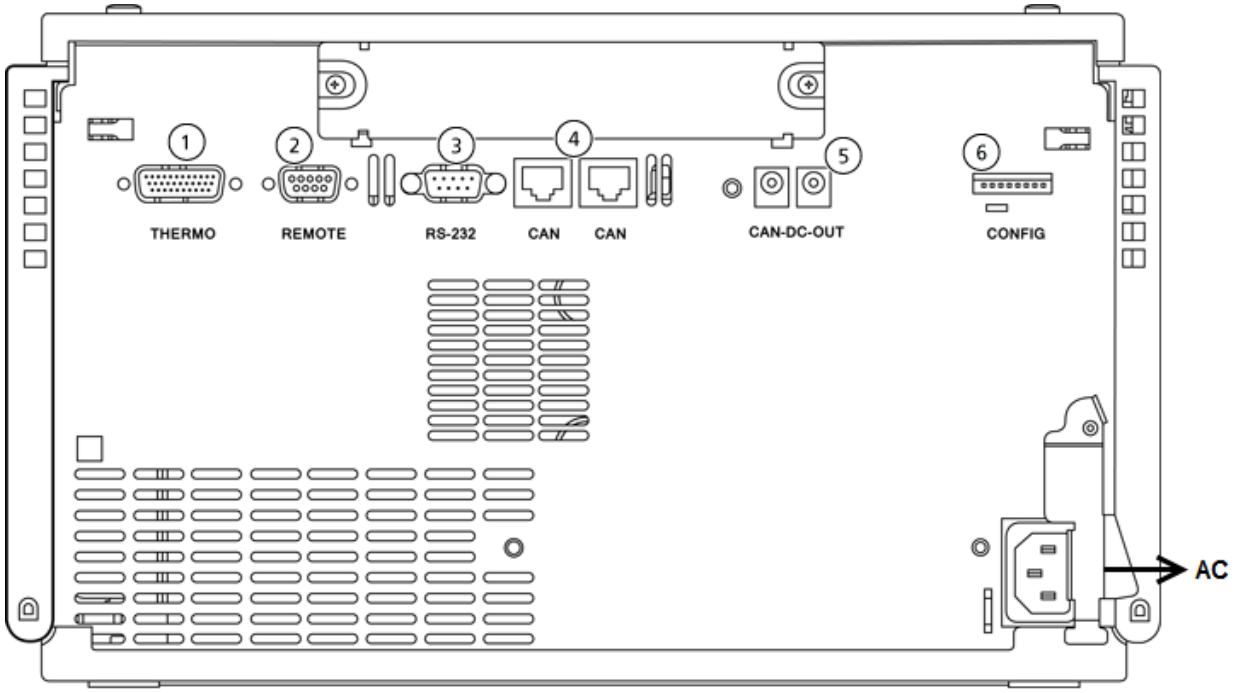
Connect the Agilent Autosampler

This procedure describes how to connect the Agilent autosampler to the computer through standard serial port communication. The Agilent autosampler can also be connected to the computer using a GPIB or LAN (Ethernet) cable.

Note: The GPIB interface is not available in all modules.

The autosampler must be wired so that the autosampler injection triggers the mass spectrometer to begin data acquisition. To do so, connect a pair of wires from the AUX I/O connector at the back of the mass spectrometer to the remote port of the autosampler.

Figure 7-1 Back Panel of the 1260 or 1290 Agilent Autosampler



Item	Description
1	Thermo port
2	Remote port
3	Serial port
4	CAN connectors
5	CAN-DC-OUT
6	DIP switches

Connect the Autosampler to the Computer

This procedure describes how to connect an Agilent Infinity autosampler to the computer through standard serial port communication. The Agilent autosampler can also be connected to the computer using a GPIB or LAN (Ethernet) cable.

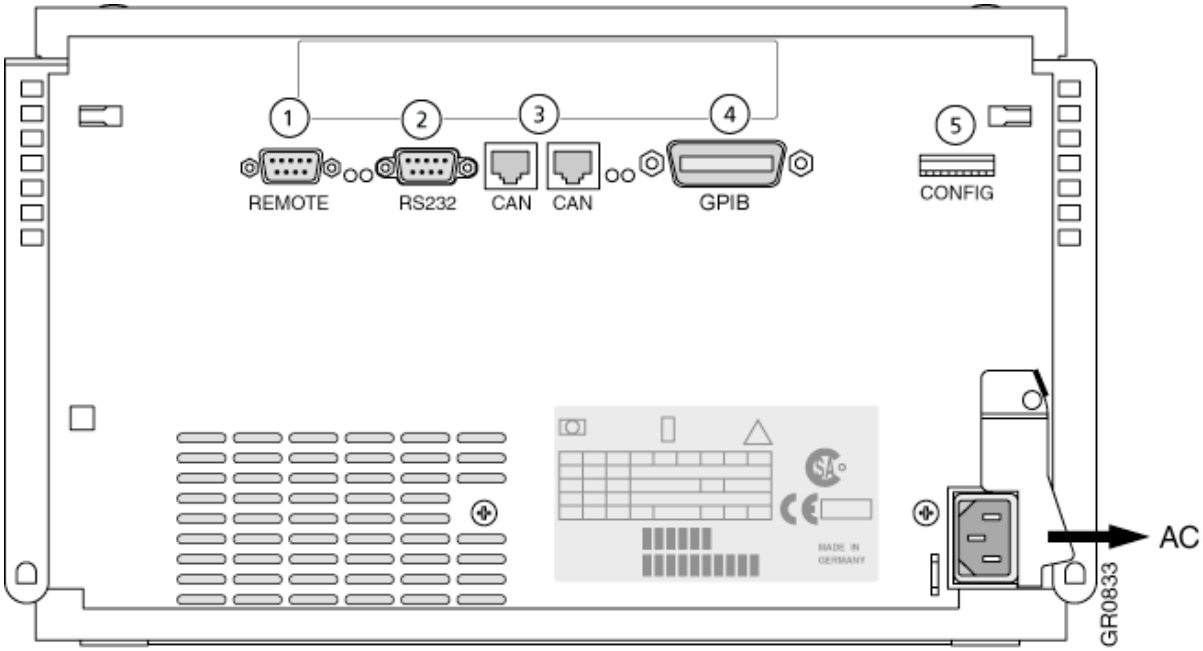
The cables for the Agilent autosamplers are included with the mass spectrometer.

The Agilent Infinity autosampler must be wired so that the autosampler injection triggers the mass spectrometer to begin data acquisition. To do so, connect a pair of wires from the AUX I/O connector at the back of the mass spectrometer to the remote port of the autosampler.

1. Turn off the Agilent autosampler by pressing the On/Off button on the front of the module.
2. Set the DIP switches at the back of the autosampler for a baud rate of 19,200. For more information on setting the DIP switches, refer to the section: Configure Serial Communication.

   For the location of the DIP switches at the back of the autosampler, refer to the following figure.

Figure 7-2 Back Panel of the 1290 Autosampler



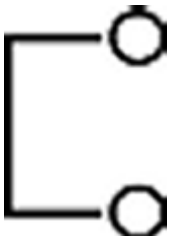
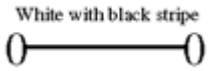
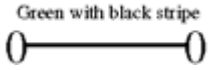
3. Connect the RS-232 cable from the serial port at the back of the autosampler to the desired serial port on the computer, noting the port number.

Connect the Autosampler to the Mass Spectrometer

Note: When using the AUX I/O cable (PN 5056592), the following steps are not required. The cable can be directly used to connect the autosampler to the mass spectrometer. Use the following procedure when using the universal AUX I/O cable.

1. Connect the 5 V supply wire (red with black stripes) to the anode wire (orange with black stripes) on the AUX I/O cable and then cover the connection with insulating tape or heat shrink tubing to prevent shorting to other wires or grounded metal parts.

Table 7-3 Wiring for the Agilent Autosampler (TTL—Active Low) Injection Input

Autosampler	Mass Spectrometer AUX I/O Cable		
		Pin 9 (power 5V)	Red with black stripes
		Pin 10 (anode)	Orange with black stripes
Remote port (pin 3)		Pin 22 (cathode)	White with black stripes
Remote port (pin 1)		Pin 21 (ground)	Green with black stripes

CAUTION: Potential System Damage. Cover each connection and then the entire cable assembly with insulating tape or heat shrink tubing to prevent shorting to other wires or metal parts that are connected to protective earth.

2. Connect the cathode wire (white with black stripes) and the ground wire (green with black stripes) on the AUX I/O cable to the remote port at the back of the Agilent autosampler.
3. Connect the cathode wire (white with black stripes) to Pin 3 of the remote port and connect the ground wire (green with black stripes) to Pin 1 of the remote port. Polarity is important.

Note: Make the connections to the remote port with a 9-pin DB push-lock or solder-tail connector. If the Agilent remote cable is used to connect the remote port to the AUX I/O cable, then make the cable as short as possible.

4. Connect the other end of the AUX I/O cable to the mass spectrometer AUX I/O connector.

Pump Configuration

WARNING! Electrical Shock Hazard. Refer to the Agilent pump safety instructions before configuring any mains-powered equipment.

This section describes the required hardware for each pump, how to connect the pump to the computer, and how to configure the pump for external control.

The following table lists the required hardware. Depending on how the system is configured, all of the following cables might not be required.

Table 7-4 Required Hardware for Agilent 1260 and 1290 Series Pumps

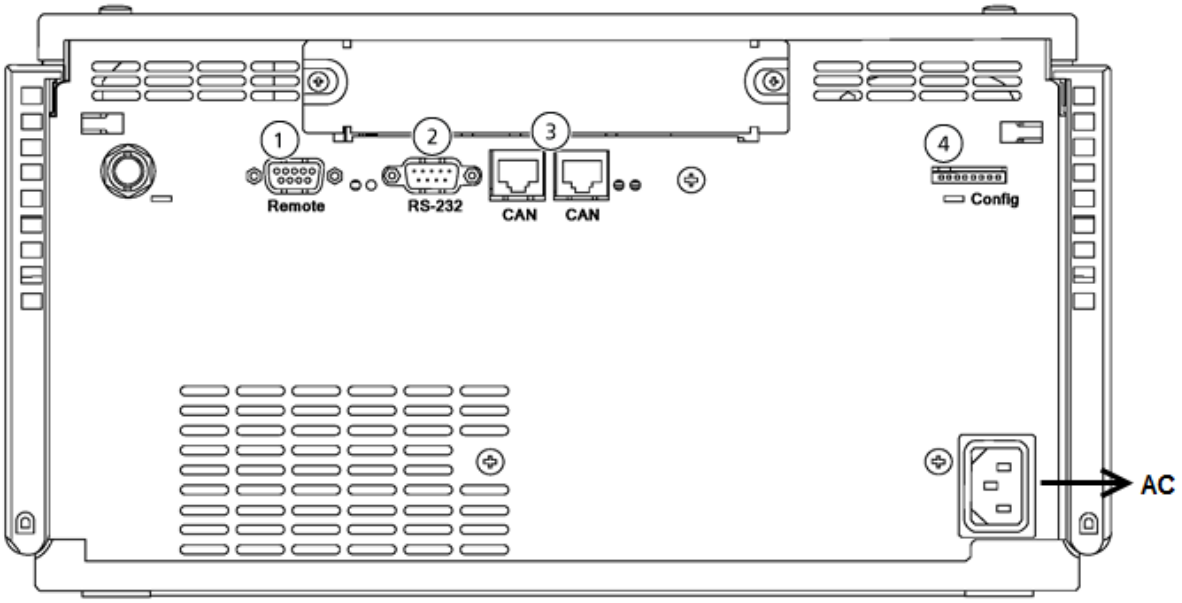
Cable	Other Parts Needed
• RS-232 cable (PN 024736) • GPIB cable (PN WC021365) **Note:** The GPIB interface is not available in all modules. • CAN cable (provided with Agilent system)	• General purpose cable for Agilent devices (Agilent PN G1103-61611) The following parts are optional. The external relay contacts board (Agilent PN G1351-68701) is required to provide timed contact closure events during the LC program. This option is not required for analog synchronization of peripheral devices. • Network interface card (PN 1016082) if using an Ethernet connection • Agilent PN 5183-4649 (for a direct LAN connection) • Agilent PN 8121-0940 (for a LAN connection using a hub)

Connect the Pump

This procedure describes how to connect the Agilent pump to the computer through standard serial port communication. Connect the pump to the computer with a GPIB or LAN (Ethernet) cable.

WARNING! Electrical Shock Hazard. Disconnect the power cable and wait at least one minute before removing the pump cover.

Figure 7-3 Back Panel of 1260 Agilent Pump



Item	Description
1	Remote connector
2	Serial port
3	CAN connectors
4	DIP switches

1. Press the On/Off button to turn off the pump.
2. To use the contact closure functionality, install the relay contact board by performing the following steps. Otherwise, go to step 3.
   a. Remove the screws that secure the plate.
   b. Insert the new plate with the board in the slot and then install and tighten the screws.
3. Set the DIP switches at the back of the pump. Refer to the figure: Figure 7-3. For more information, refer to the section: Configure Serial Communication.
4. Connect the RS-232 cable from the serial port at the back of the pump to the appropriate serial port on the computer, noting the port number.

Column Compartment Configuration

This section provides information about the required hardware and how to connect a column oven to the computer.

The following table lists the required hardware.

Table 7-5 Required Hardware for the Agilent Column Ovens

Cable	Other Parts Needed
RS-232 cable (PN 024736)	• Network interface card (PN 1016082) if using a LAN (Ethernet) connection • Agilent PN 5183-4649 (for a direct LAN [Ethernet] connection) • Agilent PN 8121-0940 (for a LAN [Ethernet] connection using a hub) • CAN cable (provided with the Agilent system)

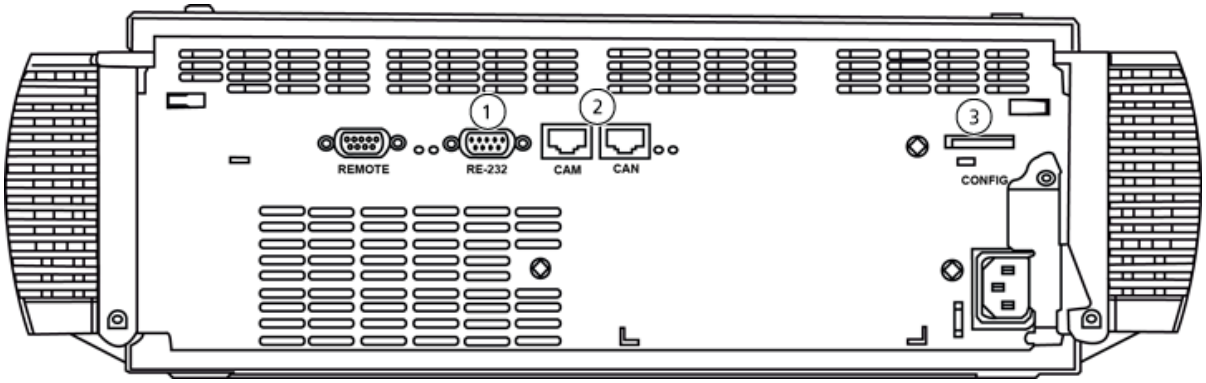
Connect the Column Oven to the Computer

WARNING! Electrical Shock Hazard: Refer to the Agilent Column Oven safety instructions before configuring any AC mains-powered equipment.

This procedure describes how to connect an Agilent column oven to the computer through standard serial port communication.

1. Turn off the column oven.
2. Set the DIP switches at the back of the column oven. Make sure that the switches are set for a baud rate of 19,200. For specific instructions on setting the DIP switches, refer to the section: Configure Serial Communication.
   For the location of the DIP switches at the back of the column oven. Refer to the following figure.

Figure 7-4 Back Panel of the Agilent Column Oven



Item	Description
1	Serial connector
2	CAN connectors
3	DIP switches

3. Connect the RS-232 cable from the serial port at the back of the column oven to the appropriate serial port on the computer, noting the port number.

Note: For instructions on connecting an Agilent column oven to a computer using the LAN (Ethernet) connection, refer to the Agilent documentation.

Detector Configuration

WARNING! Electrical Shock Hazard. Refer to the Agilent detector safety instructions before configuring any mains-powered equipment.

The following table lists the required hardware:

Table 7-6 Required Hardware for the Agilent Detector

Cable	Other Parts Needed
N/A	• Network interface card for the LAN (Ethernet) connection • Agilent PN 5183-4649 (for a direct LAN connection) • Agilent PN 8121-0940 (for a LAN connection using a hub)

The Agilent 1260 and 1290 DADs are shipped with an on-board LAN interface. Connect them to the computer with a LAN (Ethernet) cable.

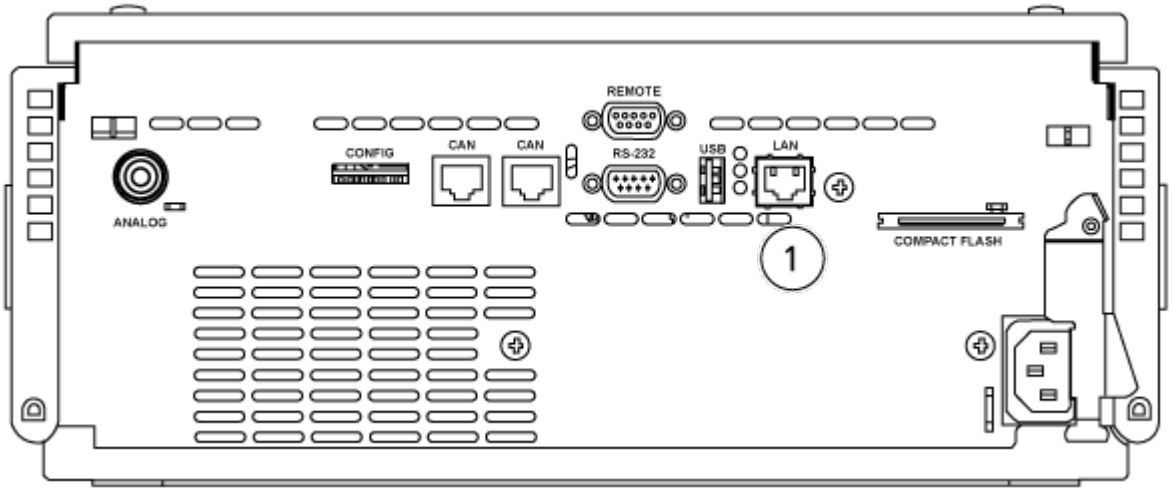
To use the LAN interface, install a network interface card in the DAD. For instructions, refer to the Agilent documentation.

Refer to the section: Configuration of Ethernet Communication.

Connect the Diode Array Detector to the Computer

1. Press the On/Off button to turn off the Agilent diode array detector.
2. Connect an Ethernet cable to the back of the Agilent diode array detector. Refer to the following figure. If an Ethernet cable is used, then use Agilent PN 5183-4649 for a direct connection from the diode array detector to the computer. If a hub connection is used, then use Agilent PN 8121-0940.

Figure 7-5 Back of the G4212A Diode Array Detector



Item	Description
1	LAN port

3. Connect the other end of the LAN cable to the computer.

CTC PAL and Other Autosampler Configuration 8

The following CTC PAL autosamplers are supported by the Analyst MD software: HTS, HTC, and LC. All are configured the same way. For information on setting up the CTC PAL autosampler, refer to the section: CTC PAL Autosampler Setup Notes.

Note: For information about configuring the CTC PAL3 autosampler, refer to the *Analyst Device Driver Tutorial*.

The following table lists the required hardware.

Table 8-1 Required Hardware for the CTC PAL Autosampler

Cable	Other Parts Needed
• RS-232 cable (PN 024736) • AUX I/O cable (PN 014474)	• CTC PAL–ready cable for connecting the instrument • DB15 male connector

The cables for the CTC autosampler is included with the CTC autosampler.

For the latest version of tested firmware, refer to the document: *Software Installation Guide*.

Connect the CTC PAL Autosampler

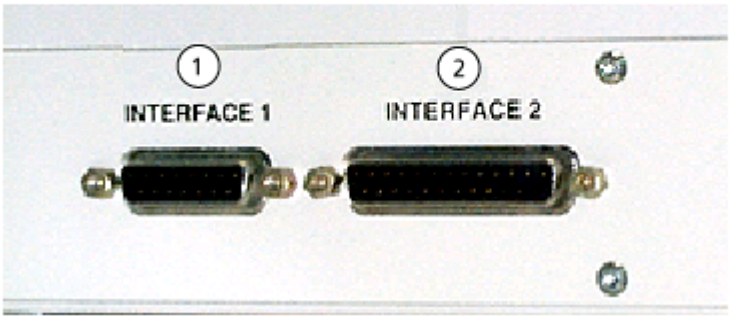
WARNING! Electrical Shock Hazard. Refer to the CTC PAL autosampler safety instructions before configuring any AC mains-powered equipment.

Wire the autosampler so that the autosampler injection triggers the mass spectrometer to begin data acquisition. To do so, connect a pair of wires from the AUX I/O connector at the back of the mass spectrometer to the remote port of the autosampler.

Connect the Autosampler to the Computer

1. Shut down the computer.
2. Press the On/Off button on the power module to turn off the CTC PAL autosampler.
3. Connect the RS-232 cable from the SER 1 port at the back of the autosampler to the appropriate serial port on the computer, noting the port number.

Figure 8-1 Connectors at the Back of the CTC PAL Autosampler



Item	Description
1	AUX I/O connector
2	Fast wash station connector

Connect the Autosampler to the Mass Spectrometer

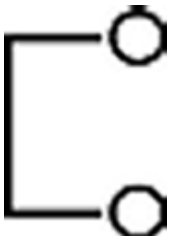
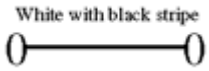
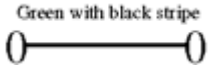
Note: If the AUX I/O cable (PN 5056590)is being used, then the following steps are not required. The cable can be directly used to connect the autosampler to the mass spectrometer.

1. On the free end of the AUX I/O cable, short together the following wires but do not connect them to anything else:

   - Red with black stripe (wire 9)
   - Orange with black stripe (wire 10)

   The CTC PAL comes with a cable that connects to the mass spectrometer. This cable has a connector that fits into the 15-pin **Interface 1** connector at the back of the CTC PAL autosampler. The other end has bare wires that must be attached to the bare wires of the AUX I/O cable.

Table 8-2 Wiring for the CTC PAL Autosampler

Autosampler	Mass Spectrometer AUX I/O Cable		
Interface 1		Pin 9 (power 5V)	Red with black stripes
		Pin 10 (anode)	Orange with black stripes
Inject marker (pin 3)		Pin 22 (cathode)	White with black stripes
Common (pin 4)		Pin 21 (ground)	Green with black stripes

CAUTION: Potential System Damage. Cover each connection and then the entire cable assembly with insulating tape or heat shrink tubing to prevent shorting to other wires or metal parts that are connected to protective earth.

2. Connect the white with black stripe AUX I/O wire to Pin 3 of the DB15 connector.
3. Connect the green with black stripe AUX I/O wire to Pin 4 of the DB15 connector.
4. Connect the DB15 male connector to the CTC PAL autosampler Interface 1 connector.
5. Connect the other end of the AUX I/O cable into the mass spectrometer AUX I/O connector.

Configure the Autosampler to Send and Receive Signals

1. Press the On/Off switch on the power module of the autosampler to turn on the CTC PAL autosampler.
2. Start the computer.
3. On the **Home** menu of the CTC PAL handheld controller, press **F1** to select **Menu**.
4. Scroll down and then select **Setup**.
5. Press **F3** and then press **ENTER** to show the available options.
6. On the next screen, scroll down and then select **Objects**.

7. Scroll down and then select **Sync Signals**.
8. Select **Start**.
9. In the next window that opens, highlight the **Source** line, and then scroll between the options. Select **Remote** and then press **ENTER**.

Note: Make sure that the tray hardware configured in the system is listed in the **Tray Type** and **Tray Holder** menus. Refer to the manufacturer documentation from the manufacturer.

10. Press **Esc** to return to the previous window and then scroll down to select **Inject**.
11. In the next window that opens, highlight the **Source** line and then scroll between the options. Select **Immediate**, and then press **ENTER**.
12. Press **Esc** twice to move back two windows.
13. Scroll down and then select **Out Signals**.
14. In the next window that opens, select **Injected**.
15. Highlight the **Destination** line, scroll between the options and then select **SW-Out1**.
16. Press **F4** to return to the **Home** menu.

Other Autosamplers

The instructions in this section are required only when AAO or the Analyst MD software support is not available. Any autosampler can be synchronized with the mass spectrometer for use with the Normally Open autosampler contact closure Inject signal. The autosampler is connected to the mass spectrometer by an AUX I/O cable.

To synchronize other autosamplers, create a hardware profile, and then choose the LC synchronization trigger

Synchronize the Autosampler and the Mass Spectrometer

1. Start the Analyst MD software.
2. Create or edit a hardware profile. Refer to the document: *Help*.
3. On the Edit Hardware Profile screen, click the mass spectrometer and then click **Setup Device**.
   The Configuration dialog for the mass spectrometer is shown.
4. Open the Configuration tab.
5. Click either **Active Low** or **Active High** to set the voltage level at which the mass spectrometer triggers the autosampler to begin. Refer to the autosampler documentation.

Note: Active Low is the preset value.

6. Click **OK**.
   The Hardware Configuration Editor dialog opens.
7. Click **Activate Profile**.
   A green check mark is shown beside the hardware profile, indicating that the profile is active.

Harvard 22 Syringe Pump 9

WARNING! Electrical Shock Hazard. Refer to the Harvard 22 Syringe Pump safety instructions before configuring any AC mains-powered equipment.

Connect the Pump to the Computer

1. Shut down the computer.
2. Press the **On/Off** button to turn off the pump.
3. Connect the 25-pin end of the RS-232 cable from the serial port at the back of the pump to the appropriate serial port on the computer, noting the port number.

Set the Baud Rate

1. Turn on the pump.
2. Press the **Enter** key.
3. Press the **SET** key while pressing the **STOP/START** key.

Table 9-1 Current Baud Rate LED Displays

LED	Baud rate
300	300 baud
1200	1200 baud
24	2400 baud
96	9600 baud

4. Press the **STOP/START** key until 96 is shown.
5. Press the **Enter** key.
   The baud rate is set to 9600.

Set the Device Address

1. Hold the **SET** key and then press the **0** key.
   The LED shows the current address using the format AD.*n*, where *n* is the address number.
2. Press the **0** key

3. Press the **ENTER** key.

Switching Valves 10

CAUTION: Potential System Damage. Refer to the safety instructions for the Valco Two-Position Switching Valve before configuring any mains-powered equipment.

The Analyst MD software supports the following switching valves:

- Valco two-position switching valve.
- Agilent switching valves. Refer to the section: Column Compartment Configuration.
- Shimadzu internal valves using the Shimadzu CBM controller. Refer to the section: Shimadzu System Configuration.

Table 10-1 Required Hardware for the Valco Valve

Cable	Other Parts Needed
RS-232 cable (PN 024740)	027522 Valve kit and all accessories

For the latest version of tested firmware, refer to the document: *Software Installation Guide*.

Valco Two-Position Switching Valve

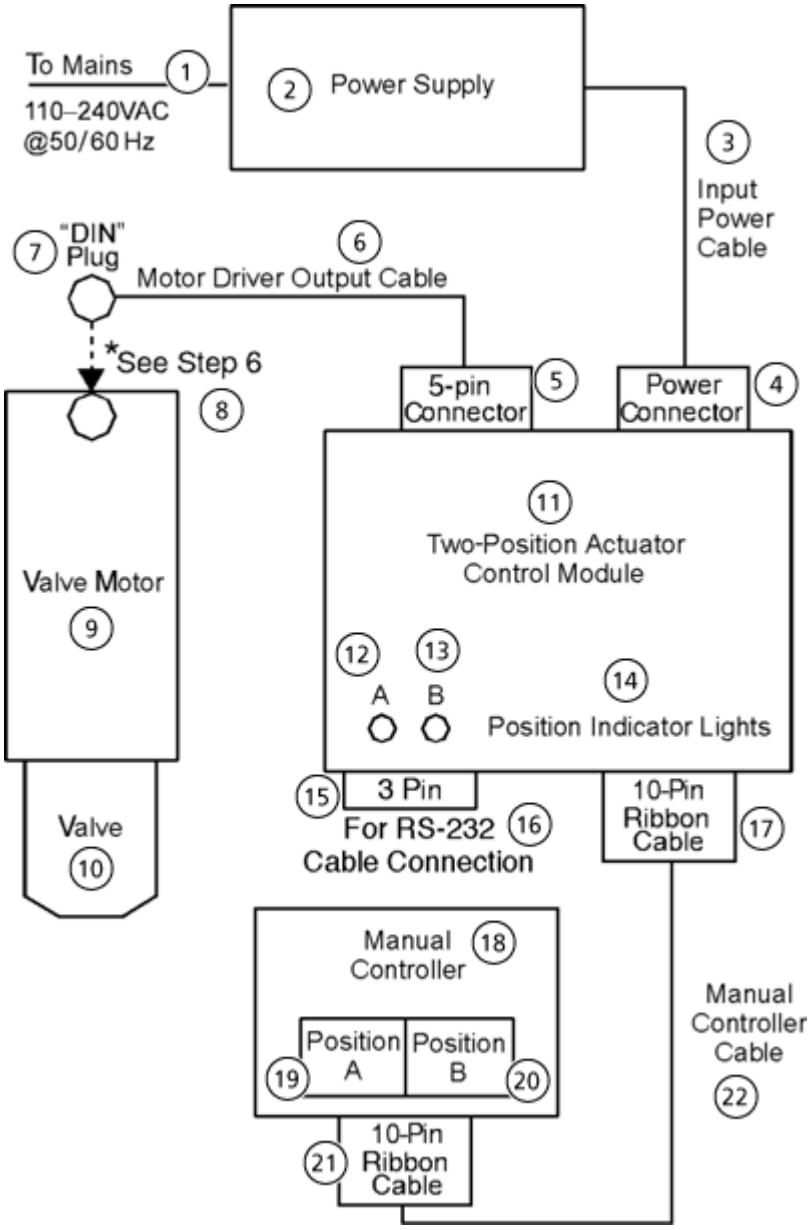
Initialize the Valco two-position switching valve when electrical power to the valve is interrupted. To initialize the valve, use the Valco manual controller, which is disconnected for routine use of the switching valve. The manual controller is included in the valve kit. Follow the procedures in this section in the order given.

Initialize the Valve

If electrical power to the Valco valve is interrupted, then follow this procedure to initialize the valve.

1. Insert the four-wire connector from the Valco power supply into the receptacle at the back right of the Valco two-position actuator control module.

Figure 10-1 Valco Switching Valve Configuration for Initialization



Item	Description
1	To Mains 110-240 VAC @50/60 Hz
2	Power Supply
3	Input Power Cable
4	Power Connector

Item	Description
5	5-pin Connector
6	Motor Driver Output Cable
7	DIN Plug
8	See Step 6
9	Valve Motor
10	Valve
11	Two-Position Actuator Control Module
12	A
13	B
14	Position Indicator Lights
15	3 Pin
16	For RS-232 Cable Connection
17	10-Pin Ribbon Cable
18	Manual Controller
19	Position A
20	Position B
21	10-Pin Ribbon Cable
22	Manual Controller Cable

CAUTION: Potential System Damage. Do not connect the round connector on this cable to the valve and motor assembly at this time, as it will damage the valve setting.

2. Insert the five-wire connector of the Valco motor output cable into the receptacle at the back left of the Valco two-position actuator control module.
3. Connect the 10-wire Valco manual controller cable from the receptacle on the front right of the Valco two-position actuator control module to the receptacle on the front of the Valco manual controller.
   The 10-wire cable should have a 10-wire connector on each end.
4. Connect the Valco power supply to the mains power.
5. On the Valco manual controller, cycle the actuator at least two times by pressing Position A followed by Position B and so on.

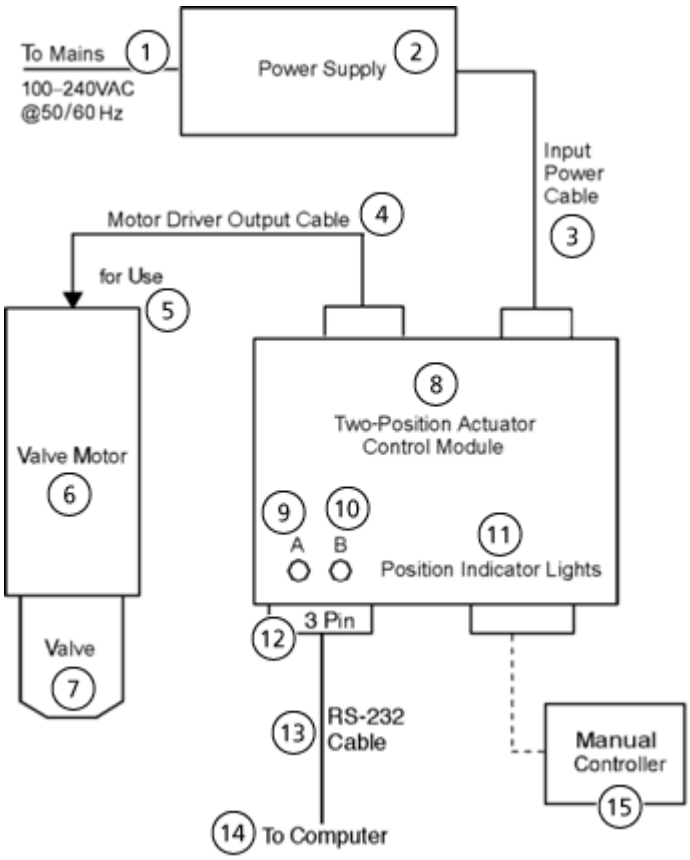
Initialization is achieved when the position indicator lights on the actuator change according to the position button pressed on the manual controller.

6. Insert the round connector of the motor driver output cable into the receptacle at the rear underside of the valve and motor assembly.
7. Make sure that the Valco kit operates properly by using the manual controller to change valve positions several times.
8. Disconnect the Valco manual controller cable from the receptacle on the front of the Valco two-position actuator control module. Store the manual controller and cable until the next time it is needed.

Connect the Valve to the Computer

1. Shut down the computer.

Figure 10-2 Valco Switching Valve Integration for Serial Control



Item	Description
1	To Mains 100-240 VAC @50/60 Hz
2	Power Supply
3	Input Power Cable
4	Motor Driver Output Cable
5	for Use
6	Valve Motor
7	Valve
8	Two-Position Actuator Control Module
9	A
10	B
11	Position Indicator Lights
12	3 Pin
13	RS-232 Cable
14	To Computer
15	Manual Controller

2. Connect the 3-pin end of the RS-232 cable to the receptacle on the Valco two-position actuator control module.
3. Connect the other end of the RS-232 cable to the desired 9-pin serial port on the computer, noting the port number.

NIDAQ and Terminal Block Installation

11

Install an ADC Card on a New Computer

Current systems have the correct drivers installed. The list of supported devices might change. Refer to the document: *Release Notes* for the current Analyst MD software.

The current systems include the Measurement and Automation Explorer software. This software is also installed on systems that had a GPIB board previously installed.

1. Connect one end of the BNC connector to the AI 0 connection on the ADC terminal box and the other end to the computer. Refer to the figure: Figure 11-1.
   The block is marked as having Floating Source and Ground Ref. Source analog channels mixed in with earthed channels (marked as AI 0 to AI 7).

   Note: Because the system uses Differential mode, the software must distinguish the voltage difference between the anode and cathode of the variable wavelength detector, instead of grounding the cathode and monitoring only the anode.

Figure 11-1 BNC Connector

Item	Description
1	AI 0 connection

2. Insert the NIDAQ PCI board in the computer. Refer to the following figures for examples of the two boards.

Figure 11-2 PCI-6259 MSeries National Instruments Card

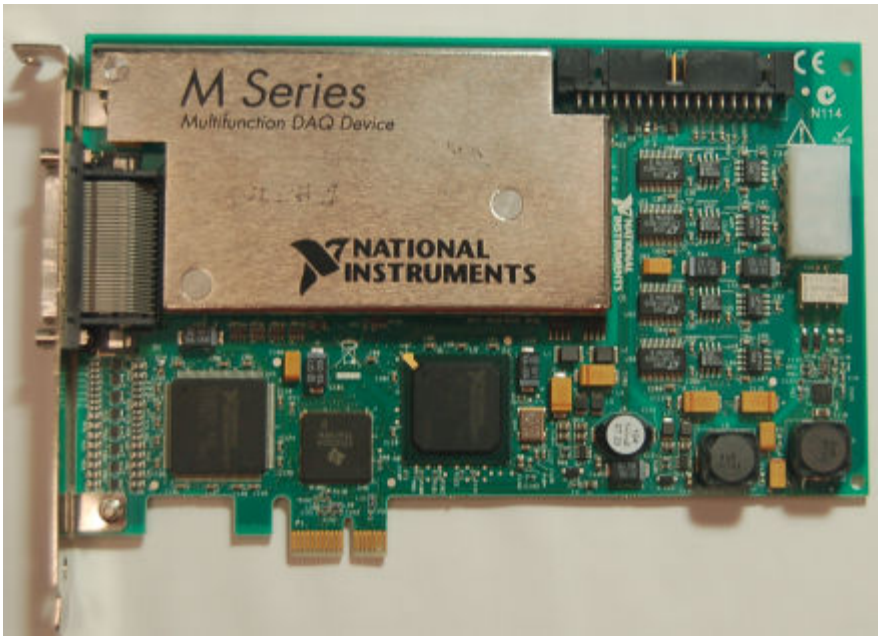


Figure 11-3 PCI-6032E National Instruments Card

3. Use the cable to attach the ADC terminal box to the NIDAQ PCI board.

Figure 11-4 Example: NIDAQ PCI board

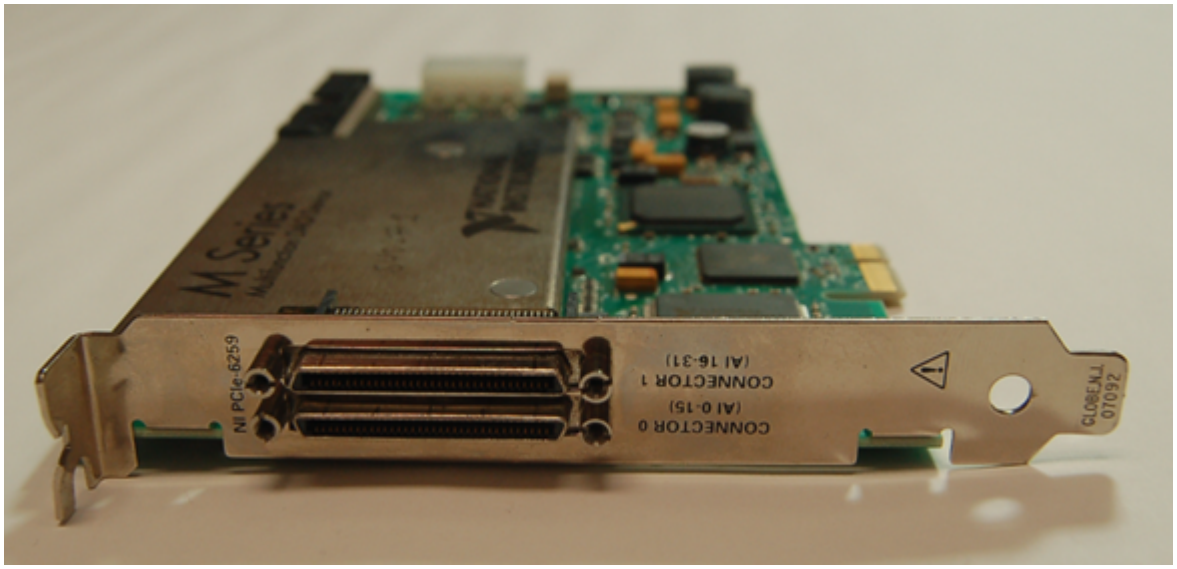
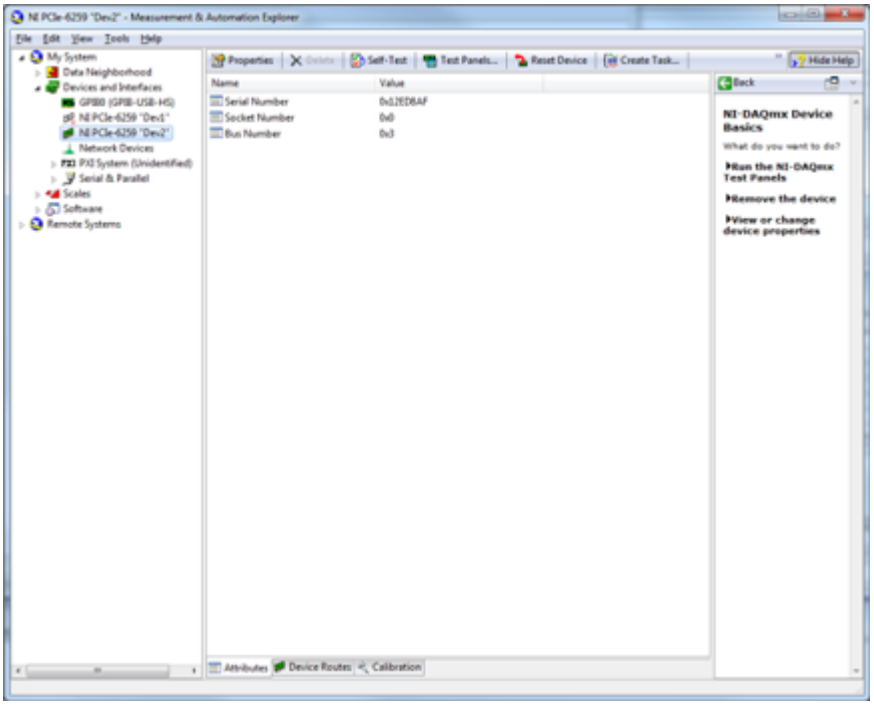


Figure 11-5 Example: Cable

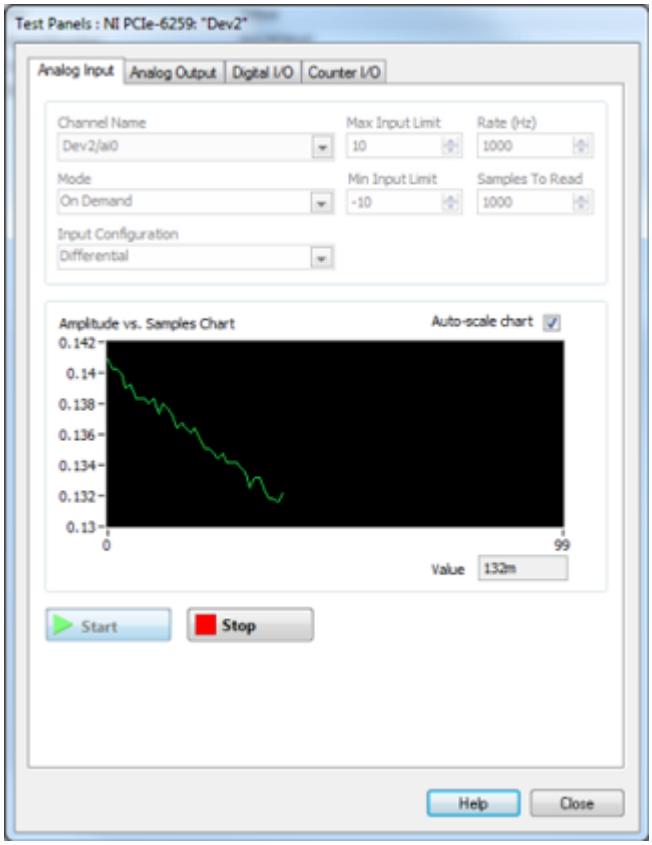
4. Open the Measurement and Automation Explorer software. The left pane shows a list of available devices.
5. Expand the list to view the PCI-6259 ADC card.

Figure 11-6 Measurement and Automation Explorer Window



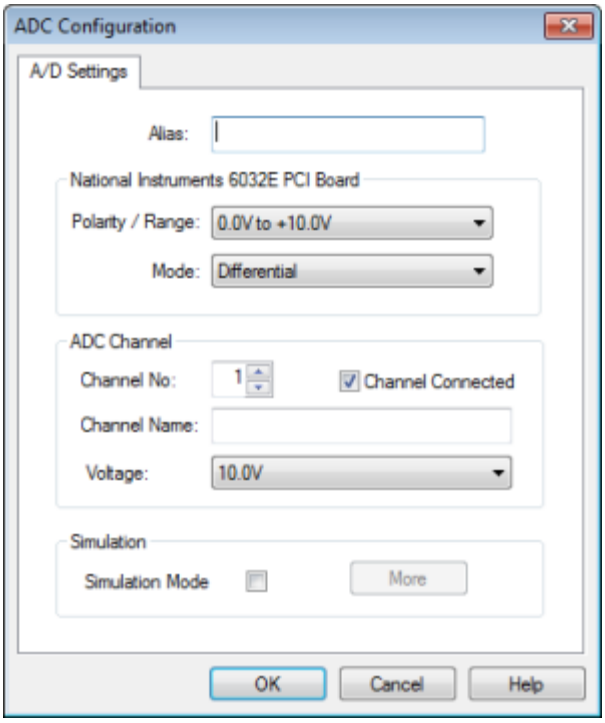
If this card is in the list, then it is installed on the computer. There are some useful tools within this software that can be used to monitor the input to the terminal block without the Analyst MD software. Use an AA battery to supply a test signal.

Figure 11-7 Test Panels Dialog



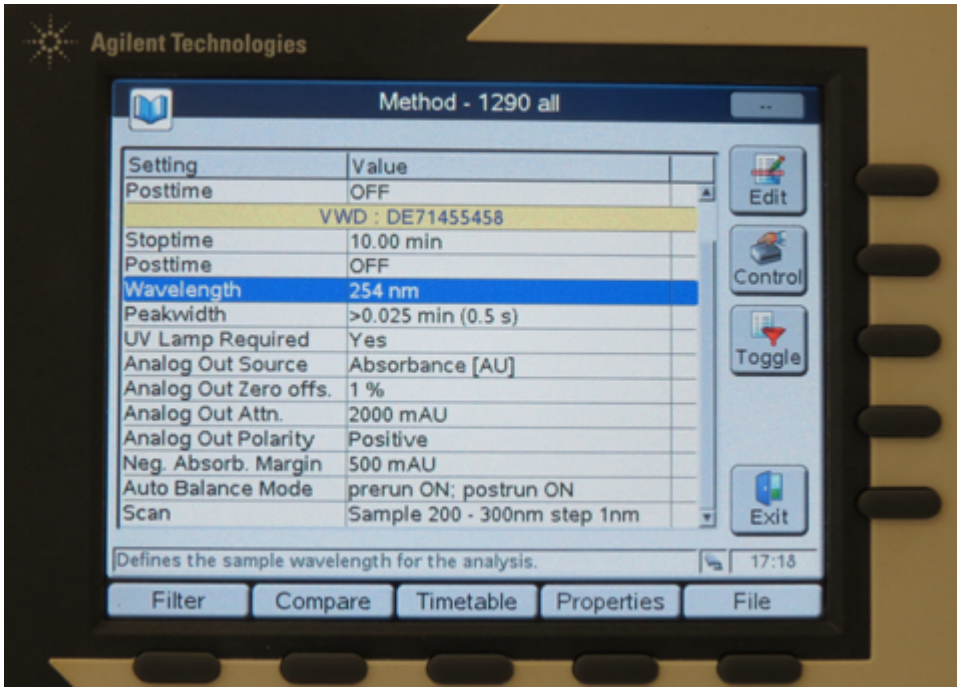
6. In the Analyst MD software, add the ADC card to the hardware profile as shown in the following figure. Make sure the settings are exactly as shown.

Figure 11-8 ADC Configuration Dialog



7. Review the settings on the UV detector.
8. Using the handheld controller, set the parameters. The settings shown in the following figure work well.

Figure 11-9 Main Screen



9. Test the system by following these steps:

   a. Set up an LC system with methanol:water.

   b. Add acetone, which is highly fluorescent under UV, to an LC vial.

   WARNING! Toxic Chemical Hazard. Read and follow the manufacturer safety data sheet prior to handling chemicals.

   c. Run a basic method at a flow rate of 20 µL/min.

   d. Perform a 5 µL injection.

   The Analyst MD software acquires the data with the MS data.

10. To access the data, open the data file in **Explore** mode, right-click in the window, and then select **Open ADC data**.

Peripheral Device Analog Synchronization

A

The preferred method of synchronizing peripheral devices is through the Analyst MD software control. For devices that cannot be controlled through the Analyst MD software, synchronize through the use of analog signals (contact closure).

API AUX I/O Interface

The mass spectrometer provides an analog interface through the **AUX I/O** port located at the rear of the instrument. The following figure is a schematic representations of the AUX I/O interface and the AUX I/O cable provided with the mass spectrometer.

In the following figure, on the left side, wire colors are indicated as *background/stripe*. Mass spectrometer (MS) signals are shown in NOT READY and NO ERROR states.

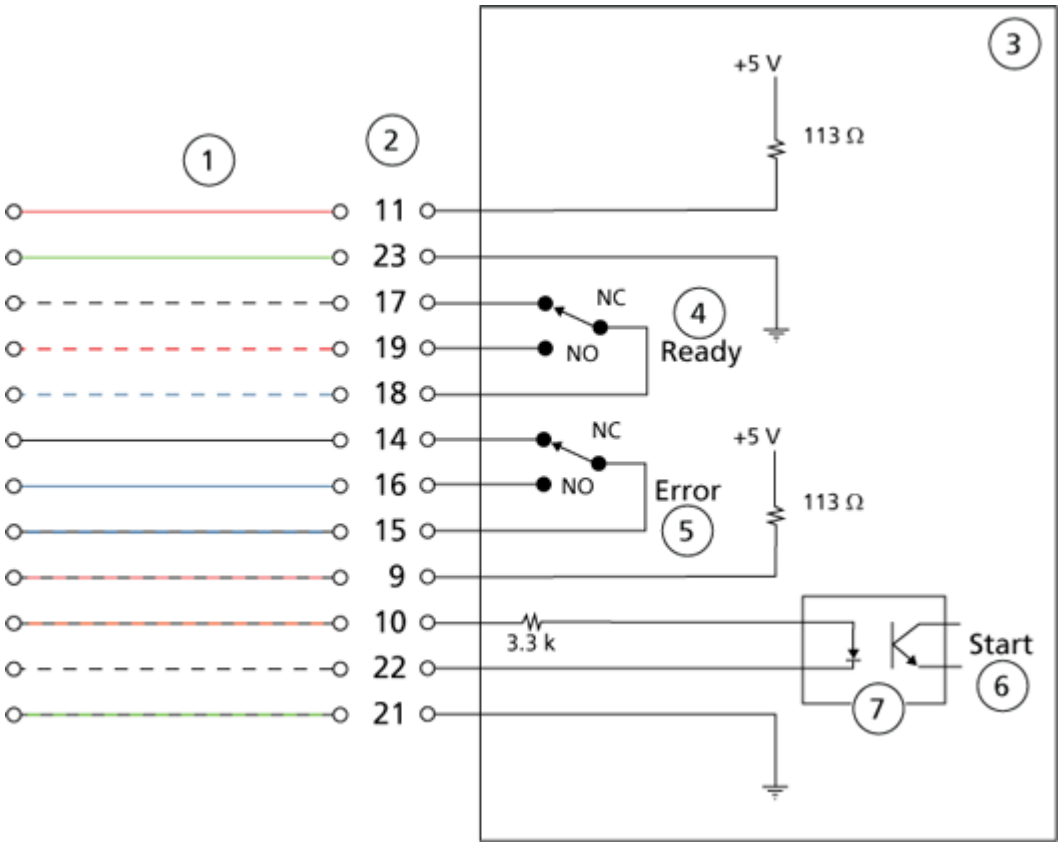
Table A-1 Figure Legend

Item	Description
1	AUX I/O cable
2	AUX I/O port
3	Mass spectrometer
4	Ready
5	Error
6	Start
7	Optocoupler
Pins	
9	Red/black
10	Orange/black
11	Red
14	Black
15	Blue/black
16	Blue

Table A-1 Figure Legend (continued)

Item	Description
17	Black/white
18	Blue/white
19	Red/white
21	Green/black
22	White/black
23	Green

Figure A-1 Schematic of the AUX I/O Interface and Cable on the SCIEX 4500MD and Citrine Systems



AUX I/O Signal Details

The mass spectrometer shows three types of signals.

Ready Signal

The Ready signal is an autosampler Inject signal that is generated using a Double-Pole, Single-Throw (DPST) relay. It provides either an Normally Open (NO) or Normally Closed (NC) contact closure.

Note: The Ready signal is active only when the mass spectrometer is operated in LC Sync mode. For more information on operating modes, refer to the document: *Help*.

The Ready signal is activated when the mass spectrometer is ready to acquire data and is waiting for an injection. As soon as the MS acquisition is started (by the Start signal), Ready is deactivated. Do not confuse Ready with the MS Ready status, which is not specific to the LC Sync mode.

Error Signal

The Error signal is used as an External Stop signal for any LC pumps connected to the ion source to prevent accidental overflow of the source. An error is generated using a DPST relay and provides either a NO or NC contact closure. The Error signal is active regardless of the MS synchronization mode. The Error signal is activated for approximately five seconds when an MS error occurs. The error type is non-specific and might include ion source, electronic, or vacuum system failures.

Start Signal

The Start signal is given to the mass spectrometer to initiate data acquisition. This signal is passed to the mass spectrometer electronics through an optocoupler (a device that couples a light-emitting-diode and a phototransistor to provide an isolated digital connection between the sender and receiver). The Start signal might be any signal that creates a potential of between 2 to 8 volts across Pins 10 and 22. For example, a voltage pulse in the normal TTL range (2 to 5 volts) would be a Start signal.

Set the MS synchronization trigger level to configure the Start signal as either Active High or Active Low, as required.

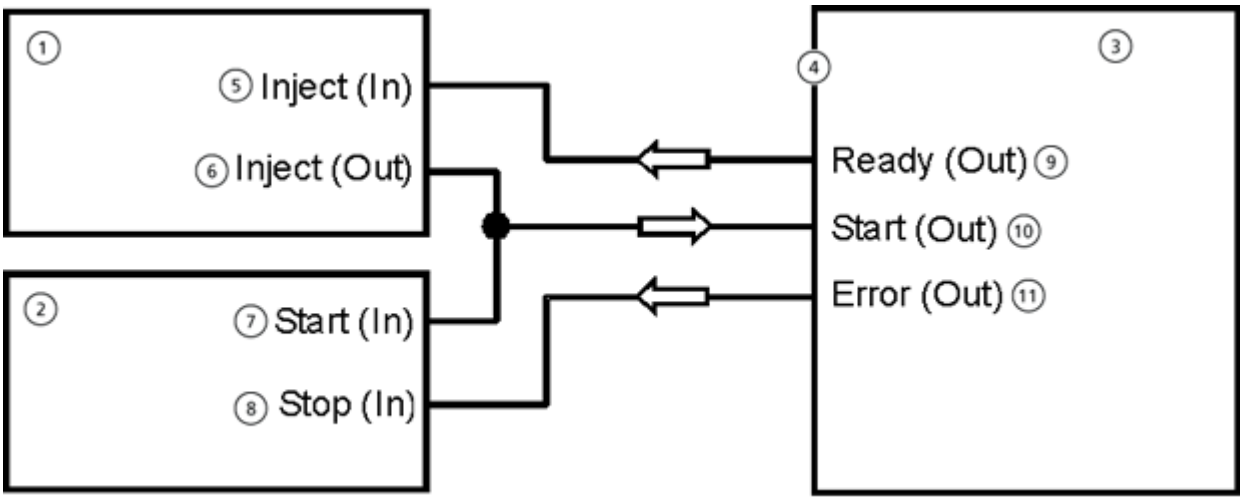
Use the biased +5V and ground signals provided on the AUX I/O port to:

- Generate the appropriate Start signal using contact closure.
- Generate TTL-level Ready and Error signals.

Wire Peripheral Devices to the Mass Spectrometer

The following figure shows a general scheme for connecting peripheral devices to the mass spectrometer. The signals available on the peripheral devices indicate to what extent the scheme presented here can be used.

Figure A-2 General Scheme for Analog Synchronization of Peripheral Devices and the Mass Spectrometer



Item	Description
1	Autosampler
2	Pumps
3	Mass spectrometer
4	AUX I/O port
5	Inject (In)
6	Inject (Out)
7	Start (In)
8	Stop (In)
9	Ready (Out)
10	Start (Out)

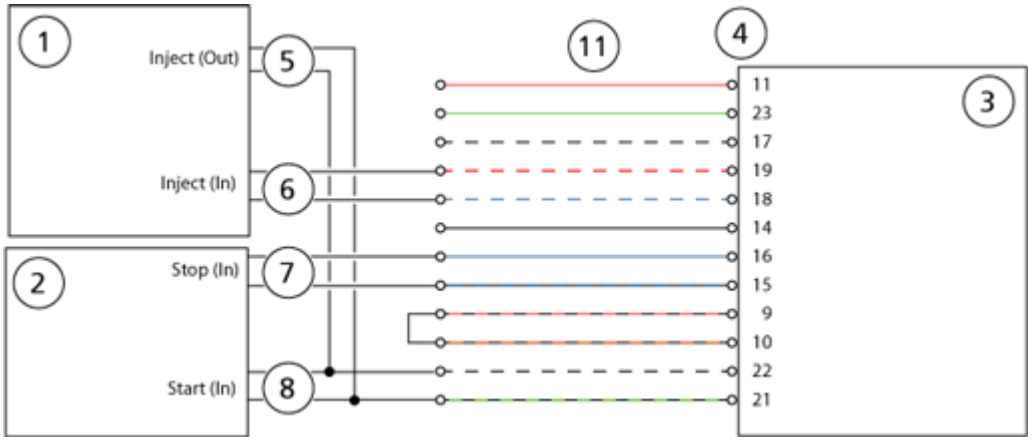
Item	Description
11	Error (Out)

Note: Set the mass spectrometer **Sync Mode** to **LC Sync** in the acquisition method to provide analog synchronization between the peripheral devices and the mass spectrometer.

The following examples are used as guidelines for developing an analog synchronization scheme for the peripheral devices. For more information about the types of signals generated and required by the peripheral device, refer to the documentation that comes with the peripheral device documentation.

In both figures, in the center, wire colors are indicated as *background/stripe*.

Figure A-3 Analog Synchronization Scheme using Contact Closure Signals



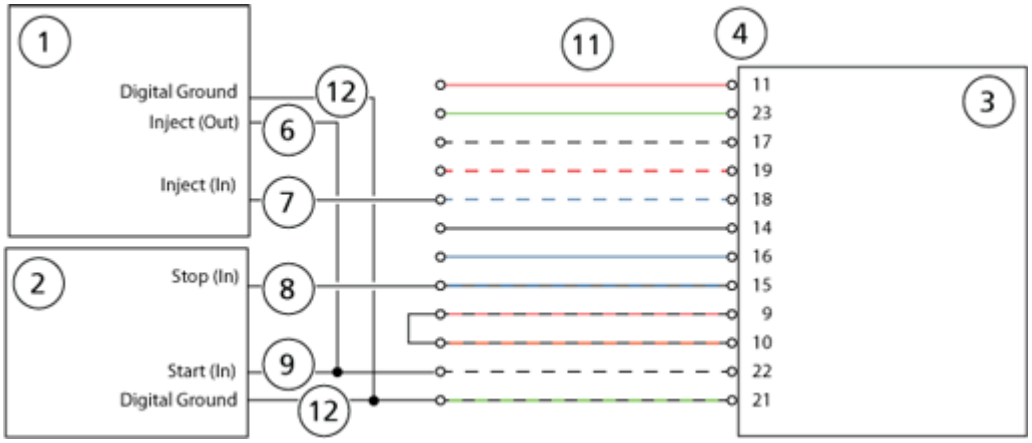
Item	Description
1	Autosampler
2	Pumps
3	Mass spectrometer
4	AUX I/O port
5	Inject (Out)
6	Inject (In)
7	Stop (In)
8	Start (In)

Item	Description
11	AUX I/O cable

Table A-2 Contact Closure Signals

Autosampler Inject (Out)	NO
Autosampler Inject (In)	NO
Pump Start (In)	NO
Pump Stop (In)	NO

Figure A-4 Analog Synchronization Scheme using TTL Signals



Item	Description
1	Autosampler
2	Pumps
3	Mass spectrometer
4	AUX I/O port
6	Inject (Out)
7	Inject (In)
8	Stop (In)
9	Start (In)
11	AUX I/O cable

Item	Description
12	Digital ground

Table A-3 TTL Signals

Autosampler Inject (Out)	TTL Active Low
Autosampler Inject (In)	TTL Active High
Pump Start (In)	TTL Active Low
Pump Stop (In)	TTL Active High

Note: In these illustrations, the mass spectrometer is set for Active Low synchronization.

CTC PAL Autosampler Setup Notes B

This section provides an overview of the setup for the CTC PAL autosampler. With all versions of the PAL autosampler, the only differences are in the frame size and the tray holders (or stacks) bolted to the autosampler frame. In some cases, additional valves and accessories can be attached.

The Analyst MD software uses a software driver developed by CTC Analytics. The driver is essentially the same as that used by the CTC software, Cycle Composer.

Note: The firmware required to operate the different models of autosampler is exactly the same for all models when used with the Analyst MD software.

A Field Service Employee (FSE) must configure the CTC autosampler firmware to indicate where the trays can be placed and where everything is located in the X, Y, and Z dimensions. Use the handheld controller for the autosampler to configure the PAL or use a separate utility from CTC to write the configuration information into the autosampler's non-volatile memory.

The following terms are used to describe the Analyst MD Software Batch Editor elements in relation to the CTC.

Rack

CTC defines a rack as a drawer or tray that holds microtitre or vial plates. The **Rack Position** designates where the rack is placed, and the **Rack Code** designates the type of rack.

Plate

CTC defines a plate as a microtitre plate or tray that holds vials. The **Plate Code** specifies the type of plate and the plate position indicates where the plate sits on the rack.

Note: There is not a one-to-one mapping between a rack and the tray in CTC terminology.

Tray

In the Analyst MD software, the term tray is used to define a physical location. A tray is a placeholder for a location in which different types of trays can be placed. The tray group indicates the tray types that can be used in each tray location.

The Analyst MD software imposes no restrictions on the number of tray types used in each location. Use all defined tray types in all tray locations, if required. With the Analyst MD software, duplicate tray definitions are not required.

CTC PAL Autosampler Setup Notes

For every tray location on the autosampler, use the handheld controller for the autosampler to verify and correct the position of each tray type. If any trays are incorrectly defined on the X, Y, or Z dimension, then the CTC driver cannot find the correct layout of the trays in the autosampler. This either causes the Analyst MD software to load the tray configuration incorrectly, which results in the Batch Editor Locations tab showing 6 tray locations, or it causes the Analyst MD software to not indicate the trays that should be present.

Note: The AUX I/O triggers the mass spectrometer to start scanning through the contact closure. If the mass spectrometer does not start scanning, then it might be because the CTC autosampler Sync Signal is not set to Immediate. This situation typically occurs when the autosampler is being used as a standalone device without any controlling software. The CTC autosampler has a handheld controller for the user to configure settings in the autosampler. One of these settings is the Sync Signal. If the autosampler is used by itself with no computer control, then set the Sync Signal to wait for an external ready signal. If the autosampler is under the Analyst MD software control, however, typically this is not needed. If the autosampler is configured incorrectly, then it will wait and not inject.

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