Analyst® Software

Peripheral Devices Setup Manual

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</table>
Foreword

The Peripheral Devices Setup Manual is intended for users who are responsible for configuring HPLC peripheral devices to work with the mass spectrometer. You can find additional information about mass spectrometers and the Analyst® software in the online Help.

Conventions

Within the scope of this manual, the following conventions are used:

WARNING! This symbol indicates a warning of electrical shock hazard. You should read the warning before attempting any procedure described in this manual. Failure to do so can result in serious injury.

WARNING! This symbol indicates a warning of potential injury. You should read the warning before attempting any procedure. Failure to do so can result in serious injury.

CAUTION! Indicates an operation that may cause damage to the instrument or device if the precautions are not followed. You should read the Manufacturer’s documentation before configuring the device. Failure to do so can result in damage to the equipment.

How This Manual Is Organized

The information provided in this manual is organized as follows:

Chapter 1: Introduction

This section provides an overview of the mass spectrometer and the types of peripheral devices that can be configured to work in conjunction with the mass spectrometer and the Analyst software. You can also find information on any hardware required to configure peripheral devices.
Chapter 2: Card and Driver Installation
This section provides information on installing GPIB, Digi, ADC, IMAQ, IonLynx, and Fishcamp cards in the computer.

Chapter 3: Agilent 1100 Series Devices Configuration
This section explains how to configure Agilent 1100 series devices.

Chapter 4: Autosampler Configuration
This section provides information on how to install, configure, and synchronize an autosampler to work with the mass spectrometer.

Chapter 5: Pump Configuration
This section provides information on how to install and configure a pump to work with the mass spectrometer.

Chapter 6: Shimadzu Devices
This section provides information on how to install and configure the Shimadzu Integrated System to work with the mass spectrometer.

Chapter 7: LC Packings UltiMate Integrated System
This section provides information on how to connect the LC Packings integrated system to the computer.

Chapter 8: Column Oven Configuration
This section provides information on how to install and configure a column oven to work with the mass spectrometer.

Chapter 9: Switching Valve Configuration
This section provides information on how to install and configure a switching valve to work with the mass spectrometer.

Chapter 10: Detector Configuration
This section provides information on how to install and configure detectors to work with the mass spectrometer.

Appendix A: Peripheral Device Analog Synchronization
This section provides information on how to use analog signals to configure peripheral devices not supported in the Analyst software, to work with the mass spectrometer.

Appendix B: CTC PAL Autosampler Setup Notes
This section provides an overview of the CTC PAL autosampler setup.
Technical Support

Applied Biosystems/MDS Sciex and its representatives maintain a staff of fully-trained service and technical specialists located throughout the world. They can answer questions about the API instruments or any technical issues that may arise. For more information, visit the Applied Biosystems/MDS Sciex Web site at http://www.appliedbiosystems.com.
Introduction

Peripheral HPLC devices can be controlled automatically during LC/MS/MS data acquisition through the Analyst® software. However, before you can achieve proper communication between the supported peripheral devices and the mass spectrometer, some hardware setup and configuration is required.

The Analyst software supports LC pumps, autosamplers, column ovens, switching valves, detectors, and analog-to-digital converters from several manufacturers. This manual details the procedures you must complete for successful installation of these devices to complement the mass spectrometer.

System Components

The following figure showing the system components is an example of how peripheral devices can be connected in relation to the applications computer and the mass spectrometer. You do not have to configure your system exactly as indicated in the figure.

The figure shows that the pumps, column ovens, autosamplers, and switching valves are controlled from the computer by means of RS-232 serial ports. The diode array detector is controlled by a LAN (Ethernet) cable.
Example of system component configuration—your configuration may differ

For more information on how peripheral devices can be configured to communicate with the computer, see the section in this manual specific to each device.

Supported Devices

This section contains the following information for each peripheral device supported by the Analyst software:

- Name of the device.
- Parts required to connect the device.

**WARNING! See the original equipment manufacturer’s manual that pertains to each board for safety instructions before configuring the communication board.**

For an updated list of the peripheral devices and firmware supported by the Analyst software, refer to the most current software release notes.
**Autosamplers**

Unless otherwise noted, all required cables and parts for the autosamplers can be obtained from Applied Biosystems. AUX I/O cables are shipped with the mass spectrometer, and they require assembly.

The Analyst software supports the following autosamplers:

<table>
<thead>
<tr>
<th>Peripheral Device</th>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent 1100 autosamplers</td>
<td>WC024736 (for serial connection)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>WC021365 (for GPIB connection)</td>
<td>Network interface card if using a LAN (Ethernet) connection.</td>
</tr>
<tr>
<td></td>
<td>AUX I/O cable p/n 014474</td>
<td>CAN cables - supplied (optional).</td>
</tr>
<tr>
<td></td>
<td>Agilent p/n G5183-4649</td>
<td>Network interface card if using a LAN (Ethernet) connection.</td>
</tr>
<tr>
<td></td>
<td>network cables (for a direct LAN connection)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Agilent p/n G1530-61485</td>
<td>Network interface card if using a LAN (Ethernet) connection.</td>
</tr>
<tr>
<td></td>
<td>network cables (for a LAN connection using a hub).</td>
<td>N/A</td>
</tr>
<tr>
<td>CTC PAL autosamplers</td>
<td>WC024736 (for serial connection)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>AUX I/O cable p/n 014474</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>CTC PAL ready cable for connecting API instruments</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>DB15 male connector</td>
<td>N/A</td>
</tr>
<tr>
<td>LCPackings Famos autosamplers</td>
<td>WC160070</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>AUX I/O cable p/n 014474</td>
<td>PerkinElmer supplied connector.</td>
</tr>
<tr>
<td>PerkinElmer Series 200 autosampler</td>
<td>WC024737 (for serial connection)</td>
<td>PerkinElmer supplied connector.</td>
</tr>
<tr>
<td></td>
<td>AUX I/O cable p/n 014474</td>
<td>PerkinElmer supplied connector.</td>
</tr>
<tr>
<td></td>
<td>Gilson GSIOC cable (supplied with device)</td>
<td>PerkinElmer supplied connector.</td>
</tr>
<tr>
<td>Gilson 215 liquid handler</td>
<td>WC024735 (for serial connection)</td>
<td>Gilson GSIOC cable (supplied with device)</td>
</tr>
<tr>
<td>819 valve</td>
<td>AUX I/O cable p/n 014474</td>
<td>Shimadzu SCL-10Avp system controller with fiber optic cables.</td>
</tr>
<tr>
<td>841 valve</td>
<td></td>
<td>Shimadzu Event Cable</td>
</tr>
<tr>
<td>Gilson 233 XL sampling injector</td>
<td>WC024735 (for serial connection)</td>
<td>Shimadzu SCL-10Avp system controller with fiber optic cables.</td>
</tr>
<tr>
<td>402 syringe pump</td>
<td>AUX I/O cable p/n 014474</td>
<td>Shimadzu Event Cable</td>
</tr>
<tr>
<td>Shimadzu series autosampler</td>
<td>Optical cable, see the Shimadzu system controller.</td>
<td>Device software driver kit (Spark Holland p/n 0920-768). The kit includes the connection cable.</td>
</tr>
<tr>
<td></td>
<td>AUX I/O cable p/n 014474</td>
<td>DB15 male connector</td>
</tr>
<tr>
<td>Spark Holland Endurance autosampler</td>
<td>AUX I/O cable p/n 014474</td>
<td>Device software driver kit (Spark Holland p/n 0920-768). The kit includes the connection cable.</td>
</tr>
</tbody>
</table>
**Pumps**

Unless otherwise noted, all required cables and parts for the pumps can be obtained from Applied Biosystems.

The Analyst software supports the following pumps:

<table>
<thead>
<tr>
<th>Peripheral Device</th>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent 1100 pumps</td>
<td>WC024736 (for serial connection)</td>
<td>External relay contacts board (Agilent p/n G1351-68701)</td>
</tr>
<tr>
<td></td>
<td>WC021365 (for GPIB connection)</td>
<td>General purpose cable for Agilent devices (Agilent p/n G1103-61611)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>These parts are optional. The external relay contacts board is required to provide timed contact closure events during the LC program. This option is not required for analog synchronization of peripheral devices.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Network interface card if using a LAN (Ethernet) connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agilent p/n G5183-4649 network cables (for a direct LAN connection)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agilent p/n G1530-61485 network cables (for a LAN connection using a hub)</td>
</tr>
<tr>
<td>Harvard 22 syringe pump</td>
<td>WC024735 (for serial connection)</td>
<td>N/A</td>
</tr>
<tr>
<td>PerkinElmer Series 200</td>
<td>WC024736 (for serial connection)</td>
<td>N/A</td>
</tr>
<tr>
<td>LC pumps</td>
<td>One cable is needed for each micro pump.</td>
<td></td>
</tr>
<tr>
<td>Shimadzu series pumps.</td>
<td>Optical cable, see the Shimadzu information in the System Controller section.</td>
<td>Shimadzu SCL-10Avp system controller with fiber optic cables.</td>
</tr>
</tbody>
</table>

**System Controller**

Unless otherwise noted, all required cables and parts for the system controller can be obtained from Applied Biosystems.

The Analyst software supports the following system controllers:

<table>
<thead>
<tr>
<th>Peripheral Device</th>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC Packings UltiMate</td>
<td>p/n 160172</td>
<td>N/A</td>
</tr>
<tr>
<td>system controller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shimadzu SCL-10Avp</td>
<td>WC024736 (for serial connection)</td>
<td>Fiber optic cables for connecting the system controller to the Shimadzu LC devices.</td>
</tr>
<tr>
<td>system controller</td>
<td></td>
<td>p/n 070-92025-51 (1 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>p/n 070-92025-52 (2 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>p/n 070-92025-53 (3 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>p/n 070-92025-54 (4 m)</td>
</tr>
</tbody>
</table>
## Column Ovens

Unless otherwise noted, all required cables and parts for the column ovens can be obtained from Applied Biosystems.

The Analyst software supports the following column ovens:

<table>
<thead>
<tr>
<th>Peripheral Device</th>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent 1100 column oven</td>
<td>WC024736 (for serial connection)</td>
<td>Network interface card if using a LAN (Ethernet) connection.</td>
</tr>
<tr>
<td></td>
<td>WC021365 (for GPIB connection)</td>
<td>Agilent p/n G5183-4649 network cables (for a direct LAN connection)</td>
</tr>
<tr>
<td></td>
<td>Network cable</td>
<td>Agilent p/n G1530-61485 network cables (for a LAN connection using a hub)</td>
</tr>
<tr>
<td>PerkinElmer Series 200 column oven</td>
<td>WC024735 (for serial connection)</td>
<td>N/A</td>
</tr>
<tr>
<td>Shimadzu series column oven</td>
<td>Optical cable, see the Shimadzu information</td>
<td>Shimadzu SCL-10Avp system controller with fiber optic cables.</td>
</tr>
<tr>
<td></td>
<td>in the System Controller section.</td>
<td></td>
</tr>
</tbody>
</table>

## Switching Valves

Unless otherwise noted, all required cables and parts for the switching valves can be obtained from Applied Biosystems.

The Analyst software supports the following switching valves:

<table>
<thead>
<tr>
<th>Peripheral Device</th>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shimadzu series switching valves</td>
<td>Optical cable, see the Shimadzu information</td>
<td>Shimadzu SCL-10Avp system controller</td>
</tr>
<tr>
<td></td>
<td>in the System Controller section.</td>
<td>Shimadzu valve interface unit (subcontroller VP, or Option Box-L), ribbon cables.</td>
</tr>
<tr>
<td>Valco two-position valve.</td>
<td>WC024740 (for serial connection)</td>
<td>WC027522</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Actuator and connectors available from Sciex.</td>
</tr>
</tbody>
</table>

## Detectors

Unless otherwise noted, all required cables and parts for the detectors can be obtained from Applied Biosystems.

The Analyst software supports the following detectors:

<table>
<thead>
<tr>
<th>Peripheral Device</th>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent 1100 diode array detector G1315</td>
<td>WC021365 (for GPIB connection)</td>
<td>Network interface card if using a LAN (Ethernet) connection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agilent p/n G5183-4649 network cables (for a direct LAN connection)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agilent p/n G1530-61485 network cables (for a LAN connection using a hub)</td>
</tr>
<tr>
<td>Shimadzu series UV detector</td>
<td>Optical cable, provided with Shimadzu.</td>
<td>Shimadzu SCL-10Avp system controller with fiber optic cables.</td>
</tr>
</tbody>
</table>
Analog-to-Digital Converter (ADC)

Unless otherwise noted, all required cables and parts for the ADC card can be obtained from Applied Biosystems.

The Analyst software supports the following analog-to-digital converter:

<table>
<thead>
<tr>
<th>Peripheral Device</th>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Instruments ADC card PCI-6032E 16 Bit</td>
<td>N/A</td>
<td>Applied Biosystems kit p/n WC024920 (includes PCI 6032 card, cable, SCB-68 terminal box)</td>
</tr>
</tbody>
</table>
Card and Driver Installation

This section describes how to install the following cards:

- GPIB
- Fishcamp
- IonLynx TDC×8
- Digi Classicboard 8
- ADC
- IMAQ

**Note:** It is recommended that you install the cards and drivers before you install the Analyst® software or Analyst QS software. If you install them after installing the software, stop and disable the Analyst Service first in order to ensure a successful installation.

**Note:** When installing certain cards, you must install the software before installing the cards.

**Tip:** After rebooting, if the system doesn’t automatically find the newly installed software, you can use the Upgrade Device Driver Wizard to add new hardware and locate the installed software.

Once the National Instruments cards are installed, you can check the hardware and software versions using the Measurement and Automation System. From the Start menu, point to Programs, National Instruments, and then click Measurement and Automation. To determine the type of hardware installed, expand the Devices and Interfaces directory. The Measurement and Automation Explorer lists the installed hardware. To check the software, expand the Software directory, and then click the card. The version number is shown in the right window pane.

You can verify the hardware and software versions of other cards using the Device Manager. To open the Device Manager, right-click on My Computer, and then select Properties. In the System Properties dialog box, click Hardware, and then click Device Manager. Navigate to the card, right-click, and then click Properties.
GPIB Card Installation

The target computer must be configured with a GPIB card in order to acquire data on the mass spectrometer.

Installing the GPIB Card

There are three procedures you must complete to install a GPIB card:

- Install the GPIB software.
- Install the GPIB card.
- Verify the installed card software.

To install the GPIB software

1. Restart the computer, and then log on as the Administrator (or a user with Administrator privileges).
2. Insert the software installation CD into the CD drive.
3. From the Installation Browser, click Install Pre-requisite Software.
4. From the Install Pre-requisite Software menu, click GPIB Driver.
5. Click OK.
6. Click Setup.
7. Click Next.
8. Accept the License Agreement, and then click Next.
9. Select the default Destination Folder, or browse to a new location, and then click Next.
10. Select Typical installation type, and then click Next.
11. Click Next.
12. Click Next.
13. Click Next.
14. On the Add GPIB Hardware Wizard screen, select PCI-GPIB, and then click Next.
15. Click Shutdown to reboot the computer, and then click Finish.

To install the GPIB card

WARNING! Electrical Shock Hazard. Severe electrical shock can result if you attempt to remove the computer enclosure panels. Detach the power cord and wait at least one minute before removing the outside panels.

CAUTION! Make sure that you are electrically grounded. Wear a grounded wrist strap during installation of the card.

1. Shut down the computer.
2. Open the computer, locate a free PCI bus slot, and then install the card.
3. Close the computer, and attach the GPIB cable to the connector at the end of the card.
To verify the Installed Card/Software
1. After the computer has booted up, log on as a user with Administrator rights.
2. If the Getting Started Wizard doesn’t run automatically, from the Start menu, point to Programs, National Instruments, and then click NI-488.2 Getting Started Wizard.
3. Select Verify your hardware and software installation.
   The NI-488.2 Troubleshooting Wizard will verify the installed card/software.
4. Click OK, and then click Exit.
5. Click Exit.

Fishcamp TDC×4 FPCI-DIO Installation
The Fishcamp card should be installed for use with a QSTAR instrument equipped with a TDC×4. Before installing the card, confirm the identification of the TDC unit installed in the instrument.

There are two procedures you must complete to install a Fishcamp FPCI-DIO card:
- Install the FPCI-DIO card.
- Install the Fishcamp FPCI-DIO software.

Installing the Fishcamp TDC×4 FPCI-DIO card
If your workstation has never been configured to run the Analyst QS software as a data acquisition workstation, the required/optional cards and their corresponding software drivers must be installed before installing the Analyst QS software.

This installation requires that the target computer be configured with both a GPIB card and Fishcamp card in order to acquire data on the mass spectrometer.

To install the FPCI-DIO card

**WARNING!** Electrical Shock Hazard. Severe electrical shock can result if you attempt to remove the computer enclosure panels. Detach the power cord and wait at least one minute before removing the outside panels.

**CAUTION!** Make sure that you are electrically grounded. Wear a grounded wrist strap during installation of the card.

1. Shut down the computer.
2. Open the computer, locate a free 32-bit PCI bus slot, and then install the card.
3. Close the computer, and attach the Fishcamp cable to the card connector at the end of the card.

To install the Fishcamp FPCI-DIO software
1. Restart the computer and then log on as the Administrator (or a user with Administrator privileges).
   The Hardware Installation Wizard appears.
2. Insert the software installation CD into the CD drive.
3. On the **Hardware Installation Wizard**, click **Next**.
4. Select **Search for a suitable driver for my device (recommended)**, and then click **Next**.
5. Browse to the driver location on the software CD, and then click **Next**.
6. Click **Finish**.

---

**IonLynx TDC×8 Card Installation**

The IonLynx card should be installed for use with a QSTAR instrument equipped with a TDC×8. There are two procedures you must complete to install an IonLynx card:

- Install the IonLynx TDC×8 card.
- Install the IonLynx TDC×8 software.

**Installing the IonLynx TDC×8 card**

If your workstation has never been configured to run the Analyst QS software as a data acquisition workstation, the required/optional cards and their corresponding software drivers must be installed before installing the Analyst QS software.

**To install the IonLynx card**

- **WARNING!** Electrical Shock Hazard. Severe electrical shock can result if you attempt to remove the computer enclosure panels. Detach the power cord and wait at least one minute before removing the outside panels.

- **CAUTION!** Make sure that you are electrically grounded. Wear a grounded wrist strap during installation of the card.

1. Shut down the computer.
2. Open the computer, locate a free PCI 32- or 64-bus slot, and install the card.
3. Close the computer.

**To install the IonLynx software**

1. Restart the computer and log on as the Administrator (or a user with Administrator privileges).
   - The **Found New Hardware Wizard** appears.
2. Insert the software installation CD into the CD drive.
3. On the **Found New Hardware Wizard**, click **Next**.
4. Select **Search for a suitable driver for my device (recommended)**, and then click **Next**.
5. Clear **Specify a location**, and then click **CD-ROM drives**.
6. Click **Next**.
   The wizard automatically finds the .inf file.
7. Click **Next**.
8. Click **Finish**.

## Digi Classicboard Installation

The standard computer has two serial ports (COM 1 and COM 2) located on the back panel of the computer. If you require more than the standard two serial ports, you must install the Digi Classicboard 8 PCI card in the computer.

The Digi Classicboard provides eight additional serial ports and is intended for installation in the computer. The Digi Classicboard comes in a kit that includes the card and a serial port octa-cable.

Do not rename the serial ports using the Digi software. The default naming scheme must be used with the Analyst software. Once a serial port expansion card has been installed, port numbering in the Analyst software appears as listed in the following table:

<table>
<thead>
<tr>
<th>PCI Serial Ports</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 1</td>
<td>Back of computer</td>
</tr>
<tr>
<td>COM 2</td>
<td>Back of computer</td>
</tr>
<tr>
<td>COM 3 to COM 10</td>
<td>Digi octa-cable</td>
</tr>
<tr>
<td></td>
<td>Port #1 on the octa-cable is COM 3 in the Analyst software and port #8 is COM 10.</td>
</tr>
</tbody>
</table>
Card and Driver Installation

The connector on the serial port expansion card

There are two procedures you must complete to install and configure a Digi Classicboard 8 PCI card:

• Install the Digi Classicboard in the computer.
• Install the Digi Classicboard software.

Once you have completed the installation and configuration, you can assign a serial port to a peripheral device.

Installing the Digi Classicboard

You must install the Digi Classicboard driver from the software installation CD. Do not use the driver that came with the Digi Classicboard. Any driver other than that on the Analyst software CD might be a different version and potentially incompatible with the Analyst software.

To install the Digi Classicboard card

WARNING! Electrical Shock Hazard. Severe electrical shock can result if you attempt to remove the computer enclosure panels. Detach the power cord and wait at least one minute before removing the outside panels.
CAUTION! Make sure that you are electrically grounded. Wear a grounded wrist strap during installation of the card.

1. Shut down the Computer.
2. Remove the computer enclosure panels, locate a free 32-bit PCI bus slot, and then install the card. Refer to the manufacturer’s documentation for detailed information on card installation.
3. Reinstall the computer enclosure panels, and then attach the Digi octa-cable to the connector at the end of the card. There should be eight individual connectors coming from a single cable.

To install the Digi Classicboard software on Windows XP

1. Restart the computer, and then log on as the Administrator (or a user with Administrator privileges).
   
   **Note:** You must configure each of the eight ports.

2. Insert the software installation CD into the CD drive.
3. Right-click **My Computer**, and then click **Properties**.
4. Click the **Hardware** tab, and then click **Device Manager**.
5. Expand **Other devices**, and then double-click **PCI Simple Communications Control**. If there is more than one device, you can check the location of the PCI slot number. Click the device, right-click, and then click **Properties**.

   The **Hardware Installation Wizard** appears.

   **Tip:** If the **Hardware Installation Wizard** does not appear automatically, right-click the device and select **Update Driver**.

6. Select **Install from a list (Advanced)**.
7. Click **Next**.
8. Browse to the driver location on the software CD, and then click **Next**.
9. In the **Hardware Installation** dialog box, click **Continue Anyway**.
10. Click **Finish**.
11. Repeat steps 8, 9, and 10 for each port.
12. Remove the software installation CD from the CD drive.
13. Restart the computer.

To install the Digi Classicboard software on Windows 2000

1. Restart the computer, and then log on as the Administrator (or a user with Administrator privileges).
2. Insert the software installation CD into the CD drive.
3. Right-click **My Computer**, and then click **Properties**.
4. Click the **Hardware** tab, and then click **Device Manager**.
5. Expand **Other devices** and, and then double-click **PCI Simple Communications Controller**. If there is more than one device, you can check the location of the PCI slot number. Select the device, right-click, and then select **Properties**.

The **Hardware Installation Wizard** appears.

**Tip:** If the **Hardware Installation Wizard** does not appear automatically, select and right-click the device, and then select Update Driver.

6. Click **Next**.

7. Select **Search for a suitable driver for my device (recommended)**, and then click **Next**.

8. Browse to the driver location on the software CD, and then click **Next**.

9. On the **Drivers Files Search Results** page, click **Next**.

10. On the **Digital Signature Not Found** page, click **Yes** to continue the installation.

11. In the **Hardware Installation** dialog box, click **Continue Anyway**.

12. Click **Finish**.

13. Repeat steps 8 through 12 for each port.

14. Remove the software installation CD from the CD drive.

15. Restart the computer.

**Note:** You must configure each of the eight ports.

---

**Serial Ports and Peripheral Devices**

When you add a peripheral device to a hardware profile in the Analyst software, you must assign a serial port to the device. The peripheral device must be configured before you can assign a serial port to the device. For more information, see the topic describing the configuration of the device.

**To assign serial ports to a peripheral device**

1. Start the Analyst software application.

2. On the **Navigation** bar, double-click **Hardware Configuration**.

The **Hardware Configuration Editor** appears.

3. Click **New Profile** to create a new profile, or click **Edit Profile** to assign a serial port to a device already configured in an existing profile, or to a newly added device. If editing an existing profile, you must first deactivate the profile.

   - If you clicked **New Profile**, the **Create New Hardware Profile** dialog box appears.

   - If you clicked **Edit Profile**, the **Edit Profile** dialog box appears. Go to step 9.

4. Type a **Profile Name**.

5. Click **Add Device**.

The **Available Devices** dialog box appears.

6. Select a **Device Type**, and then select the desired device (for example, Autosampler PerkinElmer 200).

7. Click **OK**.
8. In the **Create New Hardware Profile** dialog box, repeat steps 5 to 7 until all the devices you intend to configure are listed in the **Devices in Current Profile** window.

9. Select a device from the **Devices in Current Profile** list.

10. Click **Setup Device**.

   The configuration dialog box for the device appears.

11. Click the **Communication** tab.

12. Select a **COM Port Number** for the serial port number to which the device is connected.

   Use the default values for the remaining parameters, and ensure the switch and control settings on the device are configured properly for the device. For more information, see the topic regarding configuring the device.

13. Click **OK**.

14. Repeat steps 9 to 13 until a **COM Port Number** has been assigned to each serial device in the hardware profile.

15. In the **Create New Hardware Profile** dialog box, or the **Edit Profile** dialog box, click **OK** to save the profile.

16. Select the profile in the **Hardware Configuration Editor**. Ensure that all configured devices are powered on.

17. Click **Activate Profile**.

   A green check mark appears next to the hardware profile, indicating the profile is active.

### Digi Classicboard Driver Uninstall

If it is necessary to uninstall the Digi Classicboard driver, it is critical that the uninstall be conducted properly and cleanly, or various intermittent problems may result. For more information on uninstalling the Digi Classicboard from the operating system, refer to the instructions provided by Digi at http:\support.digi.com. It may be necessary to uninstall each COM expansion port separately from the Device Manager.

### The National Instruments ADC Card

An analog-to-digital converter (ADC) card is used to collect analog signals from devices, usually detectors, not otherwise discussed in this manual, and bundle this data with the MS chromatograms. This section describes how to install and configure an ADC card.

There are two procedures you must complete to configure the National Instruments ADC card:

- Install the ADC software drivers.
- Install the ADC card.
Installing the National Instruments ADC Card

You must install the National Instruments ADC driver from the software installation CD. Do not use the driver that came with the National Instruments ADC card. Any driver other than that on the Analyst software CD might be a different version and incompatible with the Analyst software.

To install the ADC software drivers

1. Restart the computer, and then log on as the Administrator (or a user with Administrator privileges).
2. Insert the software installation CD into the CD drive.
3. From the Installation Browser, select Install Pre-requisite Software.
4. From the Install Pre-requisite Software menu, select ADC Driver.
5. Click Next.
6. Accept the License Agreement, and then click Next.
7. On the Feature Tree, ensure that the NI-DAQ Device Driver is selected.
8. Select the default Destination Folder, or browse to a new location, and then click Next.
9. Click Next to start installation.
10. Click Finish, and then click Yes to restart the computer.
11. Once the computer restarts, log on as the Administrator (or as a user with Administrator privileges).
13. Click PCI-6032E from the Devices list, and then click Next.
14. Click SCB-68 from the Accessories list, and then click Next.
15. Select Install recommended documentation, and then click Next.
16. Click Next.
17. Choose either to copy the selected documentation to your hard drive, or to read it from the NI-DAQ CD, and then click Next.
18. Click Finish.
19. Click Configure Measurement & Automation System, and then click Finish

The Measurement & Automation Exploring - Devices and Interfaces window appears indicating a successful installation.
To display the serial number, double-click the NI-DAQ device.

**To install the ADC card**

**WARNING!** Electrical Shock Hazard. Severe electrical shock can result if you attempt to remove the computer panels. Detach the power cord and wait at least one minute before removing the outside panels.

**CAUTION!** Make sure that you are electrically grounded. Wear a grounded wrist strap during installation of the card.

1. Shut down the computer.
2. Remove the computer enclosure panels, locate a free PCI bus slot, and then install the card. Refer to the manufacturer’s documentation for instructions on how to install the card.
3. Reinstall the computer enclosure panels, and then attach the ADC cable to the connector on the end of the card.
4. Connect the SCB-68 terminal box to the other end of the ADC cable.
The National Instruments IMAQ Card

The IMAQ card is used with the oMALDI™ source on the QSTAR instrument when you want to view the sample spot on the oMALDI plate on the computer screen instead of on separate camera monitors. The NI-Vision card is supported by Analyst QS software only.

There are three procedures you must complete to configure the National Instruments IMAQ card:

- Install the IMAQ software drivers.
- Install the IMAQ card.
- Upgrade the IMAQ software.

Installing the National Instruments IMAQ Card

You must install the National Instruments IMAQ software from the software installation CD. Do not use the software that came with the IMAQ card. The card can be installed in either a 32- or 64-bit slot; however, it is recommended that the card be installed in a 64-bit slot in order to free up 32-bit slots for cards that cannot be installed in a 64-bit slot.

To install the IMAQ software drivers

1. Run the IMAQ 2.5 installer from the software CD.
2. Click Next.
3. Click Next.
4. Accept the License Agreement.
5. Select Core Components, and then click Next.
6. Click Begin Installation.
7. Click Done.
8. Restart your computer.

To install the IMAQ card

WARNING! Electrical Shock Hazard. Severe electrical shock can result if you attempt to remove the computer panels. Detach the power cord and wait at least one minute before removing the outside panels.

CAUTION! Make sure that you are electrically grounded. Wear a grounded wrist strap during installation of the board.

1. Shut down the computer.
2. Remove the computer enclosure panels, install the vision board in 64-bit PCI bus slot.
3. Reinstall the computer enclosure panels.
4. Connect the camera to the BNC connector.
To install the IMAQ software update

1. Restart the computer, and then log on as the Administrator (or a user with Administrator privileges).
2. Run the IMAQ 2.5.5 installer from the software CD.
3. Click Next.
4. Click Finish.
5. Restart your computer.
7. Click My System, and then press F5 to refresh.
   Confirm that the software drivers installed correctly.
8. Select a video format for each channel you will be using. For example, if you are using a Hitachi CCD camera (model: KP-M2E/K) at channel 0 for oMALDI source, then right-click the Channel-0 label to select the CCIR video format.
9. Right-click Channel, and then click Properties.
10. Change the bit depth to 8 bits.
11. Right-click Channel, and then click Snap to check the video image.
Agilent 1100 Series Devices Configuration

This section explains how to configure Agilent 1100 series devices.

Agilent 1100 Series Devices

Agilent 1100 series peripheral devices can be configured using standard serial port, GPIB or LAN (Ethernet) communication, with or without CAN cables. An overview of each type of communication is provided.

**Note:** CAN cables may be used in conjunction with a serial, GPIB, or LAN (Ethernet) cable if configuring multiple Agilent devices in a stack configuration. For more information, see “Configuration of Agilent Devices with CAN Cables” on page 33.

**Note:** If the Analyst® hardware profile is not configured for CAN, the CAN cables must be disconnected from the Agilent devices.

Configuration of Agilent Devices Through Serial Port Communication

The Agilent 1100 series autosamplers, pumps, and column oven can be connected to the computer with a standard RS-232 serial cable (p/n WC024736).

**Note:** You cannot connect an Agilent 1100 diode array detector (DAD) to the computer through serial port communication. The diode array detector can only be connected through GPIB or LAN (Ethernet) communication.

If you connect an Agilent device (except a DAD) to the computer with an RS-232 serial cable, you must set the Dual In-line Package (DIP) switch settings on the back of the device. DIP switch settings provide configuration parameters for communication protocol and instrument initialization procedures.

The following tables display the appropriate DIP switch settings that match baud rates of 19200 and 9600. If you create a new hardware profile that includes an Agilent device, or you add an Agilent device to an existing hardware profile, set the DIP switch settings for a baud rate of 9600, and then set the baud rate to 9600 in the Hardware Configuration.
Agilent 1100 Series Devices Configuration

Editor. For more information, refer to the online Help for instructions on setting the baud rate.

**Note:** Devices must be rebooted before the new baud rate is accepted.

Current versions of the Analyst software use a baud rate of 9600 for Agilent 1100 devices. If desired, you can change the baud rate to 19200 in the Hardware Configuration Editor.

Agilent 1100 devices may not function properly at a baud rate of 19200; this is due to a communication problem that occurs occasionally on Windows 2000. If this does occur, set the baud rate to 9600 in the Hardware Configuration Editor, and set the DIP switches as indicated in the following table:

**DIP switch settings corresponding to a baud rate of 9600**

<table>
<thead>
<tr>
<th>For this switch... (baud rate 9600)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set as...</td>
<td>Down</td>
<td>Up</td>
<td>Down</td>
<td>Down</td>
<td>Down</td>
<td>Up</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td></td>
<td>(Off)</td>
<td>(On)</td>
<td>(Off)</td>
<td>(Off)</td>
<td>(Off)</td>
<td>(On)</td>
<td>(Off)</td>
<td>(Off)</td>
</tr>
</tbody>
</table>

**DIP switch settings corresponding to a baud rate of 19200**

<table>
<thead>
<tr>
<th>For this switch... (baud rate 19200)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set as...</td>
<td>Down</td>
<td>Up</td>
<td>Up</td>
<td>Down</td>
<td>Up</td>
<td>Down</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td></td>
<td>(Off)</td>
<td>(On)</td>
<td>(On)</td>
<td>(Off)</td>
<td>(On)</td>
<td>(Off)</td>
<td>(Off)</td>
<td>(Off)</td>
</tr>
</tbody>
</table>

**Configuration of Agilent Devices Through GPIB Communication**

The Agilent 1100 series autosamplers, pumps, column oven, and diode array detector can be connected to the computer with a GPIB cable (p/n WC021365).

Agilent devices are shipped with DIP switch settings preset at the factory. These DIP switch setting are preconfigured for GPIB communication. You do not have to change the DIP switch settings if connecting the device to the computer with a GPIB cable. To serially connect (daisy chain) multiple Agilent devices together with GPIB cables, you must ensure each device is assigned the same Primary Address in the Hardware Configuration Editor. For more information, refer to the online Help for instructions on setting the Primary Address.

**DIP switch settings for autosamplers**

<table>
<thead>
<tr>
<th>For this switch...</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set as...</td>
<td>Down</td>
<td>Down</td>
<td>Down</td>
<td>Up</td>
<td>Up</td>
<td>Down</td>
<td>Down</td>
<td>Down</td>
</tr>
<tr>
<td></td>
<td>(Off)</td>
<td>(Off)</td>
<td>(Off)</td>
<td>(On)</td>
<td>(On)</td>
<td>(Off)</td>
<td>(Off)</td>
<td>(Off)</td>
</tr>
</tbody>
</table>

**DIP switch settings for pumps**

<table>
<thead>
<tr>
<th>For this switch...</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set as...</td>
<td>Down</td>
<td>Down</td>
<td>Down</td>
<td>Up</td>
<td>Down</td>
<td>Up</td>
<td>Up</td>
<td>Down</td>
</tr>
<tr>
<td></td>
<td>(Off)</td>
<td>(Off)</td>
<td>(Off)</td>
<td>(On)</td>
<td>(Off)</td>
<td>(On)</td>
<td>(On)</td>
<td>(Off)</td>
</tr>
</tbody>
</table>
Peripheral Devices Setup Manual

Configuration of Agilent Devices Through LAN (Ethernet) Communication

The Agilent 1100 series autosamplers, pumps, column oven, and diode array detector can be connected to the computer through LAN (Ethernet) communication.

To communicate using LAN (Ethernet) technology, you must install a network interface card in the Agilent 1100 series device. The required LAN (Ethernet) cables are supplied by Agilent. Use Agilent p/n G5183-4649 for a direct connection from the device to the computer, or use Agilent p/n G1530-61485 for hub connections.

For instructions on installing a network interface card in an Agilent 1100 series peripheral device, refer to the Agilent documentation.

A software program called CAG BOOTP Server is required to facilitate LAN (Ethernet) communication between the computer and Agilent instruments. For more information, see “BOOTP Support for Agilent Stack with LAN (Ethernet) Interface” on page 34.

Configuration of Agilent Devices with CAN Cables

CAN cables can be used in conjunction with a serial cable, GPIB 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 either a RS-232 serial cable, a GPIB cable, or a LAN (Ethernet) cable. Any additional Agilent devices are then connected to each other (in series) with CAN cables. With serial communication in CAN stacks, set all Agilent CAN-linked devices to the same serial port in the hardware profile.

The handheld Agilent 1100 series control module can be connected to one of the CAN connections on the back of any Agilent device, in order to monitor and control the stack manually.
For more information on configuring Agilent devices with CAN cables, refer to the documentation that came with your Agilent 1100 series peripheral device.

**Note:** The devices connected by CAN cables in the stack must match the devices in the Analyst hardware profile.

**Note:** In the event of a fault in the CAN-linked stack, you must reboot all the devices in the stack.

**Note:** If switching a stack from CAN to another communication mode in the Analyst software, the CAN cables must be disconnected from the device.

**BOOTP Support for Agilent Stack with LAN (Ethernet) Interface**

A software program called CAG BOOTP Server is available as a separate download to facilitate communication between the PC(s) and Agilent instrument(s). BOOTP Server assigns fixed and known IP address(es) to the instrument LAN (Ethernet) card(s). The following procedures are excerpts from the Agilent documentation. For more information, refer to documentation provided by Agilent.

**Installation Preparation Checklist**

Review the following requirements and specifications before proceeding with the installation of BOOTP.

- You have administrator privileges.
- You have installed an additional LAN (Ethernet) adapter.
- The following were used successfully in testing:
  - Intel PRO/100 PCI Management Adapter.
  - 3COM 10/100 PCI LAN (Ethernet) Adapter.

**Installing CAG BootP server**

1. Click **Start**, and then click **Run**.
   
The **Run** dialog box appears.
2. Click **Browse**.
3. Locate and select the BootpPackage.exe file, and then click **Open**.
4. In the **Run** dialog box, click **OK**.
5. Follow the prompts on each dialog box until you click **Finish**.

At the end of the installation, BOOTP will start and will be minimized in the task bar.

**Choosing between Interactive mode and NT Service mode when running BOOTP**

By default BOOTP is installed and run in an interactive mode on each individual PC (standalone) or on a single (laboratory wide) BOOTP Server PC desktop. This interactive run mode has some obvious advantages:

- The program can be easily accessed for configuration.
- Network communications can be monitored.
- The program's presence on the task bar or desktop is a visible indication that it is running.
However, there are also disadvantages:

- The program is accessible and configurable to anyone who has access to the PC/Server (a security issue).
- The program can be easily terminated by anyone who has access to the PC or Server (a security issue).
- Significantly, a current user login session MUST be maintained in order to run the program (a functionality issue).

The significance of the current user login requirement is exemplified when the PC running BOOTP is used by many people or for many purposes. In such cases, many logon or logoffs will most likely be made and in each case the BOOTP program will have to be terminated and then restarted. This can be inconvenient and or annoying for customers.

Running the BOOTP Program as a Windows NT Service can get around the disadvantages. The benefits of creating a Windows NT service include:

- Allowing the BOOTP Server application to survive logoff or logon sequences, hence saving the overhead of re-starting it for each new user.
- Allowing the BOOTP Server application to operate and service BOOTP requests even when no user is logged on to the PC.
- Allowing the BOOTP Server application to run and perform a task under a specific logon account, which may be different from the currently logged-on user, providing some application security.
- Allowing operation in both background or foreground modes. Background mode makes the program invisible to the current user and foreground mode means the application is still running as a service; however it can be viewed and configured as per normal operation.

**Setting the BOOTP Server to run as an NT Service**

Ensure that the Agilent BOOTP server application is installed and operating normally: that is, it is assigning IP addresses to instruments and there are no communication issues or problems. When running BOOTP as a service the expected path for the BOOTP instrument IP configuration file changes to the Windows\system32 path. Follow these steps to ensure that the new BOOTP service does not lose the current instrument IP and MAC address definitions.

The BOOTP Server program is registered as an NT service through the use of the Windows NT utilities INSTSRV.EXE and SRVANY.EXE. The SRVANY.EXE utility allows a user to run any Windows application as a service and the INSTSRV.EXE utility is used to install the service. The INSTSRV.EXE and SRVANY.EXE applications are included in the 'Windows NT 4.0 Resource Kit'.

**Maintaining IP and MAC address definitions**

1. Close the BOOTP Server application.
2. Open Windows Explorer.
3. Navigate to the C:\Program Files\Agilent\CAG BOOTP Server path.
4. Locate the file BOOTPtab (no extension).
5. Copy the file to the C:\Windows\system32 path.
Remove BOOTP from the Startup Menu
1. Open Windows Explorer and navigate to the C:\Windows\Profiles path.
2. Navigate through each user profile (including 'All Users') and find the '…\Start Menu\Programs\Startup' folder.
3. If found, delete the BOOTP shortcut from each profile.

Implementing the NT Service

CAUTION! The process outlined in this section involves editing the registry. Using the Registry Editor incorrectly can cause serious problems that may require you to reinstall your operating system. Backup the registry before editing and strictly follow the process detailed.

1. Ensure a folder called C:\Windows\ntreskit and containing the INSTSRV.EXE and SRVANY.EXE programs is on your computer.
2. Click Start, select Program, and then click Command Prompt to open a DOS prompt.
3. Enter the command: cd c:\winnt\ntreskit (or other directory where INSTSRV.EXE is located)
4. Enter the command: instsrv cagbootp c:\winnt\ntreskit\srvany.exe
   A message will then appear that says the service was successfully added.
5. To close the DOS window, type exit.
6. Click Start, and then click Run.
7. Type regedit.
8. Locate the registry folder hkey_local_machine\system\currentcontrolset\services\cagbootp and highlight it.
9. From the Edit menu, click New and then click Key. A new key will be created under the CAGBOOTP key path with a generic name.
10. Rename the new key to Parameters.
11. Highlight the Parameters key.
12. From the Edit menu, click New, and then click String Value.
    A new key value will be created under the Parameters key path with a generic name.
13. Rename the new key value Application.
14. Highlight the new key value, right-click, and then click Modify.
    The Edit String dialog box will appear for the Application key value.
15. At the prompt type C:\Program Files\Agilent\CAG BOOTP Server\BOOTPwin.exe, and then click OK.
17. Click Start, point to Settings, and then select Control Panel.
19. Scroll down the Services list and locate the CAGBOOTP item.
20. Highlight the item, and then click Startup on the right side of the panel.
21. Under **Startup Type** select **Automatic**.
22. Under **Log On As**, click **System Account**, and then select **Allow Service to Interact With Desktop**.
23. Click **OK**.
24. With CAGBOOTP still selected, click **Start** on the right side.
   
   BOOTP should start up.
25. If BOOTP has not been configured or alterations need to be made, make any configuration changes now.
26. Return to the Services window, highlight the CAGBOOTP item and click **Stop** to terminate the BOOTP program.
27. Click **Startup** again (right side of panel), and then clear **Allow Service to Interact with Desktop** check box. Click **OK**.
28. Click **Start** to restart the CAGBOOTP service. (Please Note: the BOOTP will NOT appear on the desktop).
   
   The BOOTP Server program is now running as a service.
Autosampler Configuration

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

The Analyst® software supports the following autosamplers:

- Agilent 1100 autosamplers
- CTC PAL autosampler
- Gilson 215 liquid handler
- Gilson 233 XL sampling injector
- LC Packings Famos Carousel and Wellplate autosamplers
- PerkinElmer Series 200 autosampler
- Shimadzu autosamplers. See “Shimadzu Devices” on page 71.
- Spark Holland Endurance autosampler

**Note:** Autosamplers not supported by the Analyst software can be configured to operate with the mass spectrometer through analog signals. For information on configuring unsupported autosamplers to operate with a mass spectrometer, see “Peripheral Device Analog Synchronization” on page 93.

Refer to the most current software release notes for the latest version of supported firmware.
The Agilent 1100 Autosampler

There are five types of Agilent 1100 autosamplers supported by the Analyst software: standard, thermo-enabled, well-plate, micro well-plate, and micro. All physical configuration is done in an identical manner. The following Agilent 1100 autosamplers are supported:

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>G1313</td>
</tr>
<tr>
<td>Thermo-enabled</td>
<td>G1329</td>
</tr>
<tr>
<td>Well-plate</td>
<td>G1367/G1368</td>
</tr>
<tr>
<td>Micro well-plate</td>
<td>G1377</td>
</tr>
<tr>
<td>Micro</td>
<td>G1389/G1387</td>
</tr>
</tbody>
</table>

The following table lists the required hardware for the Agilent 1100 autosampler. Refer to the Analyst software release notes for the latest version of supported firmware. The Agilent 1100 autosampler is supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024736 (serial cable)</td>
<td>Network interface card if using a LAN (Ethernet) connection</td>
</tr>
<tr>
<td>WC021365 (GPIB cable)</td>
<td>Agilent p/n G5183-4649 (for a direct LAN connection)</td>
</tr>
<tr>
<td>AUX I/O cable p/n 014474</td>
<td>Agilent p/n G1530-61485 (for a LAN connection using a hub)</td>
</tr>
</tbody>
</table>

WARNING! Refer to the Agilent 1100 Autosampler Safety Instructions before configuring any mains-powered equipment.

Configuring the Agilent 1100 Autosampler

There are two procedures you must complete to configure the Agilent 1100 autosampler:

- Connect the autosampler to the computer.
- Connect the autosampler to the mass spectrometer.

When connecting the autosampler to the computer, see the following figure, Back panel of the Agilent 1100 autosampler.
Note: This procedure describes how to connect the Agilent 1100 autosampler to the computer through standard serial port communication. The Agilent 1100 autosampler can also be connected to the computer with a GPIB or LAN (Ethernet) cable. For more information, see “Agilent 1100 Series Devices” on page 31.

The autosampler must be wired so that the autosampler injection triggers the mass spectrometer to begin data acquisition. This synchronization is achieved by connecting a pair of wires from the AUX I/O connector on the back of the mass spectrometer to the Inject Out signal of the autosampler.

To connect the autosampler to the computer

1. Turn off the Agilent 1100 autosampler by pressing the On/Off button on the front of the device.
2. Shut down the computer.
3. Ensure that all CAN connectors are disconnected from the module.
4. Set the DIP switches on the back of the autosampler. Ensure the settings are configured to match a baud rate of 19200 or 9600. For more information on setting the DIP switches, see “Configuration of Agilent Devices Through Serial Port Communication” on page 31.

For the location of the DIP switches on the back of the autosampler, see the preceding figure, Back panel of the Agilent 1100 autosampler.
5. Connect the RS-232 cable (p/n WC024736) from the serial port on the back of the autosampler to any available serial port on the computer, noting the serial port.
To connect the autosampler to the mass spectrometer

When connecting the Agilent 1100 autosampler to the mass spectrometer, see the table Wiring for the Agilent 1100 autosampler (TTL—Active Low) injection input.

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

Wiring for the Agilent 1100 autosampler (TTL—Active Low) injection input

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Mass spectrometer AUX I/O cable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pin 9 (power 5V)  red/black stripes</td>
</tr>
<tr>
<td></td>
<td>Pin 10 (anode)    orange/black stripes</td>
</tr>
<tr>
<td>Remote port (pin 3)</td>
<td>White with black stripe</td>
</tr>
<tr>
<td>Remote port (pin 1) (or pin 5)</td>
<td>Green with black stripe</td>
</tr>
<tr>
<td></td>
<td>Pin 22 (cathode)  white/black stripes</td>
</tr>
<tr>
<td></td>
<td>Pin 21 (ground)   green/black stripes</td>
</tr>
</tbody>
</table>

2. Connect the cathode wire (white with black stripes) and the ground wire (green with black stripes) of the AUX I/O cable to the remote port on the rear of the Agilent 1100 autosampler.

- Polarity is important. The cathode wire (white with black stripes) must be connected to Pin 3 of the remote port. The ground wire (green with black stripes) must be connected to Pin 1 of the remote port.

- On some systems, connecting the AUX I/O ground wire to Pin 1 of the autosampler remote port might cause improper operation. In this case, connect the ground wire to Pin 5 to provide more reliable operation.

- The connections to the remote port should be made 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.

3. Connect the other end of the AUX I/O cable into the mass spectrometer AUX I/O connector.
The CTC PAL Autosampler

There are three types of CTC PAL autosamplers supported by the Analyst software: HTS, HTC, and LC. All are configured in an identical manner. For more information on setting up the CTC PAL autosampler, see “CTC PAL Autosampler Setup Notes” on page 97.

The following table lists the required hardware for the CTC PAL autosampler. Refer to the Analyst software release notes for the latest version of supported firmware.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024736 (serial cable)</td>
<td>CTC PAL ready cable for connecting API instruments</td>
</tr>
<tr>
<td>AUX I/O cable p/n 014474</td>
<td>DB15 male connector</td>
</tr>
</tbody>
</table>

**WARNING!** Refer to the CTC PAL Autosampler Safety Instructions before configuring any mains-powered equipment.

Connectors on the back of the CTC PAL autosampler

Configuring the CTC PAL Autosampler

There are three procedures you must complete to configure the CTC PAL autosampler:

- Connect the autosampler to the computer.
- Connect the autosampler to the mass spectrometer.
- Configure the autosampler to send and receive signals.

**To connect the autosampler to the computer**

1. Shut down the computer.
2. Turn off the CTC PAL autosampler by pressing the **On/Off** button on the power module.
3. Connect the RS-232 cable (WC024736) from the “SER 1” port on the back of the autosampler to any available serial port on the computer, noting the serial port.

**To connect the autosampler to the mass spectrometer**

The autosampler must be wired so that the autosampler injection triggers the mass spectrometer to begin data acquisition. This synchronization is achieved by connecting a pair of wires from the AUX I/O connector on the back of the mass spectrometer to the
Inject Out signal of the autosampler. When connecting the CTC PAL autosampler to the mass spectrometer, see the table **Wiring for the CTC PAL Autosampler**.

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 ready cable for connection to the mass spectrometers. This cable has a connector that fits into the 15-pin Interface 1 connector on the back of the CTC PAL autosampler. The other end has bare wires that you must attach to the bare wires of the AUX I/O cable (p/n 014474).

### Wiring for the CTC PAL Autosampler

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Mass spectrometer AUX I/O cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pin 9 (power 5V)</td>
</tr>
<tr>
<td></td>
<td>Pin 10 (anode)</td>
</tr>
<tr>
<td>Inject marker (pin 3)</td>
<td>White with black stripe</td>
</tr>
<tr>
<td></td>
<td>0—0</td>
</tr>
<tr>
<td>Common (pin 4)</td>
<td>Green with black stripe</td>
</tr>
</tbody>
</table>

**CAUTION!** Cover each connection (and then the entire cable assembly) with insulating tape or heat shrink tubing to prevent shorting to other wires or grounded metal parts.

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. Insert the DB15 male connector into 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.

### To configure the autosampler to send and receive signals

The CTC PAL autosampler must be configured to accept Start/Stop signals and to send out inject signals. To ensure the autosampler can send and receive signals, perform the following steps on the CTC PAL handheld controller.

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

8. Select **Start**.

9. In the next window that appears, highlight the **Source** line and scroll between the options. Select **Remote** and press **ENTER**.

   **Note:** Ensure that the tray hardware configured in your system is listed in the Tray Type and Tray Holder menus. For more information, 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 appears, highlight the Source line and scroll between the options. Select **Immediate** and press **ENTER**.

12. Press **Esc** twice to move back two windows.

13. Scroll down and select **Out Signals**.

14. In the next window that appears, select **Injected**.

15. Highlight the **Destination** line, and scroll between the options, and then select **SW-Out1**.

16. Press **F4** to return to the **Home Menu**.
The Gilson 215 Liquid Handler

There are two types of Gilson injectors for use with the Gilson 215 liquid handler that are supported by the Analyst software: the Gilson 819 and 841 injectors. For the configuration described in this section, the Gilson 215 liquid handler is paired with the Gilson 819 injection valve actuator. Configuration of the two injectors is similar. Differences are noted where appropriate.

The following table lists the hardware required for the Gilson 215 liquid handler and the Gilson injection valve actuator. Refer to the Analyst software release notes for the latest version of supported firmware. The Gilson 215 liquid handler is supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024735 (serial cable)</td>
<td></td>
</tr>
<tr>
<td>AUX I/O cable p/n 014474</td>
<td>GSIOC cable</td>
</tr>
</tbody>
</table>

WARNING! Refer to the Gilson 215 Liquid Handler and the Gilson 819 Injection Valve Actuator Safety Instructions before configuring any mains-powered equipment.

![I/O connection to the Gilson 215 Liquid Handler](image-url)
Configuring the Gilson 215 Liquid Handler

There are four procedures you must complete to configure the Gilson 215 liquid handler:

- Connect the autosampler to the computer.
- Connect the autosampler to the mass spectrometer.
- Configure the autosampler to accept external control.
- Install the syringe pump on the Gilson 215 liquid handler.

The autosampler must be wired so that the autosampler injection triggers the mass spectrometer to begin data acquisition. This synchronization is achieved by connecting a pair of wires from the AUX I/O connector on the back of the mass spectrometer to the Inject Out signal of the autosampler.

To connect the autosampler to the computer

1. Shut down the computer.
2. Connect the 25-pin end of the serial cable (Applied Biosystems p/n WC024735) from the RS-232 port on the Gilson 215 liquid handler to any available serial port on the computer, noting the serial port.
**To connect the autosampler to the mass spectrometer**

When connecting the Gilson 215 Liquid Handler to the mass spectrometer, see the table **Wiring for the Gilson 215 Liquid Handler (normally open) injection input**.

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

**Wiring for the Gilson 215 Liquid Handler (normally open) injection input**

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Mass spectrometer AUX I/O cable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pin 9 (power 5V)</td>
</tr>
<tr>
<td></td>
<td>Pin 10 (anode)</td>
</tr>
<tr>
<td>Output switch (pin 3)</td>
<td>White with black stripe</td>
</tr>
<tr>
<td>Output switch (pin 4)</td>
<td>Green with black stripe</td>
</tr>
</tbody>
</table>

**Note:** Polarity is unimportant.

2. Connect the cathode wire (white with black stripes) and the ground wire (green with black stripes) of the AUX I/O cable to Output Switch 1 (Pins 3 and 4 of the Output Port on the rear panel of the Gilson 215 liquid handler) using the green connector supplied with the liquid handler.

3. Connect the other end of the AUX I/O cable into the mass spectrometer AUX I/O connector.

**To configure the autosampler for external control**

**WARNING! Electrical Shock Hazard. Disconnect the power cord and wait at least one minute before removing the cover. Refer to the Gilson Injection Valve Actuator Operator Safety Manual before removing the cover.**

1. Turn off the Gilson 215 liquid handler by pressing the **On/Off** button.
2. Turn off the Gilson injection valve actuator by pressing the **On/Off** button.
3. Disconnect the Gilson keypad or any other connections to the Gilson 215 liquid handler.
4. On the back of the Gilson injection valve actuator, set **UNIT ID** so that the white dot is at position 9. For help locating the UNIT ID, see the following figures, Gilson 819 Injection Valve Actuator on page 49 and Gilson 841 Injection Valve Actuator on page 49.
5. Remove the cover of the injection valve actuator.
6. Perform either of the following:
   - If you have the 819 injection valve actuator, set **SW 1** so that the white dot is at Position 0 (External).
   - If you have the 841 injection valve actuator, set the jumper to External.
**Note:** When viewed from the front of the Gilson 819 injection valve actuator, the SW1 switch is located on the left side. The jumper is located on the right side of the 841 injection valve actuator.

7. Connect the Gilson-supplied GSIOC cable as follows:
   a) Attach the end of the cable with the additional serial cable to the GSIOC port of the Gilson injection valve actuator.
   b) Attach the other end of the cable to the GSIOC port on the autosampler.

8. On the back of the Gilson 215 liquid handler, perform the following:
   a) Set the SW 1 switch so that the white dot is at Position 2.
   b) Set the SW 2 switch so that the white dot is at Position 6.

**Installing the Syringe on the Gilson 215 Liquid Handler**

Use the 215setup.exe program provided by Gilson to adjust the syringe drive arm position during syringe installation. For more information, refer to the Gilson documentation. This program is also used to adjust the vertical arm height (that is, the z-arm height).
The Gilson 233 XL Sampling Injector

There is one type of Gilson sampling injector supported by the Analyst software: the Gilson 233 XL. The Gilson 233 XL sampling injector is paired with the Gilson 402 syringe pump.

The following table lists the required hardware for the Gilson 233 XL sampling injector and the Gilson 402 syringe pump. Refer to the Analyst software release notes for the latest version of supported firmware. The Gilson 233 XL sampling injector is supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024735 (serial cable)</td>
<td>GSIOC cable</td>
</tr>
<tr>
<td>AUX I/O cable p/n 014474</td>
<td>GSIOC cable</td>
</tr>
</tbody>
</table>

WARNING! Refer to the Gilson 233 XL Sampling Injector and the Gilson 402 Syringe Pump Safety Instructions before configuring any mains-powered equipment.

Configuring the Gilson 233 XL Sampling Injector

The autosampler must be wired so that the autosampler injection triggers the mass spectrometer to begin data acquisition. This synchronization is achieved by connecting a pair of wires from the AUX I/O connector on the back of the mass spectrometer to the Inject Out signal of the autosampler.

When configuring the Gilson 233 XL sampling injector, see the following figure, Back panel on the Gilson 233 XL sampling injector.

![Back panel on the Gilson 233 XL sampling injector](image)

There are five procedures you must complete to configure the Gilson 233 XL sampling injector:

- Connect the autosampler to the computer.
- Connect the autosampler to the mass spectrometer.
- Configure the autosampler to accept external control.
- Install the rinse station and injection port.
- Install the syringe on the Gilson 402 syringe pump.

To connect the autosampler to the computer

1. Shut down the computer.
2. Connect the 25-pin end of the serial cable (p/n WC024735) from the RS-232 port on the Gilson 233 XL to any available serial port on the computer, noting the serial port.
To connect the autosampler to the mass spectrometer

When connecting the Gilson 233 XL sampling injector to the mass spectrometer, see the table Wiring for Gilson 233 XL Sampling Injector (normally open) injection input.

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

2. Connect the cathode wire (white with black stripes) and the ground wire (green with black stripes) of the AUX I/O cable to the Output Switch 1 (Pins 1 and 3 of the Output Port on the rear panel of the Gilson 233) using the green connector supplied with the liquid handler.

Note: Polarity is unimportant.

3. Connect the other end of the AUX I/O cable into the mass spectrometer AUX I/O connector.

Wiring for Gilson 233 XL Sampling Injector (normally open) injection input

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Mass spectrometer AUX I/O cable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pin 9 (power 5V) red/black stripes</td>
</tr>
<tr>
<td></td>
<td>Pin 10 (anode) orange/black stripes</td>
</tr>
<tr>
<td>Output Switch (pin 3)</td>
<td>White with black stripe</td>
</tr>
<tr>
<td></td>
<td>Pin 22 (cathode) white/black stripes</td>
</tr>
<tr>
<td>Output Switch (pin 1)</td>
<td>Green with black stripe</td>
</tr>
<tr>
<td></td>
<td>Pin 21 (ground) green/black stripes</td>
</tr>
</tbody>
</table>

To configure the autosampler to accept external control

1. Turn off the Gilson 402 syringe pump by pressing the On/Off button on the back of the device.

2. Turn off the Gilson 233 XL sampling injector by pressing the On/Off button on the back of the device.

3. Disconnect the Gilson keypad or any other connections to the Gilson 233 XL sampling injector and the Gilson 402 syringe pump.

4. Set the Options and ID DIP switches on the back of the Gilson 402 syringe pump as follows:

<table>
<thead>
<tr>
<th>For this switch...</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set as...</td>
<td>Left (Off)</td>
<td>Left (Off)</td>
<td>Right (On)</td>
<td>Left (Off)</td>
<td>Left (Off)</td>
<td>Left (Off)</td>
<td>Left (Off)</td>
<td>Left (Off)</td>
</tr>
</tbody>
</table>
5. Set the **ID Number** DIP switches on the back of the Gilson 233 XL sampling injector as follows:

<table>
<thead>
<tr>
<th>For this switch...</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set as...</td>
<td>Down (Off)</td>
<td>Up (On)</td>
<td>Up (On)</td>
<td>Down (Off)</td>
<td>Up (On)</td>
<td>Down (Off)</td>
<td>Up (On)</td>
<td>Down (Off)</td>
</tr>
</tbody>
</table>

6. Connect the Gilson-supplied GSIOC cable as follows:

   a) Attach the end of the cable with the additional serial cable to the GSIOC port of the syringe pump.

   b) Attach the other end of the cable to the GSIOC port on the autosampler.

**To install the rinse station and injection port**

1. Take the following actions depending on the sample rack you are using.

   **If you are using an XL 30 Rack containing vials:**
   
   - Position the rinse station at location A.
   
   ![Image of rinse station at location A]

   - Position the injection port at location C.
   
   ![Image of injection port at location C]

   **If you are using a Multiple Microtitre System:**
• Position the rinse station at the near end of the adapter.

• Position the injection port at the far right end of the adapter, above the switching valve.

2. Turn on the Gilson 402 syringe pump by pressing the On/Off button on the back of the device.

3. Turn on the Gilson 233 XL sampling injector by pressing the On/Off button on the back of the device.

4. Restart the computer.

**Installing the Syringe on the Gilson 402 Syringe Pump**

Use the 215setup.exe program provided by Gilson to adjust the syringe drive arm position during syringe installation. For more information, refer to the Gilson documentation. This program is also used to adjust the vertical arm height (that is, the z-arm height).
The LC Packings Famos Autosampler

There are two types of Famos autosamplers supported by the Analyst software: Famos Carousel and Famos Wellplate Autosampler. Both are configured in an identical manner.

**WARNING!** Refer to the Famos Autosampler Safety Instructions before configuring any mains-powered equipment.

The AUX I/O cable (p/n 014474) is used to connect the Famos Autosampler (P2 Vial No. & Markers) to the mass spectrometer.

Configuring the Famos Autosampler

There are three procedures you must complete to configure the Famos autosampler:

- Connect the autosampler to the computer.
- Connect the autosampler to the mass spectrometer.
- Configure the autosampler to accept external control.

**To connect the autosampler to the computer**

1. Shut down the computer.
2. Turn off the LC Packings system controller.
3. Connect a serial cable (LC Packings Cat. No. ULT-S-COM) from the Communication port on the Famos to the computer, noting the serial port.

**To connect the autosampler to the mass spectrometer**

When connecting the LC Packings Famos autosampler to the mass spectrometer, see the table *Wiring for LC Packings Famos Autosampler*.

1. On the free end of the AUX I/O cable (p/n 014474), short together the following wires but do not connect them to anything else:

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

   - red with black stripe (wire 9)
   - orange with black stripe (wire 10)

**Wiring for LC Packings Famos Autosampler**

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Mass spectrometer AUX I/O cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2 vial no. &amp; markers (TTL)</td>
<td>Pin 9 (power 5V) red/black stripes</td>
</tr>
<tr>
<td></td>
<td>Pin 10 (anode) orange/black stripes</td>
</tr>
<tr>
<td>Inject marker (pin 1)</td>
<td>Pin 22 (cathode) white/black stripes</td>
</tr>
<tr>
<td>Signal ground (pin 13)</td>
<td>Pin 21 (ground) green/black stripes</td>
</tr>
</tbody>
</table>

\[
\begin{array}{c|c|c}
\text{Autosampler} & \text{Mass spectrometer AUX I/O cable} \\
\hline
\text{P2 vial no. & markers (TTL)} & \text{Pin 9 (power 5V) red/black stripes} \\
 & \text{Pin 10 (anode) orange/black stripes} \\
\text{Inject marker (pin 1)} & \text{Pin 22 (cathode) white/black stripes} \\
\text{Signal ground (pin 13)} & \text{Pin 21 (ground) green/black stripes} \\
\end{array}
\]
2. Connect the AUX I/O wire 22 (white/black stripes) to pin 1 of the DB15 male connector. Next, connect the AUX I/O wire 21 (green/black stripes) to pin 13 of the DB15 male connector.

3. Insert the DB15 male connector into the Famos Autosampler P2 connector.

4. Connect the other end of the AUX I/O cable into the Mass Spectrometer AUX I/O connector.

5. Connect the serial cable (LC Packings Cat. No ULT-S-COM) from the communication port on the Famos to the computer.

**To configure the autosampler to accept external control**

This procedure must be followed whenever the device is turned on.

1. Turn on the autosampler and locate the keypad.
2. Press the **Menu** key.
3. Press the **Serial** key.
The PerkinElmer Series 200 Autosampler

There is one type of PerkinElmer Series autosampler supported by the Analyst software: the PerkinElmer series 200 autosampler.

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PerkinElmer Series 200</td>
<td>200</td>
</tr>
</tbody>
</table>

The following table lists the hardware required for the PerkinElmer Series 200 autosampler. Refer to the Analyst software release notes for the latest version of supported firmware. The PerkinElmer Series 200 autosampler is supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024737 (serial cable)</td>
<td>N/A</td>
</tr>
<tr>
<td>AUX I/O cable p/n 014474</td>
<td></td>
</tr>
</tbody>
</table>

WARNING! Refer to the PerkinElmer Series 200 Autosampler Safety Instructions before configuring any mains-powered equipment.

Configuring the PerkinElmer Series 200 Autosampler

There are three procedures you must complete to configure the PerkinElmer Series 200 autosampler:

- Connect the autosampler to the computer.
- Connect the autosampler to the mass spectrometer.
- Configure the autosampler to accept external control.

The autosampler must be wired so that the autosampler injection triggers the mass spectrometer to begin data acquisition. This synchronization is achieved by connecting a pair of wires from the AUX I/O connector on the back of the mass spectrometer to the Inject Out (INJ 1 or INJ 2) signal of the autosampler.

You must connect the following wires:

- INJ 1 or INJ 2 connectors to provide a Start signal for the mass spectrometer.
- Ready connector to signal that the mass spectrometer is ready for injection.

When configuring the PerkinElmer Series 200 autosampler, see the following figure, Wiring panel for the PerkinElmer Series 200 Autosampler.
To connect the autosampler to the computer
1. Shut down the computer.
2. Turn off the autosampler by pressing the On/Off button.
3. Connect the RS-232 cable (p/n WC024737) from a serial port on the back of the autosampler to any available serial port on the computer, noting the serial port.

To connect the autosampler to the mass spectrometer
When connecting the PerkinElmer Series 200 autosampler to the mass spectrometer, see the table Wiring for PerkinElmer Series 200 Autosampler (normally open) injection input.

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

2. Connect the cathode wire (white with black stripes) and the ground wire (green with black stripes) to the AUX I/O cable with one of the telephone-style connectors supplied with the PerkinElmer Series 200 autosampler.

For connection details, see the following figure, Wire connections to the telephone-style connector.
Wire connections to the telephone-style connector

3. Insert the completed connector into the INJ 1 port on the side panel of the autosampler.

4. If the autosampler will be used under Analyst control only, insert the Loop Back connector (see the following figure, Loop back connector) into the RDY IN port on the side of the autosampler. In this mode, the PerkinElmer Series 200 autosampler is directed by the software to proceed with injection when the mass spectrometer is ready.

If the autosampler is to be controlled manually, the RDY signal from the mass spectrometer may be used to tell the autosampler that the mass spectrometer is ready for injection. For more information, see “Peripheral Device Analog Synchronization” on page 93.

5. Connect the other end of the AUX I/O cable into the mass spectrometer AUX I/O connector.

To configure the autosampler to accept external control

1. Turn on the autosampler and locate the keypad.

2. Press F7 (CNFG).

   The Configure menu appears.


   The Communication menu appears.

4. Press F2 (EXTE) to set External Control.
5. Press **Return**.
   The **Configure** menu appears.

6. Press **Return**.

7. The **Main** menu appears.
The Spark Holland Endurance Autosampler

The Spark Holland Endurance autosampler device driver is available only from the manufacturer. You must install the device driver before attempting to configure the autosampler in the Analyst Hardware Configuration Editor. For more information, refer to the manufacturer’s documentation.

The following table lists the required hardware for the Spark Holland Endurance autosampler. Refer to the Analyst software release notes for the latest version of supported firmware.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUX I/O cable p/n 014474</td>
<td>Device driver kit (Spark Holland p/n 0920-768). The kit includes the connection cable. DB15 male connector</td>
</tr>
</tbody>
</table>

**WARNING!** Refer to the Spark Holland Endurance Autosampler Safety Instructions before configuring any mains-powered equipment.

The autosampler must be wired so that the autosampler injection triggers the mass spectrometer to begin data acquisition. This synchronization is achieved by connecting a pair of wires from the AUX I/O connector on the back of the mass spectrometer to the Inject Out signal of the autosampler.

**Configuring the Spark Holland Endurance Autosampler**

There are three procedures you must complete to configure the Spark Holland Endurance autosampler:

- Connect the autosampler to the computer.
- Connect the autosampler to the mass spectrometer.
- Configure the autosampler to accept external control.
To connect the autosampler to the computer

When connecting the autosampler to the computer, see the following figure, *Back panel of the Spark Holland Endurance autosampler.*

1. Shut down the computer.

2. Turn off the autosampler by pressing the **On/Off** button on the back of the device.
   
   **Note:** For more information about serial cables, refer to the manufacturer’s documentation.

3. Connect the serial cable from the serial port on the autosampler to any available serial port on the computer, noting the serial port. You can use any of the following serial cables:
   - RS-232
   - RS-422
   - RS-485
To connect the autosampler to the mass spectrometer

When connecting the Spark Holland Endurance autosampler to the mass spectrometer, see the table Wiring for Spark Holland Endurance Autosampler.

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

Wiring for Spark Holland Endurance Autosampler

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Mass spectrometer AUX I/O cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2 vial no. &amp; markers (TTL)</td>
<td></td>
</tr>
<tr>
<td>00 White with black stripe</td>
<td>Pin 9 (power 5V) red/black stripes</td>
</tr>
<tr>
<td>00 Green with black stripe</td>
<td>Pin 10 (anode) orange/black stripes</td>
</tr>
<tr>
<td>Inject marker (pin 1)</td>
<td>Pin 22 (cathode) white/black stripes</td>
</tr>
<tr>
<td>Signal ground (pin 13)</td>
<td>Pin 21 (ground) green/black stripes</td>
</tr>
</tbody>
</table>

2. Connect the AUX I/O wire (white with black stripes) to Pin 1 of the DB15 male connector.
3. Connect the AUX I/O wire (green/black stripes) to Pin 13 of the DB15 male connector.
4. Insert the DB15 male connector into the P2 connector on the back of the autosampler. Insert the other end of the AUX I/O cable into the AUX I/O connector on the mass spectrometer.

To configure the autosampler to accept external control

**Important!** This procedure must be followed whenever the device is turned on.

1. Turn on the autosampler and locate the keypad.
2. Press the **Menu** key.
3. Press the **Serial** key.
Other Autosamplers

You can synchronize any autosampler with the mass spectrometer for use with the normally open autosampler contact closure inject signal. The autosampler is connected to the mass spectrometer by means of an AUX I/O cable.

Synchronizing other Autosamplers with the Mass Spectrometer

To synchronize the autosampler, you must first create a hardware profile, and then choose the LC synchronization trigger.

To synchronize the autosampler and the mass spectrometer

1. Start the Analyst software application.
2. On the Navigation bar, double-click Hardware Configuration. The Hardware Configuration Editor appears.
3. Click New Profile to create a new profile, or click Edit Profile to edit an existing profile. If editing an existing profile, you must first deactivate the profile.
   - If you clicked New Profile, the Create New Hardware Profile dialog box appears.
   - If you clicked Edit Profile, the Edit Profile dialog box appears. Select a mass spectrometer from the Devices in Current Profile list. Go to step 7.
4. Type a Profile Name.
5. Click Add Device. The Available Devices dialog box appears.
6. Select a mass spectrometer from the Device list.
7. Click Setup Device. The configuration dialog box for the mass spectrometer appears.
8. Click the Configuration tab.
9. Click either Active Low or Active High to set the voltage level when the mass spectrometer triggers the autosampler to begin. Active Low is selected by default. For more information, refer to the documentation that came with your autosampler.
10. Click OK.
11. The Hardware Configuration Editor appears.
12. Click Activate Profile. A green check mark appears next to the hardware profile, indicating the profile is active.
Pump Configuration

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 Analyst® software supports the following HPLC pumps:

- Agilent 1100 pumps
- Harvard 22 syringe pump
- PerkinElmer Series 200 pumps
- LC Packings pump incorporated in the LC Packings UltiMate system controller. For more information, see “LC Packings” on page 81.
- Shimadzu pumps using the Shimadzu SCL-10Avp system controller. For more information, see “Shimadzu Devices” on page 71.

The Agilent 1100 Pumps

There are five types of Agilent 1100 pumps supported by the Analyst software and the Analyst QS software. All are configured in an identical manner.

<table>
<thead>
<tr>
<th>Pumps</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary</td>
<td>G1312</td>
</tr>
<tr>
<td>Quaternary</td>
<td>G1311</td>
</tr>
<tr>
<td>Isocratic</td>
<td>G1310</td>
</tr>
<tr>
<td>Capillary</td>
<td>G1376</td>
</tr>
<tr>
<td>Nano</td>
<td>G2226</td>
</tr>
</tbody>
</table>

The following table lists the required hardware for the Agilent 1100 pump. Refer to the Analyst software release notes for the latest version of supported firmware.
Connecting the Pump to the Computer

There is one procedure you must complete to configure the Agilent 1100 pump:

- Connect the pump to the computer.

WARNING! Refer to the Agilent 1100 Pump Safety Instructions before configuring any mains-powered equipment.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024736 (serial cable)</td>
<td>General purpose cable for Agilent devices (Agilent p/n G1103-61611)</td>
</tr>
<tr>
<td>WC021365 (GPIB cable)</td>
<td>External relay contacts board (Agilent p/n G1351-68701)</td>
</tr>
</tbody>
</table>

**Note:** These parts are optional. The external relay contacts board 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 if using a LAN (Ethernet) connection

- Agilent p/n G5183-4649 (for a direct LAN connection)
- Agilent p/n G1530-61485 (for a LAN connection using a hub)

This procedure describes how to connect the Agilent 1100 pump to the computer through standard serial port communication. The Agilent 1100 pump can also be connected to the computer with a GPIB or LAN (Ethernet) cable. For more information, see “Agilent 1100 Series Devices” on page 31.

**Note:** The Agilent 1100 Nano Pump (G2226A) requires an access code to control the nano pump with a firmware version less than A.05.05. Please contact Agilent to obtain the access code corresponding to each nano pump. If an access code is required, enter it in the Hardware Configuration Editor in order to run the nano pump. For more information on the Hardware Configuration Editor, refer to the online Help.

Connecting the Pump to the Computer

There is one procedure you must complete to configure the Agilent 1100 pump:

- Connect the pump to the computer.

When connecting the pump to the computer, see the following figure, *Back panel of the Agilent 1100 pump with external relay contacts board installed.*
To connect the pump to the computer

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

1. Shut down the computer.
2. Turn off the pump by pressing the **On/Off** button.
3. If you want contact closure functionality, install the relay contact board by performing the following tasks. Otherwise, go to step 4.
   a) Remove the screws that hold the plate.
   b) Insert the new plate with the board into the slot and tighten the screws.
4. Set the DIP switches on the back of the pump. Ensure the settings are configured to match the baud rate. For more information, see “Configuration of Agilent Devices Through Serial Port Communication” on page 31 for specific instructions on setting the DIP switches.
5. For the location of the DIP switches on the back of the pump, see the preceding figure, *Back panel of the Agilent 1100 pump with external relay contacts board installed.*
6. Connect the RS-232 cable (p/n WC024736) from the serial port on the back of the pump to any available serial port on the computer, noting the serial port.

The Harvard 22 Syringe Pump

There is one Harvard 22 syringe pump supported by both the Analyst software and the Analyst QS software.

<table>
<thead>
<tr>
<th>Pumps</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvard 22 Syringe Pump</td>
<td>G1312</td>
</tr>
</tbody>
</table>

The following table lists the required hardware. Refer to the Analyst software release notes for the latest version of supported firmware.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024735 (serial cable)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**WARNING!** Refer to the Harvard 22 Syringe Pump Safety Instructions before configuring any mains-powered equipment.

Configuring the Harvard 22 Syringe Pump

There are three procedures you must complete to configure the Harvard 22 syringe pump:

- Connect the pump to the computer.
- Set the baud rate.
- Set the device address.
**To connect the pump to the computer**
1. Shut down the computer.
2. Turn off the pump by pressing the On/Off button.
3. Connect the 25-pin end of the RS-232 cable (p/n WC024735) from the serial port on the back of the pump to any available serial port on the computer, noting the serial port.

**To set the baud rate**
1. Turn on the pump and press the ENTER key.
2. Press the SET key while pressing the STOP/START key.

   **The LED displays the current baud rate**

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>300 baud</td>
</tr>
<tr>
<td>1200</td>
<td>1200 baud</td>
</tr>
<tr>
<td>24</td>
<td>2400 baud</td>
</tr>
<tr>
<td>96</td>
<td>96 baud</td>
</tr>
</tbody>
</table>

3. Press the STOP/START key until 96 is displayed and then press the ENTER key.
   The baud rate is set to 9600.

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

---

**The PerkinElmer Series 200 LC Pumps**

There are two types of PerkinElmer Series 200 pumps supported by the Analyst software: micro and quaternary. They are configured in an identical manner.

<table>
<thead>
<tr>
<th>Pumps</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>200</td>
</tr>
<tr>
<td>Quaternary</td>
<td>200</td>
</tr>
</tbody>
</table>

**Note:** If you want to run a gradient with two PerkinElmer Series 200 micro pumps, you need two cables and two serial ports.

The following table lists the required hardware for the PerkinElmer Series 200 LC pump. Refer to the Analyst software release notes for the latest version of supported firmware.
The PerkinElmer Series 200 micro and quaternary pumps are supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024736 (serial cable)</td>
<td>N/A</td>
</tr>
<tr>
<td>One cable is needed for each micro pump.</td>
<td></td>
</tr>
</tbody>
</table>
WARNING! Refer to the PerkinElmer Series 200 LC Pump Safety Instructions before configuring any mains-powered equipment.

Configuring the PerkinElmer Series 200 LC Pumps

There are two procedures you must complete to configure the PerkinElmer Series 200 LC pump:

- Connect the pump to the computer.
- Configure the pump to accept external control.

To connect the pump to the computer
1. Shut down the computer.
2. Turn off the PerkinElmer Series 200 LC pump by pressing the On/Off button.
3. Connect the RS-232 cable (p/n WC024736) from the serial port on the back of the pump to any available serial port on the computer, noting the serial port.

   If you are using the micro pumps, the two serial cables from the pumps must be connected to the computer. The pump that was configured first in the Analyst Hardware Profile is pump A, followed by pump B.

To configure the pump to accept external control
1. Turn on the pump.
2. Press F7 (CNFG).
   The Configure menu appears.
   The Communication menu appears.
4. Press F3 (EXTE) to set External Control.
5. Press Return.
   The Configure menu appears.
6. Press Return.
   The Main menu appears.
Shimadzu Devices

This section provides information about the required hardware, how to connect the system controller to the computer, how to configure the pumps and valve to operate with the system controller, and how to configure the system for external control.

**Note:** You do not have to install any additional communication cards for Shimadzu pumps or switching valves. The system controller uses fiber optic cables to control the Shimadzu devices.

Drivers supplied by Shimadzu Scientific Instruments, Inc. provide Shimadzu device control. Not all Shimadzu device firmware versions are compatible with the new Shimadzu control drivers. For a list of Shimadzu’s recommended firmware versions, please refer to the most current software release notes.

Through the Shimadzu SCL-10Avp system controller, the Analyst® software supports the following devices:

**Autosamplers**
- Shimadzu SIL-10ADvp autosampler
- Shimadzu SIL-HTA autosampler
- Shimadzu SIL-HTC autosampler

**Column ovens**
- Shimadzu CTO-10A[C] column oven
- Shimadzu CTO-10Avp column oven
- Shimadzu CTO-10ACvp column oven
- Shimadzu CTO-10ASvp column oven

**Detectors**
- Shimadzu SPD-10A Detector
- Shimadzu SPD-10Ai Detector
- Shimadzu SPD-10AV Detector
- Shimadzu SPD-10AVi Detector
- Shimadzu SPD-10Avp Detector
- Shimadzu SPD-10AVvp Detector
The Shimadzu SCL-10Avp System Controller

You must use a system controller to control any Shimadzu autosampler, pump, detector, or column oven. You must use a valve interface unit, connected to the system controller, to control a Shimadzu switching valve.

The following table lists the required hardware for the Shimadzu SCL-10Avp system controller. Refer to the Analyst software release notes for the latest version of supported firmware. The Shimadzu LC-10ADvp/LC-8A pumps and switching valve are supported by the Analyst QS software.

**Note:** Shimadzu HT series autosamplers have a system controller integrated into the autosampler device. Configuration is the same.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024736 (serial cable)</td>
<td>Shimadzu fiber optic cables (one for each device connected)</td>
</tr>
<tr>
<td></td>
<td>Shimadzu Event Cable</td>
</tr>
</tbody>
</table>

**WARNING!** Refer to the Shimadzu SCL-10Avp System Controller Safety Instructions before configuring any mains-powered equipment.
Configuring the Shimadzu SCL-10Avp System Controller

There are two procedures you must complete to configure the Shimadzu SCL-10Avp system controller:

- Connect the system controller to the computer.
- Configure the system controller to accept external control.

To connect the 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 (p/n WC024736) from the serial port on the back of the system controller to any available serial port on the computer, noting the serial port.

Back of the Shimadzu SCL-10Avp System Controller

To configure the system controller to accept external control
Use this procedure when you have Analyst 1.3, or greater, software installed.

1. Power up the Shimadzu Controller SCL-10Avp.
   The System Configuration screen loads.
2. If the word FIXED is present in the upper right hand corner of the System Configuration screen, press the F2 key (screen name FIX) to deselect FIX.
3. Press the F5 key (screen name MENU)
   The Menu window appears.
4. Press the number 4 key - Response
   The System screen appears.
5. Press the F3 key (screen name NEXT)
6. Set the Class VP to 5.x, using the up and/or down arrow keys navigate to and highlight Class VP.
7. Use the left and/or right arrow keys navigate to and highlight 5.x. The Class VP is now set to 5.x.
8. Set the Baud Rate to 19200 using the up and/or down arrow keys navigate to and highlight Baud Rate.
9. Use the left and/or right arrow keys navigate to and highlight **19200**.
   The Baud Rate is now set to 19200.

10. Set the Level to Enhanced, using the up and/or down arrow keys navigate to and highlight **Level**:
    Then, using the left and/or right arrow keys navigate to and highlight **Enhanced**.
    The Level is now set to Enhanced.

11. Set the Interface to RS-232C, using the up and/or down arrow keys navigate to and highlight **Interface**:
    Then, using the left and/or right arrow keys navigate to and highlight **RS-232C**.
    The Interface is now set to RS-232C.

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

13. Power down the controller.

14. Power up the controller.
   The System Configuration screen loads.

15. Connect and configure individual devices to the controller according to their respective manuals.

16. Check that each connected device is listed on the System Configuration screen on the controller.

---

**To configure the system controller to accept external control**

Use this procedure when you have Analyst 1.2, or lower version, software installed.

1. Power up the Shimadzu Controller SCL-10Avp.
   The System Configuration screen loads.

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

3. Press the **F5** key (screen name MENU)
   The **Menu** window appears.

4. Press the number **4** key - Response
   The System screen appears.

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

6. Set the Class VP to 4.x, using the up and/or down arrow keys navigate to and highlight **Class VP**.

7. Use the left and/or right arrow keys navigate to and highlight **4.x**. The Class VP is now set to 4.x.

8. Set the Baud Rate to 9600 using the up and/or down arrow keys navigate to and highlight **Baud Rate**.

9. Then, using the left and/or right arrow keys navigate to and highlight **9600**.
   The Baud Rate is now set to 9600.

10. Set the Interface to RS-232C, using the up and/or down arrow keys navigate to and highlight **Interface**:
11. Use the left and/or right arrow keys navigate to and highlight RS-232C.
   The Interface is now set to RS-232C.
12. Press the F5 key (screen name MENU)
13. Power down the controller
14. Power up the controller.
   The System Configuration screen loads.
15. Connect and configure individual devices to the controller according to their respective manuals.
16. Check that each connected device is listed on the System Configuration screen on the controller.

**Connecting a Shimadzu Autosampler, Detector, Column Oven or Pump to the Shimadzu System Controller**

There are three procedures you must complete to connect a Shimadzu device to the Shimadzu system controller:

- Connect the device to the system controller.
- Set the device to operate through the system controller.
- Set the system controller for the device.

**Note:** You can control up to three pumps using the Shimadzu system controller.

**To connect the device to the system controller**

1. Turn off the Shimadzu device by pressing the On/Off button.
2. Turn off the Shimadzu system controller by pressing the On/Off button.

3. Connect the fiber optic cable from the device to a device address connection on the back of the system controller.
   - You can use Autosampler Address Connectors 3 through 8.
   - You can use Detector Address Connectors 3 through 8.
To set the LC-10ADvp pump to operate through the system controller
1. Turn the pump on by pressing the On/Off button.
2. Press Func until the LED displays ADRS.
3. Press the number that corresponds to the address connection of the pump to the system controller, and then press ENTER.
4. Press Func until the LED displays Local.
5. Press 0 to select Remote mode, and then press ENTER.
6. Press VP until Calibration appears.
7. Press Func and enter the password. The password is 00000.
8. Press Func until OP Mode appears.
9. Select 0 to indicate control by a VP series controller.
   • If you have any additional pumps to configure, repeat the procedure for each pump.
   • If you want to set up the system controller for the pumps, see the figure Back of the Shimadzu SCL-10Avp system controller on page 75.

To set the LC-8Ap pump to operate through the system controller
1. Turn on the pump by pressing the On/Off button.
2. Press the - (dash) key until the LED displays ADRS.
3. Press the number that corresponds to the address connection of the pump to the system controller, and then press ENTER.
4. Press the – (dash) key until the LED displays Local.
5. Press 0 and then press ENTER.
6. Press the – (dash) key until the LED displays SYS.
7. Press 1 and then press ENTER.
8. Turn off the system controller and pump, then wait two seconds and restart first the pump and then the system controller.
9. If you want to configure another pump, repeat the procedure for each pump.

For more information on setting up the system controller for the other pumps, see “Connecting a Shimadzu Autosampler, Detector, Column Oven or Pump to the Shimadzu System Controller” on page 75. If you want to setup other devices, refer to the relevant Shimadzu manual if the above procedures do not apply.
Peripheral Devices Setup Manual

Connecting a Shimadzu Valve Interface Unit to the Shimadzu System Controller

There are two procedures you must complete to connect a Shimadzu valve interface unit to the Shimadzu system controller:

- Connect the valve interface unit to the system controller.
- Set the system controller for the valve interface unit.

To connect the valve interface unit to the system controller
1. Turn off the system controller by pressing the On/Off button.
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 connectors on the back of the system controller.
   You can use Address Connectors 3 through 8.
4. Set the DIP switches on the back of the valve interface unit according to the information on the back. The DIP switch setting must match the pump address number used to connect the valve interface unit to the system controller.

To set the system controller for the valve interface unit
- The system controller is not already turned on, turn it on by pressing the On/Off button.

Note: The model number for each connected device appears on the system configuration screen. The message Remote appears on any connected valve.

To set the system controller for a newly attached Shimadzu device
- Turn off the system controller and other devices, then wait two seconds and restart all devices, turning on the system controller last.

Note: The model number for each connected device should appear on the system configuration screen. The message Remote should appear on any connected pump.

Connecting the Shimadzu SCL-10Avp System Controller to the Mass Spectrometer

The AUX I/O cable (p/n 014474) is used to connect the Shimadzu SCL-10Avp System Controller to the mass spectrometer.

To connect the system controller to the mass spectrometer
1. Connect the Shimadzu Event Cable to the Event 1–3 Out connector on the back of the 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>
<thead>
<tr>
<th>Use this AUX I/O wire...</th>
<th>And connect to Event Cable...</th>
</tr>
</thead>
<tbody>
<tr>
<td>White with black stripe (wire 22)</td>
<td>Yellow wire (pin 4)</td>
</tr>
<tr>
<td>Green with black stripe (wire 21)</td>
<td>Red wire (pin 2)</td>
</tr>
</tbody>
</table>
Wiring for the Shimadzu SCL-10Avp system controller

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>AUX I/O cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event cable</td>
<td>Pin 9 (power 5V) red/black stripes</td>
</tr>
<tr>
<td></td>
<td>Pin 10 (anode) orange/black stripes</td>
</tr>
<tr>
<td>Yellow wire (pin 4)</td>
<td>Pin 22 (cathode) white/black stripes</td>
</tr>
<tr>
<td>Red wire (pin 2)</td>
<td>Pin 21 (ground) green/black stripes</td>
</tr>
</tbody>
</table>

**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 into the mass spectrometer AUX I/O connector.

Using Shimadzu Devices

Shimadzu recommends that the devices attached to the System Controller SCL-10Avp, as shown in the System Configuration (Main Menu > Config), are identical to those configured in the Analyst hardware profile. Differences between the two configurations may result in communication problems between the Analyst software, the Controller and the attached devices.

If the vial detection sensor is ON, missed autosampler vials, or aborting a run during an Autosampler rinse, create Shimadzu device fault conditions that require manual intervention before the Analyst software can continue normal functioning. To recover Analyst control, perform the task indicated at the device display. Alternatively, following the Fault Recovery procedure will clear all conditions.

The Shimadzu default duration is set at 90 minutes. If required, you can change the duration in the Method Editor Control tab.

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

**To recover from a fault**

**Important!** In the event of a device fault, either within the Analyst software or at the device itself, there may be difficulty reactivating or running the devices. If this occurs, perform the following reboot sequence to regain control. The order of steps must be followed to ensure recovery.

1. Deactivate the Hardware Profile in Analyst.
2. Power down all Shimadzu devices including the Controller.
3. Power up all devices attached to the Controller.
4. Power up the Controller.

5. Ensure that all devices shown in Controller System Configuration screen are the same devices configured in Analyst hardware profile for Shimadzu. If not, clear and select F2 (screen name Fixed) on the controller until both configurations match. If necessary, reboot the Controller.

6. Activate the hardware profile in the Analyst software.
This section provides information on how to connect the LC Packings integrated system to the computer.

The LC Packings Integrated System

There are two communication cables that must be connected to the computer for control of the UltiMate and the Famos; to connect the solvent organizer to a third port, the DIGI serial port expansion kit must be installed.

The following table lists the required hardware for the LC Packings integrated system. Refer to the Analyst® software release notes for the latest version of supported firmware. The LC Packings UltiMate capillary HPLC system is supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC160171</td>
<td>Solvent organizer cable (optional)</td>
</tr>
</tbody>
</table>

**WARNING!** Refer to the LC Packings UltiMate System Controller Safety Instructions before configuring any mains-powered equipment.

Configuring the LC Packings UltiMate Integrated System

There is one procedure you must complete to configure the LC Packings integrated system:

- Connect the system controller to the computer.

**To connect the system controller to the computer**

1. Shut down the computer.
2. Turn off the LC Packings system controller.
3. Connect a serial cable (LC Packings Cat. No ULT-S-COM) from the Communication port on the UltiMate to the computer.
4. Connect the Y cable (LC Packings Cat. No ULT-Y-COM) from RS 232 ports 1 and 2 to the computer (the single end at the computer with the two ends RS 232-1 and –2 on the pump).

5. If required, connect the solvent organizer cable (LC Packings Cat. No ULT-O-COM) to the computer.

6. Select the COM ports for the pump and solvent organizer cable in the hardware configuration.
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 column ovens:

- Agilent 1100 column oven
- PerkinElmer Series 200 column oven
- Shimadzu column ovens via the Shimadzu SCL-10Avp system controller. For more information, see “Shimadzu Devices” on page 71.

The Agilent 1100 Column Oven

The following table lists the required hardware for the Agilent 1100 column oven. Refer to the Analyst software release notes for the latest version of the supported firmware. The Agilent 1100 column oven is supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024736 (serial cable)</td>
<td>Network interface card if using a LAN (Ethernet) connection</td>
</tr>
<tr>
<td>WC021365 (GPIB cable)</td>
<td>Agilent p/n G5183-4649 (for a direct LAN (Ethernet) connection)</td>
</tr>
<tr>
<td></td>
<td>Agilent p/n G1530-61485 (for a LAN (Ethernet) connection using a hub)</td>
</tr>
</tbody>
</table>

**WARNING!** Refer to the Agilent 1100 Column Oven Safety Instructions before configuring any mains-powered equipment.

Configuring the Agilent 1100 Column Oven

There is one procedure you must complete to configure the Agilent 1100 column oven:

- Connect the column oven to the computer.

This procedure describes how to connect the Agilent 1100 column oven to the computer through standard serial port communication. When connecting the column oven to the computer, see the following figure, *Back panel of the Agilent 1100 column oven.*
The Agilent 1100 column oven can also be connected to the computer with a GPIB or LAN (Ethernet) cable. For more information, see “Configuration of Agilent Devices Through Serial Port Communication” on page 31.

**To connect the column oven to the computer**

1. Turn off the column oven.

2. Set the DIP switches on the back of the column oven. Ensure the settings are configured to match a baud rate of 19200 or 9600. For specific instructions on setting the DIP switches, “Configuration of Agilent Devices Through Serial Port Communication” on page 31.

   For the location of the DIP switches on the back of the column oven, see the preceding figure, *Back panel of the Agilent 1100 column oven*.

3. Connect the RS-232 cable (p/n WC024736) from the serial port on the back of the column oven to any available serial port on the computer, noting the serial port.
The PerkinElmer Series 200 Column Oven

The following table lists the required hardware for the PerkinElmer Series 200 column oven. Refer to the Analyst software release notes for the latest version of the supported firmware. The PerkinElmer Series column oven is supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024735 (serial cable)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

WARNING! Refer to the PerkinElmer Series 200 Column Oven Safety Instructions before configuring any mains-powered equipment.

Configuring the PerkinElmer Series 200 Column Oven

There is one procedure you must complete to configure the PerkinElmer Series 200 column oven:

- Connect the column oven to the computer.

Connecting the Column Oven to the Computer

1. Turn off the column oven.

2. Connect the 25-pin end of the RS-232 cable (p/n WC024735) to the serial port on the back of the column oven. Connect the other end to any available 9-pin serial port on the computer, noting the serial port.
Switching Valve Configuration

This section provides information about how to configure the switching valves supported by the Analyst® software.

The Analyst software supports the following switching valves:

- Valco two-position switching valve
- Shimadzu valves using the Shimadzu SCL-10Avp system controller. For more information, see “Shimadzu Devices” on page 71.

The Valco Two-Position Switching Valve

The following table lists the required hardware for the Valco two-position switching valve. Refer to the Analyst software release notes for the latest version of the supported firmware. The Valco two-position switching valve is supported by the Analyst QS software.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC024740 (serial cable)</td>
<td>WC027522 Valve kit and all accessories</td>
</tr>
</tbody>
</table>

WARNING! Refer to the Valco Two-Position Switching Valve Safety Instructions before configuring any mains-powered equipment.

The Valco Two-Position Switching Valve

There are three procedures required to configure the Valco two-position switching valve:
Switching Valve Configuration

- Connect the valve.
- Initialize the valve.
- Connect the valve to the computer.

**Note:** You must initialize the Valco two-position switching valve each time electrical power to the valve is interrupted. This initialization is accomplished using the Valco manual controller, which is then disconnected for routine use of the switching valve. The manual controller is included in the valve kit.

**To initialize the valve**

When connecting the Valco valve, see the following figure, *Valco switching valve configuration for initialization*. Connect the valve to the power supply, actuator control module, and the controller.

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

2. Insert the five-wire connector of the Valco motor output cable into the receptacle at the rear 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. This 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 a minimum of two times by pressing Position A followed by Position B and so on. Initialization has been achieved when the position indicator lights on the actuator change correctly according to the position button depressed on the manual controller.

6. Insert the round connector of the motor driver output cable into the receptacle on the rear underside of the valve and motor assembly.

7. Verify operation of the Valco kit by using the manual controller to switch 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.

Note: If electrical power to the Valco valve is interrupted, the valve must be reinitialized according to the above steps.
**To connect the valve to the computer**

When connecting the valve to the computer, see the following figure, *Valco switching valve integration for serial control*.

1. Shut down the computer.

   ![Diagram of valve configuration](image)

   **Valco switching valve integration for serial control**

2. Connect the 3-pin end of the RS-232 cable (p/n WC024740) to the receptacle on the Valco two-position actuator control module. Connect the other end to any available 9-pin serial port on the computer, noting the serial port.
Detector Configuration

This section describes how to install and configure the detectors.

The Analyst® software supports the following detectors:

- Agilent 1100 diode array detector
- Shimadzu. See “Shimadzu Devices” on page 71.

The Agilent 1100 Diode Array Detector

There is one type of Agilent 1100 diode array detector (DAD) supported by the Analyst software.

<table>
<thead>
<tr>
<th>Detector</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent 1100 diode array detector</td>
<td>G1315</td>
</tr>
</tbody>
</table>

There is one procedure you must complete to configure the Agilent 1100 DAD.

- Connect the diode array detector to the computer.

The following table lists the required hardware for the Agilent 1100 DAD. Refer to the Analyst software release notes for the latest version of supported firmware.

<table>
<thead>
<tr>
<th>Cable p/n</th>
<th>Other parts needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC021365 (for GPIB connection)</td>
<td>Network interface card if using a LAN (Ethernet) connection</td>
</tr>
<tr>
<td></td>
<td>Agilent p/n G5183-4649 (for a direct LAN connection)</td>
</tr>
<tr>
<td></td>
<td>Agilent p/n G1530-61485 (for a LAN connection using a hub)</td>
</tr>
</tbody>
</table>

WARNING! Refer to the Agilent 1100 Diode Array Detector Safety Instructions before configuring any mains-powered equipment.

Connecting the Diode Array Detector to the Computer

This section describes how to connect the Agilent 1100 DAD to ensure communication with the computer. The DAD can be connected to the computer with either a GPIB or a LAN (Ethernet) cable.
If you want to communicate using a LAN cable, you must ensure a network interface card has been installed in the Agilent 1100 DAD. For instructions on installing a network interface card in the DAD, refer to the Agilent documentation.

For more information, see “Configuration of Agilent Devices Through LAN (Ethernet) Communication” on page 33.

**To connect the diode array detector to the computer**

1. Shut down the computer.
2. Turn off the Agilent 1100 diode array detector by pressing the On/Off button.
3. Connect either the GPIB cable or a LAN cable to the back of the Agilent 1100 diode array detector. If you are using a LAN cable, use Agilent p/n G5183-4649 for a direct connection from the diode array detector to the computer, or use Agilent p/n G1530-61485 for hub connections.

**Back of the Agilent 1100 diode array detector**

4. Connect the other end of the cable (GPIB or LAN) to the computer.
Peripheral Device Analog Synchronization

The preferred method of synchronizing peripheral devices is through the Analyst® software control; however, for devices that cannot be controlled through the Analyst software, it is usually possible to provide complete synchronization 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 on the back of the instrument. The following figure shows a schematic representation of the AUX I/O interface and the AUX I/O cable provided with the mass spectrometer.

Simplified schematic of the AUX I/O interface and cable on the mass spectrometer. Wire colors are shown as (background) / (stripe). Mass spectrometer signals are shown in NOT READY and NO ERROR states.
AUX I/O Signal Details

The three types of mass spectrometer signals are as follows:

Ready Signal

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

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

READY is activated when the LC/MS devices are ready to acquire data and are waiting for an injection. READY is intended to be used as an autosampler Inject signal. As soon as the MS acquisition is started (by the START signal), READY is deactivated. READY should not be confused with the MS Ready status, which is not specific to the LC Sync mode.

Error Signal

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

Start Signal

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

By setting the MS synchronization trigger level, START may be configured as either Active High or Active Low, as required. For more information, see “Autosampler Configuration” on page 39.

Note: The biased +5V and ground signals provided on the AUX I/O port may be used to:

- Generate the appropriate START using a contact closure
- Generate TTL-level READY and ERROR signals
Wiring Peripheral Devices to the Mass Spectrometer

The general scheme for connecting peripheral devices to the mass spectrometer is shown in the following figure. The signals available on your peripheral devices determine to what extent the scheme presented here may be used.

General scheme for analog synchronization of peripheral devices and the mass spectrometer

**Note:** The mass spectrometer Sync Mode must be set to LC Sync in the acquisition method in order to provide analog synchronization between the peripheral devices and the mass spectrometer.

The following two examples may be used as guidelines for developing an analog synchronization scheme suitable for your peripheral devices. For more information about the types of signals generated and required by the peripheral device, refer to the appropriate peripheral device documentation.

**Example 1: LC devices use Contact Closure signals**

<table>
<thead>
<tr>
<th>Autosampler</th>
<th>Aux I/O Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inject (In)</td>
<td>11</td>
</tr>
<tr>
<td>Inject (Out)</td>
<td>23</td>
</tr>
<tr>
<td>LC Pump(s)</td>
<td>19</td>
</tr>
<tr>
<td>Start (In)</td>
<td>18</td>
</tr>
<tr>
<td>Stop (In)</td>
<td>10</td>
</tr>
</tbody>
</table>

**Aux I/O Cable**
- red
- black/orange
- red/orange
- black
- blue/orange
- blue
- white/orange
- white
- pink/orange
- pink
- green/orange
- green

**Note:** Mass spectrometer set for Active Low synchronization

**Analog synchronization scheme using contact closure signals**
Peripheral Device Analog Synchronization

Example 2: LC devices use TTL signals:
- Autosampler INJ Out = TTL Active Low
- Autosampler INJ In = TTL Active High
- Pump START In = TTL Active Low
- Pump Stop In = TTL Active High

![Diagram of LC devices connection]

Note: Mass spectrometer set for Active Low synchronization

Analog synchronization scheme using TTL signals
CTC PAL Autosampler Setup

Notes

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

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

Note: Note that the firmware required to operate these different models of autosampler are exactly the same for all models when used with the Analyst software.

The CTC autosampler firmware must be configured by a service engineer to indicate where the trays can be placed and where everything is located in X, Y, and Z dimensions. You can use the autosampler’s handheld controller to configure the PAL or a separate utility from CTC can be used to write the configuration information into the autosampler's non-volatile memory.

Analyst software uses the following terms to describe the Analyst Batch Editor elements. Historically the design of the Batch Editor was based on the Gilson 215 definition of racks and plates.

- Rack - This is essentially a tray in CTC terminology, but only trays that can hold vials or plates. For example, a rack could be a code 205 for the Gilson 215 or a 10 by 10 for the Agilent 1100. The Rack Position would specify where the rack was placed and the Rack Code specified the type of rack. Note that it is not a one-to-one mapping between a rack and the tray in CTC terminology.

- Plate - This is essentially a tray in CTC terminology, but only microtitre style trays. The Plate Code specified the type of plate and the plate position indicated where the plate sat on the rack. Note again that it is not a one-to-one mapping between the plate and the definition of the tray in CTC terminology.

In the Analyst software, the tray is used to define a physical location; that is, it is only a place holder in which you can place different types of trays. The Tray Group is used to tell us which tray types you can use in each Tray Location.

The scheme used with the Analyst software has no restrictions on the number of Tray Types that can be used in each location. In fact, all defined Tray Types can be used in all
tray locations, if desired. Duplicate tray definitions are not required when used with the Analyst software.

For every tray location on the autosampler, you must check and correct the position of each Tray Type that is to be used using the autosampler’s handheld controller. If any trays are incorrectly defined in X, Y, or Z, the CTC driver cannot determine the correct layout of the trays in the autosampler. This will cause the Analyst software to either load the tray configuration incorrectly (causing a default display to be shown in the Batch Editor Locations tab consisting of 6 Tray locations), or cause the Analyst software to not indicate 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 doesn’t start scanning, it may be because the CTC autosampler Sync Signal is not configured to Immediate. This situation typically occurs when the autosampler is being used as a standalone without any controlling software. The CTC autosampler has a handheld controller that allows the user to configure settings in the autosampler. One of these settings is the Sync Signal. For certain users who have used the autosampler by itself with no computer control, they may have this set to wait for an external ready signal. However, under the Analyst software control, typically this is not needed. Therefore, if the autosampler is configured incorrectly, it will sit and wait and not inject.
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