DIONEX

ICS-90 Ion Chromatography System Installation Instructions

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1 • Unpacking the ICS-90 System

This manual provides instructions for the initial installation of the ICS-90 Ion Chromatography System (ICS-90). Follow these installation instructions step-by-step, in the order specified.

A newer version of the ICS-90, called the ICS-90A, has a feature that allows the approximate flow rate to be displayed in Chromeleon® Chromatography Management System or Chromeleon Xpress. Unless otherwise specified, all of the information in this manual applies to both the ICS-90 and the ICS-90A. If you are unsure which system you have, check the model data label on the rear panel.

IMPORTANT **It is especially important to install Chromeleon or Chromeleon Xpress before connecting the USB cable from the computer to the ICS-90 and before turning on the ICS-90 power.**

1.1   Facility Requirements

- Make sure the ICS-90 installation site meets the following environmental specifications:

    Operating Temperature: 10 to 35 °C (50 to 95 °F)

    Humidity: 5% to 95% relative humidity, noncondensing

- The ICS-90 requires a sturdy workbench of a height that ensures convenient access to the interior.

- Allow at least 15 cm (6 in) behind the ICS-90 for power connections and ventilation. For optimal performance, install the ICS-90 in a draft-free location, out of the path of air conditioning and heating vents.

- A clean gas source regulated to between 0.55 and 0.83 MPa (80 and 120 psi) is required for pressurization of the eluent reservoir.

- Use ASTM filtered, Type I (18-megohm) deionized water when preparing eluent and regenerant.

1.2   Unpacking the ICS-90 System

1.2.1   Unpacking the ICS-90

1. Open the shipping box.

2. Remove the eluent reservoir assembly and the ICS-90 Ship Kit (P/N 059947).

3. Remove the foam cover.

4. Using the cardboard side handles, carefully remove the ICS-90 from the box. You may need to remove the foam at the sides of the ICS-90 before you can lift the instrument from the box.

⚠ **CAUTION**   **Lift the ICS-90 only from each side of the cabinet bottom. Lifting from the front door will damage the door hinges. Use caution when lifting the module: it weighs 19 kg (42 lb).**

⚠ **MISE EN GARDE**   **Ne soulevez le ICS-90 que par le fond ou les côtés. Son soulèvement par la porte du panneau avant endommagera les charnières de la porte. Soyez prudent lorsque vous soulevez le ICS-90: il pèse 19 kg (42 lb).**

⚠ **VORSICHT**   **Heben Sie das ICS-90 nur an, indem Sie von beiden Seiten unter den Boden greifen. Wenn Sie das Gerät an der Vordertür anheben, beschädigen Sie die Türangeln. Vorsicht beim Heben des Moduls: Es wiegt 19 kg.**

5. Set the ICS-90 on a workbench and cut the tape to remove the plastic surrounding the instrument.

6. Inspect the ICS-90 for any shipping damage.

1.2.2   Removing the Pump Shipping Screw

1. Carefully lay the ICS-90 on its back or side.

2. Locate the middle screw on the bottom of the ICS-90 (see Figure 1-1). This screw secures the pump in place during shipment.

3. Use a Phillips screwdriver to remove the shipping screw.

4. A screw holder is located to the right of the screw (see Figure 1-1). Place the screw in the holder for safekeeping. You will need to reinstall the screw if the ICS-90 is shipped to another location.

5. Return the ICS-90 to an upright position.
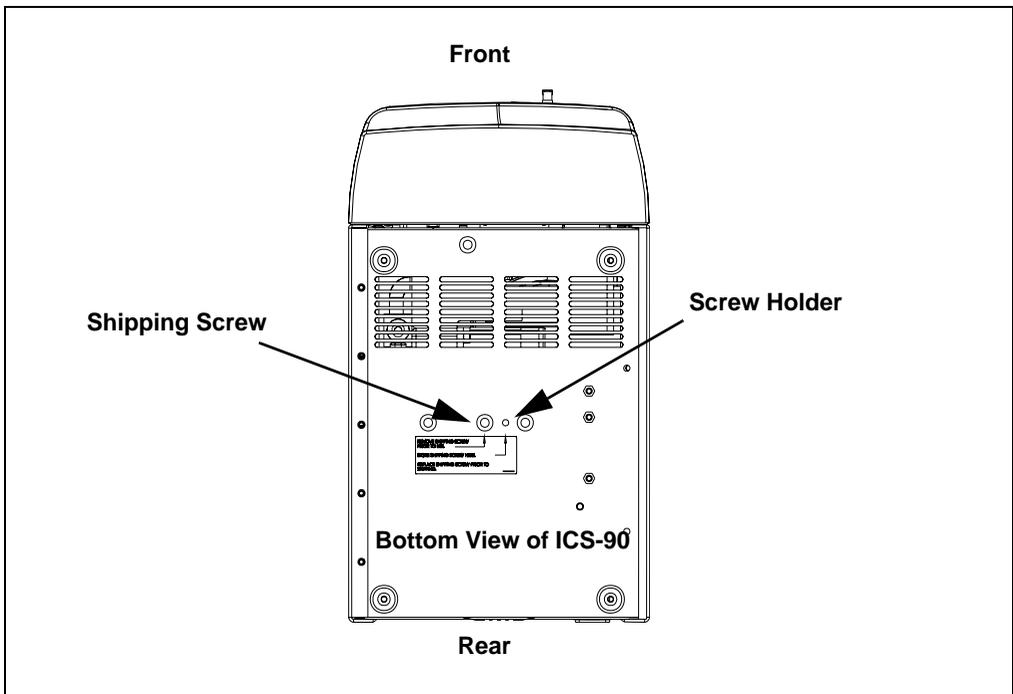
Figure 1-1. Pump Shipping Screw Removal

1.2.3   Unpacking the Computer

Outside North America

1. Remove the computer and all documentation from the computer box and place them on a workbench.

2. Chromeleon and Chromeleon Xpress run under the Microsoft® Windows® XP and Windows® 2000 operating systems. Refer to http://www.dionex.com to verify that the PC meets current system specifications.

3. Follow the instructions in the computer installation guide to hook up the PC components.

4. When you finish, go to Section 2.1 to install the chromatography software.

North America Only

> **NOTE   These instructions assume that Chromeleon or Chromeleon Xpress and the software license were installed on the PC before shipment from Dionex.**

1. Remove the computer and all documentation from the computer box and place them on a workbench.

2. Follow the instructions in the computer installation guide to hook up the PC components.

3. When you finish, go to Section 2.2 to connect the PC to the ICS-90.

2 • Installing the ICS-90 System

2.1 Installing the Chromatography Software

2.1.1 Installing the Software

NOTE **Dionex strongly recommends installing Chromeleon or Chromeleon Xpress chromatography software *before* connecting the ICS-90 to the computer on which the software is installed. When the chromatography software is installed first, USB driver information is loaded automatically and the Windows operating system will detect the ICS-90 when the power is turned on.**

The SETUP.EXE file on the Chromeleon CD-ROM installs Chromeleon or Chromeleon Xpress. After presenting a series of options for your consideration, the Setup program then copies the software onto the hard disk.

1. If this is a local computer, log onto Windows XP or Windows 2000 as an **administrator**. If this is a network computer, log on as a user with local computer administrator privileges.

    If necessary, ask the computer systems administrator for temporary administrator privileges. (Administrator privileges are required to install Chromeleon or Chromeleon Xpress, but not to operate it.)

2. Verify that the drive on which you plan to install the Chromeleon or Chromeleon Xpress application has at least 250 MB of free disk space. This is the amount of free disk space required for operation.

    Chromeleon only: 250 MB may not be enough disk space to store the large amounts of data that Chromeleon can generate. If necessary, you can store data at a different location (for example, on a network).

3. Insert the Chromeleon CD-ROM into the PC drive. The Chromeleon Setup menu should appear.

   If the Setup menu does not appear automatically, go to the Autorun folder on the Chromeleon CD-ROM and double-click **autorun.exe**. (The .exe extension is not always visible; it depends on the computer settings.)

4. Select **Launch Chromeleon Setup**.

5. Setup now guides you through the installation procedure; follow the on-screen instructions as they appear.

6. When prompted whether to add the Server Monitor program to the Startup group, select **Yes** if the computer will be physically connected to devices or **No** if the computer will never be connected to devices.

   When **Yes** is selected, the Server Monitor automatically starts when the computer is started and the program icon is displayed on the taskbar.

7. After installing the software, restart the computer.

8. Microsoft Windows should automatically detect the ICS-90 and launch the Found New Hardware Wizard. (If this does not happen, refer to the **Troubleshooting Tip** below.) Complete the wizard by selecting the following options:

   a. If asked whether Windows can connect to Windows Update to search for software, select **No, not this time**.

   b. Accept the default option (**Install the software automatically**) and click **Next >**.

   c. When the wizard reports that the software for the module has been installed, click **Finish**.

Troubleshooting Tip

If a Microsoft Windows message box asks for the USB configuration file (cmwdmusb.inf), it indicates that you connected the ICS-90 to the PC and turned on the ICS-90 power before installing Chromeleon or Chromeleon Xpress.

Follow these steps to resolve the problem:

1. Click **Cancel** in the Windows message box.

2. Turn off the power to the ICS-90 and unplug the USB cable from the computer.

3. Install Chromeleon or Chromeleon Xpress.

4. Reconnect the USB cable to the computer and turn on the power to the ICS-90. Windows will now automatically recognize the ICS-90.

2.1.2 Installing the Software License

In order for the Chromeleon or Chromeleon Xpress computer to control the ICS-90, a valid software license must be installed. To install the license, you must first install a dongle on the computer and then enter a license Key Code in Chromeleon. (A dongle is an adapter that is connected to the parallel PC interface or USB port. The dongle stores the serial number of a Chromeleon computer.)

> **NOTE If the software license is managed via a License Server, a dongle is not required.**

1. Plug the dongle into the appropriate port on the computer (either a parallel or USB port, depending on the type of dongle). For a parallel port dongle, be sure to tighten the connector screws.

2. If it is not already running, start the Chromeleon Server Monitor (select **Start > Chromeleon > Server Monitor**).

The Server Monitor window opens.

- If Chromeleon or Chromeleon Xpress was installed on the computer before shipping, the Server Monitor status will display "Chromeleon Server is running idle." (This is because the license Key Code was entered before shipping.) If this is the case, click **Close** and go Section 2.5.1 to create a timebase.

- If Chromeleon or Chromeleon Xpress was not pre-installed, the Server Monitor status displays "Chromeleon Server is running idle (Evaluation Mode)." (see Figure 2-1). If this is the case, go on to Step 3.
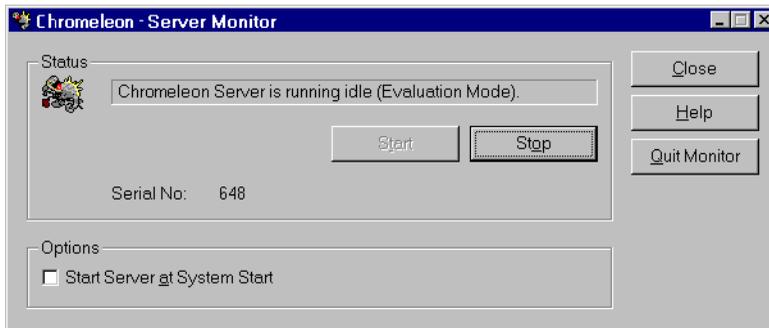
Figure 2-1. Server Evaluation Mode

3. Open the Chromeleon Server Configuration program (select **Start > Chromeleon > Server Configuration**).

4. Select **Edit > Properties** to open the Server Configuration properties dialog box (see Figure 2-2). Click **Dongle** and then enter the **Key Code** provided with the Chromeleon license. Click **OK**.
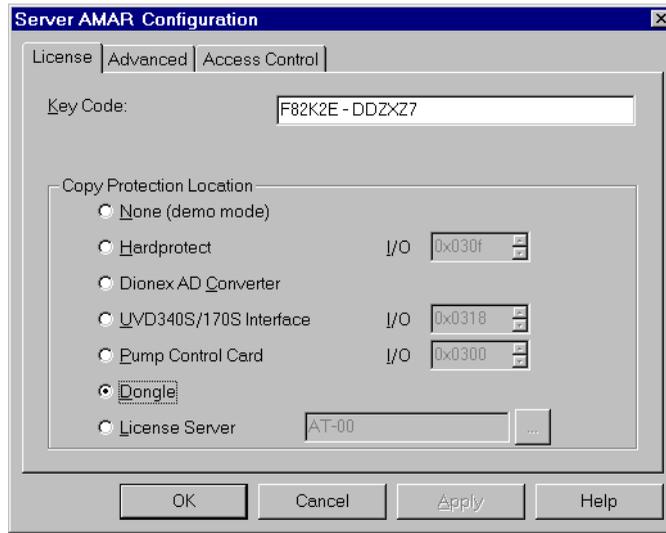
Figure 2-2. Server Configuration Properties

5. Check the Server Monitor status. It should now display "Chromeleon Server is running idle." (see Figure 2-3).
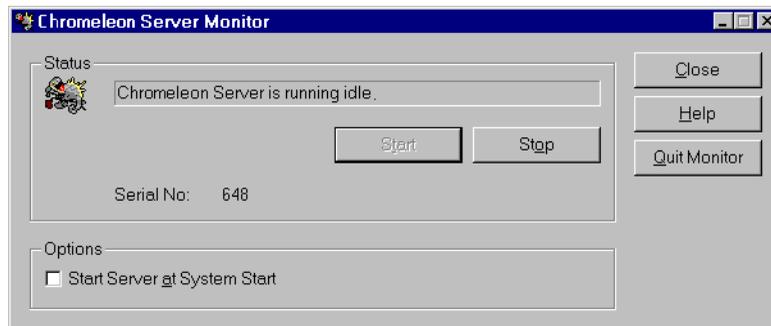
Figure 2-3. Server Running

6. Click **Close** to close the Server Monitor window.

2.1.3   Starting the Chromeleon Server Monitor

1. If the Chromeleon Server Monitor program did not start automatically, start it now by double-clicking the Server Monitor icon on the Windows taskbar.

   If the Server Monitor icon is not on the taskbar, click **Start** on the taskbar and select **All Programs** (or **Programs**, depending on the operating system) **> Chromeleon > Server Monitor**.

2. If the server is not already running, start it by clicking **Start**.
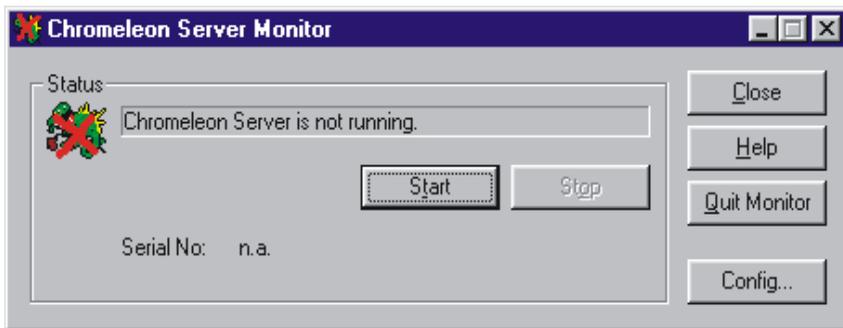
3. Click **Close** to close the Server Monitor program window.

   The Server Monitor icon appears on the taskbar.

> **NOTE   Clicking the Quit Monitor button quits (or exits) the Server Monitor program, but does not stop the server. To stop the server, click the Stop button.**

2.2   Connecting the ICS-90 to the Computer

The ICS-90 rear panel (see Figure 2-4) provides one USB receptacle. Select one of the following methods for connecting the ICS-90 to the PC on which Chromeleon or Chromeleon Xpress is installed:

• Connect the ICS-90 directly to a USB port on the PC.

• If there are no unused USB ports on the PC, connect the ICS-90 to an external USB hub (P/N 060392) and connect the PC to the hub.

If the dongle provided with Chromeleon or Chromeleon Xpress is for a USB port, remember to reserve a USB port on either the PC or the hub for the dongle.

IMPORTANT   **Before connecting the USB cable and turning on the ICS-90 power, verify that Chromeleon or Chromeleon Xpress is installed on the PC (see Section 2.1.1).**
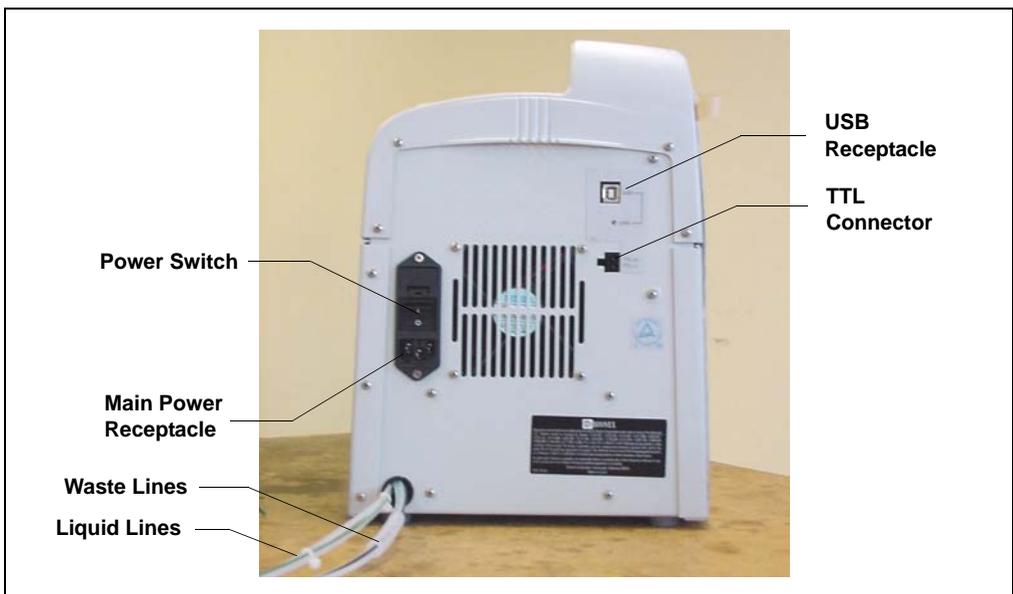
Figure 2-4. ICS-90 Rear Panel

To connect the ICS-90 directly to the PC:

1. Locate the USB cable (P/N 960777) provided in the ICS-90 Ship Kit (P/N 059947).

2. Plug the "A" connector of the USB cable into the USB port on the PC (see Figure 2-5).

3. Plug the "B" connector of the USB cable into the USB receptacle on the ICS-90 rear panel (see Figure 2-5).
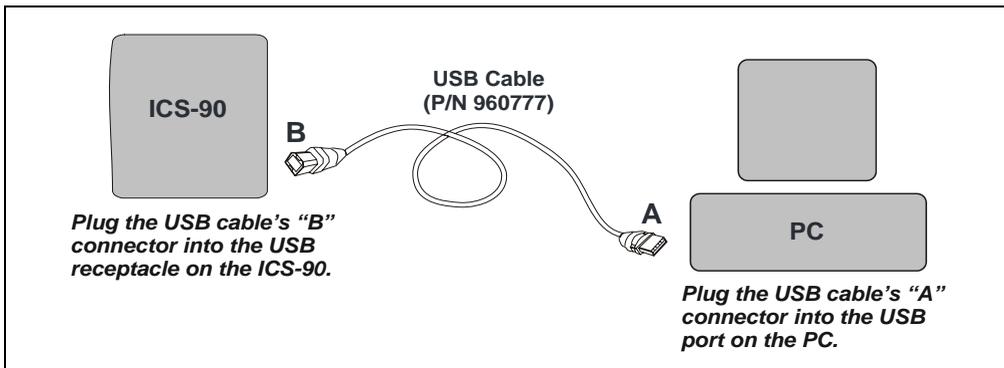
Figure 2-5. Example Connections: One ICS-90 Connected to the Computer

To connect the ICS-90 to an external hub (P/N 060392):

The ICS-90 Ship Kit (P/N 059947) includes one USB cable (P/N 960777). You must order another USB cable for this configuration.

> [IMPORTANT] **The USB standard limits the USB cable length to 5 m (5.5 yds). Each USB device can be separated from the PC by no more than five hubs. Thus, each USB device can be located no more than 30 m (32 yds) from the PC.**

> [IMPORTANT] **Carefully secure all USB cables, the external hub, and the hub power cable so that they cannot be accidentally disconnected.**

1. Plug the "A" connector of a USB cable into a port on the external USB hub (see Figure 2-6).

2. Plug the "B" connector of the cable into the USB receptacle on the ICS-90 rear panel (see Figure 2-6).
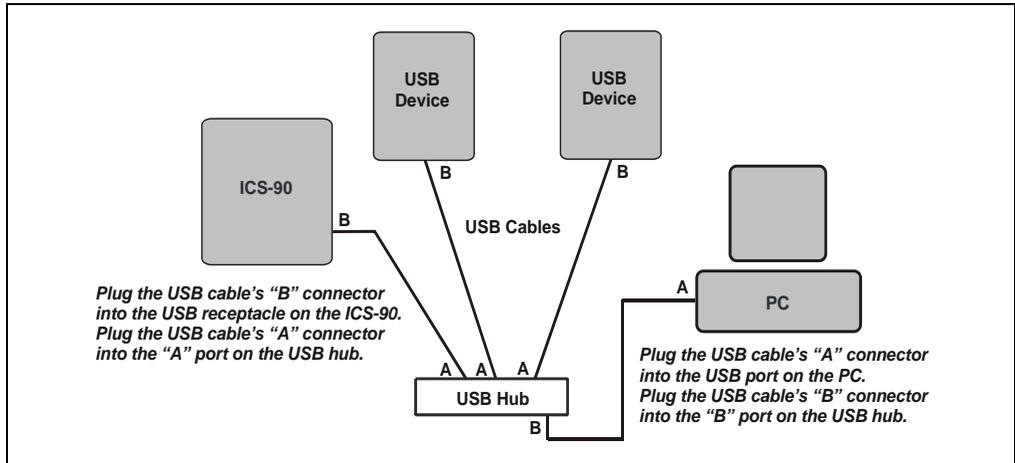
Figure 2-6. Example Connections: Multiple Modules Connected to an External Hub

3. Plug the "A" connector of a USB cable into a USB port on the computer (see Figure 2-6).

4. Plug the "B" connector of the cable into a port on the USB hub.

2.3 Connecting the Power Cord

1. A label on the ICS-90 rear panel indicates the line frequency (60 Hz or 50 Hz) and voltage (110 to 120 VAC or 220 to 240 VAC) for which the system is designed. Make sure the frequency and voltage are appropriate for your location. If you are unsure, consult an electrician.

2. Connect the power cord (IEC 320 C13) from the main power receptacle on the rear panel (see Figure 2-4) to a grounded power source.

⚠ **WARNING**

SHOCK HAZARD—To avoid electrical shock, use a grounded receptacle. Do not operate the ICS-90 or connect it to AC power mains without an earthed ground connection.

⚠ **CAUTION**

The power supply cord is used as the main disconnect device. Make sure the socket-outlet is located near the ICS-90 and is easily accessible.

Operation at AC input levels outside of the specified operating voltage range may damage the ICS-90.

DANGER D'ÉLECTROCUTION—Pour éviter toute électrocution, il faut utiliser une prise de courant avec prise de terre. Ne l'utilisez pas et ne le branchez pas au secteur C.A. sans utiliser de branchement mis à la terre.

Le cordon d'alimentation principal est utilisé comme dispositif principal de débranchement. Veillez à ce que la prise de base soit située/installée près du module et facilement accessible.

STROMSCHLAGGEFAHR—Zur Vermeidung von elektrischen Schlägen ist eine geerdete Steckdose zu verwenden. Das Gerät darf nicht ohne Erdung betrieben bzw. an Wechselstrom angeschlossen werden.

Das Netzkabel ist das wichtigste Mittel zur Stromunterbrechung. Stellen Sie sicher, daß sich die Steckdose nahe am Gerät befindet und leicht zugänglich ist.

2.4 Turning on the ICS-90 Power

Before turning on the ICS-90 power, verify that Chromeleon or Chromeleon Xpress is installed. If the chromatography software is not installed first, the Windows operating system will be unable to identify the new USB device.

1. Turn on the computer power. If this is a local computer, log onto Windows XP or Windows 2000 as an **administrator**. If this is a network computer, log on as a user with local computer administrator privileges.

2. Turn on the power to the ICS-90. The operating system automatically detects the new USB device. A message flashes on the screen to inform you that the device was detected.

2.5   Setting Up the Chromatography Software

2.5.1   Creating a Timebase

1.   In the Server Configuration program, select **Edit > Add Timebase**.

2.   A clock icon appears under the server name with a default name highlighted. To use the default name, press **Enter**. To use a different name, type the name and press **Enter**. Figure 2-7 shows an example timebase named ICS-90.
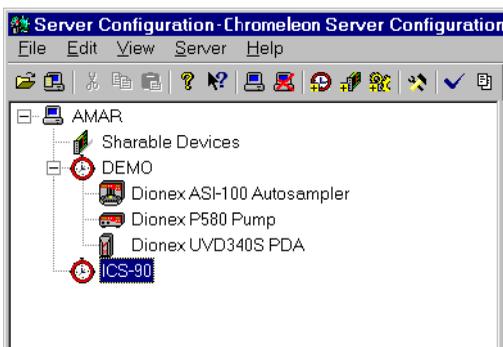
Figure 2-7. Example: Creating a Timebase

3.   Select **Edit >Add Device**. The Add device to timebase dialog box appears.
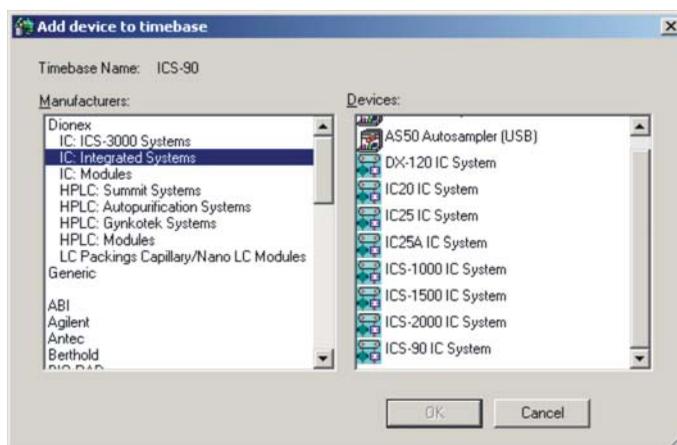
Figure 2-8. Add Device to Timebase Dialog Box

4. Select **ICS-90 IC System** from the list and click **OK**. A dialog box appears.
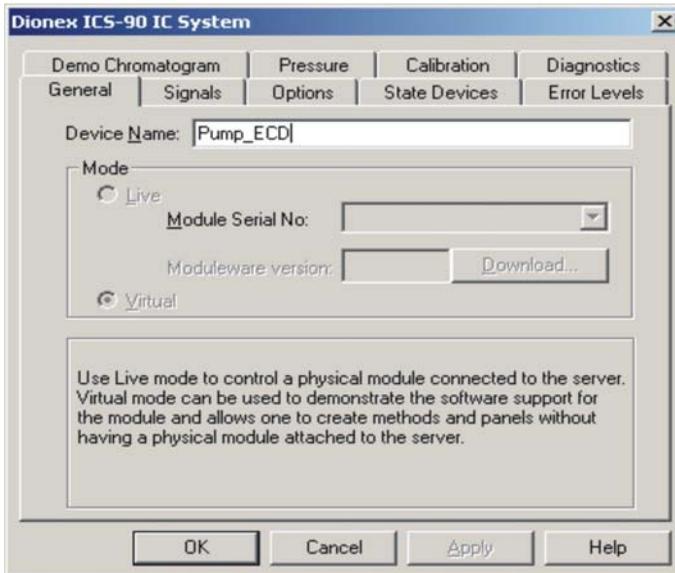
Figure 2-9. ICS-90 Configuration Properties: Live Mode

5. On the **General** tab page, **Live Mode** is selected by default. Select the ICS-90 serial number from the drop-down list. If you are installing more than one ICS-90, you can verify the serial number for each system by checking the label at the top of the component panel (see Figure 2-16).

6. Click **Options** to display the **Options** tab page.
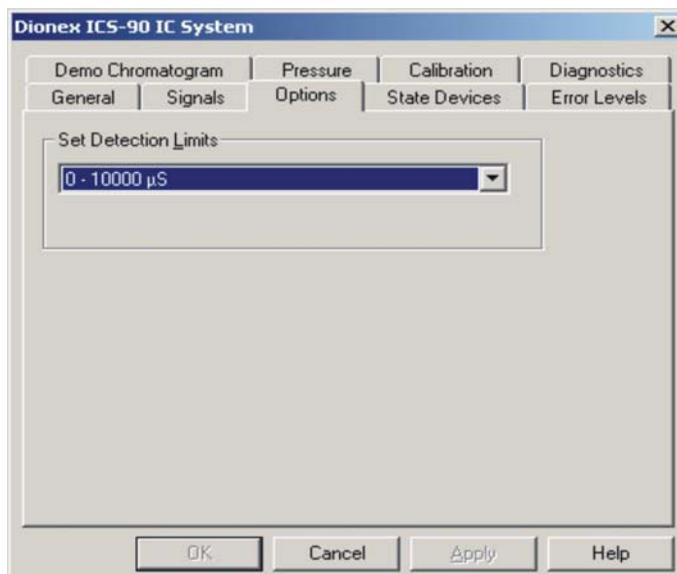
7. Select the conductivity range (0 to 500 μS or 0 to 10,000 μS) from the drop-down list under **Set Detection Limits**. Selecting the larger (coarse) range reduces the detector's resolution by a factor of 20.

> **NOTE   The Set Detection Limits option is not enabled unless Moduleware version >1.3 is installed in your ICS-90.**

8. Click **OK** to close the properties dialog box.

9. Save the configuration (select **File > Save Installation**).

10. The Server Configuration Check message window appears. You can ignore the "no inject device installed" warning, if it appears. This simply means that the timebase does not include an autosampler. Click **Close**.

11. Exit the Server Configuration program.

2.5.2 Connecting to the Control Panel

1. Click **Start** on the Windows taskbar and select **All Programs** (or **Programs**) **> Chromeleon > Chromeleon** to start the Chromeleon client.

2. If Chromeleon is installed, select **View > Default Panel Tabset** or click ⊞ on the toolbar to display the panel tabset.

> **NOTE   If Chromeleon Xpress is installed, starting the client automatically displays the panel tabset.**

3. To display the ICS-90 (or ICS-90A) Control panel (see Figure 2-10), select the **ICS-90** tab on the panel tabset. (The ICS-90A Control panel includes a **Wellness Panel** button; otherwise, the panels are identical.)
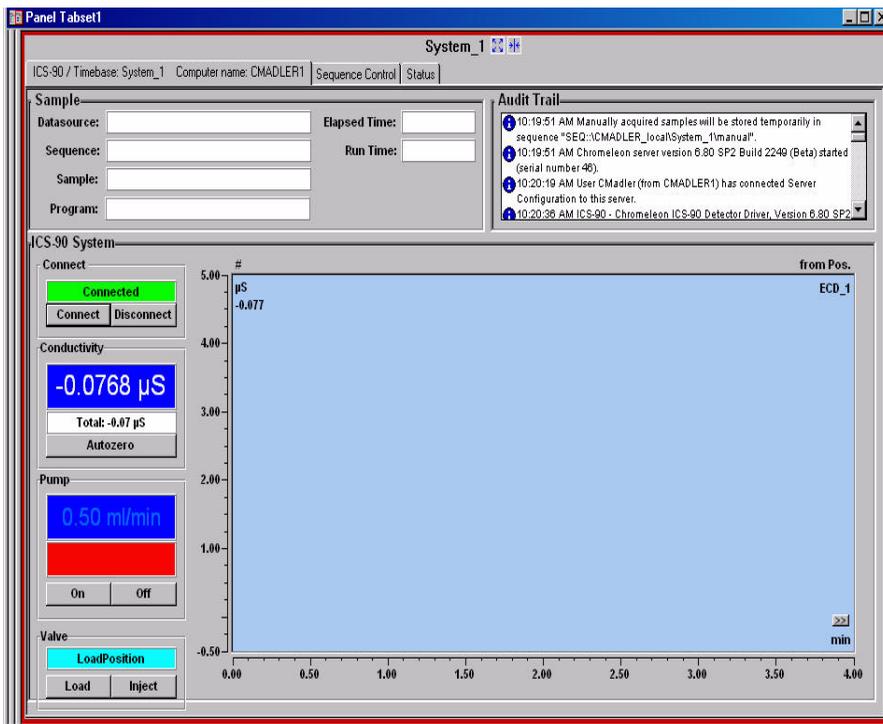
Figure 2-10. ICS-90 Control Panel on the Panel Tabset

4. If a "Cannot connect to timebase…" message appears, click **OK** to close it.

> **NOTE If the timebase was named "ICS-90" when it was created, the Control panel opens and connects automatically to the ICS-90 timebase.**

5. If the Control panel opens with the controls not yet active, connect the ICS-90 to the Control panel by clicking the **Connect** button.

   A dialog box appears (see Figure 2-11).
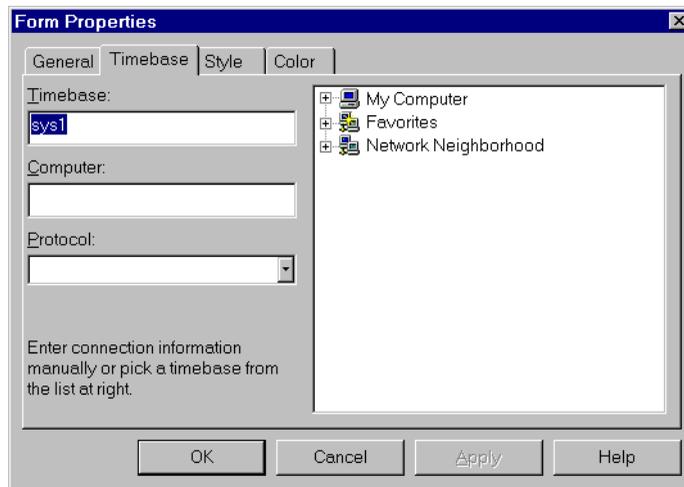
Figure 2-11. Connect to Timebase

6. Click the plus sign beside **My Computer** on the right side of the dialog box and select the timebase you created in Section 2.5.1. Click **OK** to close the dialog box.

   The controls on the panel are now connected

2.5.3 Verifying Communication with the ICS-90

To verify that Chromeleon or Chromeleon Xpress is communicating with the ICS-90, click the **Disconnect** and then the **Connect** button on the Control panel while observing the ICS-90 front panel LEDs.

If the ICS-90 and the chromatography software are communicating correctly, the **Power** and **Ready** LEDs are on when the ICS-90 is connected to Chromeleon or Chromeleon Xpress, and only the **Power** LED is on when it is disconnected.
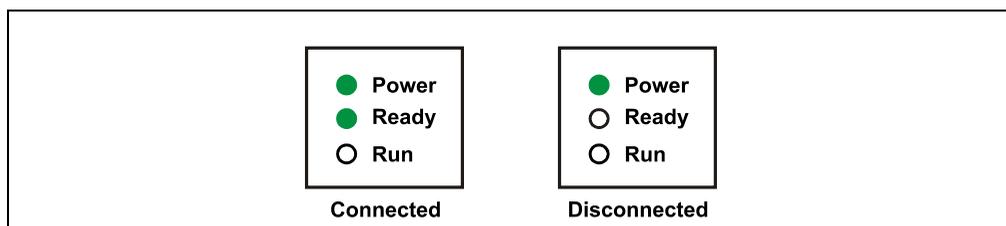
Figure 2-12. ICS-90 LEDs Connected and Disconnected States

2.6   Connecting the Waste Lines

Untape the coiled waste and liquid lines from the rear panel. Place the ends of the three waste lines into a waste container. The waste lines siphon off prime waste from the pump head, sample overflow from the injection valve, and system waste from the suppressor.

> **NOTE**   **To prevent waste from siphoning back into the system, check the lines periodically to be sure they are not bent, pinched, or elevated at any point.**

IMPORTANT

A DCR waste backpressure tubing assembly (P/N 060214) is installed on the free end of the MMS III waste line (see Figure 2-13). The assembly consists of a coupler and a 6-inch length of 0.25-mm (0.010-in) ID black tubing.

The tubing assembly provides a small amount of backpressure to compress any air bubbles formed in the suppressor's regenerant chamber. If you shorten or replace the MMS III waste line, remember to reinstall the backpressure tubing assembly. Failure to do so will result in high baseline drift.
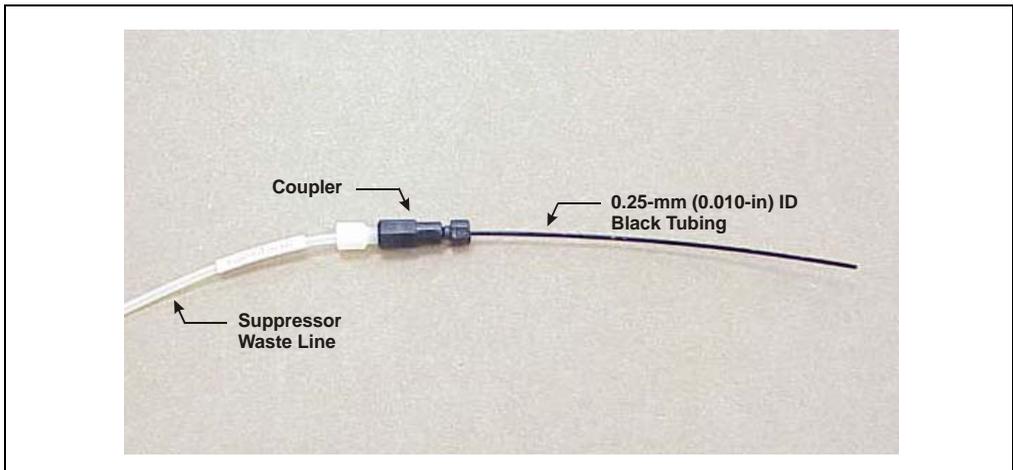
Figure 2-13. DCR Waste Backpressure Tubing Assembly

2.7   Connecting the Gas Source

1.   Locate the barbed fitting (P/N 030071), pipe thread reducer (P/N 030087),
     3-mm (1/8-in) ID tubing (P/N 040793), and ICS-90 air regulator accessory
     (P/N 060054) in the ICS-90 Ship Kit.

2.   Use the barbed fitting and pipe thread reducer to connect the 3-mm (1/8-in)
     ID tubing to a clean gas source. The gas source should be regulated to
     between 0.55 and 0.83 MPa (80 and 120 psi).

3.   Push the other end of the tubing onto the inlet of the air regulator (see
     Figure 2-14).

> **NOTE   Do not turn on the gas source. Do not pressurize until
> the eluent is prepared and the ICS-90 is plumbed.**

Figure 2-14. ICS-90 Air Regulator Accessory

2.8   Setting Up the Eluent and Regenerant Reservoirs

1.   Rinse the eluent and regenerant reservoirs.

2.   Prepare 2 L of eluent. For instructions, see the manual for the column being installed. The column manual is included on the Dionex Reference Library CD-ROM (P/N 055405), located in the Ship Kit.

3.   Follow the instructions below to prepare either anion (dilute sulfuric acid) or cation (tetrabutylammonium hydroxide (TBAOH)) regenerant.

   a.   Fill the regenerant reservoir (anion, P/N 057712; cation, P/N 057713) about halfway with ASTM filtered, Type I (18-megohm) deionized (DI) water.

⚠ **CAUTION**   **For acid concentrates (such as the anion regenerant), always pour the concentrate into deionized water, not into the empty reservoir.**

⚠ **MISE EN GARDE**   **Pour les concentrés acides (comme le régénérant anionique), versez toujours le concentré dans de l'eau désionisée et non dans le réservoir vide.**

⚠ **VORSICHT**   **Gießen Sie bei säurehaltigen Konzentraten (beispielsweise dem Kationenelutionsmittel) das Konzentrat immer in entionisiertes Wasser und nicht in den leeren Behälter.**

   b.   Empty the entire bottle of concentrate into the reservoir.

   c.   Fill the concentrate bottle with DI water and empty the contents into the reservoir.

   d.   Continue to pour DI water into the reservoir until it is filled all the way to the top. If a few drops spill over, then it is full enough.

IMPORTANT   **The regenerant reservoir must be filled all the way to the top at all times.**

   e.   Insert the stopper assembly tubing into the reservoir and tighten the stopper.

IMPORTANT   **Do not shake the regenerant reservoir to mix the contents. The ICS-90 will stratify the contents.**

> For additional information, refer to the *Installation Instructions and Troubleshooting Guide for the Displacement Chemical Regeneration (DCR) Kit* (Document No. 031664). The manual is included on the Dionex Reference Library CD-ROM (P/N 055405), located in the ICS-90 Ship Kit.

4. Make sure the regenerant reservoir is filled almost to overflowing.

5. Slip the air regulator accessory bracket over the neck of the eluent reservoir.

6. Install the caps on the eluent and regenerant reservoirs and hand tighten.

7. Place the reservoirs in the holders on the top cover of the ICS-90.

8. Connect the liquid lines from the ICS-90 to the lines exiting the eluent and regenerant reservoir caps (see Figure 2-15) as follows:

   a. Connect the two lines labeled **Eluent Bottle Out**.

   b. Connect the two lines labeled **Regen Bottle Out**.

   c. Connect the line labeled **Regen In** to the green **Regen Bottle In** line from the ICS-90.
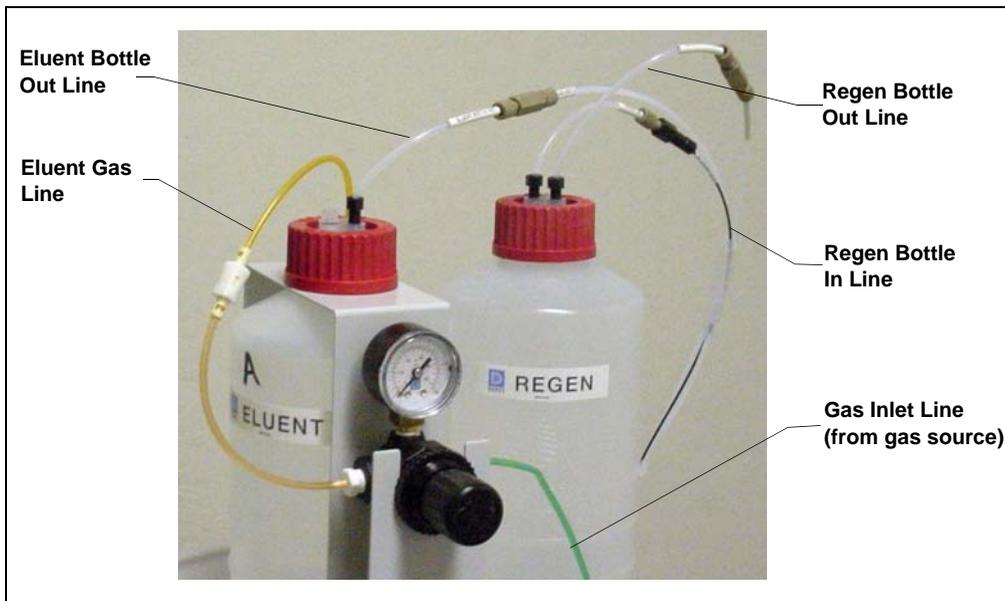
Figure 2-15. Reservoir Connections

9. To ensure the correct operating pressure for the suppressor, either one or two backpressure coil(s) (P/N 045877) must be installed between the cell outlet and the regenerant reservoir inlet. The number of coils required depends upon the application flow rate:

	Number of Required Backpressure Coils
Less than 2 mL/min	2
2 mL/min or more	1

   a. For flow rates less than 2 mL/min, verify that two coils are installed.

   b. For flow rates of 2 mL/min or more, remove one of the backpressure coils.

> **NOTE** **Refer to the flier *Backpressure Coil Pressure Test for Dionex Suppressors* (Document No. 031759) (shipped with the suppressor) for details about suppressor operating pressure requirements.**

10. Connect the orange gas line from the eluent reservoir to the gas line on the air regulator outlet.

2.9 Installing and Plumbing the Columns and Suppressor

> **NOTE** **This section provides brief installation and plumbing instructions for the columns and suppressor. For detailed installation information, refer to the column and suppressor manuals provided on the Dionex Reference Library CD-ROM (P/N 055405).**

1. Remove the guard column, separator column, and MMS III suppressor from their boxes. Remove the fitting plugs from the ends of each column and from all ports on the suppressor. Discard the tubing that temporarily connected the suppressor ports.

2. Plumb the guard and separator columns. Refer to the labels on the tubing, to Figure 2-16, and to the following instructions.

a. Remove the union connecting **GUARD IN** and **GUARD OUT** and connect **GUARD IN** to the guard column inlet. Check the arrow on the column label; it should point away from the injection valve.

b. Connect **GUARD OUT** to the guard column outlet.

c. Push the guard column onto the clips.

d. Remove the union connecting **COL IN** and **COL OUT** and connect **COL IN** to the separator column inlet. Connect **COL OUT** to the separator column outlet. Check the arrow on the column label. It should point toward the cell (DS5).

e. Push the column onto the clips.
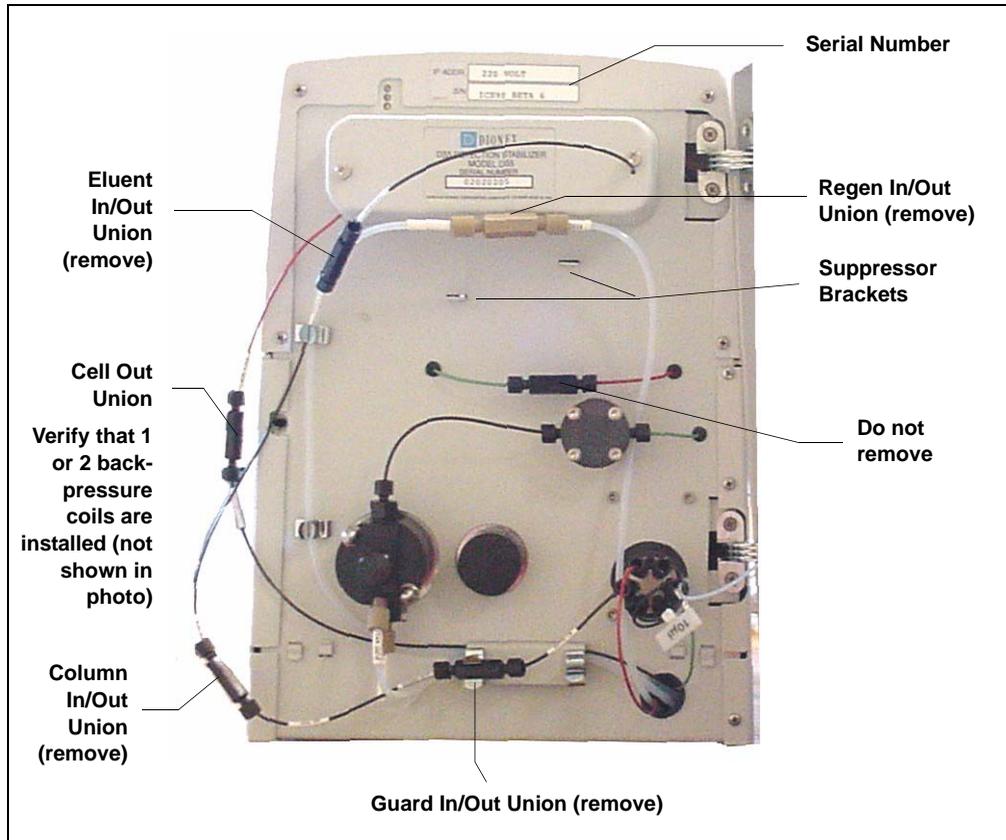
Figure 2-16. ICS-90 Component Panel (Door not shown)

3. Plumb the MMS III suppressor as follows:

   a. Install the suppressor onto the brackets located below the DS5 (see Figures 2-16 and 2-17).

   b. Remove the union connecting **ELUENT IN** and **ELUENT OUT** and connect **ELUENT IN** and **ELUENT OUT** to the corresponding ports on the suppressor.

   c. Remove the union connecting **REGEN IN** and **REGEN OUT** and connect **REGEN IN** and **REGEN OUT** to the corresponding ports on the suppressor.

Figure 2-17. ICS-90 with Columns and Suppressor Installed

4. To ensure the correct operating pressure for the suppressor, either one or two backpressure coil(s) (P/N 045877) must be installed between the cell outlet and the regenerant reservoir inlet. The number of coils required depends upon the application flow rate:

Application Flow Rate	Number of Required Backpressure Coils
Less than 2 mL/min	2
2 mL/min or more	1

    a.   For flow rates less than 2 mL/min, verify that two coils are installed.

    b.   For flow rates of 2 mL/min or more, remove one of the backpressure coils.

> **NOTE**   **Refer to the flier *Backpressure Coil Pressure Test for Dionex Suppressors* (Document No. 031759) (shipped with the suppressor) for details about suppressor operating pressure requirements.**

2.10 Pressurizing the Eluent Reservoir

> **NOTE** **Do not pressurize the regenerant reservoir.**

1. Pull out the air regulator knob and turn it fully counterclockwise to ensure there is no pressure to the reservoir when the gas source is turned on.

2. Turn on the gas source.

3. Pull out the air regulator knob and turn it clockwise to pressurize the eluent reservoir.

4. Adjust the pressure to between 30 and 40 kPa (5 and 6 psi). Push the regulator knob back in.

Do not pressurize the eluent reservoir above 70 kPa (10 psi).

Ne mettez jamais les réservoirs d'éluants sous une pression supérieure à 0,07 MPa (10 lb/po²).

Setzen Sie den Eluentbehälter auf keinen Fall einem Druck über 0,07 MPa aus.

2.11 Priming the Pump

1. Verify that the eluent and regenerant reservoirs are filled, the reservoir caps are installed and hand-tightened, and the gas and liquid lines are connected to the reservoirs (see Section 2.8).

2. Verify that the gas supply is turned on, the eluent reservoir is pressurized (see Section 2.10), and the regenerant reservoir is unpressurized. **Note:** The regenerant reservoir is unpressurized if the reservoirs are connected as described in Section 2.8.

3. Verify that the waste lines are directed to a waste container.

4. To start the liquid flow, open the pump head waste valve (see Figure 2-18) by turning the knob counterclockwise two turns. When the valve is open, eluent flows directly from the pump to waste.

Figure 2-18. ICS-90 Interior Components

5. Let the liquid flow for at least 2 to 3 minutes to ensure that there are no trapped gas bubbles in the line from the eluent reservoir to the pump head.

6.   Turn on the pump from the ICS-90 (or ICS-90A) Control panel in Chromeleon or Chromeleon Xpress. Allow the pump to run with the waste valve open for 30 seconds.

7.   Close the waste valve knob.

2.12 Setting the Pump Flow Rate (ICS-90 only)

The instructions in this section apply to the ICS-90 only. If you are unsure whether your system is an ICS-90 or ICS-90A, check the model data label on the rear panel.

2.12.1 Setting the Flow Rate

1.   Locate the production test chromatogram on the Dionex Quality Assurance Report (supplied with the separator column). Note the backpressure and flow rate listed for the column.

2.   Pull out the flow rate knob on the component mounting panel (see Figure 2-18) and turn the knob slowly to the right to begin adjusting the pressure.

     NOTES

     • **There is about a 10-second delay between adjusting the knob and the pressure reading response on the ICS-90 Control panel in Chromeleon or Chromeleon Xpress.**

     • **The flow rate on the ICS-90 Control panel is a recorded value only and does not change when the flow rate knob is adjusted.**

3.   Adjust the knob until the pump pressure reading on the ICS-90 Control panel reaches the figure listed on the production test chromatogram.

     NOTE   The production test chromatogram is produced without a guard column. If a guard column is installed, adjust the knob until the pressure is about 1.4 to 2.1 MPa (200 to 300 psi) above the backpressure listed for the separator column alone.

4. Measure the flow rate, using one of the following methods:

    •   Volumetrically (recommended for most applications): Measure the volume of liquid collected over a measured time period. The ICS-90 Ship Kit includes items for measuring the flow rate volumetrically.

    •   Gravimetrically: Weigh the mass of liquid collected over a measured time period. The gravimetric method is slightly more accurate than the volumetric method.

Volumetric Method 1 (Recommended): Using a Syringe and Adapter

a. Locate the following items in the ICS-90 Ship Kit: luer fitting (P/N 024305), luer coupler (P/N 042806), 1 mL syringe (P/N 016388), and 10 mL syringe (P/N 016387). You will also need a stopwatch or a clock or watch with a second hand (the computer's clock can be used), and a small beaker or other container for collecting waste.

b. Connect the luer coupler to the luer fitting.

c. Select the syringe to be used:

    •   For a 0.5 mL/min flow rate, use the 1 mL syringe.

    •   For a flow rate above 0.5 mL/min, use the10 mL syringe.

d. Disconnect the **ELUENT IN** line from the **ELUENT IN** port on the suppressor. Connect the luer coupler to the **ELUENT IN** line, and connect the syringe to the luer fitting (see Figure 2-19).

Figure 2-19. Assembled Syringe and Luer Adapter

e. Using a stopwatch or clock's second hand, time the flow of eluent into the syringe for 60 seconds. Determine the volume collected by noting the beginning and ending positions of the syringe plunger.

f. The volume of eluent collected in 60 seconds should be approximately equal to the desired flow rate in milliliters per minute. For example, for a flow rate of 1 mL/min, the volume should be 1.0 ± 0.1 mL.

g. If necessary, adjust the flow rate knob, and then repeat the measurement. Continue adjusting until the desired milliliters per minute is collected.

h. Reconnect the **ELUENT IN** line to the suppressor.

Volumetric Method 2: Using a Graduated Cylinder

a. Disconnect the **ELUENT IN** line from the **ELUENT IN** port on the suppressor.

b. Using a clock or watch with a second hand (the computer's clock can be used), collect eluent from the **ELUENT IN** line into a small graduated cylinder for 2 minutes.

c. The collected eluent should be approximately equal to the desired flow rate in milliliters per minute. For example, for a flow rate of 1 mL/min, 2.0 ± 0.2 mL should be collected in 2 minutes.

d. If necessary, adjust the flow rate knob, and then repeat the measurement. Continue adjustments until the desired eluent per minute is collected.

e. Reconnect the **ELUENT IN** line to the suppressor.

Gravimetric Method

a. Disconnect the **ELUENT IN** line from the **ELUENT IN** port on the suppressor.

b. Using a tared beaker and a calibrated stopwatch, collect the eluent from the **ELUENT IN** line for 60 seconds.

c. Weigh the mass of the eluent. The mass (in grams) should be approximately equal to the desired flow rate in milliliters per minute. For example, for a flow rate of 0.5 mL/min, the mass of the collected eluent should be 0.5 ± 0.02 g.

d. If necessary, adjust the flow rate knob, and then repeat Steps b and c. Continue adjusting until the desired mass per minute is collected.

e. Reconnect the **ELUENT IN** line to the suppressor.

2.12.2 Recording the Measured Flow Rate

1. From the ICS-90 Control panel, press the **F8** key or select **Control > Command**.

2. Expand the **Pump_ECD** group and select **MeasuredFlowRate** (see).
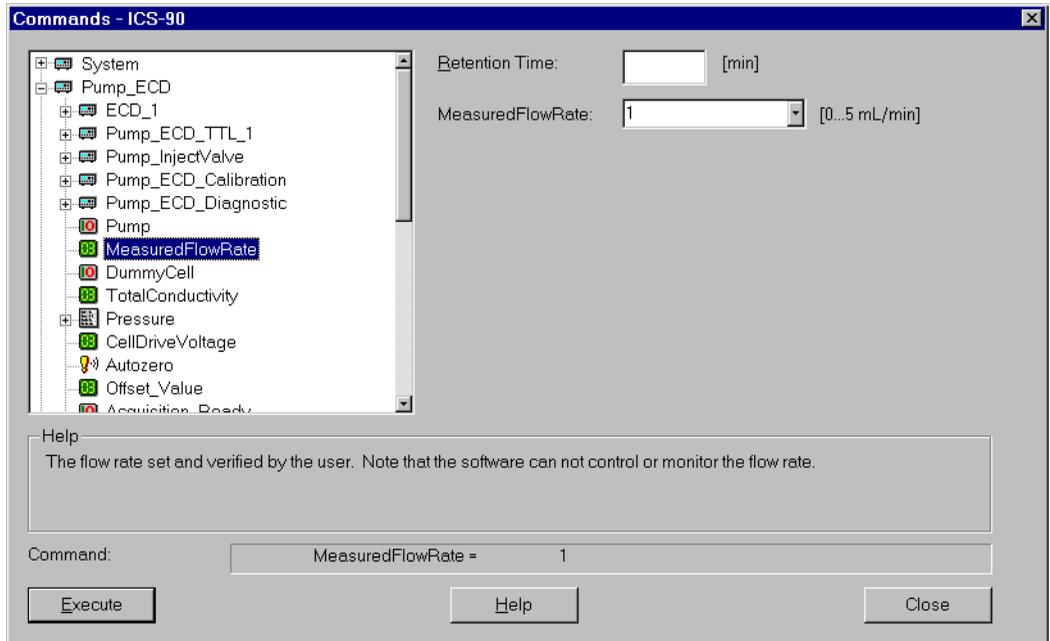
Figure 2-20. ICS-90 Chromeleon Commands: MeasuredFlowRate

3. Enter the flow rate and click **Execute**. Click **Close**. The measured flow rate is now shown on the Control panel.

2.13 Setting the Pump Flow Rate (ICS-90A only)

> **NOTE** **The instructions in this section apply to the ICS-90A only. If you are unsure whether your system is an ICS-90 or ICS-90A, check the model data label on the rear panel.**

The ICS-90A has a feature that allows the approximate flow rate to be displayed on the Control panel in Chromeleon or Chromeleon Xpress. The accuracy of the displayed flow rate depends on the flow rate at which the system was calibrated and the current pump pressure.

The ICS-90A flow rate is calibrated at the factory before shipment and does not need to be calibrated now. However, if you will typically operate the ICS-90A at a particular flow rate, you may wish to calibrate the system at that flow rate to improve flow rate accuracy. For instructions, see the *ICS-90 Ion Chromatography System Operator's Manual* (Document No. 031851). The manual is included on the Dionex Reference Library CD-ROM (P/N 055405).

To set the pump flow rate:

Pull out the flow rate knob on the component mounting panel (see Figure 2-18) and turn the knob until the desired flow rate is displayed on the ICS-90A Control panel in Chromeleon or Chromeleon Xpress.

2.14 Equilibrating the System

1. After priming the pump and adjusting the flow rate, leave the pump on and flush the system for about 5 minutes to equilibrate.

2. Monitor the system pressure from the ICS-90 (or ICS-90A) Control panel to make sure the pressure is between 107 and 153 MPa (1600 and 2300 psi). If the pressure is less than 107 MPa (1600 psi), gas may be trapped in the system. Release the gas by opening one fitting at a time from the pump head and along the plumbing to the column; pay close attention to the line from the pulse damper (see Figure 2-18).

3. Check that there are no leaks in the regenerant reservoir.

4. Check that liquid is flowing out of the suppressor **REGEN OUT** waste line and that the pressure is stable.

5. Monitor the baseline conductivity. In general, it should be <30 μS for a system set up for anion analyses, and <2 μS for a system set up for cation analyses.

2.15 Verifying Operational Status

After the system has equilibrated, verify the actual pump pressure and stability by monitoring the pump pressure. Record the short-term pressure fluctuations; they should be less than 0.13 MPa (20 psi).

2.16 Connecting the AS40 Automated Sampler (Optional)

1. Open the front door of the ICS-90 and thread the outlet line from the AS40 through the side slot near the lower ICS-90 door hinge (see Figure 2-17).

2. Connect the outlet line from the AS40 to port S (5) of the injection valve (see Figure 2-21).
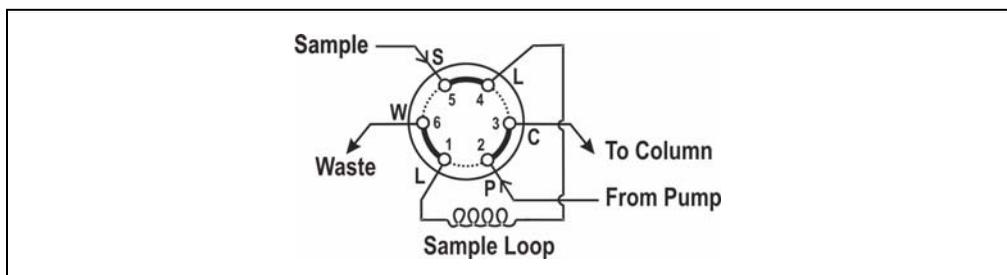
Figure 2-21. Injection Valve Connections

3. Follow the steps below to connect the **TTL Output** connector on the ICS-90 rear panel to the **RELAY CONTROL** connector on the AS40 rear panel.

    a. Locate the Relay Control cable (P/N 047946) supplied with the AS40.

    b. Connect the Relay Control cable's 10-pin connector to the **RELAY CONTROL** connector on the AS40 rear panel (see Figure 2-22).
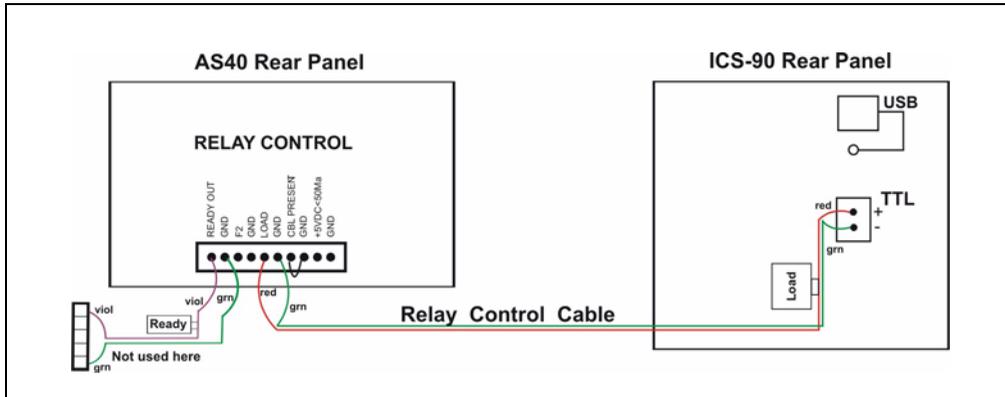
Figure 2-22. AS40 Autosampler Connection

    c.   Plug the 2-pin connector from the pair of wires labeled **LOAD** on the Relay Control cable into the **TTL Output** connector on the ICS-90.

2.17 Operating the ICS-90

ICS-90 installation is complete. For routine operation, refer to the *ICS-90 Ion Chromatography System Operator's Manual* (Document No. 031851).

2.18 Installation Troubleshooting

Problem: When the ICS-90 power is turned on for the first time, a Windows message box appears asking for a USB configuration file (cmwdmusb.inf).

Possible Cause: The USB cable was connected and the power turned on before Chromeleon or Chromeleon Xpress was installed.

Solution:

1.   Click the **Cancel** button in the Windows message box.

2.   Turn off the ICS-90 power and unplug the USB cable from the computer.

3.   Install Chromeleon or Chromeleon Xpress (see <u>Section 2.1</u>).

4.   Reconnect the USB cable to the computer and turn on the ICS-90 power. Windows will now automatically recognize the new ICS-90.