

Agilent 1100 Series HPLC Value System

User's Guide



Agilent Technologies
Innovating the HP Way

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WARNING

For details of safety,
see Safety Information
on page 36.

Warning Symbols Used In This Book



The apparatus is marked
with this symbol when
the user should refer to
the instruction manual
in order to protect the
apparatus against
damage.



User's Guide

This manual contains technical information about the Agilent 1100 Series HPLC Value System. The manual describes the following:

- system overview, specifications and limitations
- installing the system,
- setting up an analysis,
- diagnostics and troubleshooting,
- repairing and maintenance

Contents

1 General information about your system

| | |
|---|----|
| System Configuration | 10 |
| 10 | |
| System Restrictions | 11 |
| Site Requirements | 12 |
| Physical Specifications | 14 |
| Performance Specifications | 15 |
| Maintenance, Repair and Parts Information | 15 |
| Warranty and Legal Information | 15 |
| User Documentation | 16 |

2 Installing your System

| | |
|---|----|
| Unpacking the Modules | 18 |
| Damaged Packaging | 18 |
| Delivery Checklist | 18 |
| Installing the JetDirect card into the VW detector | 19 |
| Choose the optimal stack configuration | 20 |
| Installing the Manual Injector and 1100 series HPLC modules | 21 |
| Flow Connections at the Manual Injector | 24 |
| Leak Drainage of the Manual Injector | 25 |
| Flow Connections at the Isocratic Pump | 26 |
| Flow Connections to the VW Detector | 28 |
| Installing the ChemStation Hardware | 30 |
| Booting the PC for the First Time | 31 |
| Installing the LAN Communication | 32 |
| Configuring the CAG Bootp Server Program | 32 |
| Configuring the Analytical System | 35 |

3 Setting up an Analysis

| | |
|--|----|
| Before Using the System | 41 |
| Solvent Information | 41 |
| Priming and Purging the System | 41 |
| Requirements and Conditions | 43 |
| What You Will Need | 43 |
| Conditions | 43 |
| Typical Chromatogram | 44 |
| Optimization of the System | 44 |
| Preparing the HPLC System | 45 |
| Running the Sample and Verifying the Results | 50 |

4 Troubleshooting your System

| | |
|---|----|
| Diagnostic Functions | 53 |
| Status Information on the 1100 Modules | 53 |
| Online System Information | 54 |
| Instrument Logbook and Help Information | 56 |
| Using Module Diagnosis | 57 |
| Using Module Tests | 58 |
| Problems during the Installation | 59 |

5 Repair and Maintenance

| | |
|---|----|
| Repair and Parts Information for the 1100 series HPLC Modules | 62 |
| Firmware Update on 1100 Modules | 63 |
| Deinstallation and Reinstallation of the ChemStation | 64 |
| Recovering from an Operating System Crash | 65 |
| Process steps | 65 |

Contents

| | |
|--|----|
| Step 1: Installation of Windows NT | 65 |
| Step 2: Installation of TCP/IP protocol | 66 |
| Step 3: Re-installation of Windows NT Service Pack | 69 |
| Step 4: Installation of Value Solution ChemStation | 69 |
| Step 5: Installation of the Bootp Server Program | 69 |
| Step 6: Configuring the CAG Bootp Server Program | 69 |

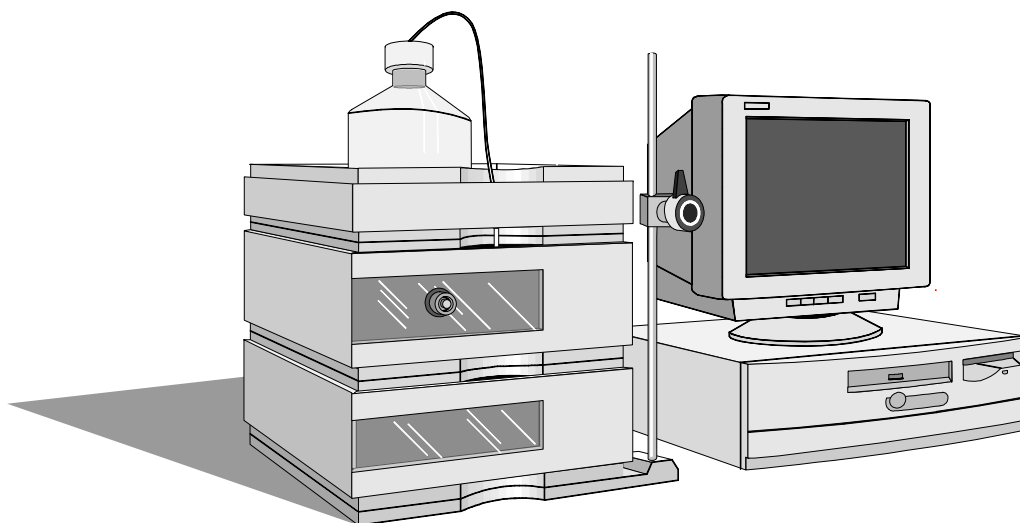
Contents

General information about your system

What you should know about your system

System Configuration

Manual - isocratic HPLC System G1380AA



standard configuration

- G1310A isocratic pump with solvent cabinet
- G1328A manual injector (MI)
- G1314A variable wavelength detector (VWD) with standard flow cell (10 mm path length, 14 μ l volume, 40 bar maximum pressure)
- G2220AA 2D-Value Solution ChemStation

other modules that can be added

- G1316A thermostatted column compartment (TCC)
- G1321A fluorescence detector (FLD)
- G1362A refractive index detector (RID)
- G1323B local control module

System Restrictions

The system mentioned on page 10 has some restrictions compared to the standard 1100 system. These restrictions are listed in the table below:

Table 1**System Restrictions**

| Module | Restrictions |
|-------------------------|---|
| ChemStation | <ul style="list-style-type: none"> • single G2220AA 2D-Value Solution ChemStation only (one online and one offline session) <ul style="list-style-type: none"> - not upgradeable to G2170AA 2D-ChemStation • supports the following 1100 series HPLC modules as shown in “System Configuration” on page 10: <ul style="list-style-type: none"> G1310A isocratic pump G1314A variable wavelength detector G1328A manual injector G1316A thermostatted column compartment (may be added) G1321A fluorescence detector (may be added), see note below. G1362A refractive index detector (may be added) • control via LAN (no HPIB or RS-232) • No support of ChemStation add-on like <ul style="list-style-type: none"> Spectra Module, ChemAccess, ChemStore, GPC and CCMODE |
| All 1100 modules | <ul style="list-style-type: none"> • operable by Control Module G1323B (may be added), see note below. • firmware upgrade via control module G1323B and/or LAN (Value Solution ChemStation/portable PC). |

NOTE

The G1321A fluorescence detector cannot be operated in spectra mode. This requires the spectra software module which is not support with the G2220AA 2D-Value Solution ChemStation. Wavelength verifications on the module require a Control Module G1323A or G1323A.

Site Requirements

A suitable environment is important to ensure optimum performance of the system.

Power Consideration

The modules' power supply has wide-ranging capability (see Table 2 on page 14). It accepts any line voltage in the above mentioned range. Consequently there is no voltage selector in the rear of the modules. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

WARNING

To disconnect the modules from line, unplug the power cord. The power supply still uses some power, even if the power switch on the front panel is turned off.

WARNING

Shock hazard or damage of your instrumentation can result, if the devices are connected to a line voltage higher than specified.

Power Cords

Different power cords are offered as options with the modules. The female end of each of the power cords is identical. It plugs into the power-input socket at the rear of the instruments. The male end of each of the power cords is different and designed to match the wall socket of a particular country or region.

WARNING

Never operate your instrumentation from a power outlet that has no ground connection. Never use a power cord other than the power cord designed for your region.

WARNING

Never use cables other than the ones supplied with the instruments to ensure proper functionality and compliance with safety or EMC regulations.

Site Requirements

Bench Space

The modules' dimensions and weight (see Table 2 on page 14) allow to place the modules on almost any desk or laboratory bench. It needs an additional 2.5 cm (1.0 inches) of space on either side and approximately 8 cm (3.1 inches) in the rear for the circulation of air and electric connections.

If the bench should carry a complete system, make sure that the bench is designed to carry the weight of all the modules.

The modules should be operated in a horizontal position.

Environment

Your modules will work within specifications at ambient temperatures and relative humidity as described in Table 2 on page 14.

Detectors

ASTM drift tests require a temperature change below 2 °C/hour (3.6 °F/hour) over one hour period. Our published drift specification (refer also to “Performance Specifications” in your detector’s reference manuals) is based on these conditions. Larger ambient temperature changes will result in larger drift. Better drift performance depends on better control of the temperature fluctuations. To realize the highest performance, minimize the frequency and the amplitude of the temperature changes to below 1 °C/hour (1.8 °F/hour). Turbulences around one minute or less can be ignored.

CAUTION

Do not store, ship or use your modules under conditions where temperature fluctuations could cause condensation within the modules. Condensation will damage the system electronics. If your modules were shipped in cold weather, leave them in their boxes and allow them to warm slowly to room temperature to avoid condensation.

Physical Specifications

Table 2 **Physical Specifications (1100 Series modules)**

| Type | Specification | Comments |
|--|--|----------------------------|
| Weight | 11.0 kg (25.0 lbs) | G1310A ISO Pump |
| | 11.0 kg (25.0 lbs) | G1314A VWD |
| | 10.2 kg (22.5 lbs) | G1316A TCC |
| | 17.0 kg (38.0 lbs) | G1362A RID |
| Dimensions (width × depth × height) | 345 × 435 × 140 mm (13.5 × 17 × 5.5 inches) | G1310A, G1314A, G1321A |
| | 345 × 435 × 180 mm (13.5 × 17 × 7.0 inches) | G1362A |
| | 410 × 435 × 140 mm (16.1 × 17 × 5.5 inches) | G1316A |
| | | |
| Line Voltage | 100 – 120 or 220 – 240 VAC, ± 10 % | Wide-ranging capability |
| Line frequency | 50 or 60 Hz, ± 5 % | |
| Power consumption | 320 VA maximum | |
| | 160 VA maximum | G1362A |
| Ambient operating temperature | 0 – 55 °C (32 – 131 °F) | |
| Ambient non-operating temperature | -40 – 70 °C (-4 – 158 °F) | |
| Humidity | <95 %, at 25 – 40 °C (77 – 104 °F) | Non-condensing |
| Operating altitude | Up to 2000 m (6500 ft.) | |
| Non-operating altitude | Up to 4600 m (14950 ft.) | For storing the instrument |
| Safety standards: IEC, CSA, UL, EN | Installation Category II, Pollution Degree 2 | |

For your PC specifications refer to its documentation.

Performance Specifications

The performance specifications can be derived from the modules' performance specifications, described in each of the modules' reference manuals (see "User Documentation" on page 16 available on your *Value Solution ChemStation Software CD-ROM*).

Maintenance, Repair and Parts Information

The information about these topics can be derived from the corresponding chapters in each of the modules' reference manuals (see "User Documentation" on page 16 available on your *Value Solution ChemStation Software CD-ROM*).

Warranty and Legal Information

For warranty and legal information refer to the modules' reference manuals, see "User Documentation" on page 16 available on your *Value Solution ChemStation Software CD-ROM*).

User Documentation

The user documentation (aside from this System Manual) is provided as Acrobat Reader documents (PDF) located on the *Value Solution ChemStation Software CD-ROM*. It can be viewed and printed when required.

Table 3

1100 User Documentation

| Type | File name |
|---|---------------|
| 1100 Isocratic Pump Reference Manual | G1310A_RM.PDF |
| 1100 Variable Wavelength Detector Reference Manual | G1314A_RM.PDF |
| 1100 Manual Injector Reference Manual | G1328A_RM.PDF |
| 1100 Refractive Index Detector Reference Manual | G1362A_RM.PDF |
| 1100 Fluorescence Detector Reference Manual | G1321A_RM.PDF |
| 1100 Control Module User Guide (part number G1323-90004) | G1323_UG.PDF |
| 1100 Control Module Quick Reference (part number G1323-90005) | G1323_QR.PDF |
| Installing your ChemStation (part number G2170-90004) | UNDER_2D.PDF |
| Understanding your ChemStation (part number G2070-9112) | INST_LC.PDF |

Installing your System

How to install your system

Unpacking the Modules

Damaged Packaging

If the delivery packaging shows signs of external damage, please call your sales and service office immediately. Inform your service representative that something may have been damaged during shipment.

CAUTION

If there are signs of damage, please do not attempt to install the damaged module.

Delivery Checklist

Ensure all parts and materials have been delivered with the modules. The delivery checklist is shown in Table 4. Please report missing or damaged parts to your local sales and service office.

Table 4

Delivery Checklist for G1380AA

| Description | Quantity |
|---|----------------------------------|
| PC, monitor, printer, software,... | as ordered |
| JetDirect card (LAN) | 1 |
| LAN cross-over cable (10 feet long, part number 5183-4649) | 1 |
| System Manual | 1 |
| 1100 modules (G1310A Isocratic Pump with solvent container, G1314A VW Detector with standard flow cell, G1328A Manual Injector) | 1 each |
| Power cable | 1 per 1100 module |
| CAN cable (1 m long, part number 5181-1519 or 0.5 m long, part number 5181-1516) | 1 per 1100 module |
| Module Reference Manuals and Accessory kit (refer to modules' reference manual) | 1 per 1100 module |
| additional 1100 series modules (G1316A TCC, G1321A FLD, G1362A RID, G1323B Control Module) | as ordered - not part of G1380AA |

Installing the JetDirect card into the VW detector

The 1100 series VW detector should be the module that is connected via LAN to the Value Solution ChemStation PC. Therefore a JetDirect card must be installed into this module.

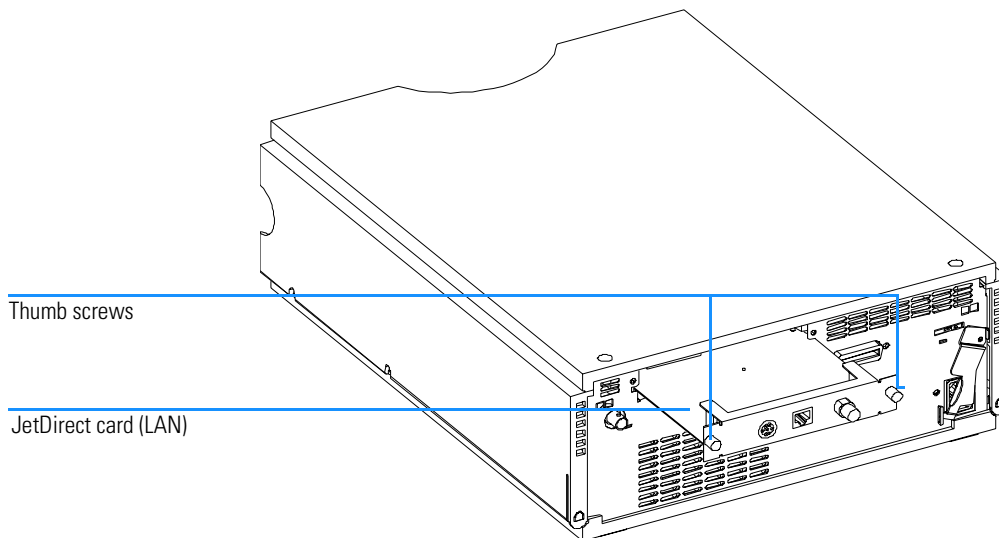
CAUTION

Electronic boards and components are sensitive to electronic discharge (ESD). In order to prevent damage always use an ESD protection (for example, the ESD wrist strap from the module's accessory kit) when handling electronic boards and components, see "*Using the ESD Strap*" in the module's *Reference Manual*.

- 1 Loosen the two screws that fix the metal cover at the rear of the module and remove it.
- 2 Slide the JetDirect card into the slot and fix the two screws.

Figure 1

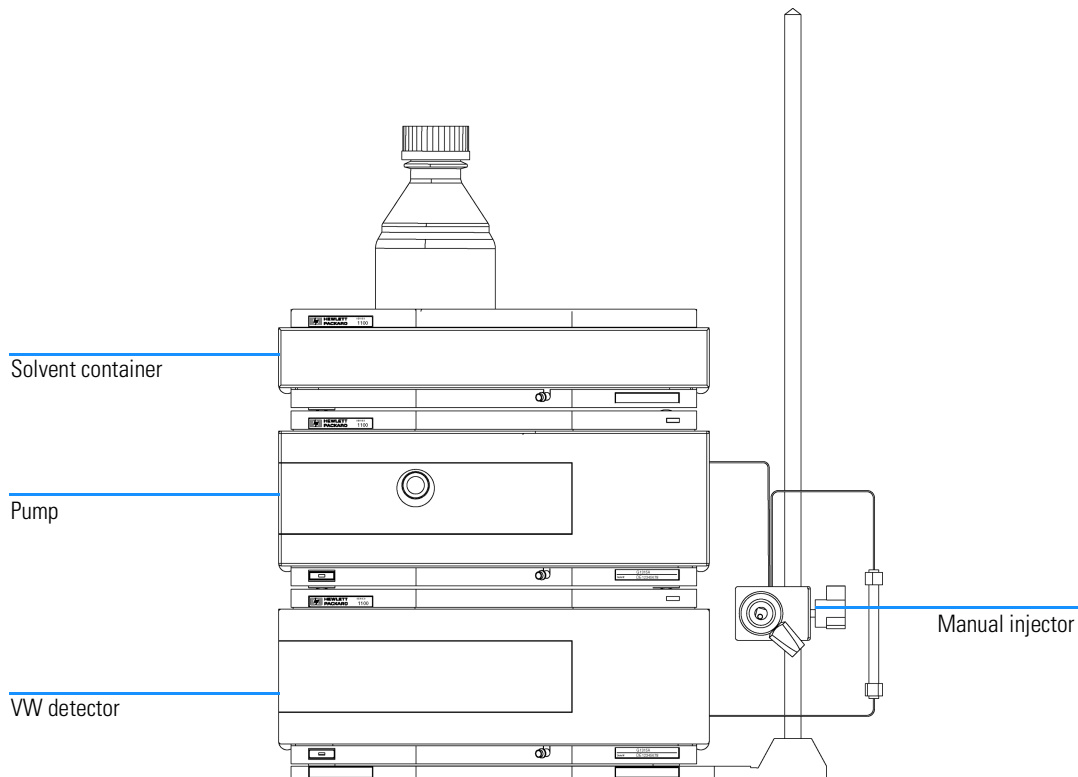
Location of the JetDirect card



Choose the optimal stack configuration

Figure 2

You can ensure optimum performance by installing the system in the following configuration. This configuration optimizes the system flow path and ensures minimum delay volume.



NOTE

An additional thermostatted column compartment (G1316A) must be located between the pump and the detector.
An additional detector (G1321A FLD or G1362A RID) must be located under the VW detector to be the last in the flow path (pressure limit on those flow cells).
An additional local control module (G1323B) may be added to one of the modules.

Installing the Manual Injector and 1100 series HPLC modules

NOTE

Assure that all power switches on the 1100 HPLC modules are in OFF (out) position.

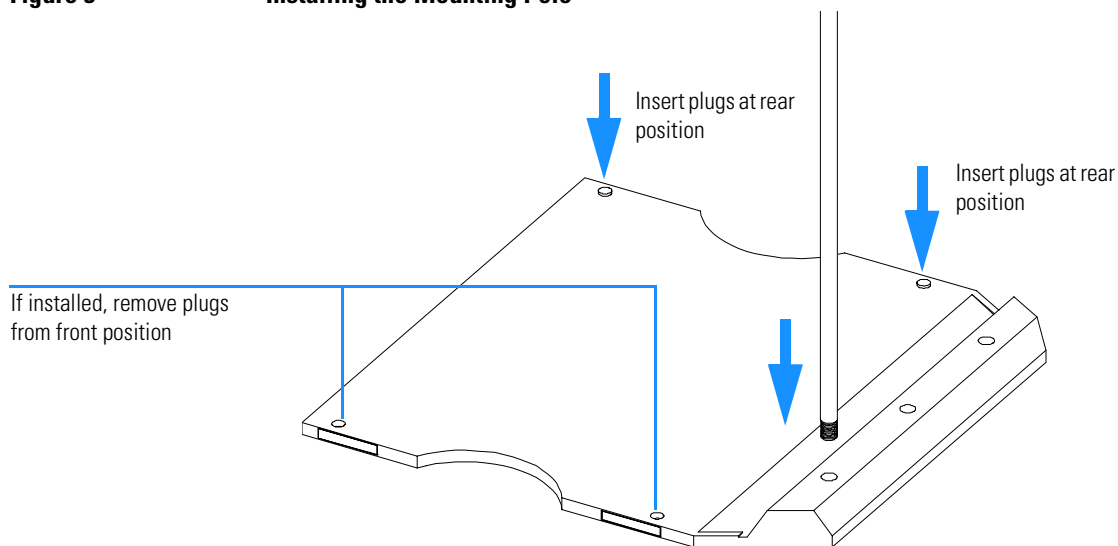
NOTE

The manual injector can be installed at the left- or right-hand side of the instrument stack.

- 1 Place the base plate on the bench.
- 2 Screw the mounting pole into one of the three holes in the base plate.
- 3 Ensure the two plugs are positioned at the rear of the base plate. If required, remove the plugs, and insert them in the correct position (see Figure 3).

Figure 3

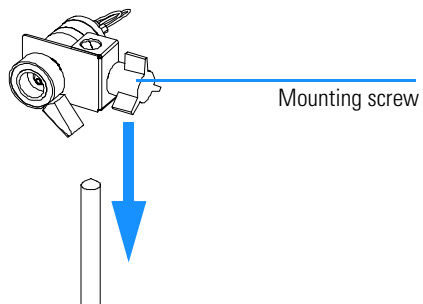
Installing the Mounting Pole



- 4 Slide the manual injector onto the mounting pole (see Figure 6). Tighten the mounting screw.

Figure 4

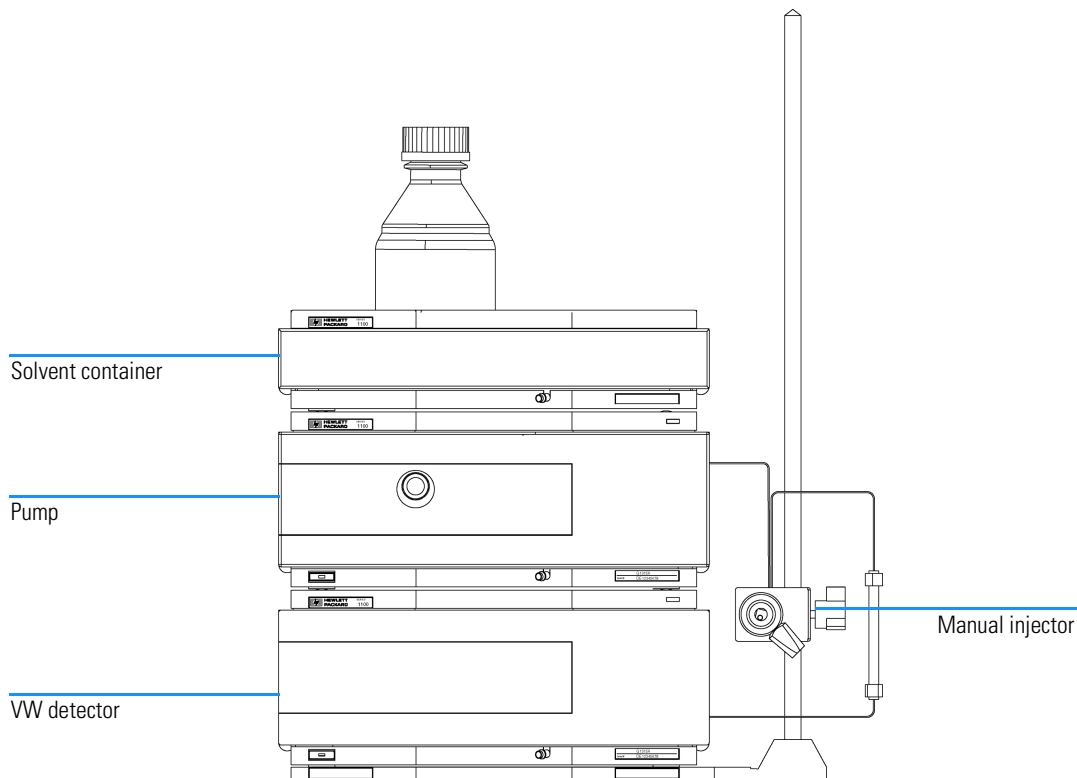
Installing the Manual Injector



- 5 Install other system modules on top of the manual injector base plate (see Figure 5).

Figure 5

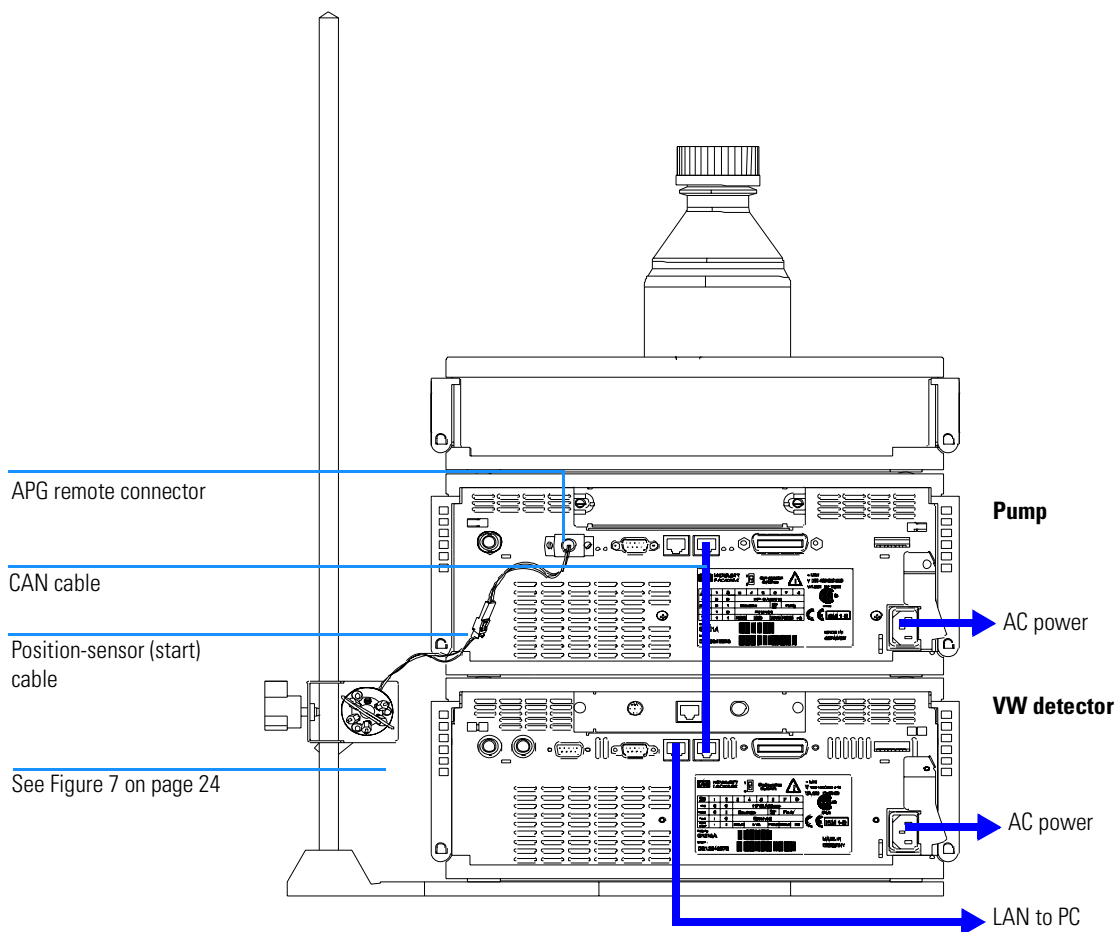
Installing the System (front view of 1100 system)



Installing the Manual Injector and 1100 series HPLC modules

- 6 Connect the position-sensor cable to the start cable (see Figure 6).
- 7 Connect the start cable to an APG-remote connector at the rear of one of the modules.
- 8 Connect the CAN-bus cable for the inter-modular communication.
- 9 Connect the LAN cross-over cable to the detector's interface board (JetDirect card).
- 10 Connect the power cords (AC) to the 1100 modules line input.

Figure 6 **Installing the Start Cable (rear view of 1100 system)**



Flow Connections at the Manual Injector

WARNING

When opening capillary or tube fittings, solvents may leak out. Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used (see also “Leak Drainage of the Manual Injector” on page 25).

- 1 Connect the pump outlet capillary to port 2.
- 2 Connect the column outlet capillary to port 3.
- 3 Connect the sample loop between ports 1 and 4.
- 4 Connect one vent capillary (supplied with valve) to port 5, and one to port 6.

CAUTION

The outlets of the two vent capillaries (ports 5 and 6) and the needle port must be at the same level to prevent siphoning (see Figure 8).

Figure 7

Flow Connections

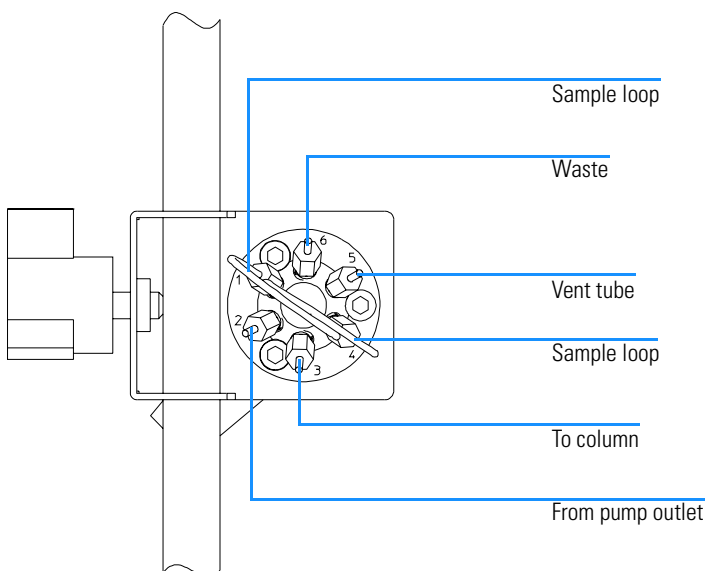
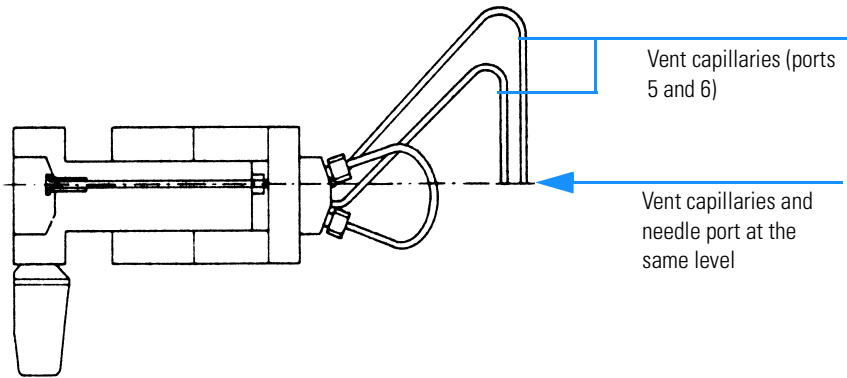


Figure 8

Vent Capillaries



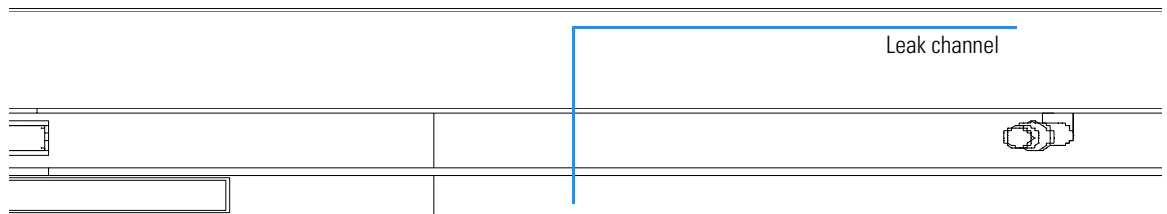
Leak Drainage of the Manual Injector

WARNING

Check the manual injector fittings periodically for signs of leakage. In the event of a leak, solvent will drop into the leak channel in the base plate, from where it is channelled to the front and back of the base plate.

Figure 9

Leak Drainage



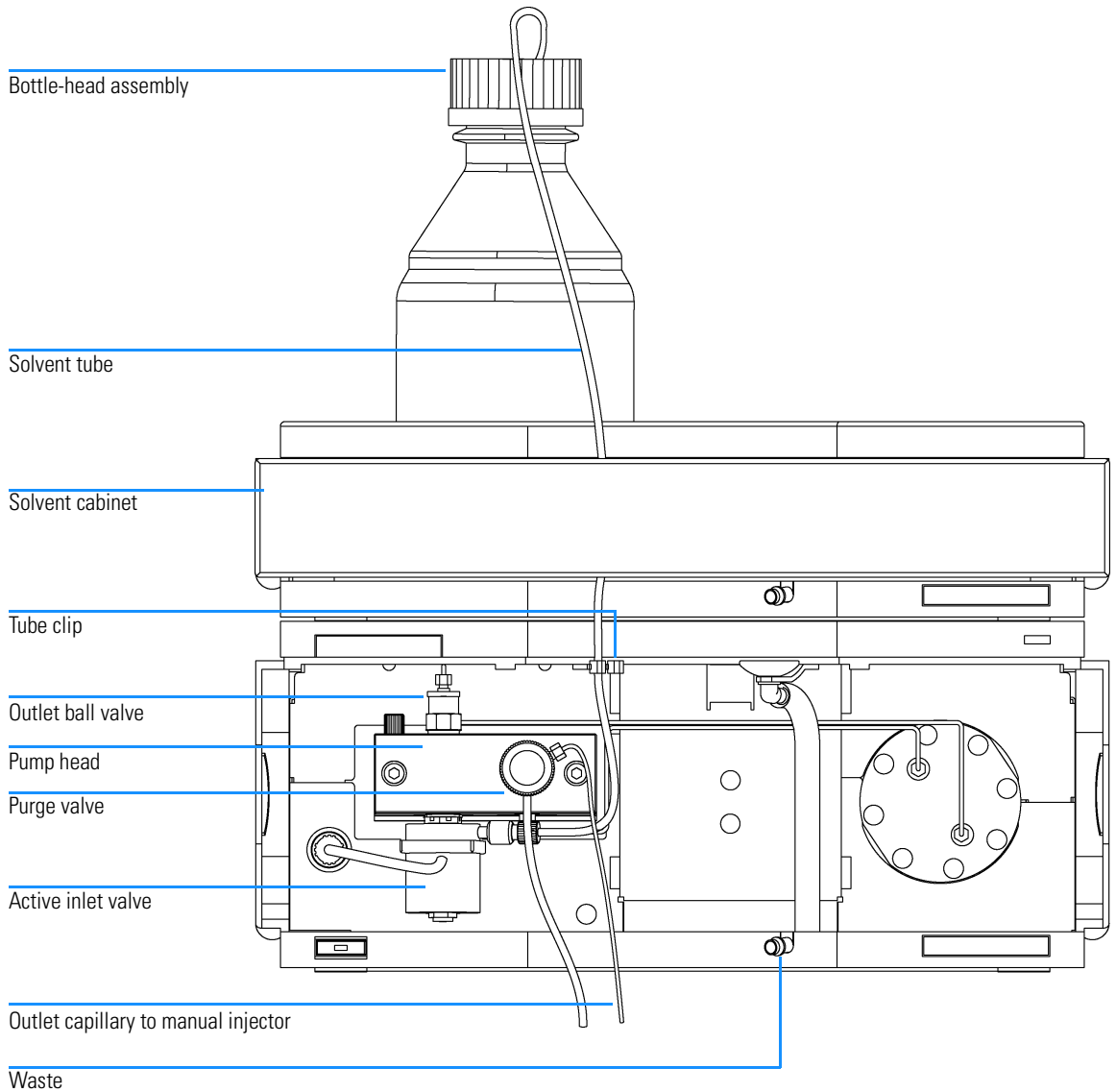
Flow Connections at the Isocratic Pump

| | |
|-----------------------|---|
| Preparations | Pump is installed in the HPLC system. |
| Parts required | Other modules Parts from accessory kit G1310-68705 Two wrenches 1/4–5/16 inch for capillary connections |

WARNING When opening capillary or tube fittings, solvents may leak out. Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

- 1 Remove the front cover by pressing the snap fasteners on both sides.
- 2 Place the solvent cabinet on top of the isocratic pump (Figure 10 on page 27).
- 3 Place the bottle containing your solvent into the solvent cabinet and place the bottle-head assembly into the bottle.
- 4 Connect the solvent tube from the bottle-head assembly to the inlet adapter of the active inlet valve. Fix the tube in the clips of solvent cabinet and isocratic pump.
- 5 Using a piece of sanding paper connect the waste tubing to the purge valve and place it into your waste system.
- 6 Connect the outlet capillary (isocratic pump to manual injection valve) to the outlet of the purge valve.

Figure 10 Flow Connections of the Isocratic Pump



Flow Connections to the VW Detector

| | |
|-----------------------|---|
| Preparations | Detector is installed in the HPLC system. |
| Parts required | Other modules Parts from accessory kit G1314-68705 Two wrenches 1/4–5/16 inch for capillary connections |

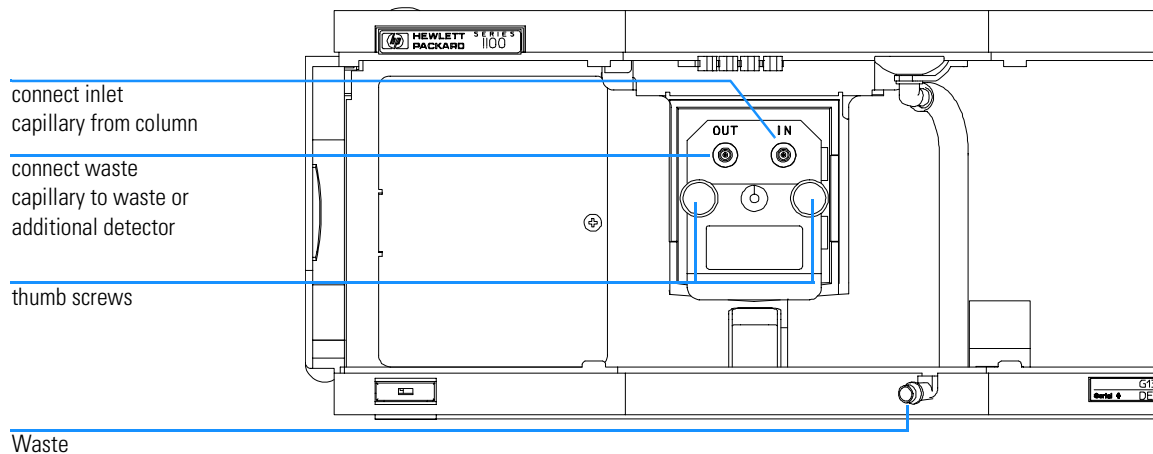
WARNING When opening capillary or tube fittings, solvents may leak out. Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

NOTE The flow cell is shipped with a filling of isopropanol (also recommended when the instrument and/or flow cell is shipped to another location). This is to avoid breakage due to subambient conditions.

- 1 Press the release buttons and remove the front cover to have access to the flow cell area.
- 2 Remove the metal cover from the flow cell area and install the flow cell. Tighten the cell screws (see Figure 11 on page 29).
- 3 Connect the column-detector capillary to the flow cell inlet connector.
- 4 Connect the other end of the column-detector capillary to the column.
- 5 Connect the PEEK waste capillary to the flow cell outlet connector (the PEEK capillary introduces a small back pressure to the flow cell for better baseline stability).
- 6 Connect the corrugated waste tube to the waste outlet of the detector leak handling system.
- 7 Route the waste tubing to your waste container.

Installing your System
Flow Connections to the VW Detector

Figure 11 Flow connections to the VW detector



NOTE If you add a Thermostatted Column Compartment (G1316A TCC), place this module above the VW detector.

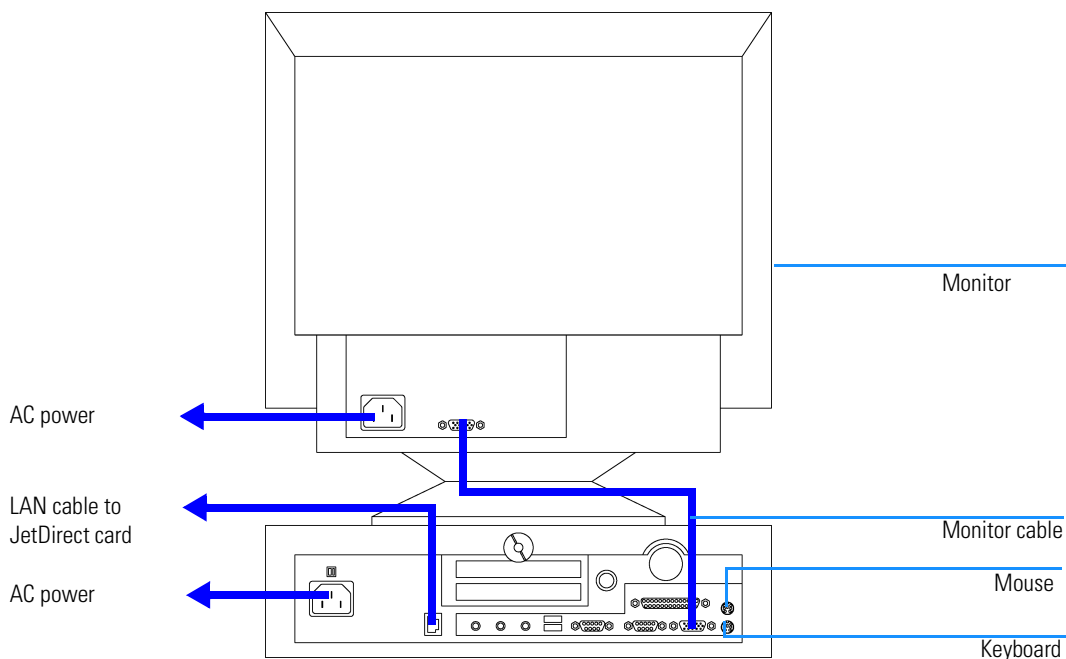
NOTE If you add another detector (G1362A RID or G1321A FLD), place this detector below the VW detector and connect its flow cell after the VW detector (lower pressure limit on these flow cells).

Installing the ChemStation Hardware

- 1 Place the Value Solution ChemStation PC next to 1100 system. Allow enough space between the 1100 modules and the PC for maintenance.
- 2 Place the Monitor on top of the PC.
- 3 Place a printer where needed.
- 4 Connect the LAN cross-over cable from the detector's JetDirect card (see "Installing the JetDirect card into the VW detector" on page 19) and the PC's LAN connector.
- 5 Connect the monitor cable between monitor and PC.
- 6 Connect mouse and keyboard to the PC.
- 7 Connect the printer cable between PC and printer (if available).
- 8 Connect power cords to the PC, monitor and printer (if available).

Figure 12

Installing the ChemStation PC (rear view)



Booting the PC for the First Time

The Value Solution ChemStation PC has been factory pre-configured. This means that

- the operating system Windows NT 4.0,
- the Value Solution ChemStation software inclusive its required utilities, and
- further application

are already loaded on the hard disk. This configuration has been optimized for running the Value Solution ChemStation.

- 1** Turn on the monitor and the PC.
- 2** The PC will boot and stop at the Login Information screen. The pre-configured user is 'Administrator' and requires the password provided with your PC.

Note your password here: _____

- 3** Then press *OK*.
- 4** The next screen shows 'End User Licence Agreement' information. Read the information and select *I Agree* and the PC will complete the boot process.

NOTE

All activities necessary to change the user profile/logon under Windows NT are not subject of this manual. Refer to the Windows NT documentation.

Installing the LAN Communication

Your instrument HPLC system is operated via a standard LAN crossover connection between the Value Solution ChemStation PC and the 1100 detector (VWD). You must ensure proper communication between the PC and the analytical instruments. The communication uses the TCP/IP protocol. For the configuration of the JetDirect card, that is used to connect the analytical instrument to the LAN, the Boot Strap protocol is used, which requires a Bootp Server.

NOTE

The TCP/IP protocol and the Bootp Server program are already factory pre-installed.

Configuring the CAG Bootp Server Program

NOTE

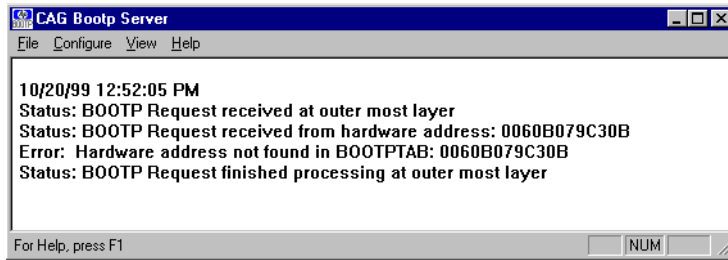
Assure that the VW detector (with JetDirect card installed and connected to the PC) is powered off.

- 1** The CAG Bootp Server program is placed in the start-up group and automatically is started during the boot process of the PC. It's minimized and located in the task bar.
- 2** Open the Bootp Server window by clicking on it in the task bar.
- 3** Now turn on the VW detector on the LAN and view the Bootp Server window. After 2 - 10 seconds the Bootp Server will display the request from the JetDirect card with the hardware (MAC) address (this information is also stored in the file trace.txt in the bootp server directory, if Log to Disk is enabled), see Figure 13.

The MAC or hardware address of the JetDirect card is a world wide unique identifier. No other network device will have the same hardware address.

Figure 13

Bootp Server



- 4 Select *Configure* -> *Add Entry* to configure the Bootp Manager. The drop down box "MAC address" lists automatically the MAC address of the installed JetDirect card (Figure 14).

If no hardware address is found, select *Cancel* and repeat step 3 and step 4.

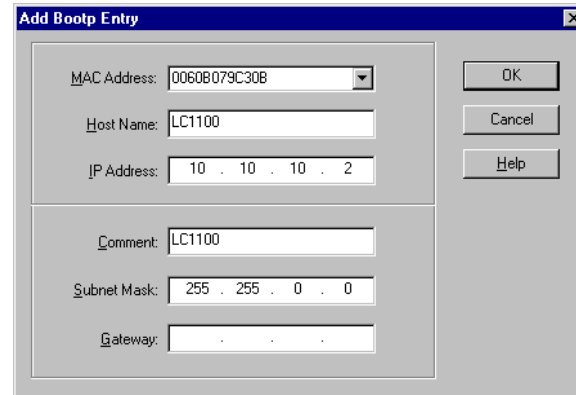
- 5 Specify the Host Name LC1100, the IP address 10.10.10.2, the Comment, e.g. LC1100 and the Subnet Mask 255.255.0.0.

NOTE

If you are working in a network system, you may need other addresses.

Figure 14

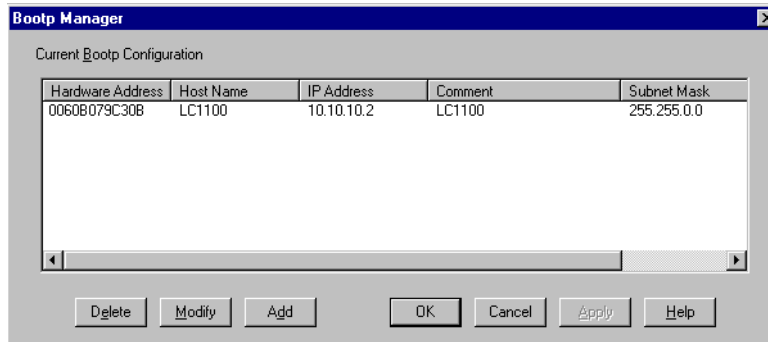
Add Bootp Entry



- 6 Exit with *OK*.
- 7 Select *Configure* -> *Bootp Manager*. All entries made above are shown in Figure 15.

Figure 15

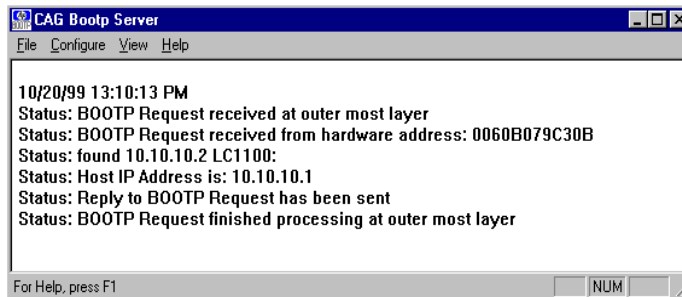
Bootp Manager



- 8 Press *Apply* to activate the changes. The Bootp Manager now shows the entries made above.
- 9 Press *OK* to exit the Bootp Manager and power cycle the VW detector, to force it to send a new bootp request again. This time, the MAC address will be recognized by the Bootp Server (Figure 16). It will send the configured IP address and subnet mask information which are necessary for communication to the JetDirect card.

Figure 16

Bootp Server - 1100 module found



Configuring the Analytical System

This chapter describes how to configure the communication of your Value Solution ChemStation software with your LC instruments using a LAN connection with the ChemStation Configuration Editor. For details refer to the *Installing your ChemStation* manual supplied with your system.

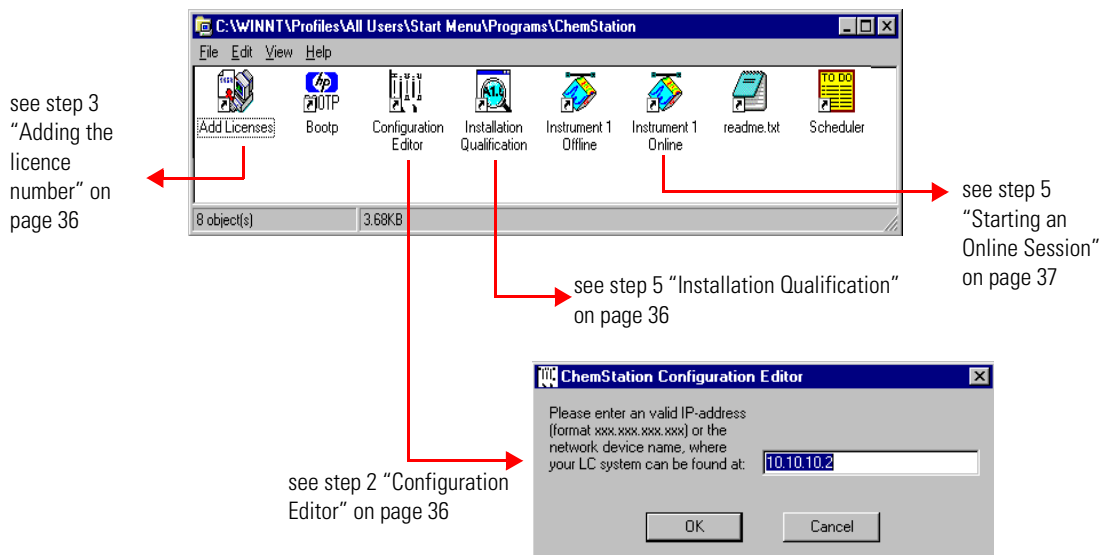
The following example describes how to configure an 1100 Series system with modules interconnected by the 1100 Series controller area network (CAN) that will automatically configure each module.

NOTE

Microsoft TCP/IP protocol must be installed and configured on the Value Solution ChemStation PC. In addition a Bootp Server must be running, which was configured for the instruments to be used.

- 1 Open the ChemStation start-up group or select *Start -> Programs -> ChemStation*.

Figure 17 ChemStation Program Folder

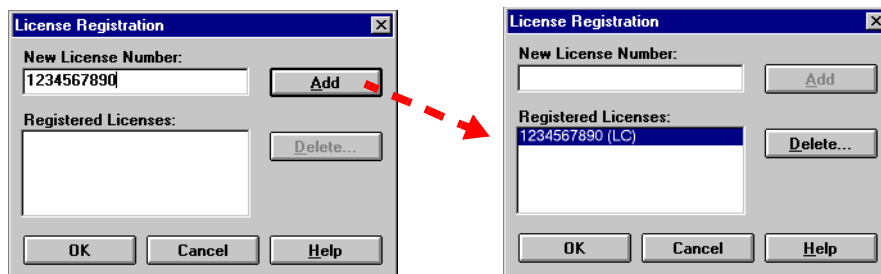


Configuring the Analytical System

- 2 Start the *ChemStation Configuration Editor* (see Figure 17) and type in the IP address of the JetDirect card (10.10.10.2, see also “Configuring the CAG Bootp Server Program” on page 32) and press *OK*.
- 3 Start the *ChemStation Add Licences Editor* (see Figure 17). Add a valid 10-digit licence number (provided with your Value Solution ChemStation Software) and press the *Add* button.

Figure 18

Adding the licence number



- 4 Start the *ChemStation Installation Qualification* (see Figure 17). Now the ChemStation installation will be verified for completeness. You may save this report as Reference (*File -> Save all as*). For details refer to your *Installing your ChemStation* manual.

Figure 19

Installation Qualification

| File | Version | FileDescription |
|------------------------|----------|----------------------|
| Identical files | | |
| apg_top.exe | 4.0.0.2 | CAG Server execut... |
| apgdde.dll | 3.27.0.0 | Analytical Product (|
| ccccc15.exe | | (NO VERSION INFO |
| cfg35900.exe | | (NO VERSION INFO |
| dB452a.dll | 0.0.1.76 | HP 8452A Runbuffe |
| editor.hlp | | (Help) |
| hp-ic.ini | | (Initialization) |
| hpcont00.exe | | (NO VERSION INFO |
| hpfabs00.dll | 1.0.3.10 | support functions |
| hpgthk00.dll | 0.0.0.0 | Generic Thunk Mod |
| hpib_gt.dll | | (NO VERSION INFO |
| hpib_srv.dll | 4.0.0.0 | CAG DataComm Se |
| hpitgr01.dll | 1.44.0.0 | HP LEGO Compone |
| hplc1050.hlp | | (Help) |
| hplc1090.hlp | | (Help) |
| hpnls01.dll | 0.4.0.0 | NLS Module |
| hppcad.ini | | (Initialization) |
| hppcad16.dll | 1.0.0.0 | 16-bit Thunking DLL |

Installation Verification completed successfully.

Configuring the Analytical System

- 5 When you start the *Instrument 1 Online* Value Solution ChemStation for the first time (refer to Figure 17 on page 35), the “Configure 1100 System Access” dialog box displays the 1100 modules detected during instrument initialization (see Figure 20). 1100 modules that have been recognized are listed as “online” (indicated by a green icon) along with their serial numbers. 1100 modules that have not been detected are marked “offline”. You can selectively take certain modules out of the software configuration, e.g. if your 1100 system includes two 1100 detectors and your next analysis only requires one of them.

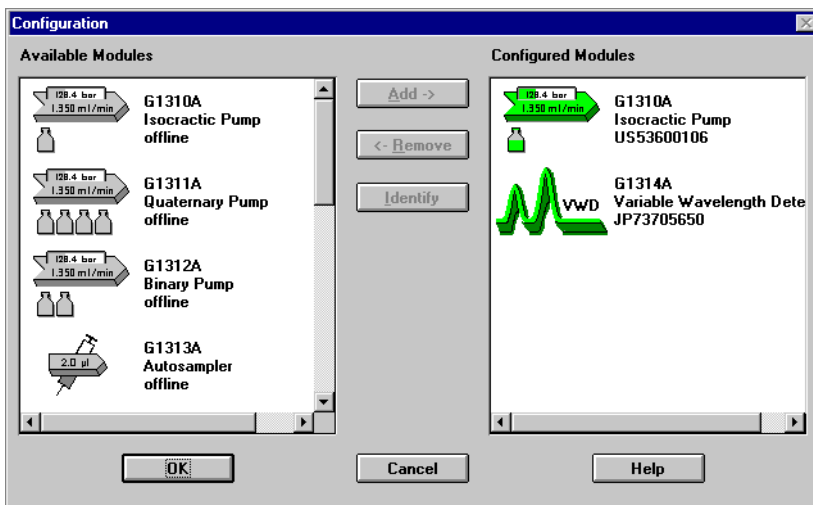
NOTE

The section “System Restrictions” on page 11 describes the limitations on usable 1100 series modules.

The unneeded 1100 module may then remain turned off but still be connected. After modifying the configuration, you must restart the Value Solution ChemStation. The “Configure 1100 System Access” dialog is available from the Instrument menu in the “Method and Run-Control” view, when view *Full Menu* is displayed.

Figure 20

The Configure 1100 System Access dialog allows to selectively include detected 1100 modules into the configuration.



- 6 Press *OK* and the software continues the loading process.

Installing your System
Configuring the Analytical System

Figure 21 shows the initial Value Solution ChemStation screen.

Figure 21 ChemStation Online Entry Screen



- 7 Deselect *Show on Start* unless you want to see this Welcome screen at every ChemStation start.
- 8 Exit the Welcome box or read *What's New* or start the *Tutorial* session.
- 9 Select *View -> Full Menu* and *System Diagram* to have all menus and the system diagram available.
- 10 Your *Value Solution ChemStation* is now ready for operation.

NOTE

Detailed information about the use of the Value Solution ChemStation software can be found in the *Value Solution ChemStation* documentation.

Setting up an Analysis

How to analyze the isocratic standard sample using a single injection analysis

This chapter can be used for three purposes:

- preparing the system,
- to learn the set up of an HPLC analysis and
- to use it as an instrument check to demonstrate that all modules of the system are correctly installed and connected. It is not a test of the instrument performance.

Before Using the System

Solvent Information

Observe recommendations on the use of solvents in chapter “*Solvents*” in the *pump’s reference manual*.

Priming and Purging the System

When the solvents have been exchanged or the pumping system has been turned off for a certain time (for example, overnight) oxygen will re-diffuse into the solvent channel between the solvent reservoir, vacuum degasser (when available in the system) and the pump. Solvents containing volatile ingredients will slightly lose these. Therefore priming of the pumping system is required before starting an application.

Table 5 **Choice of Priming Solvents for Different Purposes**

| Activity | Solvent | Comments |
|--|-------------------------|---|
| After an installation | Isopropanol | Best solvent to flush air out of the system |
| When switching between reverse phase and normal phase (both times) | Isopropanol | Best solvent to flush air out of the system |
| After an installation | Ethanol or Methanol | Alternative to Isopropanol (second choice) if no Isopropanol is available |
| To clean the system when using buffers | Bidistilled water | Best solvent to re-dissolve buffer crystals |
| After a solvent change | Bidistilled water | Best solvent to re-dissolve buffer crystals |
| After the installation of normal phase seals (P/N 0905-1420) | Hexane + 5% Isopropanol | Good wetting properties |

NOTE

The pump should never be used for priming empty tubings (never let the pump run dry). Use a syringe to draw enough solvent for completely filling the tubings to the pump inlet before continuing to prime with the pump.

- 1** Open the purge valve of your pump (by turning it counterclockwise) and set flow rate to 3-5 ml/min.
- 2** Flush all tubes with at least 30 ml of solvent.
- 3** Set flow to required value of your application and close the purge valve.
Pump for approximately 10 minutes before starting your application.

Requirements and Conditions

What You Will Need

Table 6 lists the items you need to have for the set up of the analysis. Some of these are optional (not required for the basic system).

Table 6

What you will need

| | |
|--------------------|---|
| HP 1100 Instrument | Isocratic pump |
| | Manual Injector |
| | Detector - VWD, Standard flow cell installed |
| | ChemStation or Control Module (optional) |
| Column: | Zorbax Eclipse XDB-C8 150 x 4.6 mm i.d. Part No. 993967-902 or Part No. 5063-6600 |
| Standard: | Part No. 01080-68704 0.15 wt.% dimethylphthalate, 0.15 wt.% diethylphthalate, 0.01 wt.% biphenyl, 0.03 wt.% o-terphenyl in methanol |

Conditions

A single injection of the isocratic test standard is made under the conditions given in Table 7:

Table 7

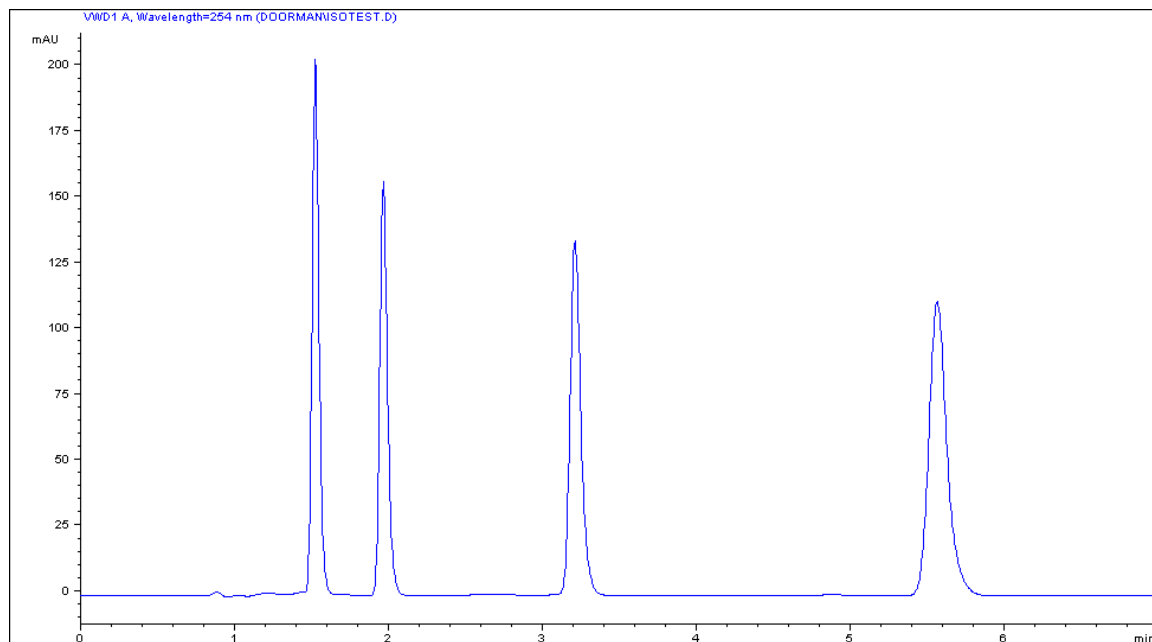
Conditions

| | |
|------------------|-----------------------------------|
| Flow: | 1.5 ml/minute |
| Stoptime: | 6 minutes |
| Solvent: | 100% (30% water/70% Acetonitrile) |
| Temperature | Ambient |
| Wavelength VWD: | 254 nm |
| Injection Volume | 2 μ l (VWD) |

Typical Chromatogram

A typical chromatogram for this analysis is shown in Figure 22 on page 44. The exact profile of the chromatogram will depend on the chromatographic conditions. Variations in solvent quality, column packing, standard concentration and column temperature will all have a potential effect on peak retention and response.

Figure 22 Typical Chromatogram with UV-detector



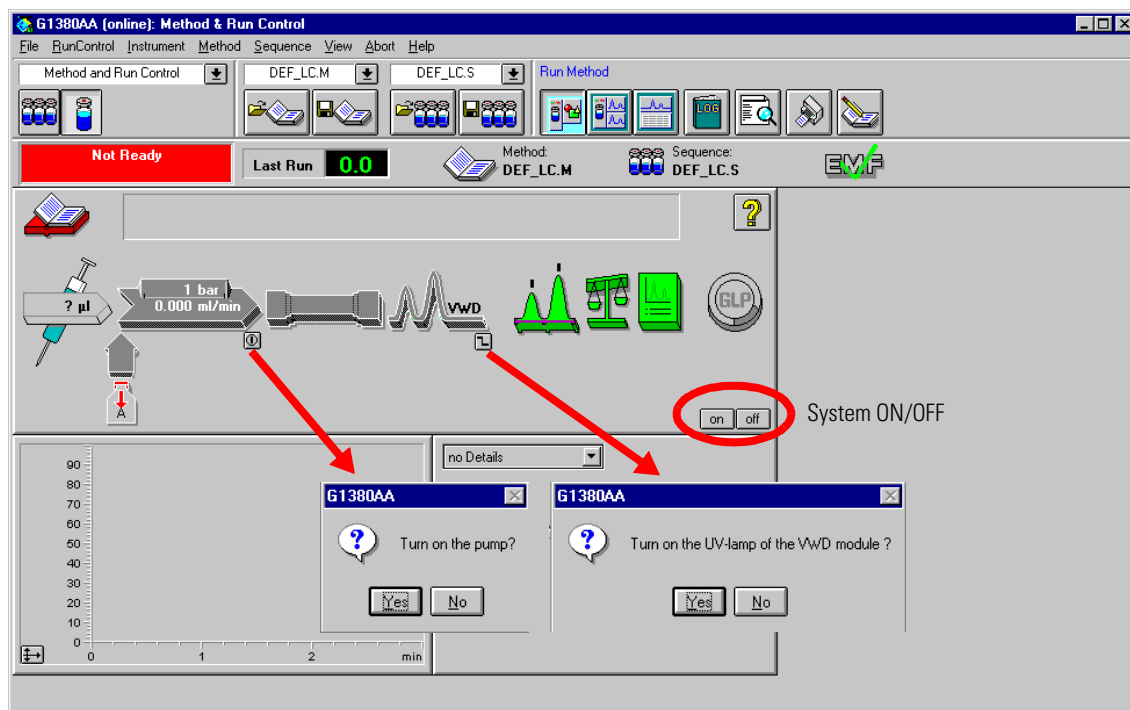
Optimization of the System

The settings used for this analysis are specific for this purpose. For other applications the system can be optimized in various ways. Please refer to the section “*Optimizing*” in the your *module’s Reference Manual*.

Preparing the HPLC System

- 1 Turn on the Value Solution ChemStation PC and the monitor.
- 2 Start the Bootp server.
- 3 Turn on the 1100 series HPLC modules.
- 4 Start the Value Solution ChemStation software. If the pump and VW detector are found the ChemStation screen should look like shown in Figure 23.
- 5 Turn on the detector lamp and pump by clicking the *System On* button or the buttons below the module icons on the graphical user interface (GUI).

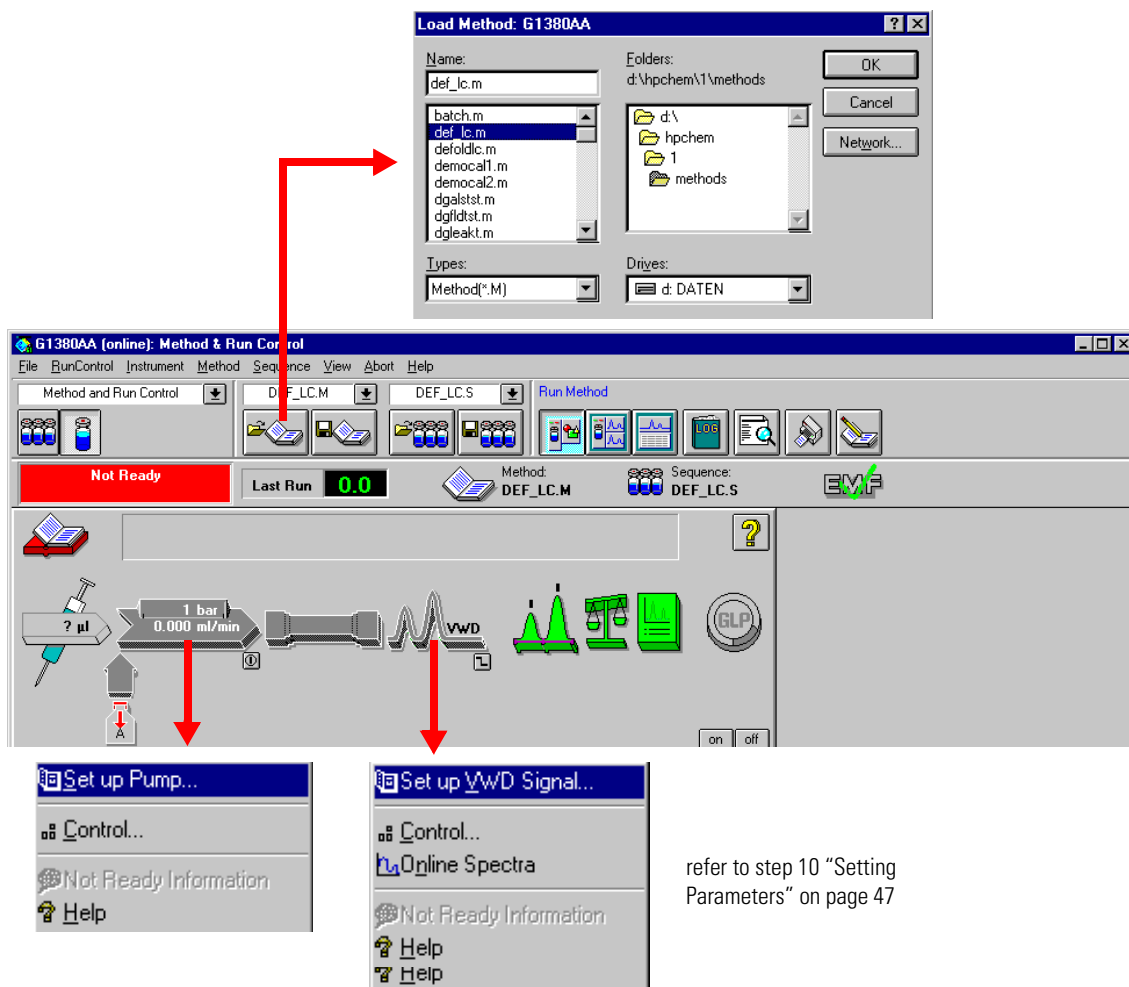
Figure 23 Turning on the HPLC Modules



Setting up an Analysis
Preparing the HPLC System

- 6 Purge the pump. For more information see “Priming and Purging the System” on page 41.
- 7 Allow the detector at least 15 minutes to provide a stable baseline.
- 8 For the isocratic pump, fill the solvent bottle with the mixture of HPLC-grade bidistilled water (30 %) and acetonitrile (70 %).
- 9 Click on the *Load Method* button and select DEF_LC.M and press *OK*. The default LC method parameters are transferred into the 1100 modules.

Figure 24 Loading Default LC Method



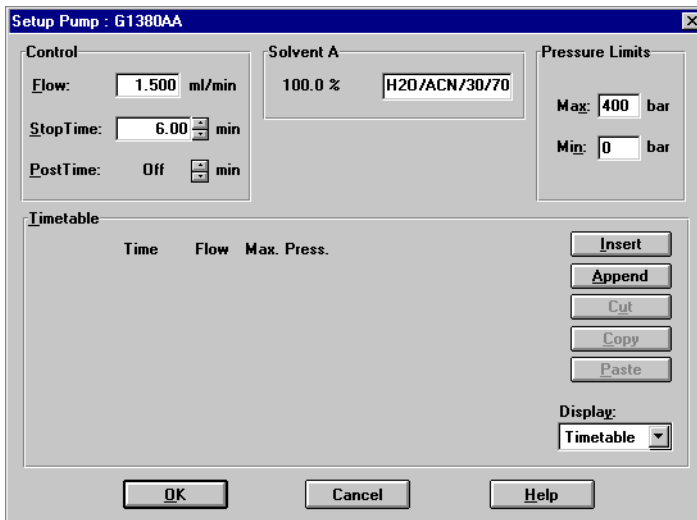
refer to step 10 “Setting Parameters” on page 47

- Click on the pump and VW detector icon (Figure 24 on page 46) to open the *Setup* of those modules. Enter the parameters mentioned under “Conditions” on page 43.

Figure 25 Setting Parameters

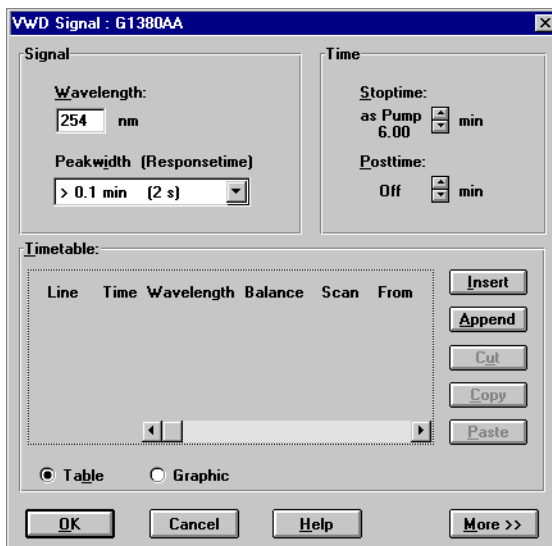
Enter:

Flow - 1.50 ml/min
Stop Time - 6 minutes
Solvent Description



Enter:

Wavelength - 254 nm
Peak width - 2 s
Stop Time - same as pump



- Pump the water/acetonitrile (30/70 %) mobile phase through the column for 10 minutes for equilibration.

Setting up an Analysis
Preparing the HPLC System


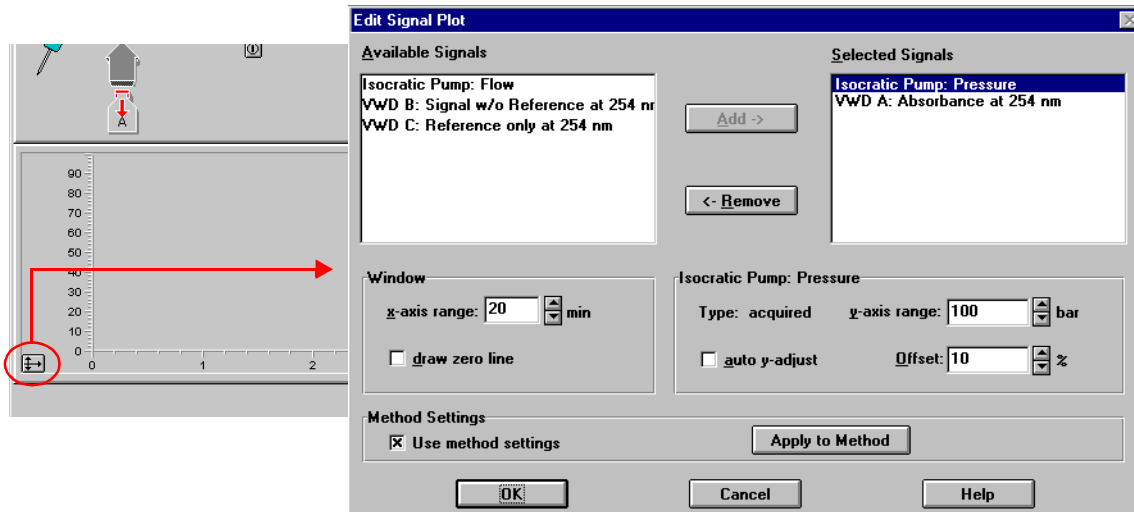
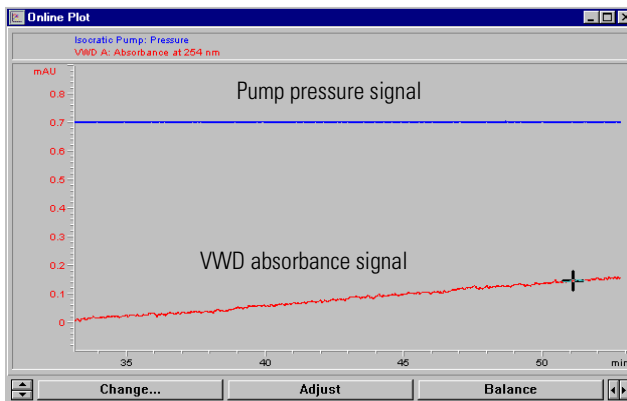
- Click the button  and select *Change...* to open the Signal Plot information. Select the *Isocratic Pump: Pressure* and the *VWD A: Absorbance at 254 nm* as signals. Change the Y-range for the VWD to 1 mAU. The X-axis range should be 20 minutes. Press *OK* to exit this screen.

Figure 26 Edit Signal Plot Window



The Online Plot (Figure 27) shows both, the pump pressure and the VWD absorbance signals. Pressing *Adjust* the signals can be reset to the offset value and *Balance* would do a balance on the VWD.

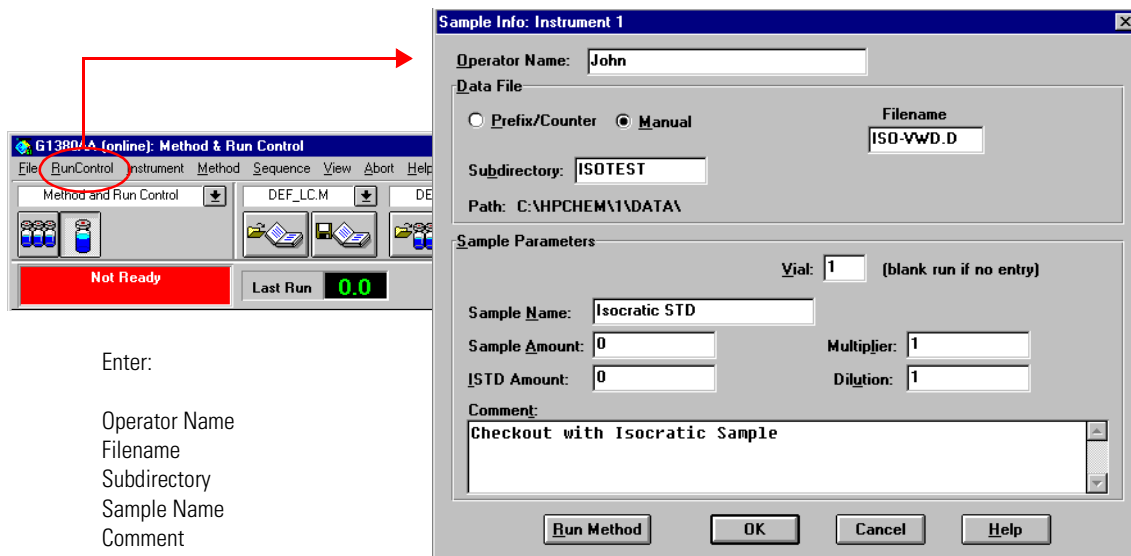
Figure 27 Online Plot Window



Setting up an Analysis
Preparing the HPLC System

- 13 If both baselines are stable, set the Y-range for the VWD signal to 300 mAU.
- 14 Select the menu item *RunControl* -> *Sample Info* and enter information about this application (Figure 28). Press *OK* to leave this screen.

Figure 28 **Sample Information**



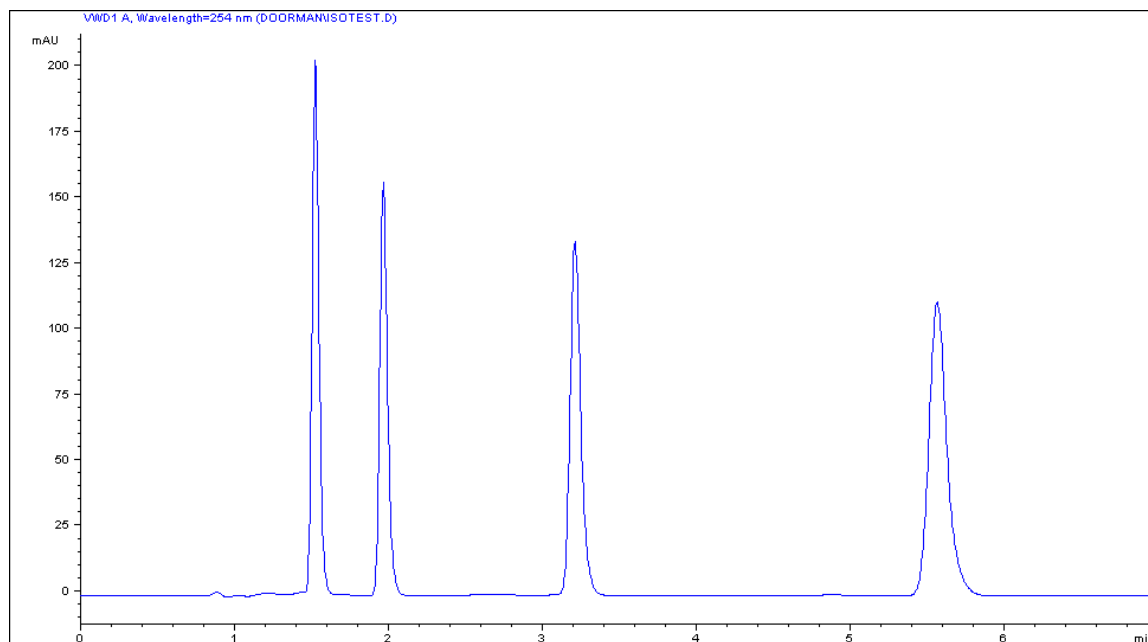
- 15 Fill the content of an isocratic standard sample ampoule into a vial and seal the vial with a cap.
- 16 Fill the injection syringe with the isocratic standard sample.

Running the Sample and Verifying the Results

- 1 At the Manual Injector move the handle into the load-position.
- 2 Take the injection syringe and insert its tip into the Manual Injector port.
- 3 Inject the sample into the injection port (loop).
- 4 Move the handle into the inject-position. This will start the 1100 modules and the online plot on the Value Solution ChemStation will show the resulting chromatogram.

Figure 29

Chromatogram with Isocratic Test Sample on VWD



NOTE

Information about using the *Data Analysis* functions can be obtained from the *Using your ChemStation* manual supplied with your system.

Troubleshooting your System

Introduction to the diagnostic features built into
your system

This chapter will introduce you to the diagnostic features built into your system. It is an overview and more details can be found in the system component's *Reference Manuals*.

Diagnostic Functions

Status Information on the 1100 Modules

LEDs

The 1100 modules provide two LEDs each.

- A green LED is built into the power switch and indicates that the power supply has been turned on. It does not indicate, whether all voltages are present or not.
- A multi-color LED at the top-right of the module, indicates the actual state of the module/system.

RED: indicates an error condition in the module/system (e.g. leak).

YELLOW: indicates a not-ready condition (e.g. lamp is off)

LED OFF: the system is ready (ChemStation is GREEN)

GREEN: the system is in run mode (ChemStation is BLUE)

In case of an error condition, check for corresponding error messages in the system log or instrument error log, see Figure 31 on page 56.

Analog Signals

The isocratic pump and the variable wavelength detector provide an analog output, where module specific analog signals (pump: pressure, pressure ripple; VWD: absorbance signals, board temperature, ...) can be selected and plotted to a connected recording device or routed into a data system (via A/D converter).

NOTE

For detailed information on error messages, signals and tests refer to the user interface help system and the module's *Reference Manual, section Diagnostics*.

Online System Information

Online Messages

The user interface (Value Solution ChemStation or Control Module) provides certain messages (errors or not-ready conditions) online.

Depending on the actual state of the modules/system the color of the system changes.

RED: indicates an error condition in the module/system (e.g. leak).

YELLOW: indicates a not-ready condition (e.g. lamp is off)

LED OFF: the system is ready (ChemStation is GREEN)

BLUE: the system is in run mode

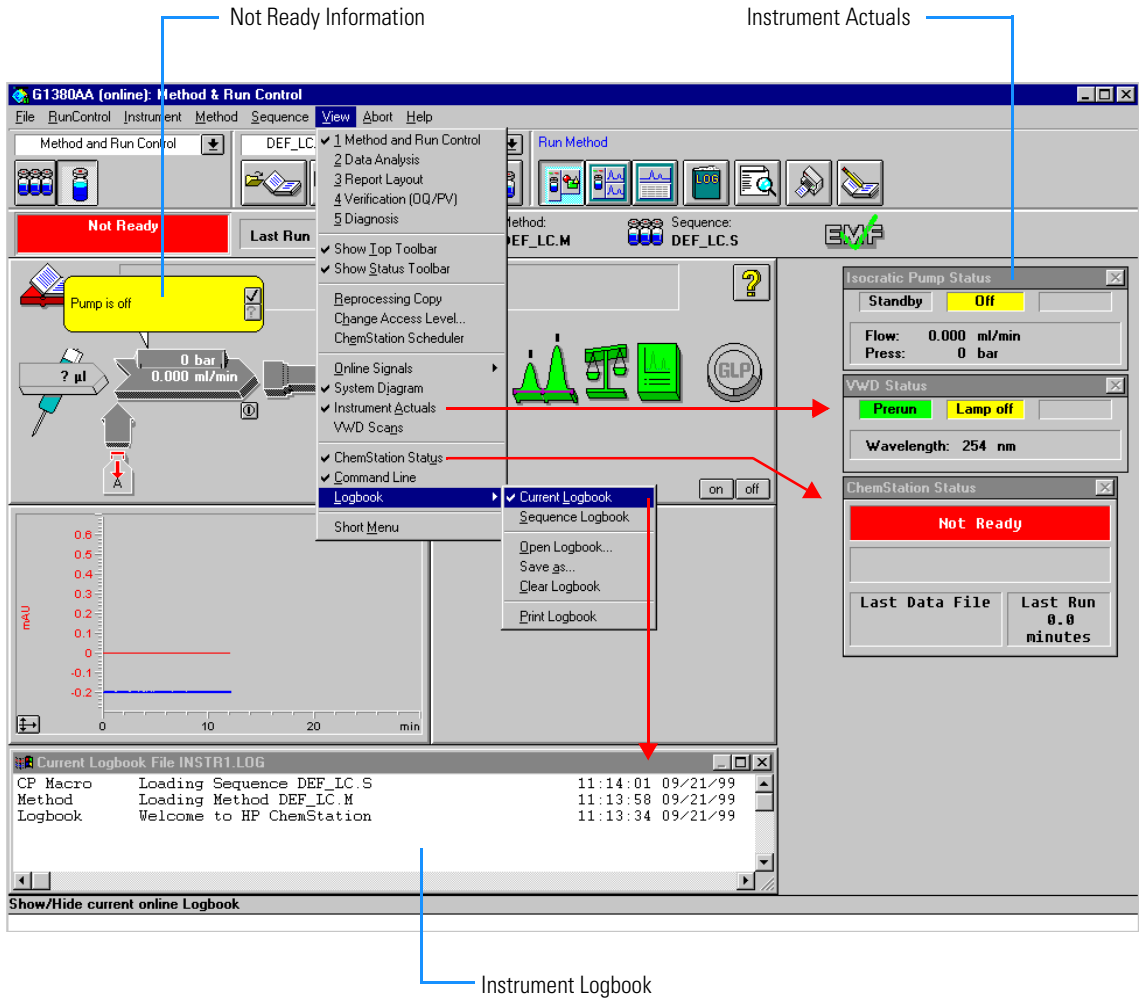
Signals

The isocratic pump and the variable wavelength detector provide module specific signals (e.g. pump: pressure, pressure ripple; VWD: absorbance signals, board temperature, ...) that can be monitored online (may vary depending on the user interface in use).

NOTE

For detailed information on error messages, signals and tests refer to the user interface help system and the module's *Reference Manual, section Diagnostics*.

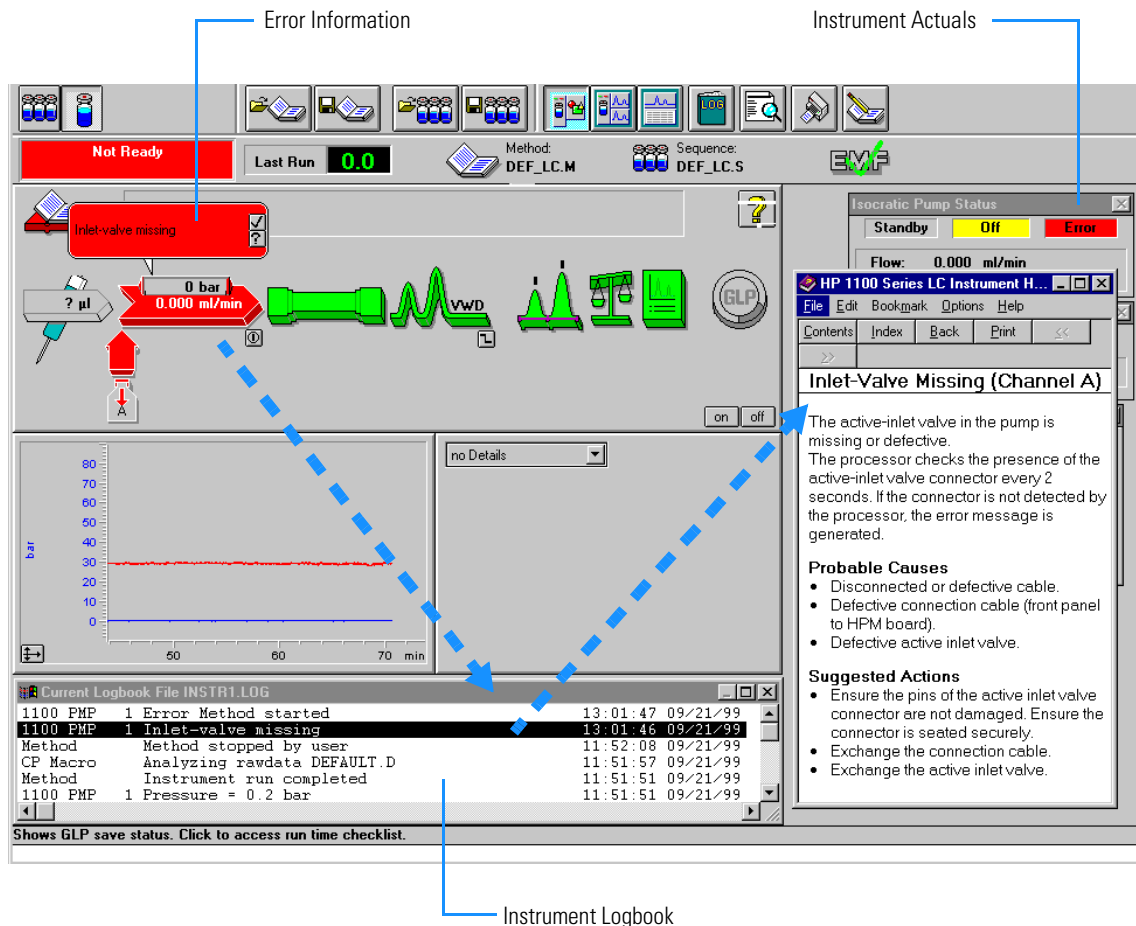
Figure 30 Online System Information



Instrument Logbook and Help Information

The user interface (Value Solution ChemStation or Control Module) provides an instrument logbook where errors, not-ready conditions and all activities are recorded. In case of an error condition, check for corresponding error messages in the system log. Just by double-clicking the error message opens another window with help-information on the problem, see Figure 31.

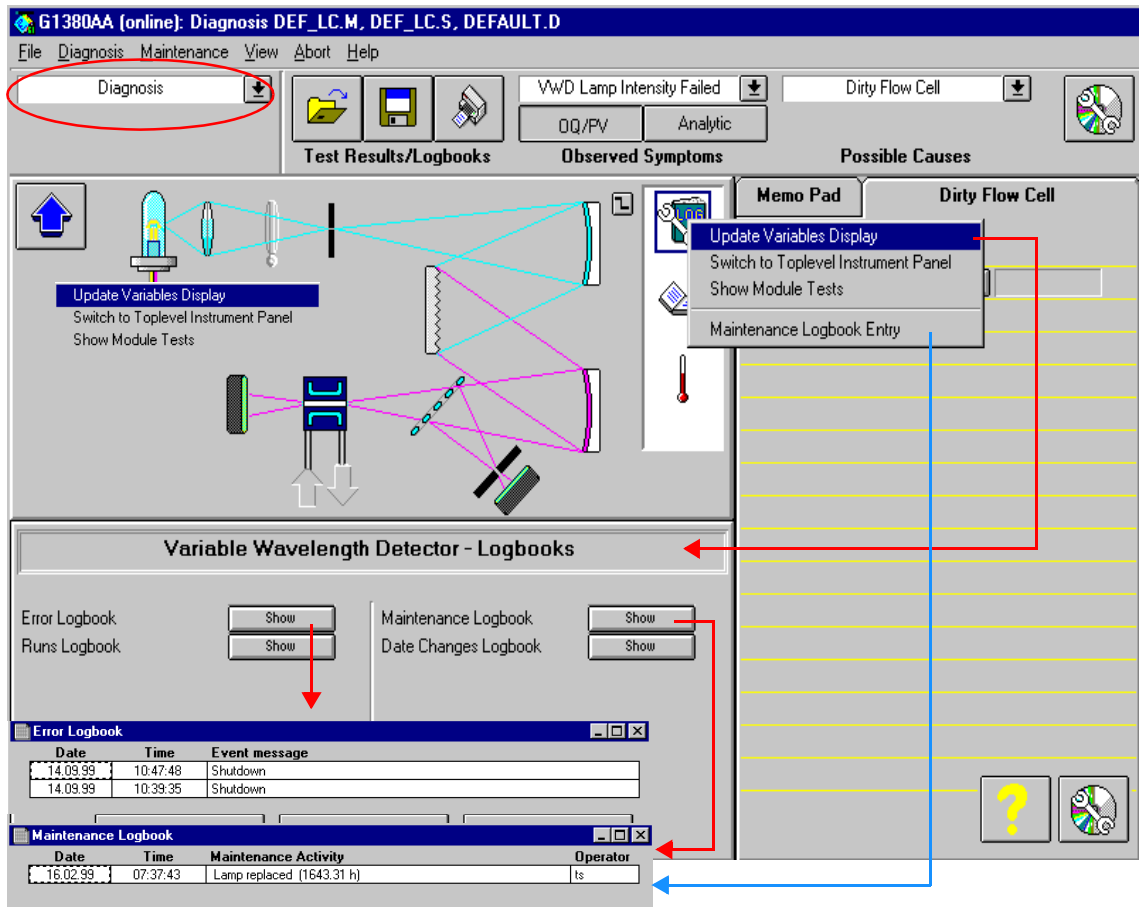
Figure 31 Online Error Information



Using Module Diagnosis

Select *View Diagnosis*. Figure 32 shows the VW detector detailed diagnostic screen (on the overall diagram select the VWD and select *Show Module Details*). Via *Update Variables Display* you have access to the module logbooks, module tests and maintenance entries. Clicking on an assembly (e.g. lamp) opens a sub-menu. Selecting *Update Variables Display* displays lamp related information (e.g. lamp on time, lamp ignitions, voltages, etc.).

Figure 32 Module Diagnosis



Using Module Tests

Select *Show Module Tests*. Figure 33 shows the VW detector module test screen. From the procedure list select a test (e.g. *Intensity Test*) and press *Start*. The tests runs and outputs an intensity spectrum and the test results. If a test fails (or part of it) you can select on the troubleshooting guide a symptom and you will get a possible cause. Use the *module's Reference Manual* to correct the problem.

Figure 33 Module Tests

Troubleshooting Guide, select a symptom and then a defect cause

Dirty Flow Cell

Start

Start

Copy to Memo Pad

Close

VWD Intensity Spectrum

Intensity (counts)

Wavelength (nm)

Intensity Test Results

| | Limits | Measured | Result |
|--------------------------------|-------------|------------|--------|
| Date: 21.09.99; Time: 13:31:55 | | | |
| Accumulated lamp on time | | 21.09 h | ■ |
| Highest intensity | > 10000 cts | 263105 cts | Passed |
| Average intensity | > 5000 cts | 35101 cts | Passed |
| Lowest intensity | > 200 cts | 1185 cts | Passed |

If test failed

Problems during the Installation

In case of problems during the installation follow the hints in the table below:

Table 8 **Troubleshooting Guide**

| Symptom | What you can do |
|--|--|
| No communication between PC and 1100 modules | <ul style="list-style-type: none"><input type="checkbox"/> JetDirect card installed in the detector? (see page 19)<input type="checkbox"/> LAN cable connected? (see page 30)<input type="checkbox"/> Bootp Server running? (see page 32)<input type="checkbox"/> IP addresses of JetDirect card set correctly? (see page 33)<input type="checkbox"/> ChemStation Configuration Editor set correctly? (see page 35)<input type="checkbox"/> 1100 System Access set correctly? (see page 37) |

Troubleshooting your System

Problems during the Installation

Repair and Maintenance

What you should know about your system

Repair and Parts Information for the 1100 series HPLC Modules

There is no specific repair and parts information other than that available in the *Reference Manuals* of the 1100 series HPLC modules, sections “*Repairing the ...*” and “*Identifying Parts and Materials*”.

Firmware Update on 1100 Modules

The installation of new firmware is required

- if a new version solves problems of the currently installed version.
- if the version of firmware on the new main board after an exchange of the board is older than the one previously installed.

To upgrade the module's firmware follow the procedures and instructions given on the internet addresses:

| | |
|---|--|
| http://www.agilent.com | section <i>Service&Support - Chemical Analysis - Technical Support</i> |
| http://www.chem.agilent.com | section <i>Technical Support</i> |

To download and install always the newest available version of firmware on

Deinstallation and Reinstallation of the ChemStation

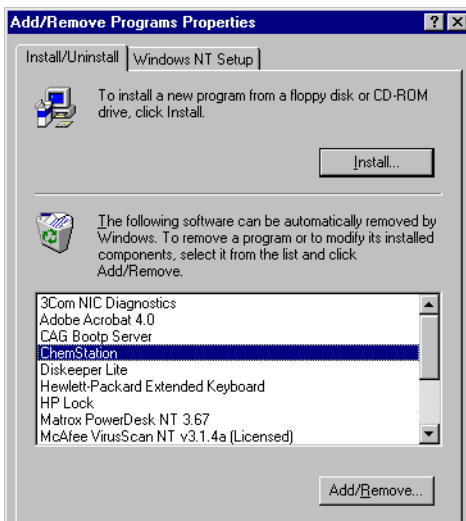
The reinstallation of the Value Solution ChemStation software may be required in case of other problems during normal operation.

The steps below will give a quick overview on the actions:

- 1 Backup all the important data, specific methods and sequences located under \HPCHEM\1\....
- 2 Open the *Add/Remove Programs Properties* of the Windows NT Control Panel (Start -> Settings - Control Panel). Select the ChemStation application and press *Add/Remove*.

Figure 34

Removing ChemStation



- 3 Rename the directory C:\HPCHEM to HPCHEM.OLD.
- 4 Open the C:\WINNT\WIN.INI file (e.g. with the *SYSEDIT* program) and delete the section [PCS] until the next [...] section.
- 5 Reboot the PC and delete the HPCHEM.OLD folder.
- 6 Proceed with “Step 4: Installation of Value Solution ChemStation” on page 69.

Recovering from an Operating System Crash

The re-installation of the complete operating system is required after a system crash or in case of other problems during normal operation.

WARNING

The procedure below will overwrite the complete system. This means all existing data on the PC will be lost. Any sensitive data must be backed on a different media prior to this process.

What you need

- Recovery CD
- Password for NT
- Value Solution ChemStation software CD
- Licence number

Process steps

- 1 Installation of Windows NT
- 2 Installation of TCP/IP protocol
- 3 Re-installation of Windows NT service pack
- 4 Installation of Value Solution ChemStation software
- 5 Installation of Bootp Server program
- 6 Configuring the CAG Bootp Server program

Step 1: Installation of Windows NT

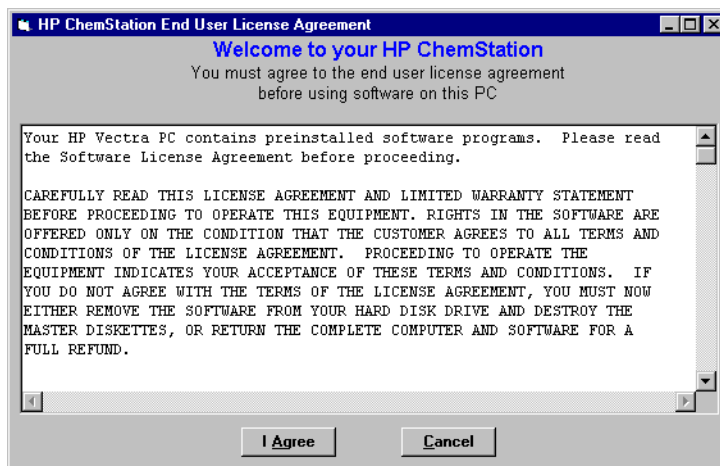
- 1 Insert the recovery CD into the CD-ROM drive.
- 2 Turn on the PC.
- 3 Press Enter to start the installation of the Windows NT operating systems.

Recovering from an Operating System Crash

- 4 The PC will reboot and stop at the Login Information screen. The pre-configured user is 'Administrator' and requires the password provided with your PC.
- 5 Then press *OK*.
- 6 The next screen shows 'End User Licence Agreement' information. Read the information and select *I Agree* and the PC will complete the boot process.

Figure 35

Licence Agreement



Step 2: Installation of TCP/IP protocol

- 1 From the Start menu in the Task Bar, select Start -> Settings -> Control Panel.
- 2 Select Network, to open the Network Properties dialog box.
- 3 Select the *Adapters* tab to check if a network card is configured on your system (Figure 36).
- 4 Select the *Protocols* tab and check if a TCP/IP protocol is already installed. If no TCP/IP protocol is installed (Figure 37), select *Add* to add a network protocol stack, select *TCP/IP Protocol* and press *OK*.

Figure 36 TCP/IP Configuration Screens- Adapters

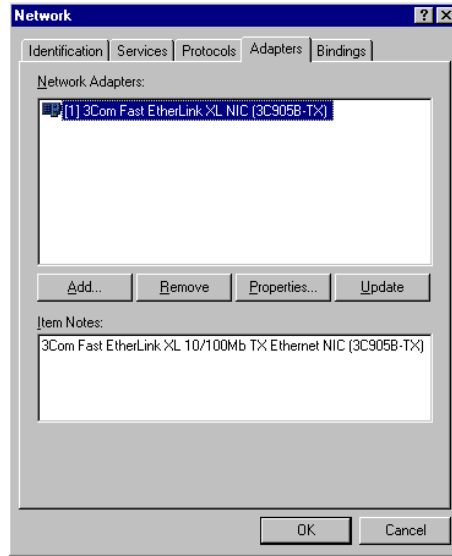
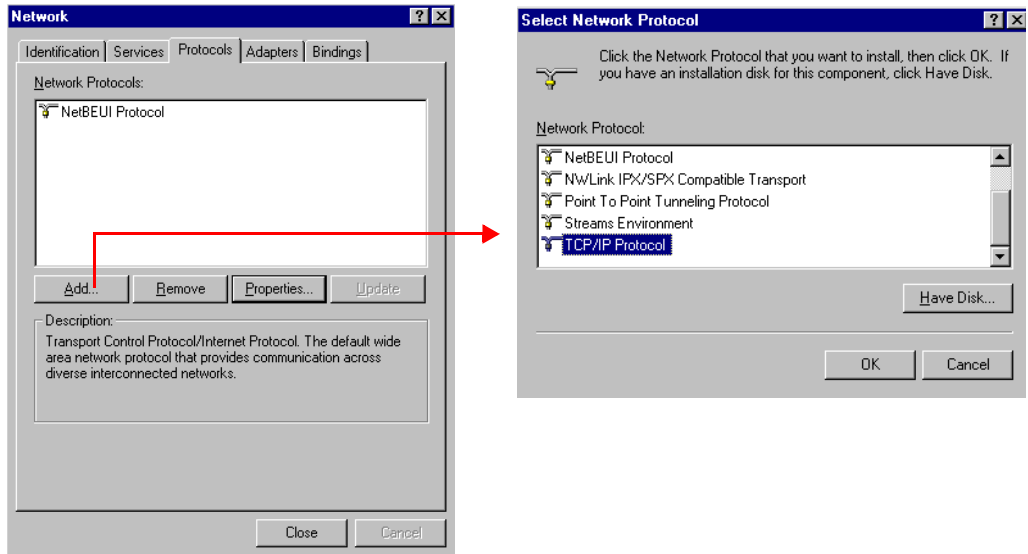


Figure 37 TCP/IP Configuration Screen - adding TCP/IP Protocol

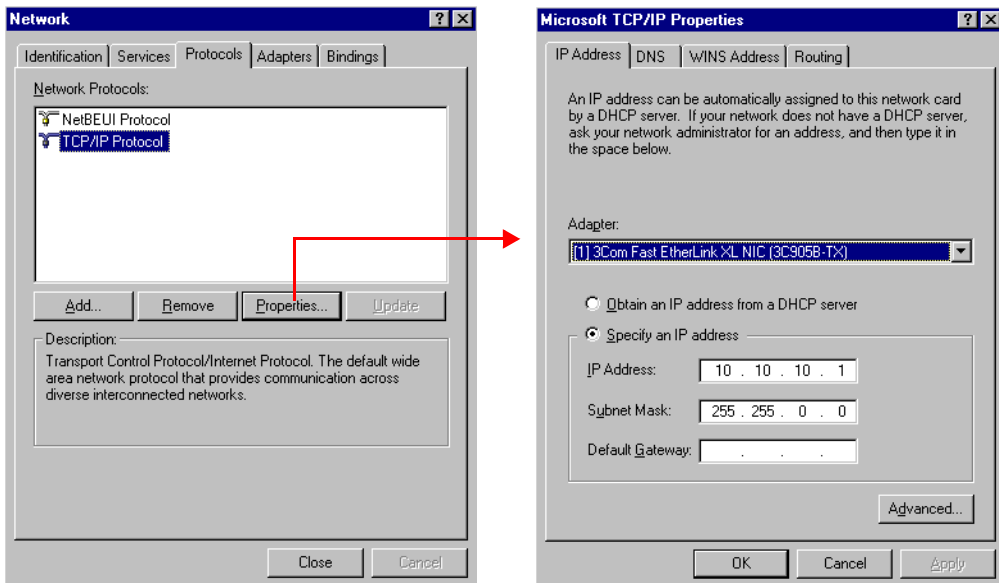


Recovering from an Operating System Crash

- 5 Select *No* to the usage of DHCP and use C:\I386 as the location of your Windows NT 4.0 installation files on your hard disk.

After the file copying is finished, select the *Bindings* tab, to allow NT to associate the TCP/IP protocol with your installed network adapter.

- 6 Open the *Protocols* tab again and select TCP/IP from the list of installed protocols. Press the *Properties* button to configure the TCP/IP, see Figure 38 on page 68.

Figure 38**TCP/IP Configuration Screen - Changing Properties**

- 7 Specify as IP address 10.10.10.1 and for the subnet mask 255.255.0.0.

NOTE

If you are working in a network system, you may need other addresses.

- 8 Now select the bindings tab again, to allow the operating system to associate the configured protocols to the configured network adapters. Select OK and restart your PC to activate the changes.

Step 3: Re-installation of Windows NT Service Pack

NOTE

After the PC has been re-started it is necessary to re-install the Windows NT Service Pack to update older file versions.

- 1 Run the SP4I386.EXE from directory C:\I386\SP4.
- 2 Restart your PC to activate the changes.

Step 4: Installation of Value Solution ChemStation

- 1 Insert your Value Solution ChemStation software CD into the CD-ROM drive.
- 2 Select a path, usually *C:\HPCHEM*.
- 3 Choose a program folder, usually *ChemStations*.
- 4 Add the licence number of your Value Solution ChemStation software, see “Adding the licence number” on page 36.
- 5 Add the IP address of the JetDirect card, located in the VW detector. Type in 10.10.10.2, see “ChemStation Program Folder” on page 35.
- 6 At the end of the installation you are asked to reboot to make the changes active.

Step 5: Installation of the Bootp Server Program

- 1 Insert your Value Solution ChemStation software CD into the CD-ROM drive.
- 2 From the Windows Start menu in the Task Bar, select Start -> Run and browse for E:\Bootp\Setup.exe. Select it and run it. The Bootp Server program will be installed now.

Step 6: Configuring the CAG Bootp Server Program

NOTE

Assure that the VW detector (with JetDirect card installed and connected to the PC) is powered off.

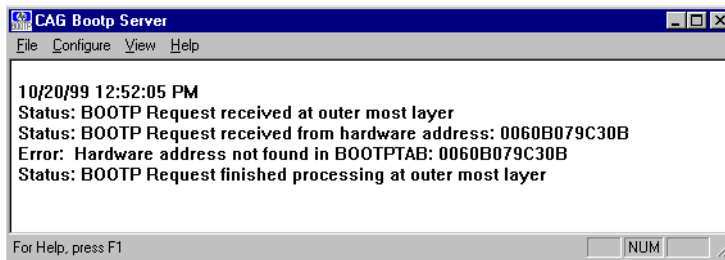
The CAG Bootp Server program is placed in the start-up group and automatically is started during the boot process of the PC. It's minimized and located in the task bar.

- 1 Open the Bootp Server window by clicking on it in the task bar.
- 2 Now turn on the VW detector on the LAN and view the Bootp Server window. After 2 - 10 seconds the Bootp Server will display the request from the JetDirect card with the hardware (MAC) address (this information is also stored in the file trace.txt in the bootp server directory, if Log to Disk is enabled), see Figure 39.

The MAC or hardware address of the JetDirect card is a world wide unique identifier. No other network device will have the same hardware address.

Figure 39

Bootp Server



- 3 Select *Configure* -> *Add Entry* to configure the Bootp Manager. The drop down box "MAC address" lists automatically the MAC address of the installed JetDirect card (Figure 40 on page 71).

If no hardware address is found, select *Cancel* and repeat step 2 and step 3.

- 4 Specify the Host Name HP1100, the IP address 10.10.10.2, the Comment, e.g. LC1100 and the Subnet Mask 255.255.0.0.

NOTE

If you are working in a network system, you may need other addresses.

Figure 40

Add Boot Entry

- 5 Exit with *OK*.
- 6 Select Configure -> Bootp Manager. All entries made above are shown in Figure 41.

Figure 41

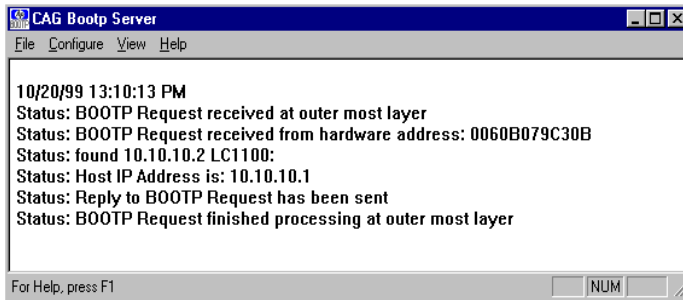
Bootp Manager

| Hardware Address | Host Name | IP Address | Comment | Subnet Mask |
|------------------|-----------|------------|---------|-------------|
| 0060B079C30B | LC1100 | 10.10.10.2 | LC1100 | 255.255.0.0 |

- 7 Press *Apply* to activate the changes. The Bootp Manager now shows the entries made above.
- 8 Press *OK* to exit the Bootp Manager and power cycle the VW detector, to force it to send a new bootp request again. This time, the MAC address will be recognized by the Bootp Server (Figure 42). It will send the configured IP address and subnet mask information which are necessary for communication to the JetDirect card.

Figure 42

Bootp Server - 1100 module found



Numerics

1100 Series

controller area network (CAN), 35

A

adding

the licence number, 36

analog signals, 53, 54

APG-remote, 23

B

booting the PC, 31

C

CAN

1100 Series, 35

connecting, 23

capillary connections, 24

configuration editor, 36

controller area network

1100 Series, 35

D

delivery checklist, 18

diagnose

a module, 57

dimensions, 14

documentation, 16

E

errors

indicator, 53

logbooks, 53, 54

online messages, 54

F

firmware update, 63

flow connections, 24

H

hardware address

JetDirect card, 32, 70

humidity, 14

I

installation

delivery checklist, 18

of flow connections, 28

unpacking, 18

installing

1100 modules, 21

ChemStation hardware, 30

JetDirect card, 19

manual injector, 21

J

JetDirect card

hardware address, 32, 70

installation, 19

L

lamp ignitions

logbook, 57

lamp on time

logbook, 57

LAN

installing communication, 32

leak channel, 25

leak drainage, 25

leaks, 24

LED, 53

legal information, 15

licence number

adding, 36

line voltage and frequency, 14

logbook

lamp ignitions, 57

lamp on time, 57

logbooks, 53, 54

login information, 31, 66

M

maintenance

entries, 57

maintenance, repair and parts, 15

manuals, 16

module diagnose section, 57

module tests, 57, 58

N

NT login information, 31, 66

O

online messages, 54

operation temperature, 14

optimization

of the system, 44

P

parts, 15

performance specifications, 15

physical specifications, 14

humidity, 14

line voltage and frequency, 14

operation temperature, 14

power consumption, 14

weight and dimensions, 14

position-sensor cable, 23

power consumption, 14

problems during installation, 59

purging the pump, 41

R

re-installation

ChemStation, 64

repair, 15

S

safety information

standards, 14

site requirements

bench space, 13

environment, 13

power considerations, 12

power cords, 12

snap fasteners, 26

specifications

performance, 15

start cable, 23

status indicator, 53

T

test

failed, 58

module, 57, 58

troubleshooting

analog signals, 53, 54

guide, 58

symptom and cause, 58

troubleshooting guide, 59

U

unpacking, 18

user documentation, 16

W

warranty and legal, 15

weight, 14



Agilent Technologies

Innovating the HP Way

In This Book

This manual contains technical reference information about the Agilent 1100 Series HPLC value system. The manual describes the following:

- system overview, specifications and limitations,
- installing the system,
- setting up an analysis,
- diagnostics and troubleshooting, and
- repairing and maintenance.



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