Analyst® and Analyst® TF Software

Peripheral Devices Setup Guide

RUO-IDV-05-0269-H

October 2017

AB Sciex Pte. Ltd.
Blk 33, #04-06
Marsiling Ind Estate Road 3
Woodlands Central Indus. Estate.
SINGAPORE 739256

Contents

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® software. In this guide, the term Analyst® software refers to both the Analyst® and the Analyst® TF software. The software supports LC pumps, autosamplers, column ovens, switching valves, detectors, and analog-to-digital converters from several manufacturers.

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.

Related Documentation

To find software product documentation, refer to the release notes or software installation guide that comes with the software. Documentation for the hardware products can be found on the *Customer Reference* DVD that comes with the system or component.

For the latest versions of the documentation, visit the SCIEX website at sciex.com.

Contact Us

SCIEX Support

- sciex.com/contact-us
- sciex.com/request-support

Customer Training

- In North America: NA.CustomerTraining@sciex.com
- In Europe: Europe.CustomerTraining@sciex.com
- Outside the EU and North America, visit sciex.com/education for contact information.

Online Learning Center

- SCIEX**University**

CyberSecurity

For the latest guidance on cybersecurity for SCIEX products, visit sciex.com/Documents/brochures/win7-SecurityGuidance.pdf.

Technical Support

SCIEX and its representatives maintain a staff of fully-trained service and technical specialists located throughout the world. They can answer questions about the system or any technical issues that might arise. For more information, visit the website at sciex.com.

System Components

The following figures are examples of how to connect peripheral devices to the computer and mass spectrometer. In these examples, the pumps, column ovens, autosamplers, and switching valves are controlled from the computer by means of serial (RS-232) ports. The diode array detector is controlled by LAN (Ethernet) cables.

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
	(LAN) Ethernet; GPIB (TripleTOF® 4600, 5600/5600+, and 6600 systems)
	CAN
	USB Cable
1	Computer
2	Mass Spectrometer
3	Autosampler
4	Thermostatted Column Compartment
5	Pump
6	DAD Detector
7	USB-to-Serial-Converter

Figure 1-1 Example One: System Component Configuration

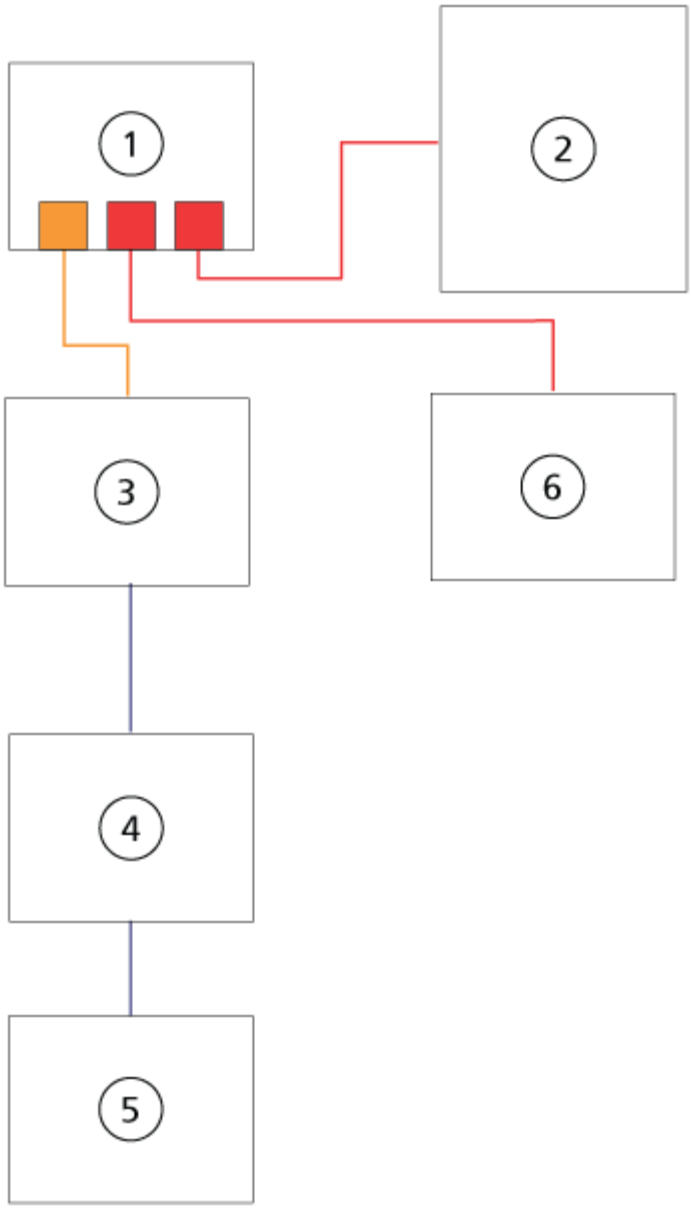


Figure 1-2 Example Two: System Component Configuration

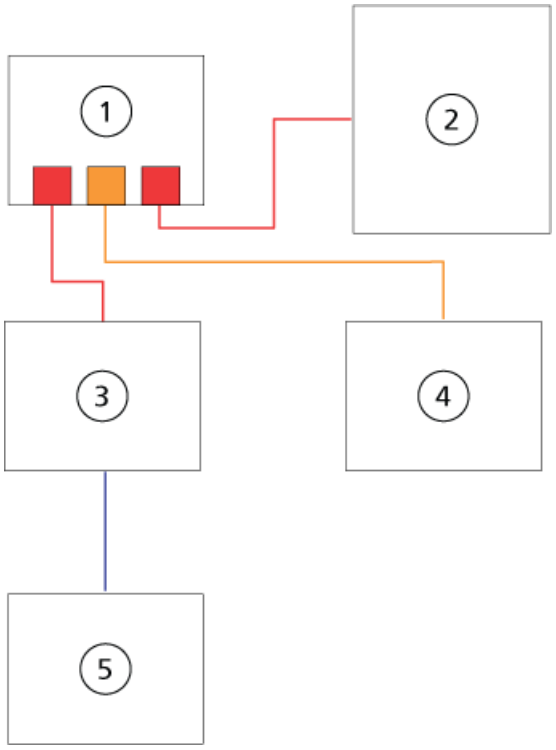
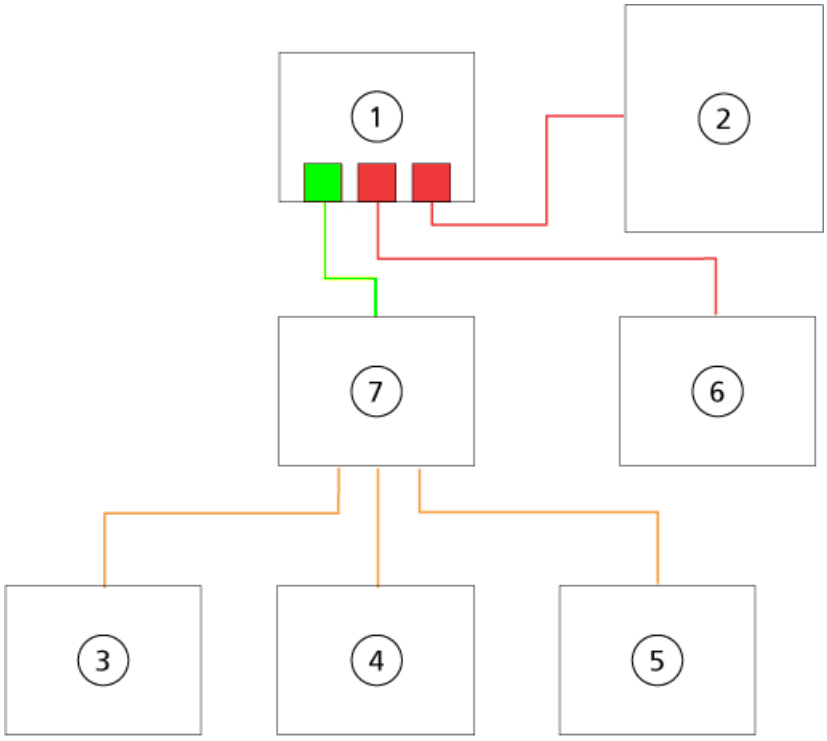


Figure 1-3 Example Three: System Component Configuration



Supported Devices

For a current list of the peripheral devices and firmware supported by the Analyst® software, refer to the current software *Release Notes* and *Installation Guide*.

Peripheral Device Software Plug-in Vendors

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

- Advion Biosciences Inc.
- Alcott Chromatography
- Beckman Coulter Inc.
- BioTrove
- Dionex Corp.

- Eksigent Technologies
- ESA Inc.
- Flux Instruments
- Hitachi HTA Inc.
- Jasco
- Leap Technologies
- MassTech Inc.
- Maylab Analytical Instruments
- Micro-Tech Scientific
- PerkinElmer Inc.
- Selerity Technologies
- Shimadzu
- Shiseido Co. Ltd.
- Spark Holland
- Waters Corp.

Note: Shimadzu PDA can only be controlled through Shimadzu AAO.

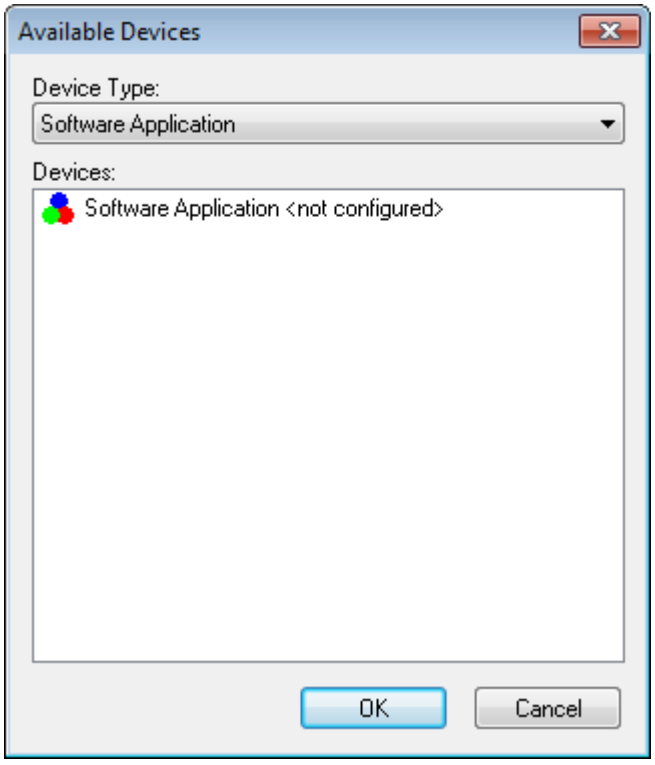
Refer to the vendor documentation or contact the vendors directly for AAO device software information, including latest releases, installation instructions, and information on device hardware set up and configuration.

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 Analyst® software *Help*.
2. Click **Add Device**.

Figure 1-4 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**.

ExionLC™ Devices 2

The Analyst® software supports the following ExionLC™ series devices:

- ExionLC™ 100
- ExionLC™ Controller
- ExionLC™ CBM-Lite
- ExionLC™ Solvent Valve
- ExionLC™ Rack Changer
- ExionLC™ AC Pump
- ExionLC™ AC Autosampler
- ExionLC™ AC Column Oven
- ExionLC™ UV Detector
- ExionLC™ AD Pump
- ExionLC™ AD Autosampler
- ExionLC™ AD Multiplate Autosampler
- ExionLC™ AD Column Oven
- ExionLC™ PDA Detector
- ExionLC™ HPLC Pump

For the latest version of tested firmware, refer to the most current *Analyst® Software Installation Guide*.

For more information, refer to the guides for ExionLC™ series devices that are available on the *ExionLC™ Systems Customer Reference* DVD.

ExionLC™ Device Configuration

Use the following system controllers to connect to and control ExionLC™ series LC systems using the Analyst® software:

- ExionLC™ Controller
- ExionLC™ CBM-Lite

The communications settings are similar for both.

Both the system controllers use the ethernet connectivity. For more information on controlling the ExionLC™ devices, contact a SCIEX Field Service Employee (FSE).

Set ExionLC™ Device Communications for Standalone Use (Peer-to-peer Network) — ExionLC Controller (ExionLC 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 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 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. The next four 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. **TRS MODE** sets the communications protocol parameters. 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: 192.168.200.89**
- **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. Using a CAT 5 network cable, connect the ExionLC CBM-Lite to the supplied network switch.
18. Connect the computer to the network switch using the network card that was configured for use with the ExionLC series LC system.
19. Turn on the computer and the ExionLC CBM-Lite and wait for them to complete their respective boot-up routines.
20. To determine whether proper communications have been established between the computer and ExionLC CBM-Lite, start Microsoft Internet Explorer (other browsers might not display properly), type the ExionLC 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.
21. Make sure that the Serial number listed for the HPLC system under System Name matches that of the unit to which you are connected and that its status is Ready.
22. Close Internet Explorer.
23. Start the Analyst® software and then configure the HPLC system.

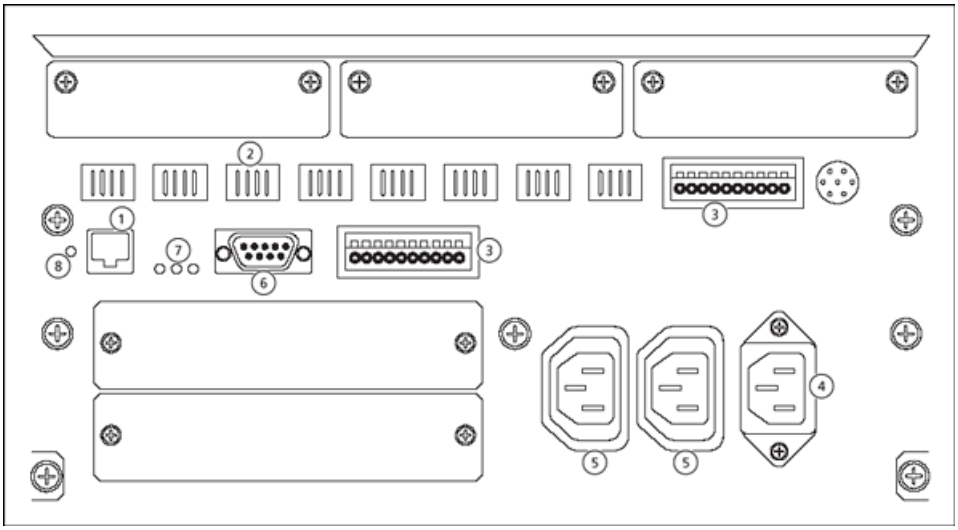
Configure the ExionLC™ Controller

Use the following procedures to configure the ExionLC™ controller.

Connect the ExionLC™ Controller to the Computer

1. Shut down the computer.
2. Press the **On/Off** button to turn off the ExionLC™ controller.
3. Connect the ethernet cable from the ethernet port at the back of the controller to the ethernet port on the computer. Refer to *Figure 2-1*.

Figure 2-1 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 connector (**n/a**)
7	Network indicators (100M/ACT/LINK)
8	Initialization button (INIT)

Connect the Autosampler to the Mass Spectrometer

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

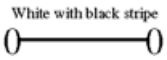
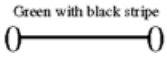
Note: If using AUX I/O cable (5056951), the following steps are not required. The cable can be directly used to connect the autosampler to the mass spectrometer.

1. Connect the following wires from the free end of the AUX I/O cable to the Output Start connectors located in the back of the autosampler. Refer to *Table 2-1*.

Table 2-1 AUX I/O Wire connected to Autosampler

AUX I/O Cable wires	Connect to Output Start connectors on the back of the Autosampler
White with black stripe (wire 22)	Pin 9
Green with black stripe (wire 21)	Pin 10

Table 2-2 Wiring for the Autosampler

Autosampler	Mass Spectrometer AUX I/O cable	
White with black stripes		Pin 22 (cathode)
Green with black stripes		Pin 21 (ground)

Note: Isolate these wires so they do not contact any other wires or metal.

2. 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)

WARNING! This step must be performed by a trained QMP or a SCIEX FSE only.

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

Fault Recovery

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

If the vial detection sensor is ON, then missing autosampler vials or aborting a run during an autosampler rinse creates device fault conditions. To correct these errors, users must intervene manually before the Analyst® software

can continue functioning normally. To recover Analyst® software control, perform the task indicated on the device screen. Alternatively, follow the Fault Recovery procedure to clear all conditions.

The ExionLC series preset run time is set at 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 trays.

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

Errors from controller modules are shown in the Windows or Analyst® software event logs as VIxxxx 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 Analyst® software treats warnings as error conditions, generates an error, and then stops the sequence. Contact SCIEX for more information on how to minimize these conditions.

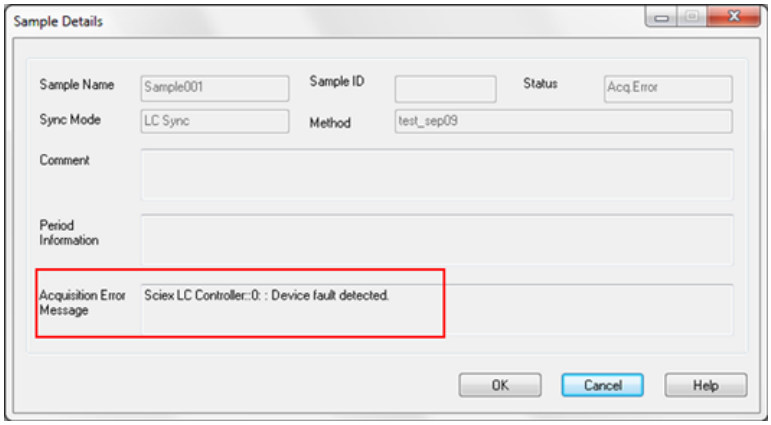
Errors

Any error condition on the system stops the Analyst® software sequence. The ExionLC™ system typically sounds an audible alarm in the event of an error 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™ Systems Equipped with the ExionLC Controller or the ExionLC CBM-Lite on page 20*.
- ERROR P-MAX: Press CE to stop the alarm. Correct the issue. Recover with the following procedure: *Recover from a Fault for ExionLC™ Systems Equipped with the ExionLC Controller or the ExionLC CBM-Lite on page 20*.

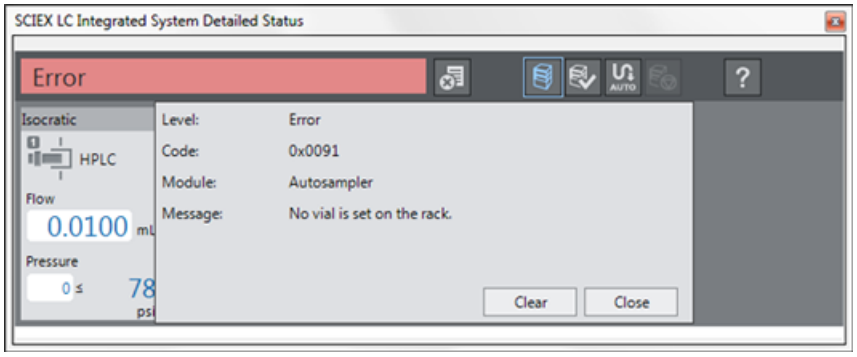
- NO VIAL DETECTED: This error shows on the autosampler if it does not find a vial it is asked to inject. Batch acquisition stops. Double-click the sample with acquisition error in the Analyst® software to view the acquisition error message. Refer to *Figure 2-2*.

Figure 2-2 Acquisition Error Message



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® software window to open the SCIEX LC Integrated System Detailed Status dialog. Refer to *Figure 2-3*.

Figure 2-3 SCIEX LC Integrated System Detailed Status Dialog



Fatal Errors

The final level of error generated by the ExionLC™ 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 local SCIEX representative for assistance.

Recover from a Fault for ExionLC™ Systems Equipped with the ExionLC Controller or the ExionLC CBM-Lite

For warnings and typical errors, the module experiencing the problem shows the condition on its front panel display 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-Lite 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 ExionLC controller or ExionLC CBM-Lite for no longer than five seconds. Refer to *Figure 2-1*.

   The ExionLC controller or ExionLC CBM-Lite LED status bar changes to green and the connect LED illuminates, thus confirming that the communication with the Analyst® 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® software or at the device itself, it might be difficult to reactivate or run the devices. If this occurs, then perform the following reboot sequence to regain control.

---

5. Deactivate the Analyst® software hardware profile.
6. Turn off all of the LC modules, including the system controller.
7. Turn on all of 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 shown in the system controller System Configuration screen are the same devices configured in the Analyst® software hardware profile for the ExionLC™. If not, then clear and select **F2** (screen name FIXED) on the system controller until both configurations match. If necessary, restart the system controller.
10. Activate the Analyst® software hardware profile.

Connect ExionLC™ Series Devices to the Controller

The autosampler, pump, column oven, or UV detector can be connected to the controller. **The PDA Detector requires a switching hub to connect to the controller and the acquisition computer.** Make sure to use the same IP address for the PDA Detector and the controller. Refer to the documentation that comes with the devices.

Connect the Devices

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 pumps to any of the fiber optic ports, 3 to 8.
   - Connect the UV detectors to any of the fiber optic ports, 3 to 8.
   - Connect any other accessories to any of the fiber optic ports, 3 to 8.

Connect the Valve Interface Unit to the Controller

Follow the procedures in this section in the order given.

Connect the Valve Interface Unit to the System Controller

1. Press the **On/Off** button to turn off the system 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 system 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 system controller.

Configure the System Controller for the Valve Interface Unit

- If the system controller is not already turned on, then press the **On/Off** button to turn it on.

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

Configure the Controller for a Newly Attached Device

- Turn off the controller and other devices, wait two seconds, and then restart all of the devices, turning on the controller last.

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

Agilent Device Configuration 3

The Analyst® Device Driver is a device control application for the Analyst® software. The newer Agilent LC devices that work with the Agilent Instrument Control Framework (ICF) can be controlled through the Device Driver.

Note: Use the Analyst® Device Driver only if an Infinity II device or later is to be controlled. Otherwise, use the integrated driver through Hardware Configuration Editor. Methods created previously without the Analyst® Device Driver must be updated or recreated to add support for Analyst® Device Driver-controlled devices.

Device Communication Configuration

This section provides information about configuring the Agilent series peripheral devices using a standard serial (RS-232) port or LAN (Ethernet) communication, with or without CAN cables. An overview of each type of communication is provided for the Agilent 1200, 1260, and 1290 series LC Systems.

Note: Use CAN cables with a RS-232 or LAN (Ethernet) cable when configuring multiple Agilent devices in a stack configuration. Refer to Configuration of CAN Communication on page 25.

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 LAN (Ethernet) communication.

If an Agilent device (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 1200, 1260, and 1290 series devices. If a hardware profile that includes an Agilent 1200, 1260, or 1290 series device is created, or if an Agilent device is added to an existing hardware profile, 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.

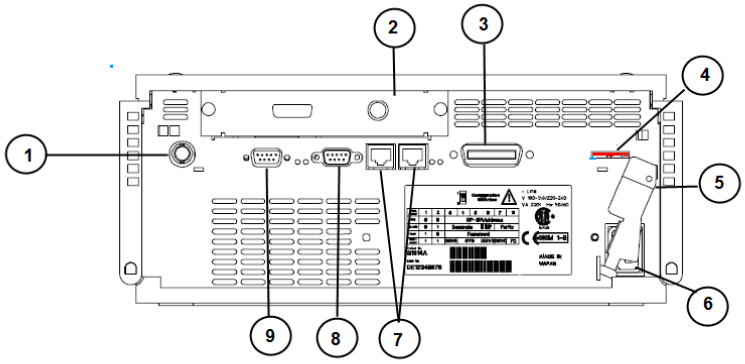
Note: Restart the devices to apply the new baud rate.

Set the DIP switches as indicated in *Table 3-1*.

Table 3-1 Agilent 1200, 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)

Figure 3-1 Communication Port Configuration



Item	Description
1	Analog pressure, 2 mV/bar
2	Slot for interface board
3	GPIB
4	Configuration switch
5	Security lever
6	Power
7	CAN
8	RS-232C port
9	APG remote port

Configuration of LAN (Ethernet) Communication

Connect the Agilent system to the computer through LAN (Ethernet) communication. Use Agilent PN 5183-4649 for a direct connection from the device to the computer, or use Agilent PN 8121-0940 for hub connections.

Install a network interface card in the Agilent device. 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 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 or a LAN (Ethernet) cable to configure a stack of Agilent devices. In an Agilent stack configuration, a single device is connected to the computer with a RS-232 cable or a LAN (Ethernet) cable. Any additional Agilent devices are then connected to each other (in series) with CAN cables. For serial communication in CAN stacks, set all of the Agilent CAN-linked devices to the same serial port in the hardware profile.

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

Note: It is not advisable to have the controller connected while a batch that the Analyst® software initiated is running.

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

Note: All devices connected by CAN 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 requires a LAN connection between the LC and the PC. No Aux I/O cable is required.

1. Confirm that the DIP switches on all modules are set correctly.
   - For modules with two or six DIP switches, all switches should be down.
   - For the pump, which has eight DIP switches, the first six should be down. In a configuration with an Infinity II autosampler or DAD, switches 7 and 8 must also be down. In a configuration without an Infinity II autosampler or DAD, where the pump will be connected to the computer, 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 multicolumn thermostat.
   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 multicolumn thermostat.
   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

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

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® software to operate 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 *Peripheral Device Analog Synchronization on page 72*.

The following Agilent autosamplers are supported by the Analyst® software and are configured the same way. For a current list of supported devices, refer to the current Analyst® software *Release Notes*.

Table 3-2 Supported Agilent 1200 Series Autosamplers

Autosampler	Model Number
Standard	G1329A
Thermostat Module	G1330B
High Performance	G1367B
High Performance SL	G1367C
Micro well-plate	G1377A
High performance autosampler SL plus	G1367D

Table 3-3 Supported Agilent 1260 Infinity and Infinity II Series Autosampler

Autosampler	Model Number
High Performance	G1367E
Standard	G1329B
Infinity II Vialsampler	G7129A
Infinity II Multisampler (single/dual needle)	G7167A

Table 3-4 Supported Agilent 1290 Infinity and Infinity II Series Autosampler

Autosampler	Model Number
Standard autosampler	G4226A
Infinity II Vialsampler	G7129B
Infinity II Multisampler (single/dual)	G7167B

The following table lists the required hardware. For the latest version of firmware supported, refer to the current Analyst® software *Installation Guide*.

Table 3-5 Required Hardware for the Agilent Autosamplers

Cable	Other Parts Needed
• RS-232 cable (PN 024736) • AUX I/O cable (PN 5056592)	• 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 Infinity autosampler to the computer through standard serial port communication. The Agilent Infinity autosampler can also be connected to the computer using a LAN (Ethernet) cable. The Agilent Infinity II autosampler can be connected to the computer using a LAN (Ethernet) cable only.

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 3-2 Back Panel of the 1290 Autosampler

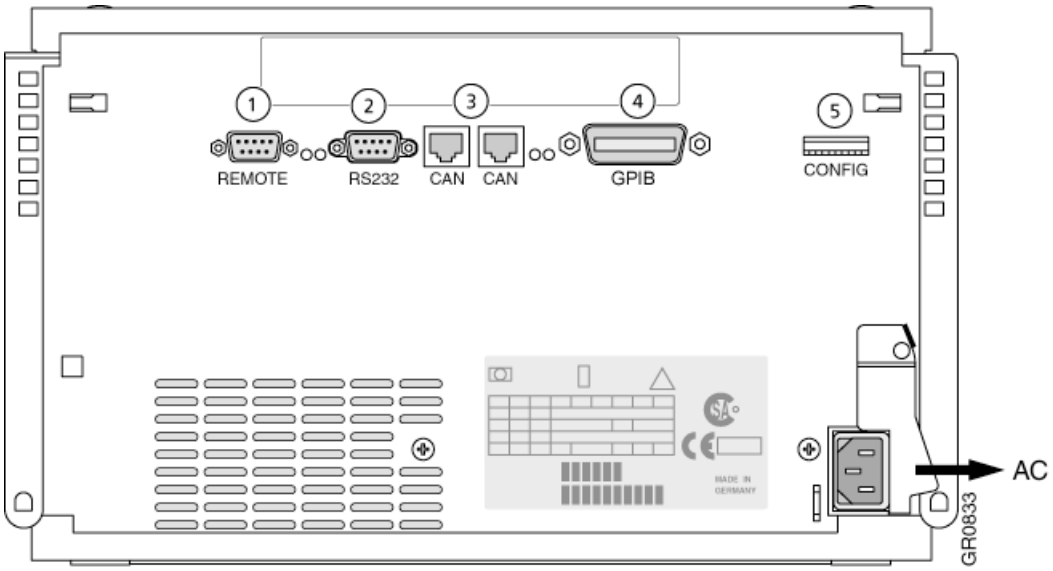
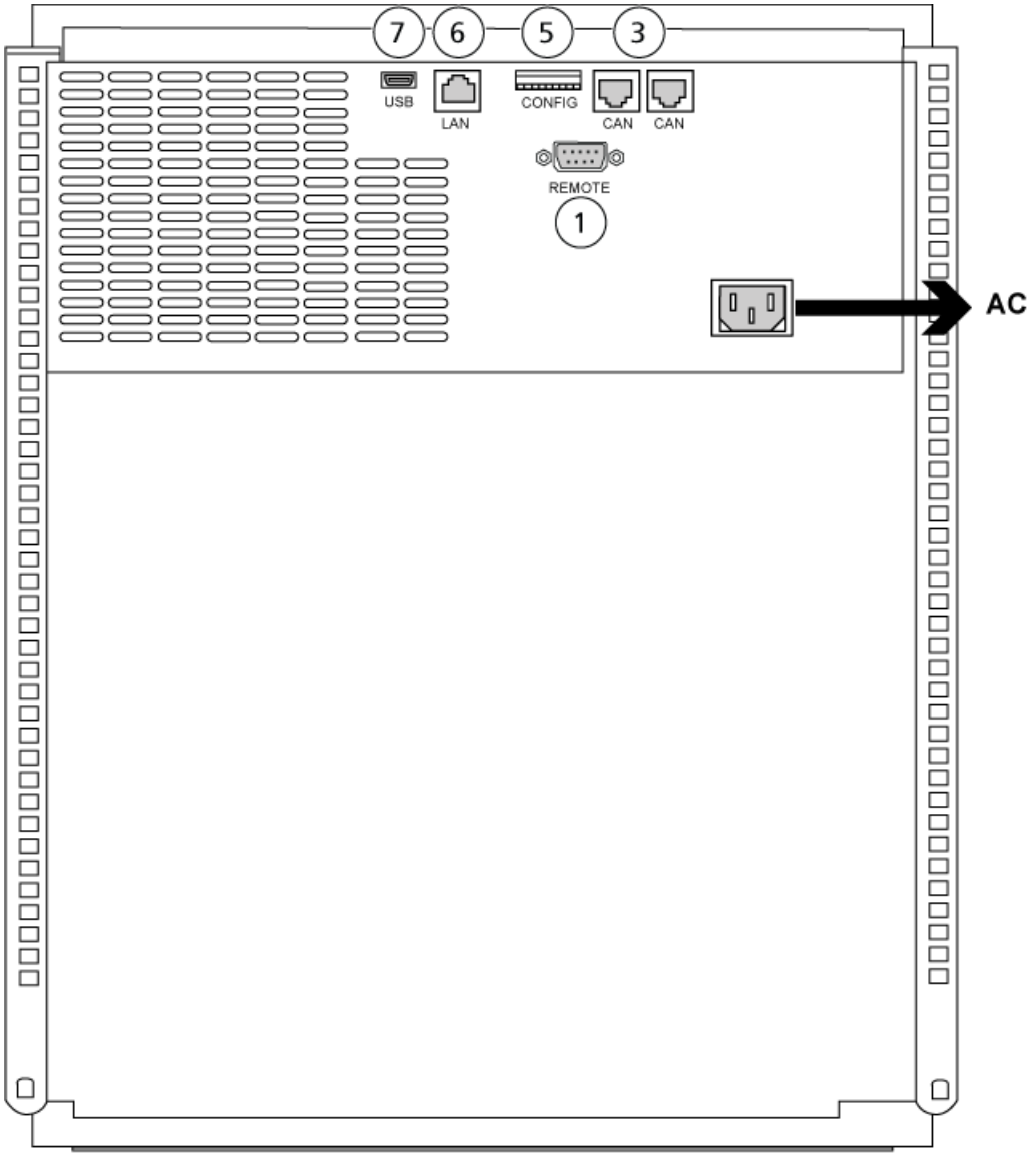


Figure 3-3 Back Panel of the 1260 or 1290 Infinity II Autosampler



Item	Description
1	Remote port
2	Serial port
3	CAN connectors
4	Agilent GPIB

Item	Description
5	DIP switches
6	LAN (Ethernet) port
7	USB port

Connect an Infinity Autosampler to the Computer

This procedure describes how to connect an Agilent Infinity autosampler to the computer through standard serial port communication. An Agilent Infinity or an Agilent Infinity II autosampler can also be connected to the computer using a 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 Infinity autosampler by pressing the On/Off button on the front of the device.
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 *Configure Serial Communication on page 23*.

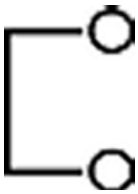
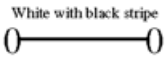
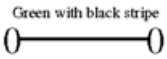
   For the location of the DIP switches at the back of the autosampler, refer to Figure 3-2.
3. Connect the RS-232 cable from the serial port at the back of the autosampler to the desired serial port on the computer, noting the port number.

Connect the Autosampler to the Mass Spectrometer (Only applicable to Agilent Infinity Autosamplers)

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 3-6 Wiring for the Agilent Autosampler (TTL—Active Low) Injection Input

Autosampler	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 you use the Agilent remote cable to connect the remote port to the AUX I/O cable, 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 Agilent pumps are supported by the Analyst® software and all are configured the same way.

Table 3-7 Supported Agilent 1200 Series Pumps

Pumps	Model Number 1200
Binary	G1312A, G1312B
Quaternary	G1311A
Isocratic	G1310A
Capillary	G1376A
Nano	G2226A

Table 3-8 Supported Agilent Infinity and Infinity II 1260 Series Pumps

Pumps	Model Number 1260
Binary	G1312B
Isocratic	G1310B
Quaternary	G1311B
Infinity II Isocratic Pump	G7110B
Infinity II Quarternary Pump	G7111B
Infinity II Binary Pump	G7112B

Table 3-9 Supported Agilent Infinity and Infinity II1290 Series Pump

Pumps	Model Number 1290
Binary	G4220A
Infinity II High Speed Pump	G7120A
Infinity II Flexible Pump	G7104A

Note: The Agilent G4220A Binary Pump contains a software-controlled Purge valve. The Analyst® software allows users to control the purge option through the acquisition method. For more information, refer to the current Analyst® software *Release Notes*.

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

Table 3-10 Required Hardware for Agilent 1200 Series Pumps and Agilent Infinity and Infinity II 1260 and 1290 Series Pumps

Cable	Other Parts Needed
• RS-232 cable (PN 024736) • 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 a LAN (Ethernet) connection • Agilent PN 5183-4649 (for a direct LAN connection) • Agilent PN 8121-0940 (for a LAN connection using a hub)

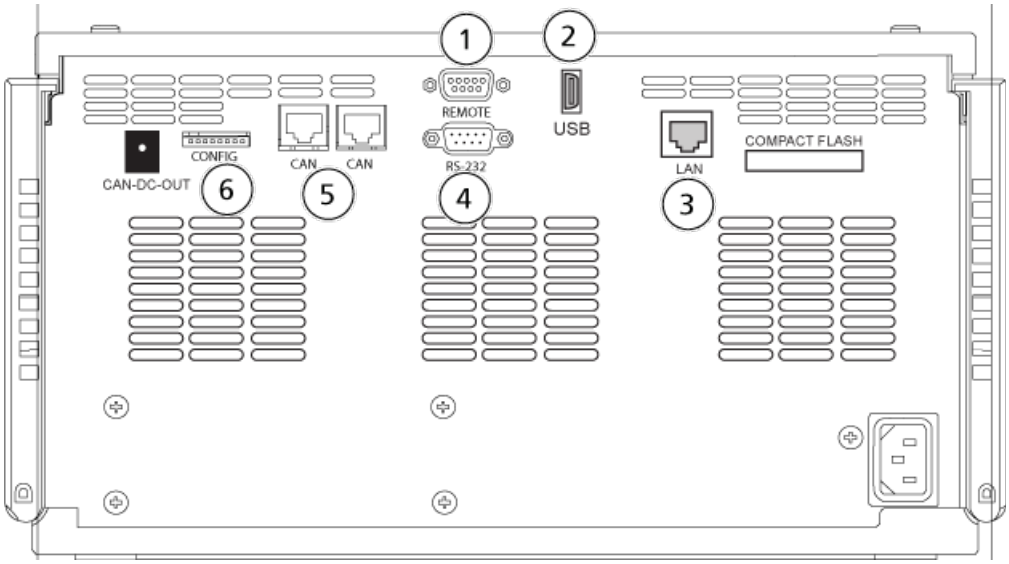
For the latest version of tested firmware, refer to the most current *Analyst® Software Installation Guide*.

Connect the Agilent Pump

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

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

Figure 3-4 Back Panel of Agilent G4220A Pump



Item	Description
1	Remote port
2	USB port
3	LAN (Ethernet) port
4	Serial port
5	CAN ports
6	DIP switches

Note: Depending on the firmware version, an access code (300) in the Agilent Nano Pump (G2226A) might be required.

1. Press the On/Off button to turn off the pump.
2. If you want contact closure functionality, install the relay contact board by performing the following steps. Otherwise, go to step *3*.

   a. Remove the screws that hold the plate.

   b. Insert the new plate with the board into the slot and tighten the screws.

3. Set the DIP switches at the back of the pump. Refer to Figure 3-4. For more information, refer to *Configure Serial Communication on page 23*.

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 Oven Configuration

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

The Analyst® software supports the following Agilent column oven models and switching valves:

Table 3-11 Supported Agilent Infinity Column Oven Models and Switching Valves

Models	Valves
G1316A , G1316B (1200 series)	• 6-port/2-position valve • 10-port/2-position valve
G1316A (1260 series)	• 6-port/2-position valve • 10-port/2-position valve
G1316C (1290 series)	• 6-port/2-position valve • 9-port/8-position valve • 10-port/2-position valve • 14-port/6-position valve

Table 3-12 Supported Agilent Infinity II Column Oven Models

Model Name
G7116A (1260 Infinity II Multicolumn Thermostat)
G7116B (1290 Infinity II Multicolumn Thermostat)

The following table lists the required hardware. For the latest version of supported firmware, refer to the current Analyst® software *Release Notes*.

Table 3-13 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

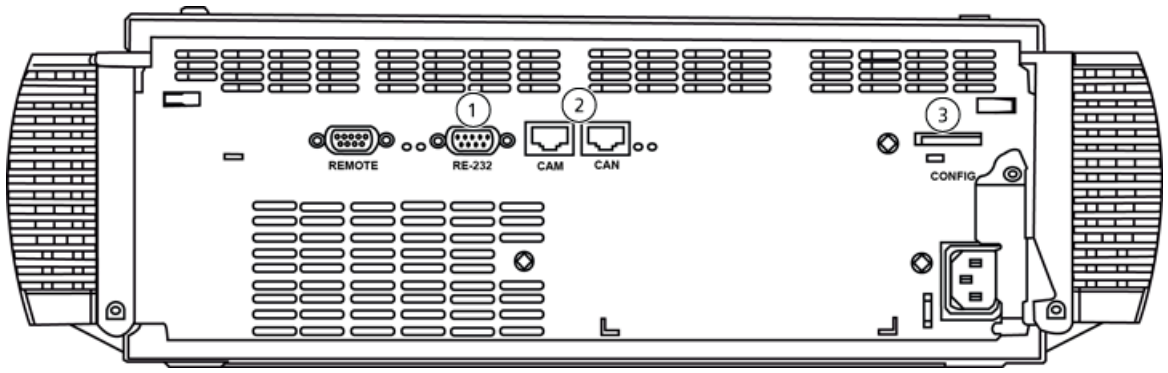
WARNING! Electrical Shock Hazard: Refer to the Agilent Column Oven safety instructions before configuring any AC mains-powered equipment.

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 *Configure Serial Communication on page 23*.

   For the location of the DIP switches at the back of the column oven, refer to Figure 3-5.

Figure 3-5 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 types of Agilent diode array detectors (DADs) are supported by the Analyst® software.

Table 3-14 Supported Detectors

Detector	Model Number
Agilent DAD	G1315 A, B, C, D The A model connects by GPIB only.
Agilent 1260 DAD	G4212B
1260 Infinity II DAD	G7117C
Agilent 1290 DAD	G4212A
1290 Infinity II DAD	G7117B

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.

The following hardware is required:

Table 3-15 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)

For information about the latest version firmware supported, refer to the current Analyst® software *Installation Guide*.

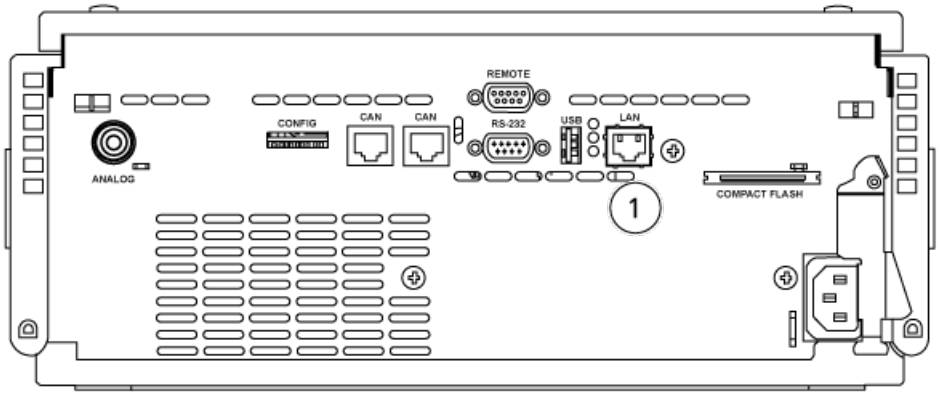
The Agilent 1200, 1260, and 1290 DADs are shipped with an on-board LAN interface. Connect them to the computer with a LAN (Ethernet) cable.

Refer to *Configuration of LAN (Ethernet) Communication on page 24*.

Connect the Diode Array Detector to the Computer

1. Press the **On/Off** button to turn off the Agilent diode array detector.
2. Connect a LAN cable to the back of the Agilent diode array detector. Refer to Figure 3-6. If a LAN 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 3-6 Back of the G4212A Diode Array Detector



Item	Description
1	LAN port

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

CTC PAL and Other Autosampler Configuration 4

The following CTC PAL autosamplers are supported by the Analyst® software: HTS, HTC, and LC. All are configured the same way. For information on setting up the CTC PAL autosampler, refer to 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. For the latest version of firmware supported, refer to the current *Analyst® Software Installation Guide*.

Table 4-1 Required Hardware for the CTC PAL Autosampler

Cable	Other Parts Needed
• RS-232 cable (PN 024736) • AUX I/O cable (PN 5056590)	• CTC PAL–ready cable for connecting the instrument • DB15 male connector

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

Connect the CTC PAL Autosampler

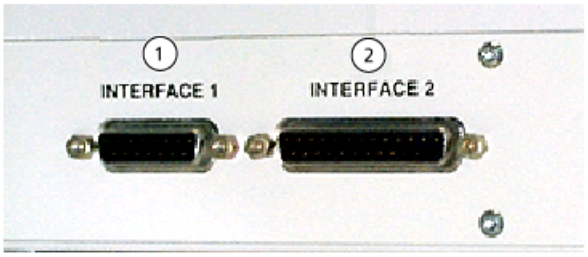
WARNING! Electrical Shock Hazard: Refer to the CTC PAL autosampler safety instructions before configuring any AC mains-powered equipment.

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 4-1 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: When using the AUX I/O cable (PN 5056590), 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 4-2 Wiring for the CTC PAL Autosampler

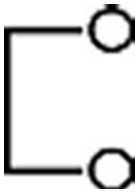
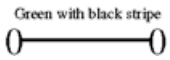
Autosampler	spectrometer AUX I/O cable		
Interface 1		Pin 9 (power 5V)	Red with black stripes
		Pin 10 (anode)	Orange with black stripes

Table 4-2 Wiring for the CTC PAL Autosampler (continued)

Autosampler	spectrometer AUX I/O cable		
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 display 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's documentation.

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 appears, 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® 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® software.
2. Create or edit a hardware profile. Refer to the Analyst® software 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. Click 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 next to the hardware profile, indicating that the profile is active.

Shimadzu Device Configuration 5

Use the following controllers to connect to and control a Shimadzu HPLC system using the Analyst® software:

- CBM-20A
- CBM-20A lite
- SIL-HT (SCL-10Avp)

Communications settings are similar for all.

The CBM is required for the Analyst® software to communicate with and control any Shimadzu device. The CBM uses serial or TCP/IP (Ethernet) connectivity, with TCP/IP being the preferred mode of communication. For more information on controlling Prominence and Nexera devices using the Analyst® 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 *Analyst® Software Installation Guide*.

Table 5-1 Required Hardware for Shimadzu Devices

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

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

Shimadzu LC-30 Series Devices

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

In addition to the earlier Shimadzu HPLC series, the Analyst® software also supports the following Shimadzu devices:

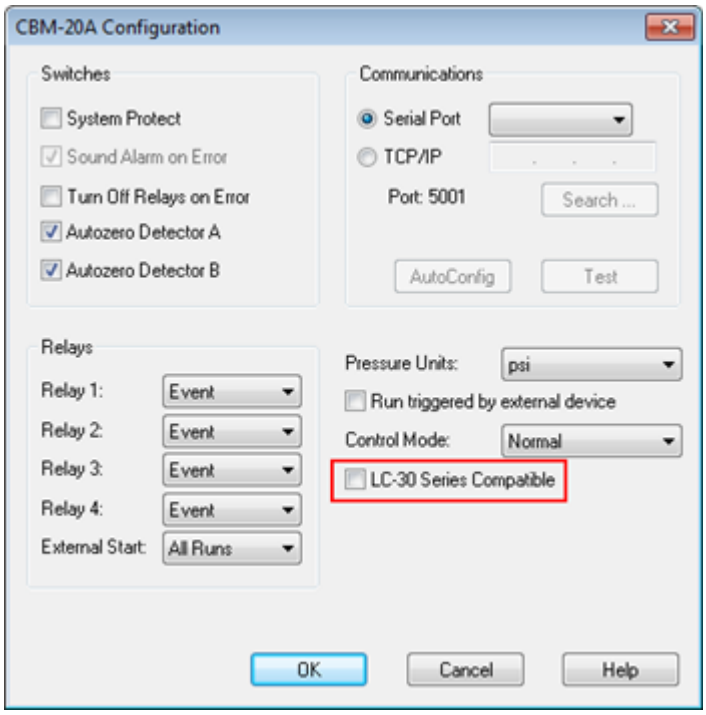
- SIL-30ACMP autosampler
- SIL-30AC autosampler

- CTO-30AS column oven
- CTO-30A column oven
- LC-30AD pump

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 using an LC-30 device, then remember to select the LC-30 Series Compatible check box in the CBM-20A Configuration. Refer to *Figure 5-1*.

Figure 5-1 CBM-20A Configuration



Set Shimadzu Device Communications – SIL-HT (SCL-10Avp)

ROM version 5.33 or later is acceptable.

1. Press **4 (System)**.
2. Using the arrow keys, navigate to **RELAY 1** and then select **START**.
3. Press **F3 (NEXT)**.

4. Use the arrow keys to set the following:
   - Communication CLASSvp 5 or 6
   - Interface RS-232C
   - Baud Rate 19200
   - Level Enhanced
5. **POWER CYCLE** the unit to accept and save the changes.

Set Shimadzu Device Communications for Use on a Network – CBM-20A (CBM-20A lite)

From the front panel of the autosampler or any other 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, follow this procedure to set the communications for use on a network.

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 COMM**.
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 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. The next four parameters require information from the Network Administrator (IT group) if the system is installed on the laboratory network for remote HPLC monitoring:
   - **USE GATEWAY**: 0 (zero) for NO; 1 for YES – and then press **ENTER**.
   - **IP ADDRESS**: Type the static IP address assigned to the unit by the Network Administrator, and then press **ENTER**.
   - **SUBNET MASK**: Type the number supplied by the Network Administrator, and then press **ENTER**.
   - **DEFAULT GATEWAY**: Type the value supplied by the Network Administrator, and then press **ENTER**.
8. **TRS MODE** sets the communications protocol parameters. Press **2** and then press **ENTER**.
9. **POWER CYCLE** the unit to accept and save the changes.

Set Shimadzu Device Communications for Stand-alone use (Peer-to-peer Network) – CBM-20A (CBM-20A lite)

This method is the most reliable way to communicate with the Shimadzu system. If you also want 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 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. The next four 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. **TRS MODE** sets the communications protocol parameters. 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: 192.168.200.89**

- **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. Using a CAT 5 network cable, connect the Shimadzu CBM (lite) to the supplied (Shimadzu) network switch.
18. Connect the computer to the network switch using the network card that was configured for use with the Shimadzu system.
19. Turn on the computer and the CBM (lite) and wait for them to complete their respective boot-up routines.
20. To determine whether proper communications have been established between the computer and CBM (lite), start Microsoft Internet Explorer (other browsers may not display properly), type the 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 Shimadzu Prominence LC CBM-20A screen is shown for a few seconds followed by the Status screen.
21. Make sure that the Serial number listed for the HPLC system under System Name matches that of the unit to which you are connected and that its status is Ready.
22. Close Internet Explorer.
23. Start the Analyst® software and then configure the HPLC system.

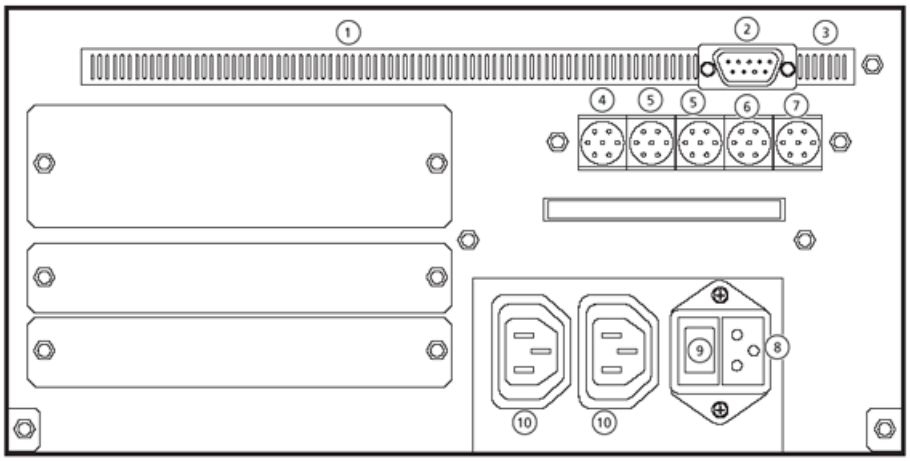
Configure the Shimadzu System Controller

Use the following procedures to configure the Shimadzu system controller.

Connect the Shimadzu System Controller to the Computer

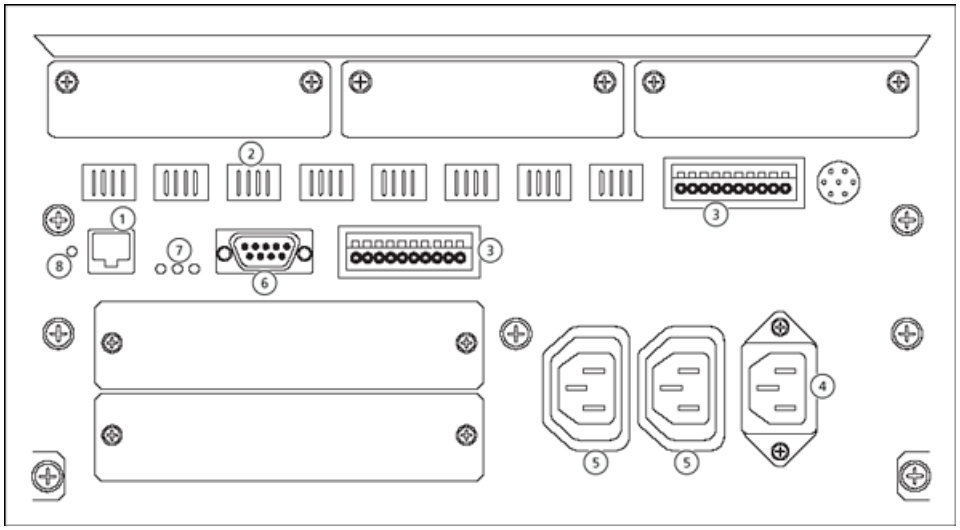
1. Shut down the computer.
2. Turn off the Shimadzu system controller by pressing the On/Off button.
3. Connect the RS-232 cable from the serial port at the back of the system controller to any available serial port on the computer, noting the port number. Refer to *Figure 5-2* or *Figure 5-3*.

Figure 5-2 Back of the Shimadzu SCL System Controller



Item	Description
1	Remote Connector Channels 1 to 8 (fiber optic ports)
2	RS-232C connector
3	OPT LINK connector
4	AC REMOTE connector
5	EVENT OUT connectors
6	MAN. INJ. IN connector
7	ALARM IN connector
8	Power connector
9	Fuse holder
10	AC OUT connectors

Figure 5-3 Back of the Shimadzu 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)

Configure the System Controller for External Control (Analyst® Software Version 1.3 or Later)

1. Turn on the Shimadzu SCL system controller.

   The System Configuration window opens.

2. If the word **FIXED** is shown in the upper right corner of the System Configuration screen, then press the **F2** key (screen name **FIX**) to deselect **FIX**.

3. Press the **F5** key (screen name **MENU**).

The Menu window opens.

4. Press the number **4** key.

   The System screen opens.

5. Press the **F3** key (screen name **NEXT**).
6. Set the Class VP to 5.x: Use the up and down arrow keys to select **Class VP** and then use the left and right arrow keys to select **5.x**.
7. Set the Interface to RS-232C: Use the up and down arrow keys to select **Interface** and then use the left and right arrow keys to select **RS-232C**.
8. Set the Baud Rate to 9600: Use the up and down arrow keys to select **Baud Rate** and then use the left and right arrows to select **9600**.
9. Set the Level to Enhanced: Use the up and down arrow keys to select **Level** and then use the level and right arrows to select **Enhanced**.
10. Press the **F5** key (screen name **MENU**).
11. Turn off the Shimadzu SCL System Controller.
12. Turn on the Shimadzu SCL System Controller.

    The System Configuration screen loads.

13. Connect and configure individual devices to the system controller, following the instructions in their respective guides.
14. Verify that each connected device is listed on the System Configuration screen on the system controller.

Configure the System Controller for External Control (Analyst® Software Version 1.2 or Earlier)

1. Turn on the Shimadzu SCL System Controller.

   The System Configuration window opens.

2. If the word **FIXED** is shown in the upper right corner of the System Configuration screen, then press the **F2** key (screen name **FIX**) to clear **FIX**.
3. Press the **F5** key (screen name **MENU**).

   The Menu window opens.

4. Press the number **4** key - **Response**.

   The System screen opens.

5. Press the **F3** key (screen name **NEXT**).

6. Set the **Class VP** to **4.x**: Use the up and down arrow keys to select **Class VP** and then use the left and right arrow keys to select **4.x**.
7. Set the **Interface** to **RS-232C**: Use the up and down arrow keys to select **Interface**.
8. Set the **Baud Rate** to **9600**: use the up and down arrow keys to select **Baud Rate**.
9. Press the **F5** key (screen name **MENU**).
10. Turn off the Shimadzu SCL System Controller.
11. Turn on the Shimadzu SCL System Controller.

    The System Configuration screen loads.
12. Connect and configure individual devices to the system controller, following the instructions in their respective guides.
13. Verify that each connected device is listed in the System Configuration window on the system controller.

Connect the Shimadzu Autosampler to the Mass Spectrometer

Perform the following procedure when using the CBM-20A system controller.

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

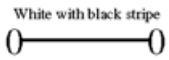
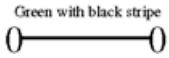
Note: If using AUX I/O cable (5056951), the following steps are not required. The cable can be directly used to connect the autosampler to the mass spectrometer.

1. Connect the following wires from the free end of the AUX I/O cable to the Output Start connectors located in the back of the Shimadzu autosampler. Refer to Table 5-2.

Table 5-2 AUX I/O Wire Connected to Shimadzu Autosampler

AUX I/O Cable Wires	Connect to Output Start Connectors on the back of the Shimadzu Autosampler
White with black stripe (wire 22)	Pin 9
Green with black stripe (wire 21)	Pin 10

Table 5-3 Wiring for the Shimadzu Autosampler

Autosampler	Mass Spectrometer AUX I/O Cable	
White with black stripes		Pin 22 (cathode)
Green with black stripes		Pin 21 (ground)

Note: Isolate these wires so they do not contact any other wires or metal.

2. 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)
3. Connect the other end of the AUX I/O cable to the mass spectrometer AUX I/O connector.
4. Verify that RELAY 1 in the CBM-20A system controller is set to START while you are configuring the Shimadzu system controller in the Analyst® software.

Connect the Shimadzu SCL System Controller to the Mass Spectrometer

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

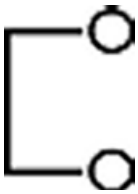
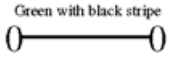
Note: If using AUX I/O cable (5056951), the following steps are not required. The cable can be directly used to connect the autosampler to the mass spectrometer.

1. Connect the Shimadzu Event Cable to the Event1–3 OUT connector, shown in Figure 5-2 to the back of the SIL-HT/SCL-10Avp system controller.
2. Connect the wires from the free end of the AUX I/O cable to the two wires from the free end of the Event Cable as follows:

Table 5-4 Wire Connections

Use this AUX I/O wire...	And connect to Event Cable...
White with black stripe (wire 22)	Orange wire
Green with black stripe (wire 21)	Brown wire

Table 5-5 Wiring for the Shimadzu SIL-HT/SCL-10Avp System Controller

Autosampler	Mass Spectrometer AUX I/O cable		
Event Cable		Pin 9 (power 5V)	Red with black stripes
		Pin 10 (anode)	Orange with black stripes
Orange wire		Pin 22 (cathode)	White with black stripes
Brown wire		Pin 21 (ground)	Green with black stripes

Note: Isolate these wires so they do not contact any other wires or metal.

3. 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)
4. Connect the other end of the AUX I/O cable to the mass spectrometer AUX I/O connector.
5. Verify that RELAY 1 in the SIL-HT (SCL-10Avp) is set to START while you are configuring the Shimadzu system controller in the Analyst® software.

Note: Shimadzu firmware versions of 9.XX are provisional ROMs that impart special functionality to the device. Before configuring the hardware in the Analyst® software, determine which features might have been added or deleted and their impact on communications. Due to programming delays and limited application, the Analyst® software might not be updated for control of such features.

Connect the Shimadzu CBM (lite) System Controller to the Mass Spectrometer

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

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

1. Connect the Shimadzu Event cable to OUT 1 at the back of the CBM, shown in *Figure 5-3*, by pressing the button above the terminal with a flat-head screwdriver and pushing the wire inside. Make sure the wire is held securely inside the terminal.

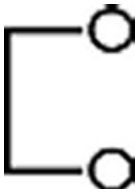
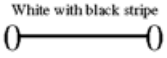
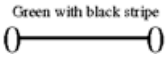
Note: Polarity does not matter.

2. Connect the wires from the free end of the AUX I/O cable as follows:

Table 5-6 Wire Connections

Use this AUX I/O wire...	And connect to Event Cable...
White with black stripe (wire 22)	Black wire
Green with black stripe (wire 21)	White wire

Table 5-7 Wiring for the Shimadzu CBM (lite) System Controller

Autosampler	Mass Spectrometer AUX I/O cable		
Event cable		Pin 9 (power 5V)	Red with black stripes
		Pin 10 (anode)	Orange with black stripes
Black wire		Pin 22 (cathode)	White with black stripes
White wire		Pin 21 (ground)	Green with black stripes

Note: Isolate these wires so they do not contact any other wires or metal.

3. 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)

WARNING! This step must be performed by a trained QMP or a SCIEX FSE only.

4. Connect the other end of the AUX I/O cable to the mass spectrometer AUX I/O connector.
5. Make sure that RELAY 1 in the CBM-20A lite is set to START while you are configuring the Shimadzu system controller in the Analyst® software.

Fault Recovery

The manufacturer recommends that the devices attached to the system controller be identical to those configured in the Analyst® 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 missing autosampler vials or aborting a run during an autosampler rinse creates fault conditions. To correct these errors you will have to intervene manually before the Analyst® software can continue functioning normally. To recover Analyst® 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 90 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 HPLC equipment can generate three different error conditions that cause the Analyst® software to stop: warning, error, and fatal error.

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

To identify the true root cause, go to the error logs in the system controller itself through the Shimadzu Web interface.

Warnings

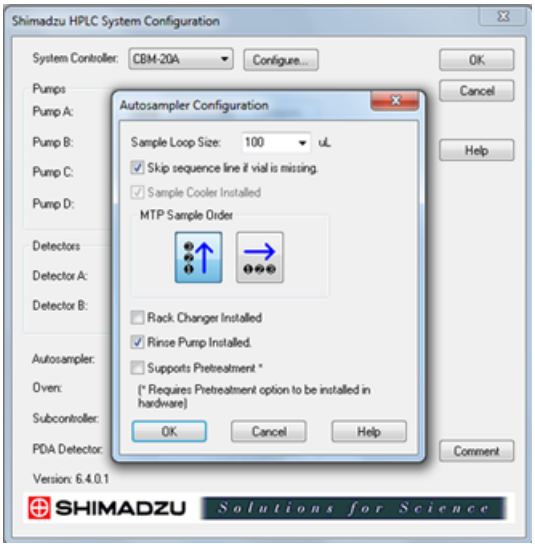
A warning is an informational notification of conditions such as a door open on a temperature controlled module, solvent level, or temperature not ready. These conditions do not prevent the LC system from operating properly. However, the Analyst® software does not recognize these warnings, generates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

Errors

Any error condition on the LC system stops the Analyst® software sequence. The LC system typically sounds an audible alarm in the event of an error until you acknowledge 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 with one of the following procedures: Recover from a Fault for Systems Equipped with a CBM-20A Lite System Controller, ROM 1.11 or Higher on page 57 or Recover from a Fault for Systems Equipped with a SCL-10Avp (SIL-HT) System Controller on page 57
- PRESSURE OVER PMAX: Press **CE** to stop the alarm. Correct the problem. Recover with one of the following procedures: Recover from a Fault for Systems Equipped with a CBM-20A Lite System Controller, ROM 1.11 or Higher on page 57 or Recover from a Fault for Systems Equipped with a SCL-10Avp (SIL-HT) System Controller on page 57
- 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® software in the Hardware profile. Select the autosampler model from the list and then click **Configuration** to display the Autosampler Configuration dialog.

Figure 5-4 Autosampler Configuration Dialog



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

The Skipped Vial notification appears on the SIL front panel display and the vial number skipped is shown. Be sure to reconcile the data obtained in subsequent runs.

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 System Controller, ROM 1.11 or Higher

For warnings and typical errors, the module experiencing the problem displays the condition on its front panel display and the module and CBM display 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** 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 for no longer than five seconds. Refer to *Figure 5-3*.

   The system controller status LED bar changes to green and the connect LED illuminates, thus confirming that communication with the Analyst® software has been restored.
4. If either the status LED does not change to green or the connect LED fails to illuminate, continue with *Recover from a Fault for Systems Equipped with a SCL-10Avp (SIL-HT) System Controller*.

Recover from a Fault for Systems Equipped with a SCL-10Avp (SIL-HT) System Controller

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

1. Deactivate the Analyst® software hardware profile.
2. Turn off all of the LC modules, including the system controller.
3. Turn on all of the devices attached to the system controller and allow them to finish initialization.
4. Turn on the system controller.
5. Make sure that all of the devices shown in the system controller System Configuration screen are the same devices configured in the hardware profile for Shimadzu. If not, clear and then select **F2** (screen name FIXED) on the system controller until both configurations match. If necessary, restart the system controller.
6. Activate the Analyst® software hardware profile.

Connect Shimadzu Devices to the Shimadzu System Controller

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

Note: Up to four pumps can be controlled using the Shimadzu CBM system controller. A provisional ROM is available for four-pump control through the SIL-HT (SCL-10Avp). For more information, contact a local Shimadzu Representative.

Connect the Devices

1. Press the **On/Off** button to turn off the Shimadzu device.
2. Press the **On/Off** button to turn off the Shimadzu system controller.
3. Connect the fiber optic cable from the device to an appropriate connection at the back of the CBM-20A lite or SIL-HT (SCL-10Avp).
   - Connect the SIL-XX to fiber optic port 1/SIL.
   - Connect pumps to any fiber optic ports 3 to 8.
   - Connect detectors to any fiber optic ports 3 to 8.
   - Connect any other accessories to any fiber optic ports 3 to 8.

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 System Controller

1. Press the **On/Off** button to turn off the system 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 system 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 system controller.

Configure the System Controller for the Valve Interface Unit

- If the system controller is not already turned on, then press the **On/Off** button to turn it on.

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

Configure the System Controller for a Newly Attached Shimadzu Device

- Turn off the system controller and other devices, wait two seconds, and then restart all of the devices, turning on the system controller last.

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

Switching Valve Configuration 6

The Analyst® software supports the following switching valves:

- Valco two-position switching valve.
- Agilent switching valves. Refer to Column Oven Configuration.
- Shimadzu internal valves using the Shimadzu CBM controller. Refer to *Shimadzu Device Configuration on page 43*.

The following table lists the required hardware. For the latest version of firmware supported, refer to the current Analyst® software *Installation Guide*.

Table 6-1 Required Hardware for the Valco Valve

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

Note: Refer to the Valco Two-Position Switching Valve safety instructions before configuring any AC mains-powered equipment.

Valco Two-Position Switching Valve

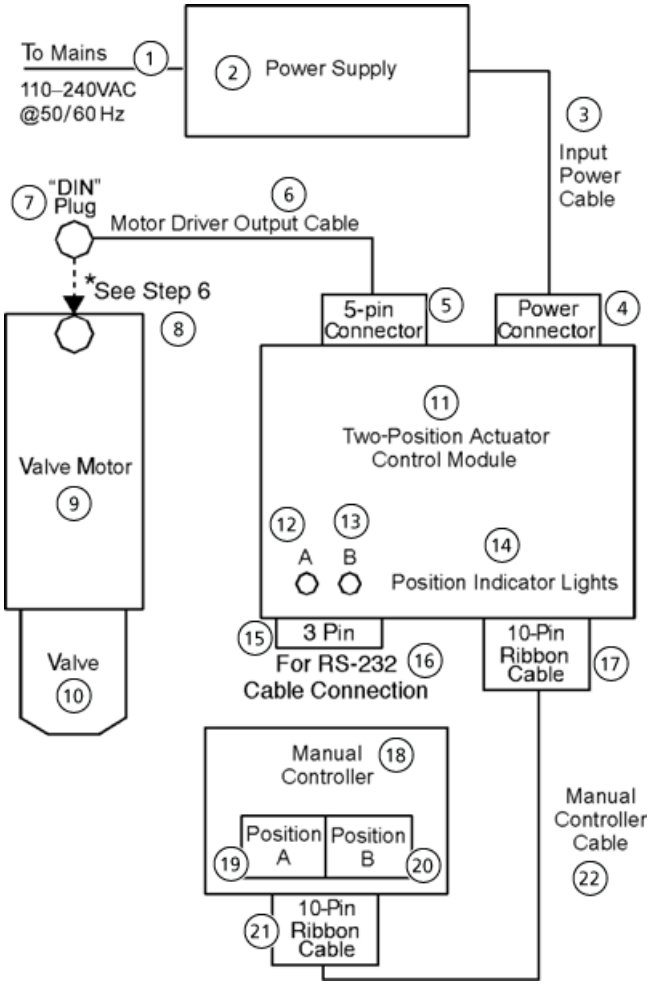
Initialize the Valco two-position switching valve when electrical power to the valve is interrupted. To initialize the valve, use the Valco manual controller, which is disconnected for routine use of the switching valve. The manual controller is included in the valve kit. Follow the procedures in this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

Figure 6-1 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
5	5-pin Connector
6	Motor Driver Output Cable
7	DIN Plug

Item	Description
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.

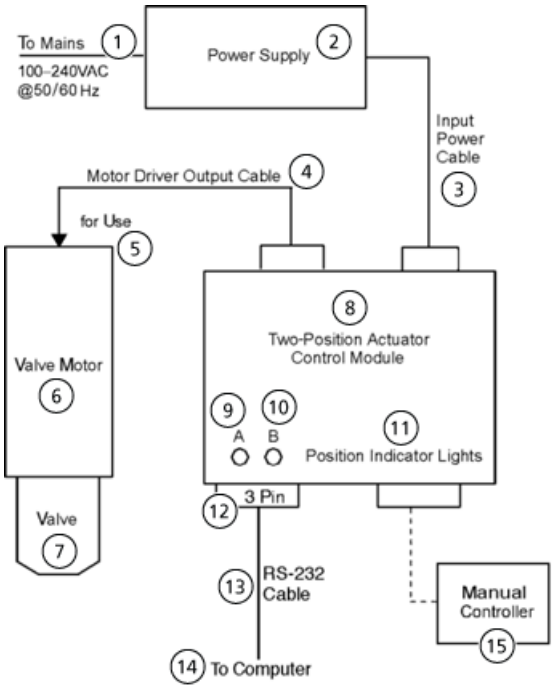
   Initialization is achieved when the position indicator lights on the actuator change according to the position button pressed on the manual controller.

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. Check the operation of the Valco kit 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 6-2 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

Item	Description
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 7

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 current Analyst® software *Release Notes*.

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 *Figure 7-1*.

   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 has to distinguish the voltage difference between the anode and cathode of the variable wavelength detector, as opposed to grounding the cathode and monitoring only the anode.

Figure 7-1 BNC Connector

Item	Description
1	AI 0 connection

2. Insert the NIDAQ PCI board in the computer. *Figure 7-2* and *Figure 7-3* show examples of two boards.

Figure 7-2 PCI-6259 MSeries National Instruments Card

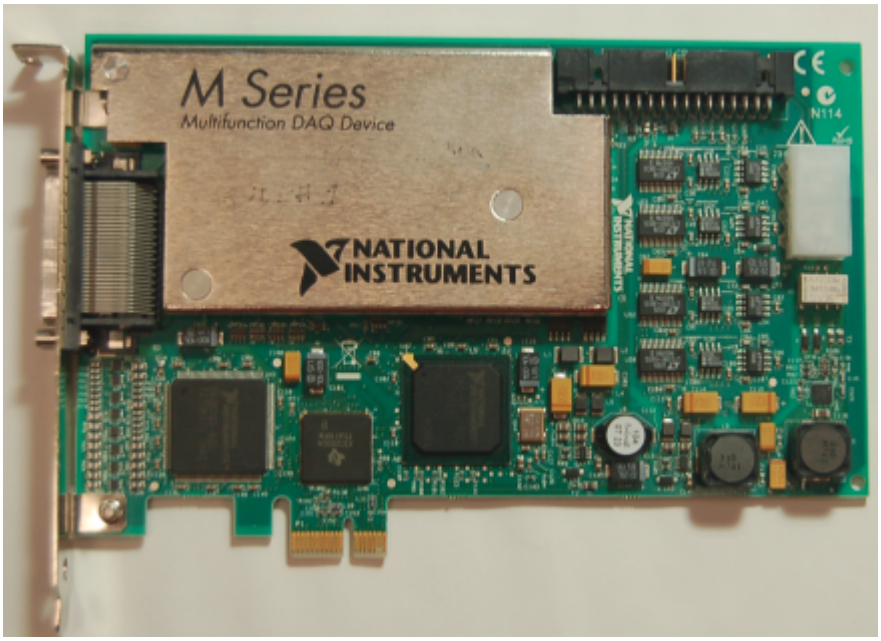


Figure 7-3 PCI-6032E National Instruments Card

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

Figure 7-4 Example: NIDAQ PCI board

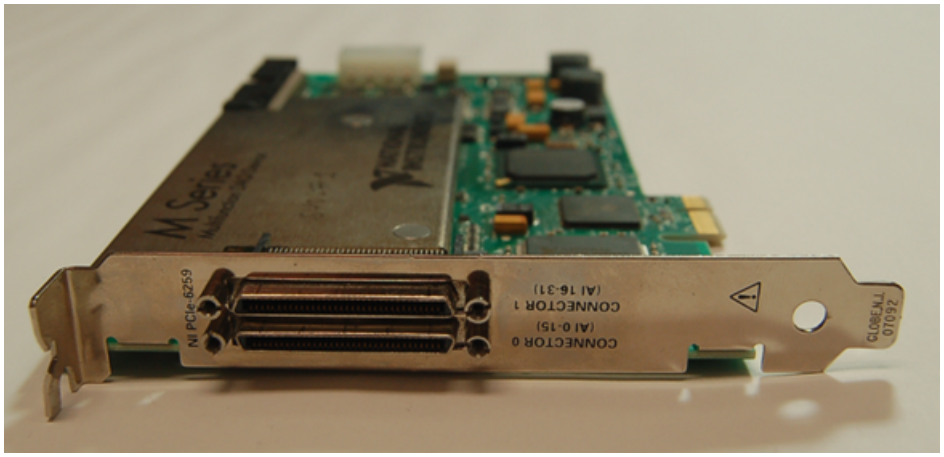


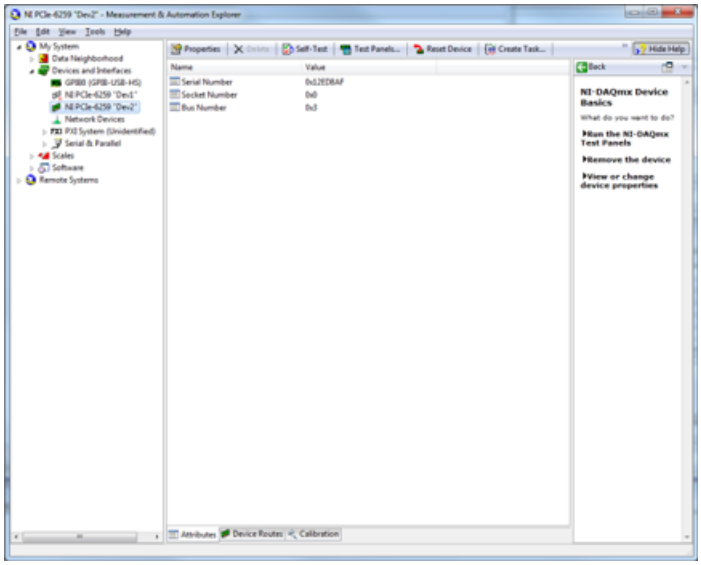
Figure 7-5 Example: Cable

4. Open the **Measurement and Automation Explorer** software.

   The left pane shows a list of available devices.

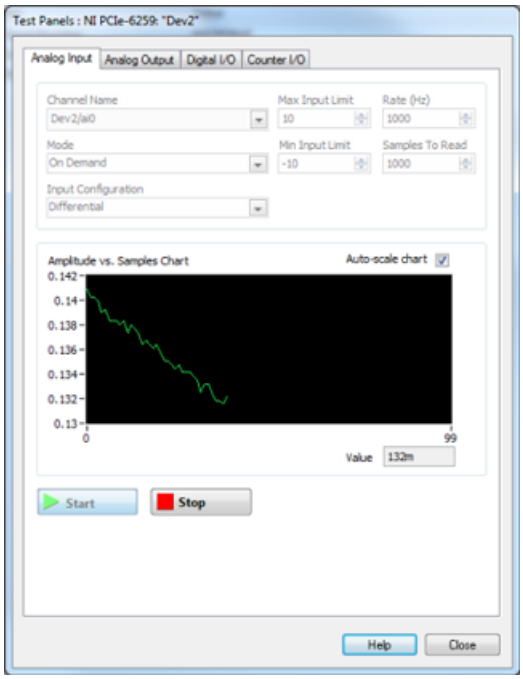
5. Expand the list to view the PCI-6259 ADC card.

Figure 7-6 Measurement and Automation Explorer Window



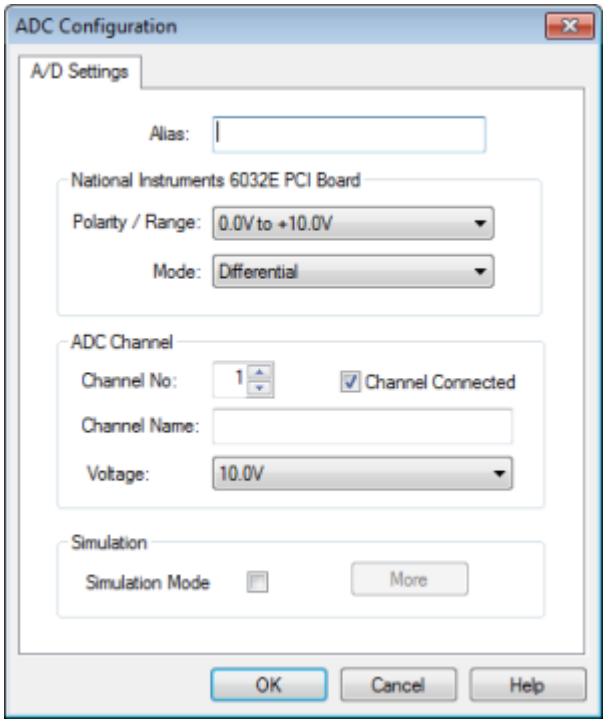
If this card is in the list, then it is installed on the computer. There are some useful tools within this software that you can use to monitor the input to the terminal block without having to use the Analyst® software. Use an AA battery to supply a test signal.

Figure 7-7 Test Panels Dialog



6. In the Analyst® software, add the ADC card to the hardware profile as shown in *Figure 7-8*. Make sure the settings are exactly as shown.

Figure 7-8 ADC Configuration



7. Review the settings on the UV detector.
8. Using the handheld controller, set the parameters. The settings shown in *Figure 7-9* work well.

Figure 7-9 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 HPLC 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® 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® software control. For devices that cannot be controlled through the Analyst® 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. *Figure A-1* and *Figure A-2* are schematic representations of the AUX I/O interface and the AUX I/O cable provided with the mass spectrometer.

In both figures, on the left side, wire colors are indicated as *background/stripe*. Mass spectrometer 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

Table A-1 Figure Legend (continued)

Item	Description
16	Blue
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 TripleTOF™ 5600, SCIEX Triple Quadrupole, and LIT Mass Spectrometers

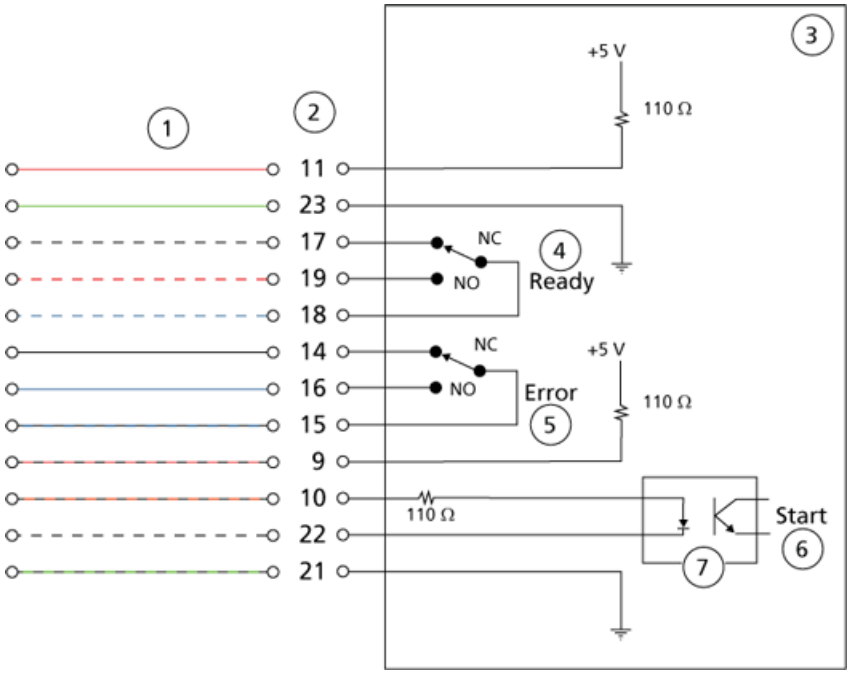
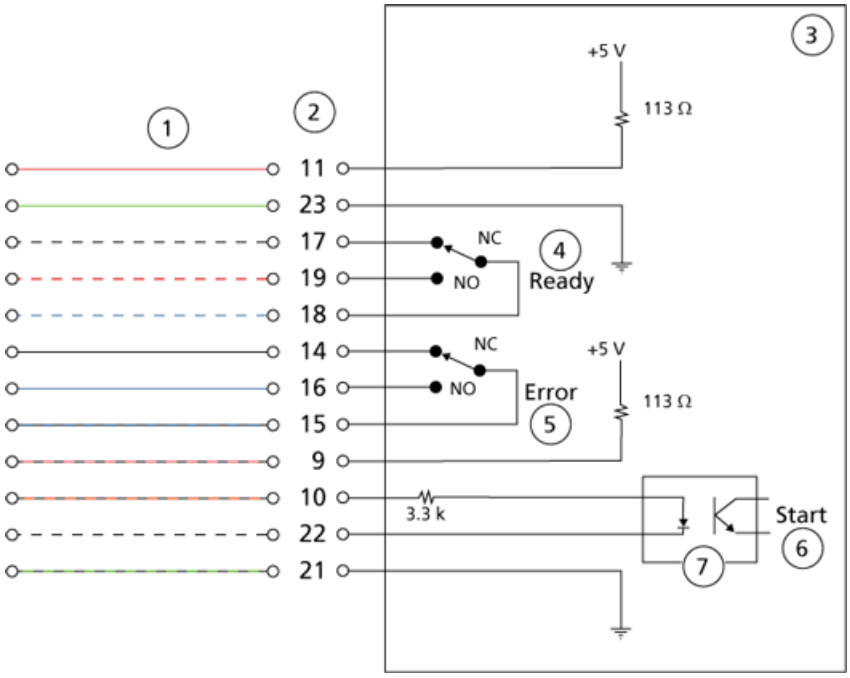


Figure A-2 Schematic of the AUX I/O Interface and Cable on the 5500 Series of Instruments



AUX I/O Signal Details

The mass spectrometer displays three types of signals.

Ready Signal

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

The Ready signal is activated when the LC/MS devices are ready to acquire data and are 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 may include 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 MS 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 may 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.

By setting the MS synchronization trigger level, you can 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 using a contact closure.
- Generate TTL-level READY and ERROR signals.

Wire Peripheral Devices to the Mass Spectrometer

Figure A-3 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-3 General Scheme for Analog Synchronization of Peripheral Devices and the Mass Spectrometer

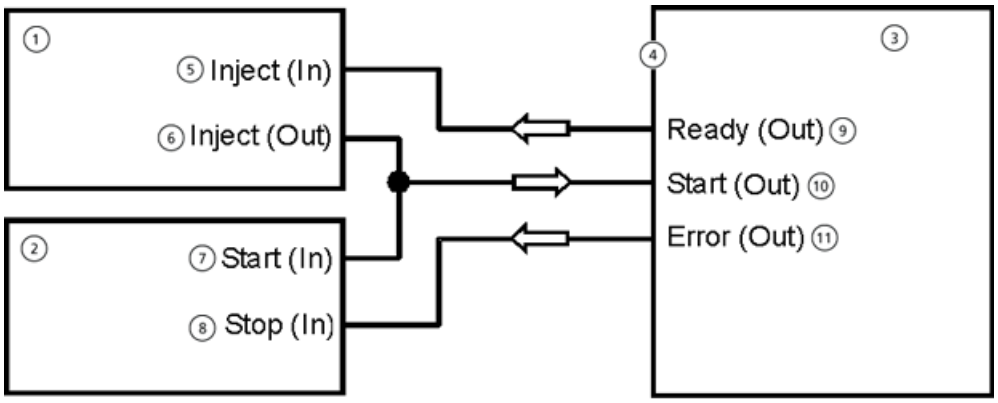


Table A-2 Figure Legend

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)
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-4 Analog Synchronization Scheme using Contact Closure Signals

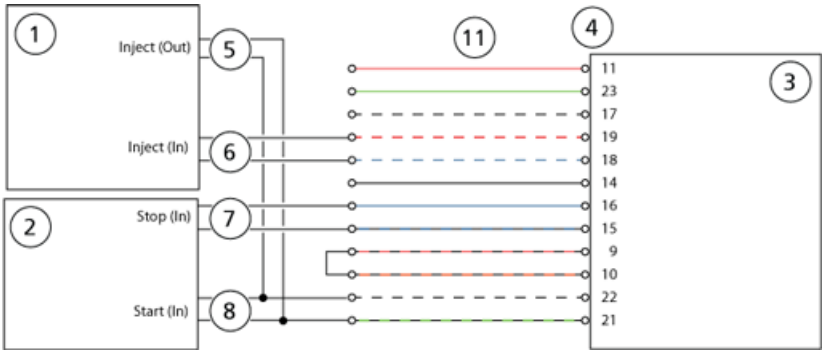


Table A-3 Figure Legend

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)
11	AUX I/O cable

Table A-4 Contact Closure Signals

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

Figure A-5 Analog Synchronization Scheme using TTL Signals

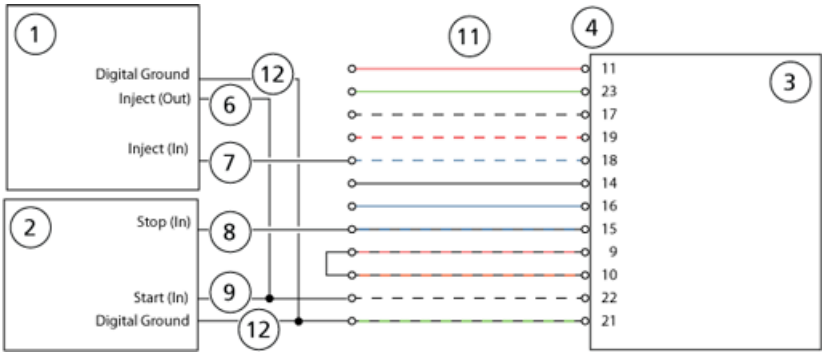


Table A-5 Figure Legend

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
12	Digital ground

Table A-6 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® 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® 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® 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® software, the term tray is used to define a physical location. A tray is a placeholder for a location in which you can place different types of trays. The tray group indicates the tray types you can use in each tray location.

CTC PAL Autosampler Setup Notes

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

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, the CTC driver cannot find the correct layout of the trays in the autosampler. This either causes the Analyst® software to load the tray configuration incorrectly, which results in the Batch Editor Locations tab showing 6 tray locations, or it causes the Analyst® 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, 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® software control, however, typically this is not needed. If the autosampler is configured incorrectly, it will wait and not inject.

Revision History

Revision	Reason for Change	Date
A	First release of document.	May 2013
B	Reorganized documentation based on component. Removed peripheral devices that are no longer supported.	September 2013
C	• Added Agilent 1260 G1329B standard autosampler in the guide. • Added references to TripleTOF® 6600 system	July 2014
D	Changed release date.	March 2015
E	Changed AB SCIEX to SCIEX where required.	May 2015
F	Added information about the ExionLC Series devices supported in the Analyst® 1.6.3 software. Added a new section Connect the Shimadzu Autosampler to the Mass Spectrometer.	September 2015
G	Changed name of Chapter 2 from ExionLC Series to ExionLC Series Device Configuration to match similar chapter naming convention. Removed the Analyst® software version (1.6.3) from the ExionLC Series Device Configuration chapter introduction. Added information about the Analyst® Device Driver to the beginning of the Agilent Device Configuration chapter. Incorporated minor wording changes throughout the document. For example, changed "see" to "refer to".	July 2016

Revision History

Revision	Reason for Change	Date
H	Reorganized content based on devices. Added Contact Us and updated the Related Documentation. Updated system components section. Removed the section Set ExionLC Device Communications for Use on a Network ExionLC Controller (ExionLC CBM-Lite). Added the following new graphics in the Agilent Device Configuration chapter: Communication Port Configuration, Back Panel of the 1260 or 1290 Infinity II Autosampler, Back Panel of Agilent G4220A Pump with External Relay Contacts Board Installed, Back Panel of Agilent G7111B Pump.	October 2017
H (continued)	Updated the Shimadzu Device Configuration chapter. Rearranged some sections in the chapter. Added Agilent 1260 and 1290 Infinity II LC module names and model numbers. Added a new note about not having the Agilent controller connected while a batch is running. Added a new section Connect the Autosampler to the Mass Spectrometer. Updated the Install an ADC Card on a New Computer section In the Wire Peripheral Devices to the Mass Spectrometer section, updated graphics and figure legend tables added. In the Switching Valve Configuration section, updated graphics and added figure legend tables. Added a new note and a screenshot in the Shimadzu LC-30 Series Devices section. Added a new warning about handling chemicals in the Install an ADC Card on a New Computer section. Added the section CTC PAL Autosampler Setup Notes.	October 2017