



LC30 CHROMATOGRAPHY OVEN OPERATOR'S MANUAL



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LC30 Chromatography Oven

1.1 Overview

The LC30 Chromatography Oven provides a controlled above-ambient temperature environment for a Dionex DX 500 system. The LC30 front panel displays the temperature inside the oven and the target temperature to which the oven should heat. The LC30 provides two operating temperature ranges: 0 to 41 °C, and 0 to 80 °C.

Two LC30 versions are available, depending on the type of Rheodyne injection valve installed:

- LC30 with PEEK automated injection valve (P/N 044174)
- LC30 with stainless steel automated injection valve (P/N 044176)

The LC30 also houses a combination of the following system components, which must be ordered separately or as part of another module:

- Analytical columns
- Guard columns
- Self-Regenerating Suppressor (SRS™)
- DS3 Detection Stabilizer
- Column switching valve
- Detector cells for the ED40 Electrochemical Detector and CD20 Conductivity Detector

An optional second channel (P/N 044184) is available. The second channel includes a left-side component panel, equipped with a Rheodyne injection valve. The second channel allows you to run a second set of instruments (a pump and one or more detectors), using

a single LC30 module. The second channel can be installed at the factory or ordered later as a separate kit.

1.2 About This Manual

Chapter 1, **Introduction**, introduces the module and manual, and provides safety information.

Chapter 2, **Description**, describes the features of the LC30 Chromatography Oven and their function.

Chapter 3, **Operation and Maintenance**, provides instructions for start-up, operation, shutdown, and routine maintenance of the LC30.

Chapter 4, **Troubleshooting**, lists possible causes of problems and provides step-by-step procedures to isolate them.

Chapter 5, **Service**, presents step-by-step instructions for service and parts replacement.

Appendix A, **Specifications**, contains specifications for the LC30 module and installation site.

Appendix B, **Installation**, describes how to install the LC30.

Appendix C, **Error and Fault Codes**, details the codes that display when errors or faults occur in the oven.

Appendix D, **Calibration and Diagnostics**, describes the LC30 calibration and diagnostic procedures.

Appendix E, **TTL Control**, describes the LC30 TTL functions and how to connect the TTL control connector to other modules.

Appendix F, **Hardware Configurations**, provides example component layouts for different applications.

1.2.1 Typeface Conventions

Bold type indicates a front panel button, the name of a display, or a label on a component. The case matches that used for the actual button, display, or component label. For example:

Press **Enter** to begin running the method.

Select the set point in the **Set°C** display.

Set the injection valve knob to **INJECT**.

1.2.2 Safety Messages and Notes

This instrument is designed to comply with the requirements for safety set forth in IEC 1010, *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use*.

This manual contains warnings and precautionary statements that can prevent personal injury and/or damage to the instrument when properly followed. Safety messages appear in bold type and are accompanied by icons.



Indicates a potential hazard which could result in serious injury or loss of life. Any hazard of this type will be located behind a barrier and will be accessible only by use of a tool. Access may be required during installation, maintenance, or service.



Indicates a potential hazard to the operator, or damage to the instrument or other property.



Indicates that the function or process of the instrument may be impaired. Operation does not constitute a hazard.

Informational messages also appear throughout this manual. These are labeled NOTE and are in bold type:

NOTE

NOTES call attention to certain information. They alert you to an unexpected result of an action, suggest how to optimize the performance of the instrument, etc.

1.3 Related Manuals

During installation and operation of the LC30, you may need to refer to one or more of the following manuals (depending on your system) for information about other modules and components included in a DX 500 system.

The following manuals are provided with their respective modules or components:

- *AS40 Automated Sampler Operator's Manual* (Document No. 034970).
- *CD20 Conductivity Detector Operator's Manual* (Document No. 034854)
- *ED40 Electrochemical Detector Operator's Manual* (Document No. 034855)
- *GP40 Gradient Pump Operator's Manual* (Document No. 034856)
- *IP20 Isocratic Pump Operator's Manual* (Document No. 034857)
- *Column Switching Valve Installation Instructions* (Document No. 034991)
- *LC20/LC30 Second-Channel Installation Instructions* (Document No. 034997)

The following manuals are provided in the LC30 Ship Kit:

- *Installation of Dionex Ferrule Fittings* (Document No. 034213)
- *Rheodyne Valve Operator's Manual* (Document No. 034468)

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LC30 Chromatography Oven

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2 • Description

2.1 System Overview

Eluent from the GP40 Gradient Pump or IP20 Isocratic Pump enters the Rheodyne injection valve inside the oven. Sample enters the valve, either by manual loading through the injection valve port or by automatic loading from an autosampler, such as the AS40 Autosampler or AS3500 Autosampler. From the injection valve, eluent and sample flow through the remaining components installed in the oven. These components vary, depending on the application. For example, in suppressed conductivity analysis, the flow passes from the injection valve through the guard column, the separator column, the SRS, the conductivity cell, and finally to waste (see Figure 2-1). See Appendix B for detailed plumbing schematics and other plumbing configurations.

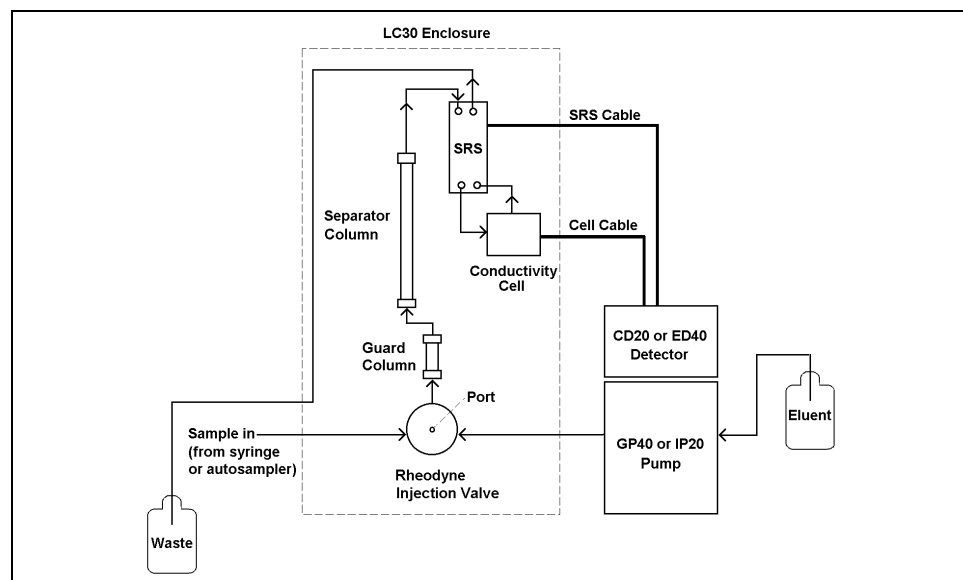


Figure 2-1. Example System Flow Schematic
(Suppressed Conductivity)

2.2 Front Door

Figure 2-2 illustrates the features of the LC30 front door:

- The control panel contains the temperature readouts, operating buttons, and operating status indicators (see Figure 2-3).
- The Rheodyne injection valve control knob selects the valve position (**INJECT** and **LOAD**). Use the valve port in the center of the knob for loading sample with a syringe.
- The main power switch is at the lower right corner of the front door. The front door must be closed for the switch to operate.

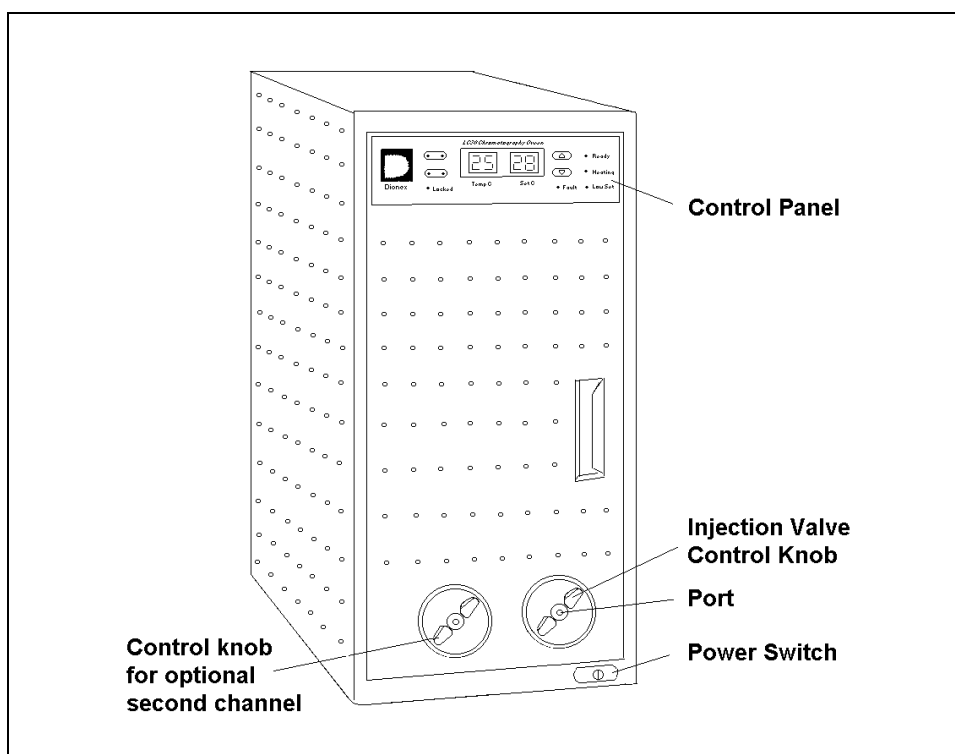


Figure 2-2. LC30 Front Door

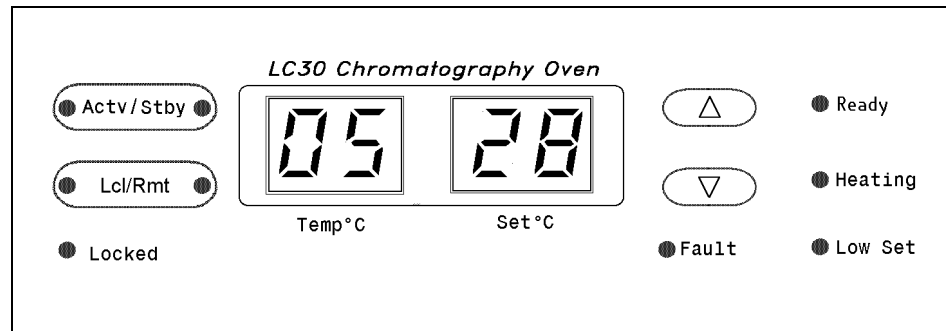


Figure 2-3. LC30 Control Panel

2.2.1 Control Panel Buttons

Actv / Stby

Selects the Active and Standby states. A green LED indicates the current state. In the Active state, the oven regulates the temperature. In the Standby state, the oven is powered-up, but does not regulate; the heater is off and the fan remains at the speed it was at when last in the Active state.

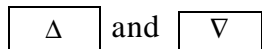
The power-up default is Standby with the fan off.

Lcl / Rmt

Selects the Local and Remote modes. A green LED indicates the current mode.

In the Local mode, all front panel controls are active and the oven operates as a stand-alone device (even if the remote control serial cable is connected). TTL or relay control is possible, however, in parallel with the control panel. The last command received will be the controlling command, regardless of its origin. Appendix E describes TTL and relay control.

In the Remote mode, the host computer, operating through the pump, controls the oven. Except for the **Lcl / Rmt** button, the front panel controls are disabled.



The two arrow buttons increase or decrease the temperature set point in the display one degree at a time. Holding down a button increases or decreases the value continuously.

2.2.2 Temperature Display

Temp°C

The **Temp°C** display shows the oven's internal temperature in degrees Celsius. The display switches at midpoint between two integers. For example, it switches from **33** to **34** when the internal temperature reaches 33.5 degrees.

NOTE

Although the set point can be as low as 0 °C, the oven cannot regulate to a set point that is less than the ambient temperature plus about 5 °C (the oven has no active cooling).

Set°C

The **Set°C** display shows the oven temperature set point in degrees Celsius. Use the arrow buttons to change the set point.

There are two **Set°C** operating temperature ranges: 0 to 41 °C or 0 to 80 °C. The power-up default is 0 to 41 °C. To select the higher range, turn on DIP switch 1. The DIP switches are located on the inside of the front door (see Section 2.2.4).



Do not operate the Self-Regenerating Suppressor (SRS) or MicroMembrane Suppressor at temperatures above 35 °C.

Fault and Error Codes

The **Set°C** display also shows Fault and Error conditions as they occur by displaying either **En** for *Error* or **Fn** for *Fault*, where *n* = a number identifier listed in Appendix C.

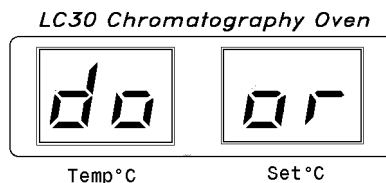
- An *Error* is a non-catastrophic event that permits the oven to continue operation. When an Error occurs, a short burst of tone sounds. To disable the tone, turn on DIP switch 3 (see Section 2.2.4).
- A *Fault* is a catastrophic event that causes shutdown of oven operation. When a Fault occurs, the red LED below the arrow keys lights and a long fault tone sounds. The tone cannot be disabled.

The display resets from an Error or Fault condition to normal display when the condition is cleared and the door is opened and then closed again.

Appendix C contains a description and probable cause of each Error and Fault condition.

Door Open

When the oven door is open, the displays convert to **do** and **or** respectively, as shown below:



The heater and fan stop when the door is open. Normal operation resumes when the door is closed.

2.2.3 Indicators

Locked

When on, this green LED indicates that the Locked Remote mode of operation is active. Locked Remote mode can be selected only from the host computer. When in this mode, the front panel controls are disabled, including the **Lcl / Rmt** button, and the oven is fully controlled by the host computer. The only way to exit the Locked Remote mode is either by a command from the host computer or by powering-down the LC30. At power-up, the oven defaults to the Local mode.

Fault

When on, this red LED indicates a serious fault in the oven operation. It turns on when the LED readout displays a Fault (**F_n**) condition, and turns off when the Fault is cleared. Error and Fault codes are defined in Appendix C.

NOTE

The Ready, Heating, and Low Set LEDs are updated only every few seconds. Therefore, until updated, more than one LED may be on.

Ready

When on, this yellow LED indicates the oven is fully stabilized and within 0.1 C° of its set point.



The Ready indicator does not guarantee that the components inside the oven have stabilized. Depending on their mass and materials, they may take 10 to 30 minutes longer to fully stabilize internally.

Heating

When on, this yellow LED indicates that the heater is on and is either maintaining the set temperature or is in the process of reaching it. While regulating, this LED intermittently blinks on and off, indicating the cycling of power to the heater. It may turn off for several minutes if the oven overshoots its target temperature and will turn off whenever the **Low Set** LED is on.

Low Set

When on, this yellow LED indicates that the selected temperature set point (shown in the **Set°C** display) is more than 1 °C *lower* than the current oven temperature (shown in the **Temp°C** display). The heater will turn off, waiting for the temperature to drop. Opening the oven door speeds the adjustment process. Because the display shows “door” while the door is open, you will need to close it to check the temperature level.

2.2.4 Configuration DIP Switches

The configuration DIP switches are located behind a cover on the inside of the door (see Figure 2-4). These DIP switches set the parameters listed below. Generally, the factory-set parameters are used and will rarely need to be changed. The switches are numbered 1 through 8, from left to right. The off position (logic-false) is down and the on position (logic-true) is up.

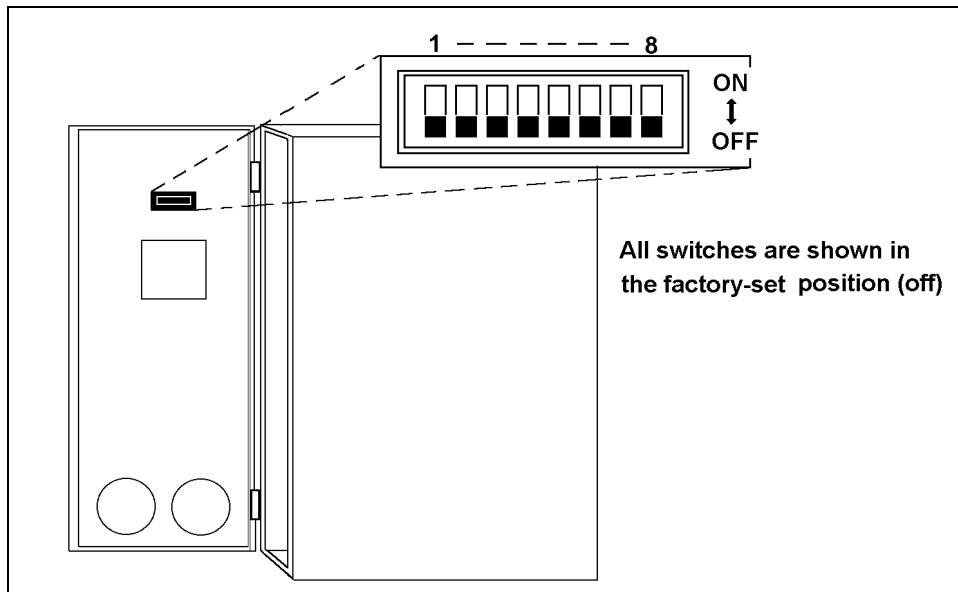


Figure 2-4. DIP Switch Location and Orientation

Sw #	Function	Off	On	Default
1	Temp. Range	0 to 41 °C max	0 to 80 °C max	0 to 41 °C
2	Calibration/Diagnostic	Normal Run	Calib/Diag Mode	Normal Run
3	Tone Control	Enabled	Disabled	Enabled
4	TTL Mode	Edge	Pulse	Edge
5	Polarity	Negative	Positive	Negative
6	Reserved	NA	NA	Off
7	Reserved	NA	NA	Off
8	Reserved	NA	NA	Off

Temperature Range

Switch 1 controls the highest allowable temperature in the oven by limiting the set point to 41 °C or 80 °C maximum. Use the 0 to 41 °C range (switch 1 off) for IC applications requiring PEEK components. Use the 0 to 80 °C range (switch 1 on) for HPLC applications requiring stainless steel components.



Do not operate the Self-Regenerating Suppressor (SRS) or MicroMembrane Suppressor at temperatures above 35 °C.

Calibration/Diagnostic Mode



The Calibration/Diagnostic mode allows access to functions that can delete factory-set calibrations. This mode is normally reserved for use by Dionex-trained personnel. Use this mode only when, and as, directed by a Dionex representative.

Turning on switch 2 selects the Calibration/Diagnostic mode. For more information, refer to Appendix D.

Tone Control

Switch 3 controls the tone that is heard when any control panel button is pressed, and when an Error occurs. Turn on switch 3 to disable the tone. Faults still activate the tone when they occur.

TTL Mode

Switch 4 selects the Edge or Pulse mode (see Appendix E for details).

Polarity

Switch 5 reverses the polarity when operating in the Edge or Pulse mode. Set the switch as required for your application (see Appendix E for details).

2.3 Interior Components

Figure 2-5 illustrates the interior features of the LC30:

- The fan and heater are at the rear of the module. Two service chases, also at the rear, allow routing of cables and tubing from interior components to the outside of the module. Foam plugs in the chases protect the oven from air currents.
- A flammable vapors sensor (P/N 938912) below and to the right of the fan detects abnormal concentrations of flammable vapors and generates a Fault code (F2) when such conditions exist. The sensor can detect common solvents in quantities below 0.5 mL.

NOTE

The factory-installed sensor is very sensitive to methylene chloride. If this solvent causes repeated flammable vapor faults, an alternate sensor (P/N 938914) is available. Contact your Dionex representative for more information.

- A leak sensor, located on the lower left wall, detects leaks and spills in the bottom of the oven and generates an Error code (E1) when they occur. Error and Fault codes are described in Appendix C.



IMPORTANT

Make sure that the connector attached to the leak sensor wires is locked in place with the blue clip (see Figure 2-6).

- A slide-out panel for mounting components is installed on the right side. Two releases on the upper slide lock the panel in a fully closed (in) or open (out) position. See Section 2.3.1 for details about the component panel.

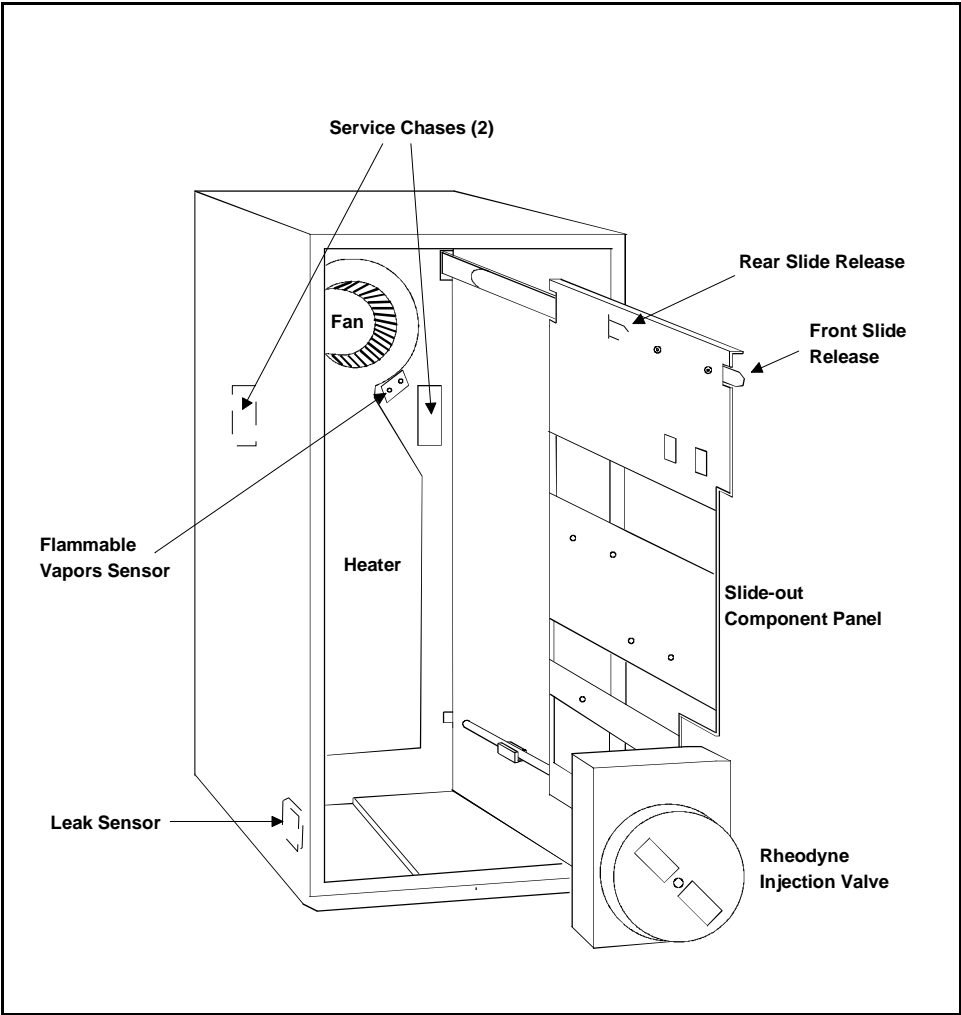


Figure 2-5. Interior Layout of the LC30

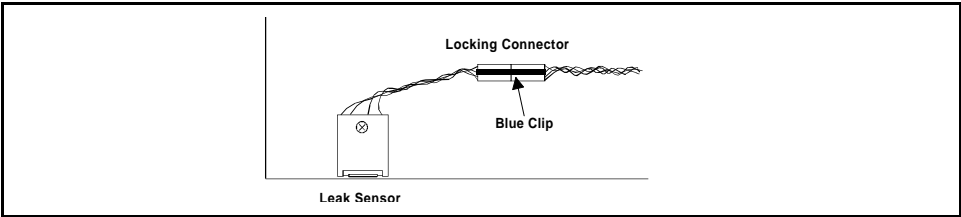


Figure 2-6. Leak Sensor and Connector

2.3.1 Component Panel

Components are mounted on the slide-out panel inside the LC30. The panel on the right side is standard in all LC30 ovens. When a second-channel module is ordered, an opposite (mirror image) panel is factory-installed on the left side of the oven. The second channel can also be ordered as a kit (P/N 044184) and installed later.

The component panel is equipped at the factory with a Rheodyne injection valve (see Section 2.). Multiple mounting holes and slots on the panel allow various component configurations. Figure 2-7 illustrates the component panel features and an example layout. See Appendix F for other configurations.

The following components can be mounted on the panel:

- *Self-Regenerating Suppressor (SRS)*: The SRS is used with conductivity detection to neutralize the eluent and enhance analyte conductivity.
- *Analytical column(s)*: The panel can hold up to two columns installed on a column mount. The mount has two larger clips on one side for supporting 4-mm columns and two smaller clips on the other side for supporting 2-mm columns.
- *Guard column(s)*: The optional guard column is held in place by the tubing connecting it to the separator column and injection valve. No mounting clip is required.
- *Column switching valve*: The optional column switching valve is used to control liquid flow in the system. The column switching valve kit (P/N 044187), which you order separately from the LC30, includes all the parts needed for installing the valve in an LC30.

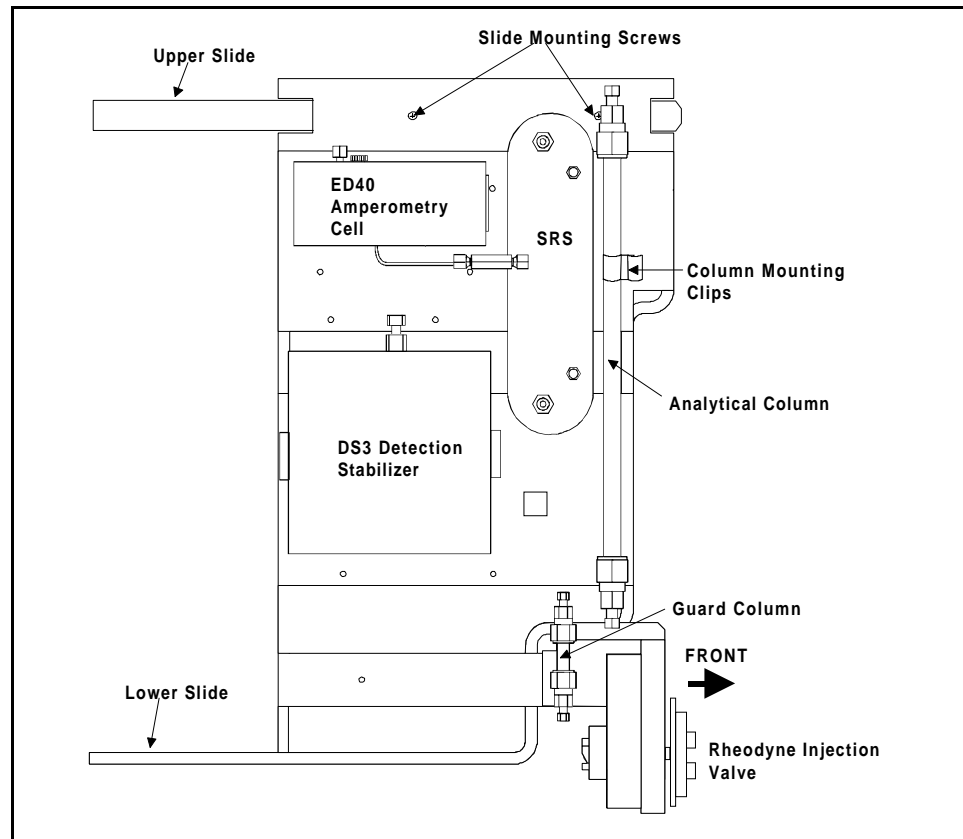


Figure 2-7. Example Component Panel Layout

- Detector cells:* The conductivity cell mounts on the panel in either a shield box or a DS3 Detection Stabilizer (P/N 044130). The optional DS3 improves baseline stability by damping fluctuations in temperature, thus improving detection at trace levels. Refer to the CD20 or ED40 detector manual for details about the DS3. The ED40 amperometry cell mounts in the keyhole slots on the upper-left side of the panel.

Sliding the Panel

Two releases on the upper slide (see Figure 2-5) lock the panel in a fully closed (in) or open (out) position.

To pull the panel out to the open position:

1. Press the front slide release to release the panel.
2. Pull the panel out until it locks in place. The panel will lock at about three quarters of its total travel when you pull it out. This prevents it from being pulled entirely out of the tracks and possibly damaging the components.

To push the panel back into place:

1. Press the rear slide release and push the panel back into its closed position.
2. The fully closed position locks the panel and prevents it from being forced outward by pressure from the various tubing arrangements.

NOTE

If the panel does not slide into place easily, the upper male slide on the panel can be adjusted slightly by loosening the two mounting screws (see Figure 2-7). Align the panel and then retighten the screws.

Rheodyne Injection Valve

The Rheodyne injection valve is mounted at the bottom of the component panel. Its control knob extends through the door to allow manual operation with the door closed.

The injection valve is a low-volume, 35 MPa (5000 psi) rotary injection valve, made of either PEEK or stainless steel. The standard front-loading valve accommodates syringe injections. To load sample from an autosampler, the valve must either be fitted with a needle adapter or converted to a rear-loading valve. A rear-loading conversion kit (P/N 045595) is available from Dionex. See the Rheodyne valve manual for instructions on using the needle adapter.

The valve has two operating positions: **INJECT** and **LOAD**. Inside the Rheodyne injection valve, eluent flows through one of two paths, depending on the valve position:

- In the load position, eluent flows in from the pump and out to the column without entering the sample loop. When you load the sample, sample flows from the syringe or autosampler line into the valve and through the sample loop; excess sample flows out to waste.
- In the inject position, eluent flows in from the pump, through the sample loop, and out to the column (carrying the contents of the sample loop with it).

Figure 2-8 shows the flow path for a front-loading valve and Figure 2-9 the flow path for a rear-loading valve.

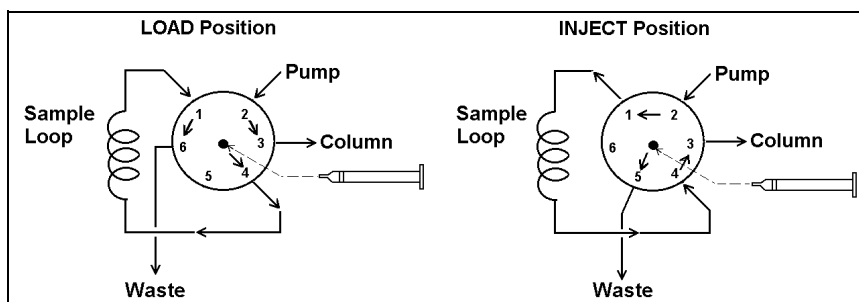


Figure 2-8. Rheodyne Injection Valve Flow Schematics
(Front Loading)

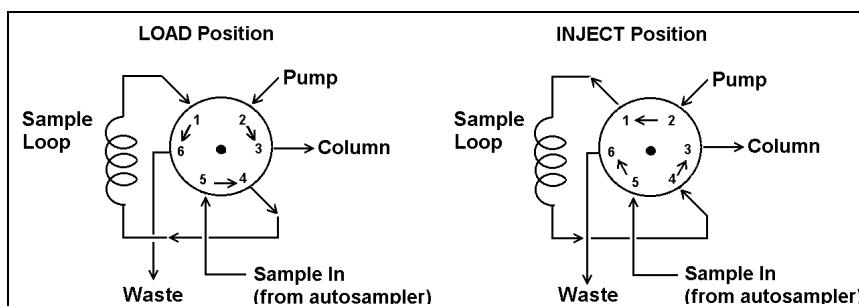


Figure 2-9. Rheodyne Injection Valve Flow Schematics
(Rear Loading)

The Rheodyne injection valve is equipped with a microswitch for detection of the valve position. The microswitch is mounted on the side of the valve body. Wires are connected to the electrical leads on the switch and routed through the rear chase. The wires can be connected to TTL input connectors on another device, such as an integrator. The change in valve position can be used, for example, to trigger the run for an integrator or a data station.

For more information about the valve, including important operating precautions, refer to the Rheodyne valve operator's manual, included in the LC30 Ship Kit (P/N 046301, PEEK; P/N 047306; stainless steel).

2.4 Rear Panel

The LC30 rear panel contains the following main features (see Figure 2-10):

- Air-actuated solenoid valves for controlling the injection valve (see Section 2.4.1)
- Two service chases for routing tubing and cables out of the module
- The main power receptacle with fuses, and four auxiliary IEC receptacles for controlling power to other Dionex modules in the system (see Section 2.4.2)
- Oven and fan housing
- An RJ-11 6-pin telephone-type serial connector for DX LAN control (see Section 2.4.3)
- Five pairs of connectors for TTL and relay control (see Section 2.4.4)

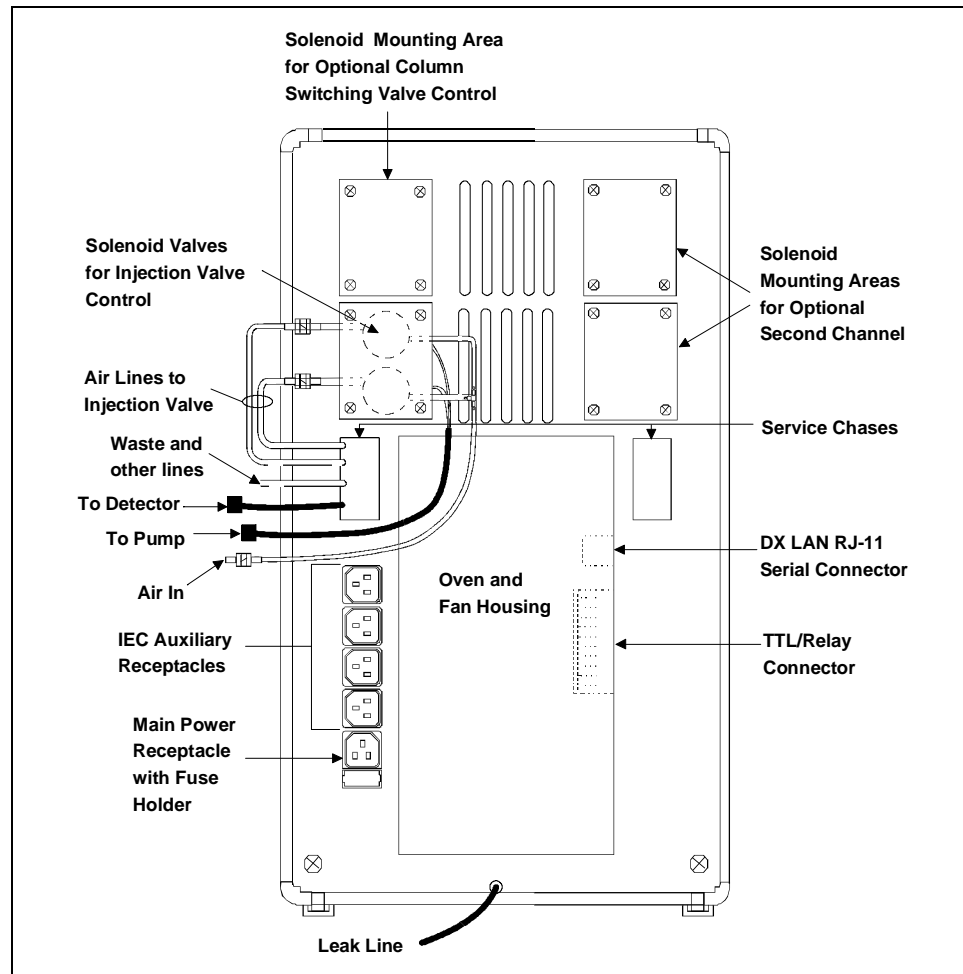


Figure 2-10. LC30 Rear Panel

- A leak line (12.5-mm (0.5-in) OD tubing (P/N 035759)). If a leak occurs, waste liquid will accumulate in the bottom of the oven. The bottom is sloped to collect the liquid in the trough on the left side. An opening at the front of the trough drains the liquid from the oven through the leak line and into a waste container.

2.4.1 Solenoid Valves

The air-actuated solenoid valves used to control the injection valve and the column switching valve (if installed) are controlled by the pump. The solenoids are installed as pairs; one pair is shown in Figure 2-10. An electrical cable connects the valves to the pump module.

2.4.2 Main Power

The main power receptacle on the rear panel mates with a 3-prong (grounded) standard IEC-approved power cord (P/N 960708).

Four auxiliary IEC receptacles are provided to connect other modules in the system, if desired. The LC30 main power switch controls the oven and these receptacles. Therefore, when other modules are connected to the receptacles, the LC30 can function as the system main power control.

The two IEC fuses (P/N 954746) in the fuse holder (part of the main power receptacle) are rated 10 amps at 250 Vac to protect the oven and any modules connected to the auxiliary IEC outlets. In addition to 2 amps for the LC30, the four IEC outlets are capable of handling 2 amps each when all four are used equally, or a maximum of 8 amps with only one outlet in use. See Section 5.1 for instructions on changing the fuses.

2.4.3 DX LAN Serial Connector (Optional)

The DX LAN 6-pin RJ-11 telephone-type connector is the serial communications interface between the LC30 and the pump. It allows remote control of the oven by a host computer equipped with PeakNet software. An RJ-11 serial interface cable (P/N 047476) is included in the LC30 Ship Kit.

2.4.4 TTL and Relay Connector

The TTL/Relay 10-pin connector interfaces with Dionex and non-Dionex modules for relay control of the oven. Each pair of pins includes an active wire and a ground wire. The connector is illustrated in Figure E-2 in Appendix E. Appendix E provides details about using TTL and relay control.

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3 • Operation and Maintenance

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LC30 Chromatography Oven

3 • Operation and Maintenance

3.1 Start-Up

1. Make sure the front door of the oven is fully closed.
2. Turn on the power to the oven and verify that the front panel displays and indicators are as follows:
 - **The LED on the right side of the Actv / Stby** switch is on, indicating the oven is in Standby status.
 - **The LED on the left side of the Lcl / Rmt** switch is on, indicating the oven is in the Local mode.
 - **The Temp°C** display shows the internal temperature of the oven.
 - **The Set°C** display shows the temperature set point last used. It may be higher or lower than the actual temperature in the oven. If an Error or Fault (E or F) is displayed, refer to the Error and Fault Codes in Appendix C.
 - **Of the status indicators, only Low Set** may be on, indicating that the set point is lower than the oven temperature.
 - **The Fault** indicator should not be on. If it is, refer to the Fault/Cause chart in Appendix C and to Chapter 4, Troubleshooting.



Verify that the two foam plugs are plugged into the service chases on the rear panel to reduce the effect of ambient air currents (see Figure 2-10).

3.2 Operation

3.2.1 Selecting the Maximum Temperature Range

As shipped, the oven will not accept set points higher than 41 °C. This temperature range is used for IC applications requiring inert PEEK components. For applications requiring stainless steel components (such as for HPLC), a higher temperature range, with a maximum set point of 80 °C, is available.



Operating the oven at temperatures above 41 °C may damage or destroy sensitive chromatography components inside the oven. It is your responsibility to verify that components used in the oven can withstand the temperature at which the oven is set.

To select the 80 °C range:

1. Set the temperature limit switch (DIP switch 1 on the inside of the front panel) to its on position (see Section 2.2.4).
2. Before operating the oven at temperatures above 41 °C, remove all sensitive components (e.g., the SRS, column switching valve, and detector cells).

3.2.2 Running the Oven

1. Use the Δ and ∇ buttons to select the temperature set point required for your application. For a typical IC application, adjust the temperature set point to approximately 10 ° above ambient.
2. If the set point is higher than the oven temperature (the usual case), press **Actv/Stby** to select the Active status. The fan starts running and the **Heating** status indicator turns on after a few seconds.

It takes approximately 5 to 10 minutes before the **Ready** status indicator turns on, indicating that the oven is at temperature and stabilized (not fluctuating more than 0.1 °C above or below the set point). The system components (columns, SRS, cells) may require additional time to fully stabilize depending on their mass and shape. While stabilizing, the **Temp °C** display slowly rises until it matches the set point temperature.

3. If the selected set point is lower than the current oven temperature, the **Heating** indicator turns off to indicate the oven has stopped heating, and the **Low Set** indicator turns on a few seconds later.

Press **Actv/Stby** to select the Standby status. This prevents the heater from starting from cool ambient air.

As the oven has no components for cooling, wait until it cools down by heat transfer to the ambient. Opening the door for a few seconds or even a few minutes speeds the cooling process. Return the oven to the Active status after it has reached its new set point temperature.

Changes in operating conditions have the following effects:

- Opening the door briefly destabilizes the oven for about 3 to 5 minutes with, generally, no detectable effect on the baseline. Opening the door for longer periods may take the oven 10 to 15 minutes to recover, and the baseline will show some disturbance.
- If outside events change abruptly, such as air conditioning cycling, flow rate changing significantly, or regenerant flow starting/stopping abruptly, the oven may fail to regulate for a short time (**Ready** indicator turns off). As long as the **Temp °C** display matches the **Set °C** display, the oven internal temperature is within $\pm 0.5^\circ$ of the set point, even with the **Ready** indicator off.

3.2.3 Filling the Sample Loop

The Rheodyne injection valve may be filled completely or partially. These techniques differ in accuracy, precision, and the amount of sample required. Refer to the Rheodyne valve operating instructions included in the LC30 Ship Kit before selecting a method for your application.

This section describes four methods for filling the Rheodyne valve sample loop:

- Injecting directly into the valve
- Drawing sample through the waste line
- Loading sample through the waste line
- Loading from an automated sampler

Regardless of the method used, observe the following precaution:



When inserting needles into the needle port on the injection valve, use only 0.028-in OD (22 gauge) x 2-in long needles with a 90° end (square). Using the incorrect needle size can damage the injector.

Injecting directly into the valve

1. Set the injection valve to **LOAD**.
2. Insert the syringe into the needle port on the injection valve (see Figure 3-1).
3. Overfill the sample loop with several sample loop volumes. Excess sample will flow out through the waste line.
4. Leave the syringe in the needle port.
5. Set the injection valve knob to **INJECT**.

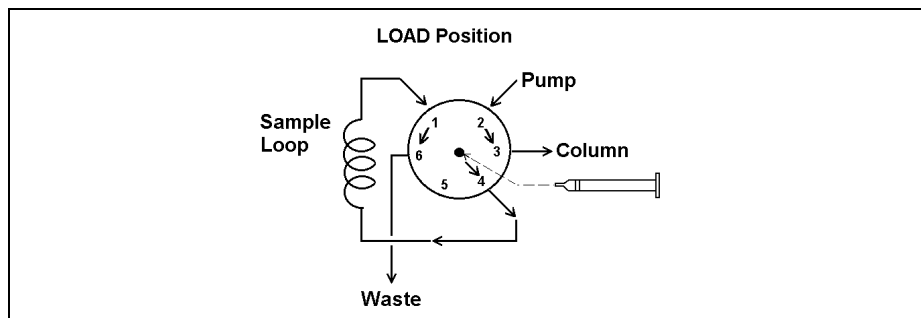


Figure 3-1. Injecting Directly into the Valve

Drawing sample through the waste line

1. Set the injection valve to **LOAD**.
2. Insert the syringe into the needle port on the valve and place the valve waste line (port 6) into the sample container (see Figure 3-2).
3. Draw sample into the loop through the injection valve waste line. No sample will come into contact with the metal needle of the loading syringe.
4. Remove the waste line from the sample container.
5. Leave the syringe in the needle port.
6. Set the injection valve knob to **INJECT**.

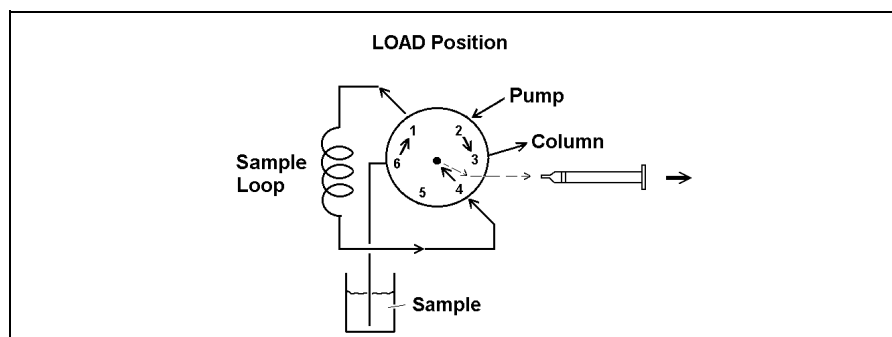


Figure 3- 2. Drawing Sample Through the Waste Line

Loading sample through the waste line

1. To avoid possible outgassing from using suction to draw the sample through the waste line, connect a luer fitting (P/N 024305) and sample-filled syringe to the end of the waste line.
2. Connect the other end of the waste line to injection valve port 6.
3. Set the injection valve to **LOAD**.
4. Insert the needle adapter shipped with the Rheodyne valve into the needle port.
5. Push sample through the waste line. Waste will exit the valve through the needle adapter. No sample to be analyzed will come into contact with the metal needle of the needle adapter (see Figure 3-3).

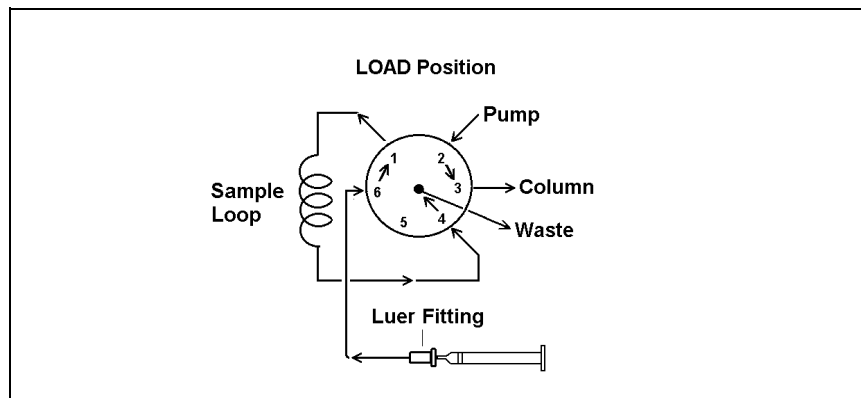


Figure 3-3. Loading Sample Through the Waste Line

Loading from an automated sampler

There are three ways to load sample from an autosampler:

- Connect the sample line from the autosampler to port 6 on the Rheodyne valve and install the needle adapter shipped with the Rheodyne valve into the needle port. This method is similar to loading sample through the waste line as described in the previous section (see Figure 3-3).
- Fit the Rheodyne injection valve with the needle adapter and connect the sample line from the autosampler to the needle adapter. However, because of the high pressure generated from the autosampler line, this method can cause leaks at the needle port fitting.
- The best way to load sample from an autosampler is to convert the standard front-loading Rheodyne valve to a rear-loading valve. A conversion kit (P/N 045595) is supplied with the AS40 Automated Sampler and is also available separately from Dionex. In the rear-loading valve, a three-groove rotor seal replaces the two-groove rotor seal with needle port used for syringe loading. Figure 3-4 shows the flow path for sample loading using a rear-loading valve.

See the autosampler operator's manual for instructions on loading the sample.

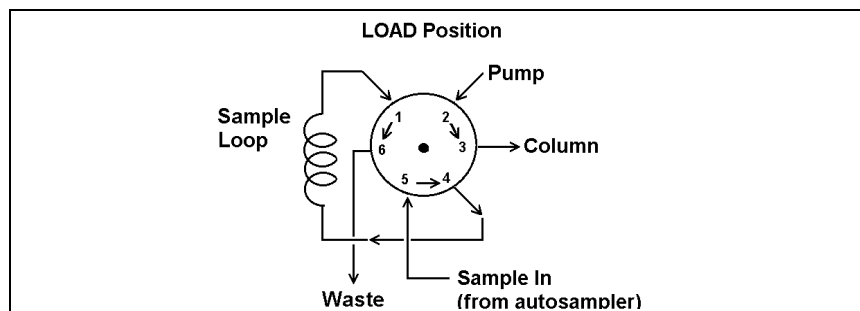


Figure 3-4. Loading Sample from an Autosampler (Rear-Loading Valve)

3.3 Shutdown

If the shutdown is for less than three days, press **Actv / Stby** to place the oven in Standby status. Power may remain on.

If the oven will be shut down for more than three days, do the following:

- Reduce the torque on the pressure bolts on the column switching valve (if the valve has been in use) to 90 in-oz to prevent possible permanent distortion to the valve.
- Make sure the front panel door is fully closed. Press the power switch on the front panel to shut off power to the oven. If other modules are connected to the power strip on the rear panel of the LC30, they will also be shut down.
- To protect the next user from inadvertently running the oven at high temperatures, Dionex recommends returning DIP switch 4 (Temperature Range) to its off position (41 °C max) each time the oven is emptied of its chromatography components (columns, etc.). See Section 2.2.4 for instructions on setting the DIP switches.

3.4 Routine Maintenance

- Periodically check for leaks or spills inside the oven. If a leak occurs, waste liquid will accumulate in the bottom of the oven. The bottom is sloped to collect the liquid in the trough on the left side. The leak line drains the liquid from the LC30 into the waste container.
- Locate and repair leaks (see Section 4.2) and clean up spills. Rinse dried eluents (especially when they include salt solutions) and reagents off system components with deionized water or, in the case of spilled ninhydrin, with isopropyl alcohol. Rinse the oven floor with deionized water to prevent formation of salt crystals, and dry it. Rinse and dry the leak sensor.
- Periodically check all air and liquid lines for crimping. Move or reroute pinched lines; replace damaged lines (see Section 5.2).

4 • Troubleshooting

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LC30 Chromatography Oven

4 • Troubleshooting

This chapter is a guide to troubleshooting common problems that may occur while operating the LC30 Chromatography Oven. To use this guide, turn to the section that best describes the operating problem. There, you will find the possible causes of the problem listed in order of probability. If you cannot eliminate a problem on your own, notify your Dionex office.

For troubleshooting procedures specific to the Rheodyne injection valve, refer to the *Rheodyne Valve Operator's Manual*.

For troubleshooting procedures specific to the optional column switching valve, refer to the *Column Switching Valve Installation Instructions*.

4.1 Error and Fault Conditions

A description, probable cause, and corrective action for each Error and Fault is given in Appendix C.

When an Error or Fault condition (including “door open”) shows in the display, it can be cleared only by opening the door, eliminating the cause, and closing the door again. If the display does not clear when the door is closed, the Error or Fault condition still exists.

4.2 Liquid Leaks

- **Leaking fitting**

Locate the source of the leak. Tighten or, if necessary, replace all liquid line connections (see Section 5.2).

1. If the connections are made with Dionex ferrule fittings, see *Installation of Dionex Ferrule Fittings* for tightening requirements.
2. If the leaking fitting is on the column switching valve, refer to the column switching valve manual.

- **Broken liquid line**

Replace the line and fittings (see Section 5.2).

- **Blocked or improperly installed waste line**

Make sure the waste lines from the valves and cells are not crimped or otherwise blocked. Also make sure waste drain lines are not elevated at any point after they exit the module.

- **Loose column switching valve pressure bolt(s)**

NOTE

All eight pressure bolts must be evenly tightened against the slider for optimal leak-free operation.

Refer to the column switching valve manual for tightening instructions.

- **Scratched column switching valve port**

Replace the port face and tighten all eight pressure ports carefully. Refer to the column switching valve manual for instructions.

4.3 Excessive System Backpressure

- **Restriction in the hydraulic system**

Check all liquid lines and valves for crimping or blockage. Make sure the ferrule fittings are not overtightened onto tubing. Refer to *Installation of Dionex Ferrule Fittings* for details.

- **Plugged or damaged fitting**

Isolate the faulty fitting by loosening fittings one-by-one until the pressure returns to normal. Repair or replace the fitting (see Section 5.2).

- **Injection or column switching valve not fully actuated (caught in between positions)**

Check for the following:

- Insufficient air pressure to the valve. Adjust the pressure to between 530 KPa and 800 KPa (80 and 120 psi); 690 KPa (100 psi) is recommended.
 - Unevenly tightened or overtightened pressure bolts on the column switching valve, or an incorrectly installed slider (see the column switching valve manual).
- **Flow rate through the columns too high**
 1. Check the column flow rate, and verify that it matches the flow rate set in the pump.
 2. Measure the pump flow rate using a 10 mL graduated cylinder and stopwatch. Calibrate the flow rate if needed.
 - **Clogged column bed supports**

Replace the bed supports as instructed in the column manual.
 - **Contaminated columns**

Clean the columns (see *Column Rejuvenation Procedures*, Technical Note 2R, Document No. 032036, or refer to the column manual).

4.4 Inoperative Injection or Column Switching Valve

- **Air not reaching the valve**
 1. Check that the air supply is turned on and is supplying between 530 and 800 KPa (80 and 120 psi).
 2. Check the air tubing for blockage. Remove and replace any blocked tubing. Reposition crimped or pinched tubes.
- **Air leaks**

Air leaks are usually audible; locate and repair the leak.

- **Valve incorrectly plumbed**

Refer to the plumbing diagrams in Figures B-3 through B-7, then replumb the system if necessary.

- **Valve air lines incorrectly connected**

Verify that the air line connections are correct, using one of the following methods:

- From the pump **Main** screen, switch the position of the valve between **LOAD** and **INJECT** and back again. The position of the Rheodyne valve control knob on the front of the LC30 should change to match the position selected from the pump screen.
- Disconnect the sample loop from port 1 of the Rheodyne valve. Switch the position of the valve between **LOAD** and **INJECT**, using either the pump **Main** screen or the Rheodyne valve control knob. In the inject position, eluent should pass from the pump through the loop. In the load position, eluent should not pass through the loop.

If the operation of the valve is reversed, reverse the air lines on the top of the Rheodyne valve.

- **Solenoid valve cable not plugged into the pump**

Verify that the electrical cable extending from the solenoid valves on the LC30 rear panel is plugged into the **LC AIR** connector on the pump electronic chassis (see Figures B-12 and B-13).

- **Pressure bolts on the column switching valve too tight**

Use the following procedure to loosen the pressure bolts:

1. Turn off the liquid flow.
2. Use an open-end wrench to loosen each bolt one-eighth turn.

3. Turn on the liquid flow and check for leaks. Tighten pressure bolts if leaks appear. For optimal leak-free operation at 17 MPa (2500 psi), all eight pressure bolts must be evenly tightened (0.637 N·m, 90 in-oz). A special torque wrench kit (P/N 038943) is available from Dionex.

4.5 Air Leaks

Air leaks are usually audible and frequently cause excessive cylinder gas/air consumption.

Locate and repair the leak.

4.6 Peak “Ghosting”

Ghosting is the appearance of extraneous peaks in a chromatogram. These may be late-eluting peaks from a previous injection or they may result from a contaminated, malfunctioning, or incorrectly installed injection valve. These peaks may co-elute with peaks of interest, resulting in non-reproducible peak heights.

- **Insufficient time between sample injections**

Wait until the previous sample has been completely eluted before making another injection.

- **Insufficient flush between samples**

Flush the sample loop with at least 10 loop volumes of deionized water or sample between sample injections.

- **Malfunctioning or incorrectly installed injection valve**

Refer to the *Rheodyne Valve Operator's Manual*, and to Section B.4 in this manual for installation instructions

4.7 Non-Reproducible Peak Height or Retention Time

- **Column overloading**

1. Change to a sample loop with a smaller volume.
2. Dilute the sample.

- **Liquid leaks**

Locate and eliminate the leaks (see Section 4.2).

- **Incomplete or imprecise filling of the sample loop**

1. Fill the sample loop until excess sample flows out through the waste line.
2. Inspect the syringe and replace if damaged.

4.8 Abnormal Retention Time or Selectivity

- **System not equilibrated following an eluent change**

Allow the system to equilibrate with at least 20 column volumes of eluent (for example, 30 minutes at 2.0 mL/min for 4 mm anion separator columns).

- **Incorrect flow rate through system**

1. Check that the correct flow rate is selected.
2. Calibrate the pump flow rate.
3. Locate and eliminate any liquid leaks (see Section 4.2).

- **Contaminated or incorrect eluent**

Remake the eluent using reagent grade chemicals and ASTM filtered, Type I (18-megohm) deionized water.

- **Contaminated or degraded sample**

Take appropriate precautions when preparing and storing samples to prevent contamination and degradation.

- **Contaminated column**

1. Clean the column (see *Column Rejuvenation Procedures*, Technical Note 2R, Document No. 032036, or refer to the column manual).
2. If cleaning is unsuccessful, replace the column.

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5 • Service

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5.2	Replacing Tube Fittings	5-5
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This section describes service and repair procedures for the LC30. These procedures are required rarely, but some wear of the fittings and tubing is to be expected during the life of the oven. Before repairing or replacing any part, refer to Chapter 4 to isolate the source of the problem.

For service and maintenance procedures for the Rheodyne injection valve, refer to the *Rheodyne Valve Operator's Manual*.

For service and maintenance procedures for the optional column switching valve, refer to the *Column Switching Valve Installation Instructions*.

When ordering replacement parts, please include the model and serial number of your LC30. If possible, also provide the part numbers and, where applicable, the revision number of the items you are ordering.

5.1 Changing Main Power Fuses

1. Turn off the main power.



HIGH VOLTAGE—Disconnect the main power cord from its source and also from the rear panel of the LC30.

2. The fuse holder is part of the main power receptacle on the rear panel (see Figure 5-1). A recessed lock is located on each side of the fuse holder. Using a small screwdriver or your fingernails, push each lock toward the center to release it. The fuse holder pops out approximately $\frac{1}{16}$ -in when the locks release. When both locks are released, pull the fuse holder straight out of its compartment.

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3. The holder contains two fuses. Replace these with new IEC fuses rated 10 amps at 250 Vac (P/N 954746). Dionex recommends replacing both fuses even though only one is open; the other fuse has been stressed and could fail even under normal operation.
4. Reinsert the fuse holder into its compartment. The fuse holder is keyed to fit only in its proper orientation. Apply sufficient pressure evenly against the holder to engage the two locks. The holder is flush against the panel when both locks are engaged.
5. Reconnect the main power cord and turn on the power.

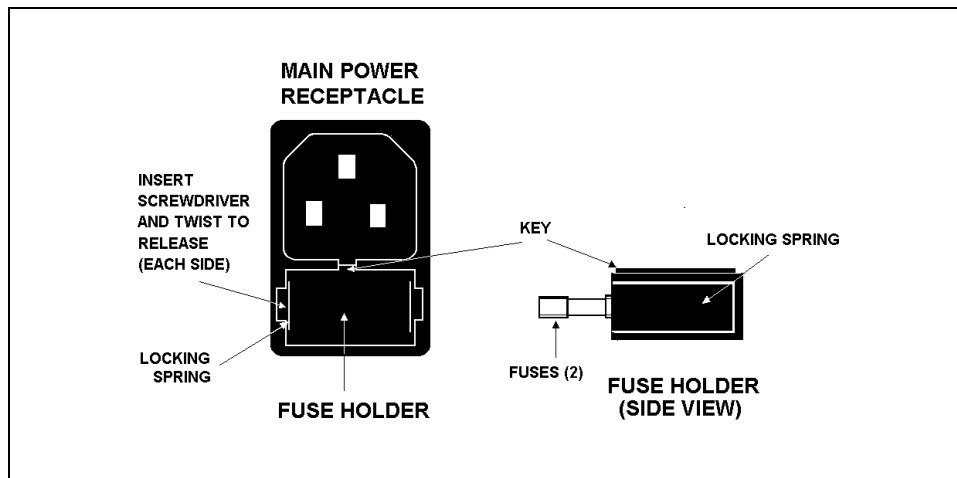


Figure 5-1. Main Power Fuse Holder

5.2 Replacing Tube Fittings

The tubing connections vary depending on whether the system is plumbed with PEEK or stainless steel tubing.

- The LC30 PEEK version is plumbed with Dionex 10-32 ferrules (P/N 042376) and fittings (P/N 043275).

Refer to the following table for tubing size and type information:

Tubing	Use For
0.125-mm (0.005-in) ID PEEK (P/N 044221)	Connections between system components in 2-mm column systems
0.25-mm (0.010-in) ID PEEK (P/N 042690)	Connections between system components in 4-mm column systems Detector cell waste lines (both systems)
0.5-mm (0.020-in) ID PEEK (P/N 042855)	Valve waste lines (both systems)
1.6-mm (0.063-in) ID Teflon	Regenerant lines for both the 2-mm and 4-mm SRS

Table 5-1. Tubing Requirements for PEEK Systems

NOTE

If preferred, ThermoFlare™ tubing can be installed where pressures are below 30 MPa (3000 psi). This may include waste lines and tubing from the separator column to the SRS.

- The LC30 stainless steel version is plumbed with Dionex 1.6-mm (0.062-in) ferrules (P/N 010262) and fittings (P/N 010277). PEEK-covered stainless steel tubing assemblies are used for connections between system components. See Figure B-10 in Appendix B for assembly part numbers.

Valve waste lines are 0.5-mm (0.020-in) ID PEEK tubing (P/N 042855).

NOTE

The stainless steel tubing assemblies are made of microbore stainless steel tubing encased in PEEK. If you prefer, use plain stainless steel tubing (not encased in PEEK) in the appropriate size from 0.125-mm (0.005-in) to 0.5-mm (0.020-in) ID. Plain stainless steel tubing is not provided in the Ship Kit.

For instructions on how to install ferrule fittings, refer to *Installation of Dionex Ferrule Fittings*.

5.3 Isolating a Restriction in the Liquid Plumbing

A restriction in the liquid plumbing will cause excessive system backpressure.

1. Begin pumping eluent through the system (including the columns) at the flow rate normally used.
2. Follow the appropriate hydraulic schematic (see Figures B-3 through B-7) and work backward through the system, beginning at the cell exit. One at a time, loosen each fitting and observe the pressure. The connection at which the pressure drops abnormally indicates the point of restriction.
3. A restriction often causes such high pressure that the entire system cannot be operated. Then you must work forward through the flow schematic (see Figures B-3 through B-7), adding parts one at a time until an abnormal pressure increase (and hence, the restriction) is found.
4. If the restriction is in the tubing or fitting, remove the restriction either by back flushing or replacing the tubing or fitting.
5. If the restriction is caused by the column switching valve, disassemble the valve and clean the slider (see the column switching valve manual for instructions).

A • Specifications

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A.2 Environmental A-3
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A.4 Hydraulics A-4
A.5 Oven A-4

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A • Specifications

A.1 Electrical

Power Requirements	90 to 255 Vac, 47/63 Hz, 300 VA, main voltage across the voltage range with no switching required
Fuses	Two IEC (25 mm), rated 10 amps at 250 Vac (P/N 954746)

A.2 Environmental

Ambient Temperature	10 °C to 40 °C (50 °F to 104 °F) down to 4 °C (39 °F) if the oven is not powered down
Humidity	5 to 90% relative humidity, non-condensing
Air Pressure	530 to 800 KPa (80 to 120 psi) for the Rheodyne injection valve and the column switching valve. Use laboratory-quality air or regulated compressed air, nitrogen, or helium.
Operating Pressure	35 MPa (5000 psi) maximum liquid path (tubing, valves, columns, etc.)

A.3 Physical

Dimensions	50 cm high x 22.5 cm wide x 49 cm deep (19.5 in x 8.8 in x 19.1 in)
Weight	17 kg (37 lbs); 22 kg (48 lbs) fully loaded with components (two panels, four analytical columns, four guard columns, two suppressors, two DS3 Detection Stabilizers, and two column switching valves)

A.4 Hydraulics

Rheodyne Injection Valve 35 MPa (5000 psi) PEEK or stainless steel rotary valve for low-volume injections

Column Switching Valve (Optional) 28 MPa (4000 psi) metal-free column switching valve to direct eluent and sample flow between two columns. The column switching valve can be installed at the factory or ordered separately. Tubing to plumb the LC30 for column switching applications is included in the column switching valve kit (P/N 044187).

A.5 Oven

Heater Power Rating 150 Watts

Materials Coated steel

Operating Temperature 4 °C to 80 °C selected in 1 °C increments, subject to ambient temperature

Minimum operating temperature is 5 °C to 8 °C above ambient, depending on configuration, flow rate, etc.

B • Installation

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B • Installation

B.1 Facility Requirements

Appendix A contains the LC30 specifications for power, air pressure, ambient temperature, and humidity. In addition to meeting the specifications listed there, the LC30 installation location should meet the following requirements:

- Install the LC30 on a sturdy table or work bench with at least 7.5 cm (3 in) free space behind the module (inclusive of the electronics housing) for power connection and ventilation. Maximum horizontal slope is 2-cm per lateral meter (¼-in per lateral foot) for proper operation of the leak control line. Install the module at a height that ensures convenient viewing of the front panel display and access to the interior.
- Install the LC30 in an area with adequate ventilation and in an environment that provides maximum consistency in ambient temperature and humidity. Ambient temperature affects oven operation, especially when operating at temperatures only slightly above ambient. Follow these guidelines when selecting an installation site:
 - Avoid direct sunlight and proximity to hot equipment.
 - Avoid heavy air drafts and sudden temperature changes.
 - Avoid high humidity atmospheres.

B.2 Stacking Modules

Dionex DX 500 modules are designed to be stacked on top of each other up to a maximum height of four units. The oven is three units high and should not be stacked on any other module. The oven should not receive more than a single-unit module on top of it, such as a CD20 Conductivity Detector, ED40 Electrochemical Detector, or the EO1 Eluent Organizer. Figure B-1 illustrates the recommended stacking configuration.



Lift the module only from the bottom or side surfaces. Lifting with the panel door will damage the door hinges. Use caution when lifting the module; it weighs 17 kg (37 lbs).

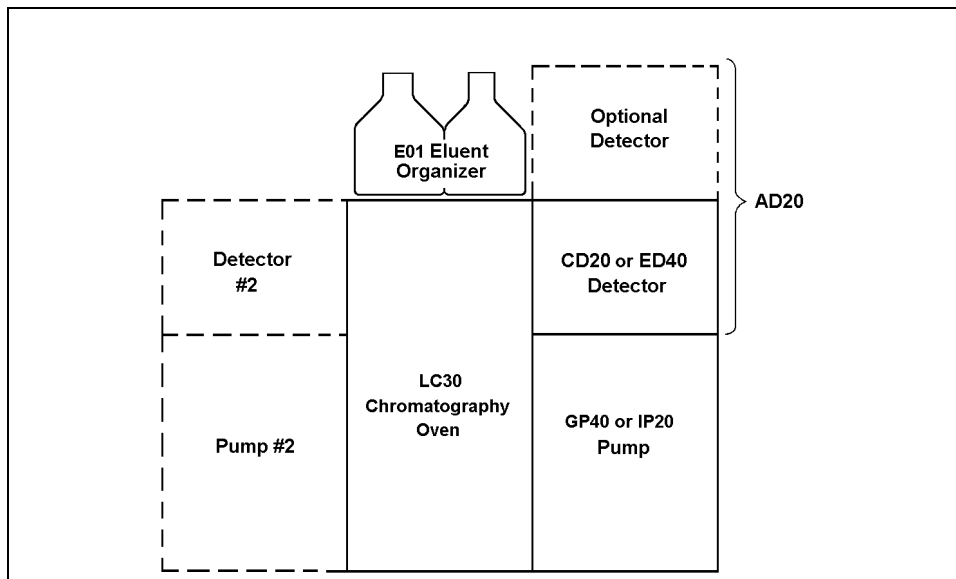


Figure B-1. Recommended Stacking Configuration

B.3 Securing the Modules (Optional)

The Ship Kit contains a shoe (P/N 046478) for securing modules together. The shoe is a gray-colored rubber rectangle with raised edges. It installs under two modules sitting side-by-side on the laboratory bench; for example, the LC30 Chromatography Oven and a GP40 Gradient Pump. The shoe locks the two units together, preventing them from sliding apart.

B.3.1 Installing a Shoe

1. The bottom of each module contains a molded ribbing with a pocket on each side midway between the front and the rear of the module. One side of the shoe fits in the pocket of one module and the other side fits in the pocket of the adjacent module (see Figure B-2). To install the shoe, lift the edge of one module away from the adjacent module.
2. Place the shoe, with the grooved side up, under the lifted edge and slide the shoe along the edge until it fits into the pocket.
3. Press the shoe firmly into the pocket and carefully lower the module back onto the bench.
4. Lift the edge of the second module, align the front and rear edges of the two modules and then lower the second module over the shoe. Press down to seat the second module on the shoe.

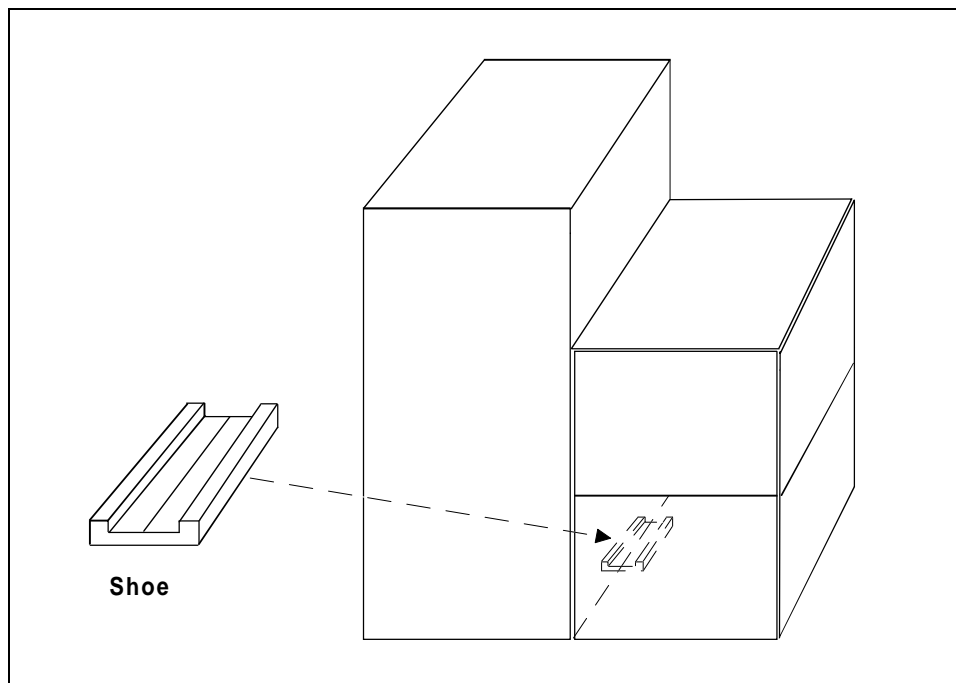


Figure B-2. Shoe Installation

B.4 Liquid Line Connections

The liquid line connections vary depending on whether the system is plumbed with PEEK or stainless steel tubing.

- See Section B.4.1 for PEEK tubing connections.
- See Section B.4.2 for stainless steel tubing connections.

B.4.1 PEEK Systems

The LC30 Ship Kit contains PEEK tubing in three different IDs. Before making the liquid connections, locate the proper tubing sizes for your system:

PEEK Tubing Size	Use For
0.125-mm (0.005-in) ID (P/N 044221)	Connections between system components in 2-mm column systems
0.25-mm (0.010-in) ID (P/N 042690)	Connections between system components in 4-mm column systems Detector cell waste lines (both systems)
0.5-mm (0.020-in) ID (P/N 042855)	Valve waste lines (both systems)

NOTE

If preferred, ThermoFlare tubing can be installed where pressures are below 30 MPa (3000 psi). This may include waste lines and tubing from the separator column to the SRS.

After determining the appropriate tubing size, you will need to cut the tubing to lengths required to plumb the system. Refer to the plumbing schematics in Figures B-3 through B-7 and to the example hardware configurations in Appendix F to determine the tubing requirements for your system. Before cutting any tubing, be sure it is long enough to allow servicing the system (e.g., you should be able to open the front door of the LC30 and slide the component panel out of the enclosure to its stop without putting stress on the tubing).

To minimize dead volume in the system, keep all fluid lines as short as possible.

For each liquid line connection, install a Dionex 10-32 ferrule (P/N 043276) and fitting (P/N 043275). For instructions on how to install ferrule fittings, refer to

LC30 Chromatography Oven

Installation of Dionex Ferrule Fittings, provided in the LC30 Ship Kit.

Recommended Plumbing Configurations

The system plumbing and tube length requirements depend primarily on the detection mode:

- *Absorbance*: Figure B-3 shows the plumbing configuration for systems that include an LC30 Chromatography Oven, an AD20 Absorbance Detector, and either a GP40 Gradient Pump or an IP20 Isocratic Pump.
- *Conductivity*: Figures B-4, B-5, and B-6 show plumbing configurations for three conductivity detection modes:
 - AutoSuppression™ recycle mode
 - AutoSuppression external water mode
 - Non-suppressed mode

These systems include an LC30, a conductivity cell connected to either a CD20 Conductivity Detector or an ED40 Electrochemical Detector, and either a GP40 or an IP20 pump. A Self-Regenerating Suppressor (SRS) is required for the AutoSuppression modes.

- *Amperometry*: Figure B-7 shows the plumbing configuration for systems that use an ED40 amperometry cell. These systems include an LC30 oven, an ED40 detector, and either a GP40 or an IP20 pump.

NOTE

See Appendix F for example component layouts which correspond to the plumbing configurations.

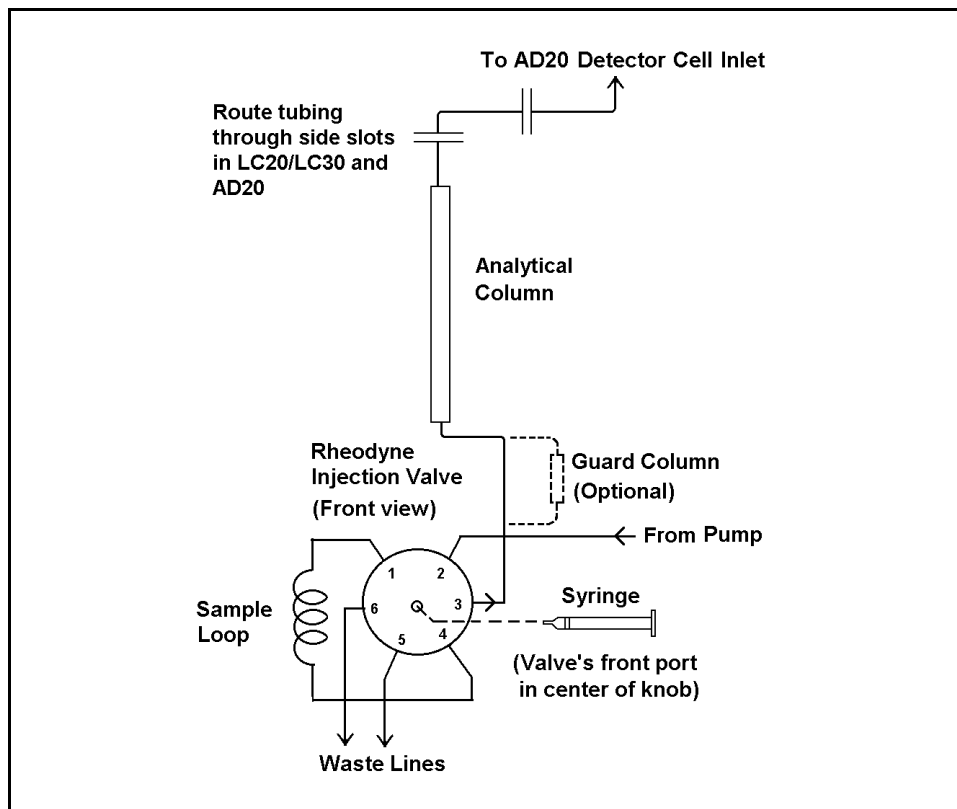


Figure B-3. AD20 Detector Cell Plumbing Schematic

LC30 Chromatography Oven

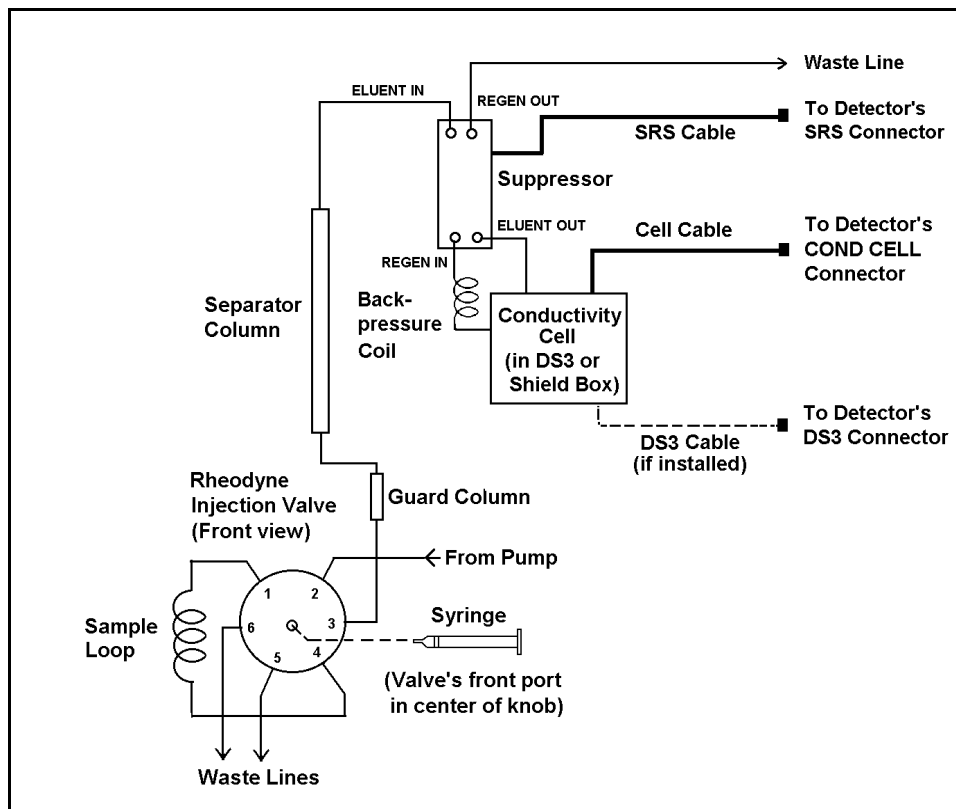
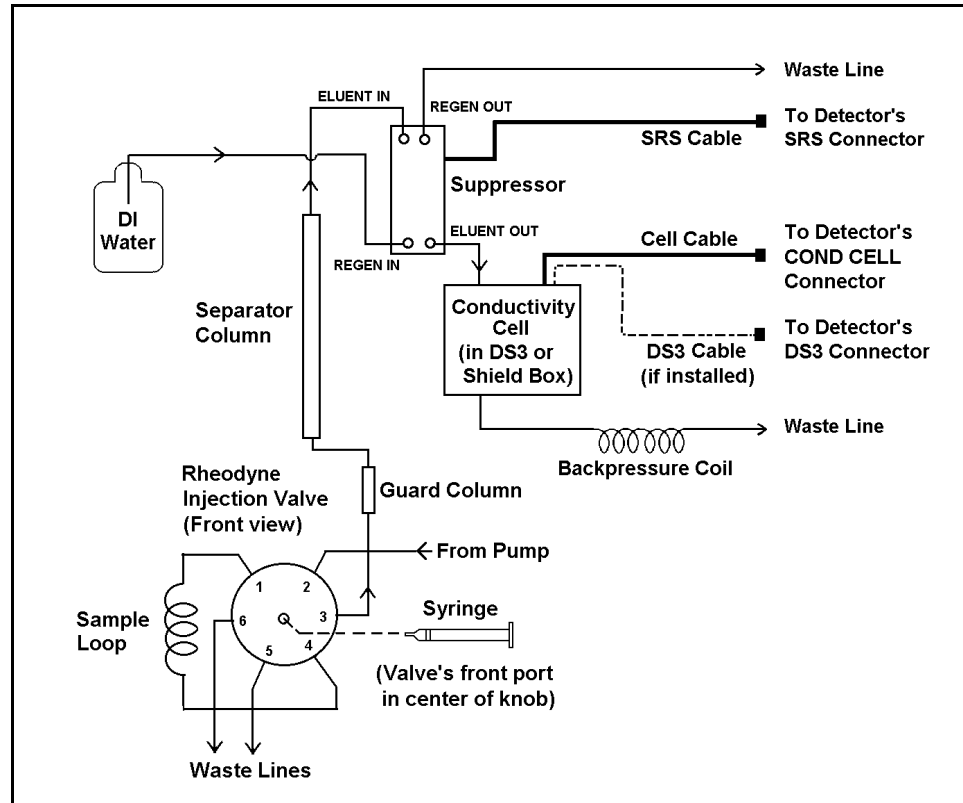


Figure B-4. Conductivity Cell Plumbing Schematic
AutoSuppression Recycle Mode



*Figure B-5. Conductivity Cell Plumbing Schematic
AutoSuppression External Water Mode*

LC30 Chromatography Oven

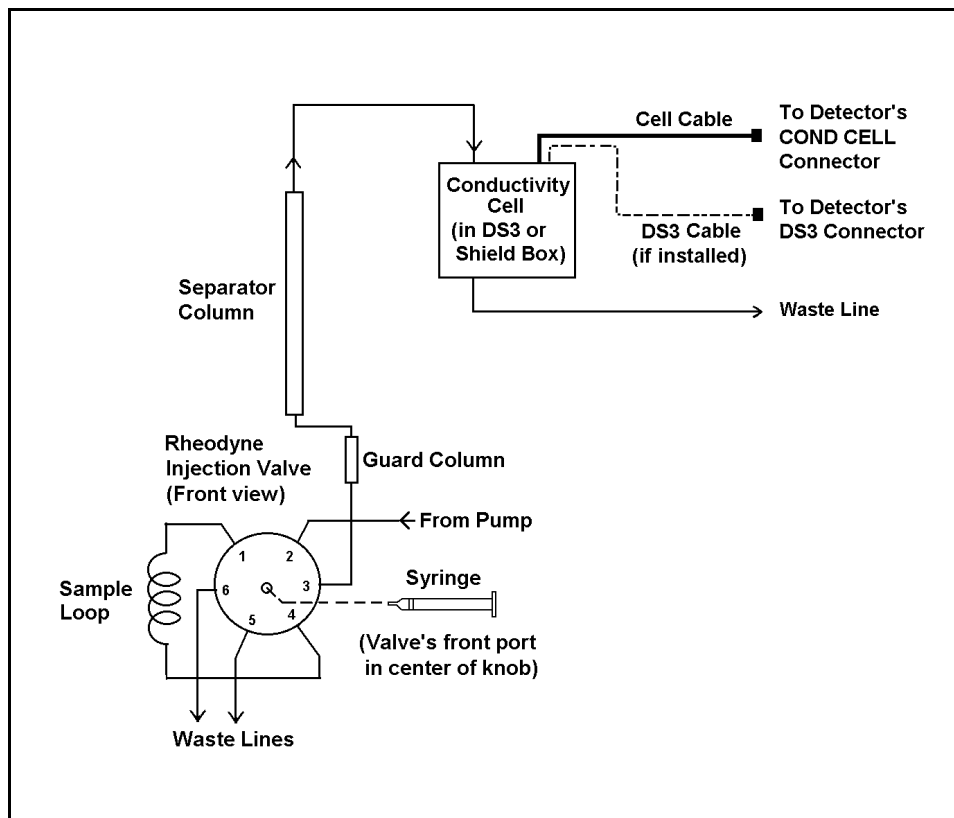


Figure B-6. Conductivity Cell Plumbing Schematic
Non-Suppressed Mode

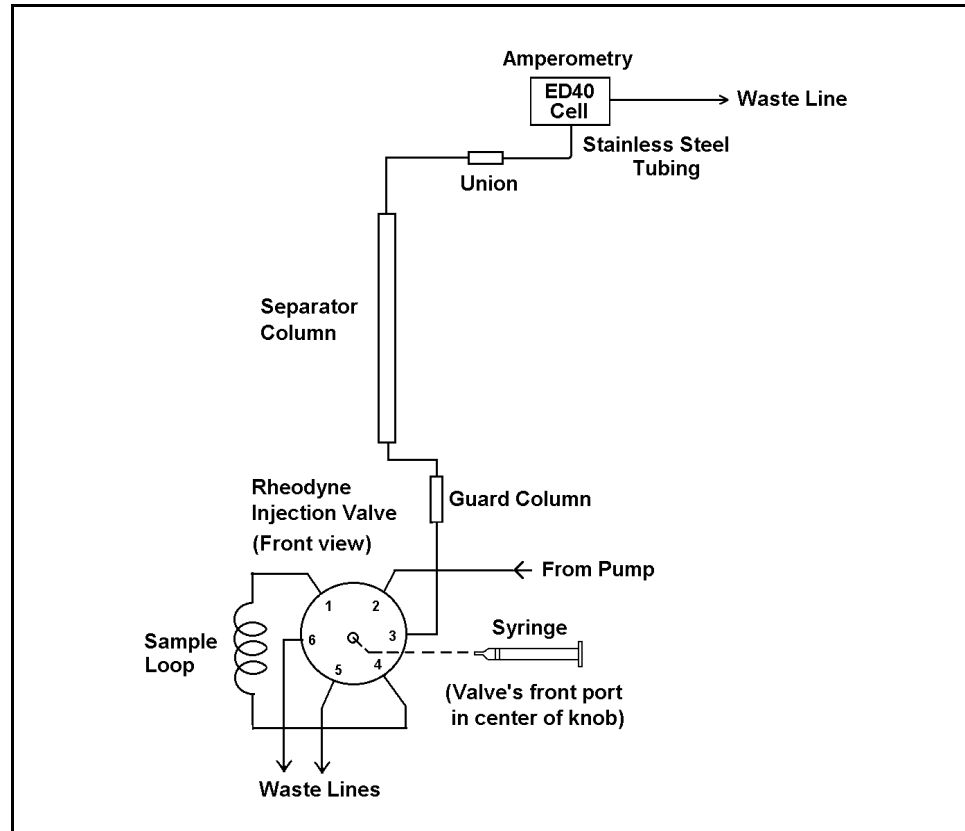


Figure B-7. Amperometry Cell Plumbing Schematic

Injection Valve Connections

1. Using a ferrule fitting and PEEK tubing in the appropriate ID, connect an eluent line from the pump pressure transducer to port 2 on the Rheodyne injection valve. (Port numbers are etched on the back of the valve.)
2. Attach a piece of PEEK tubing with ferrule fittings to port 3. This tube will connect to the separator column or guard column (if used).
3. Connect the 25 μL PEEK (P/N 042857) sample loop between ports 1 and 4.

NOTE

Other sample loop sizes are available. Contact your Dionex office for information.

4. **For front-loading valves:**

Cut two pieces of 0.5-mm (0.020-in) ID PEEK tubing for waste lines. Install a ferrule and fitting on one end of each of the pieces. Attach one of these lines to port 5 on the Rheodyne valve and attach the other to port 6 (see Figure B-8, view A).

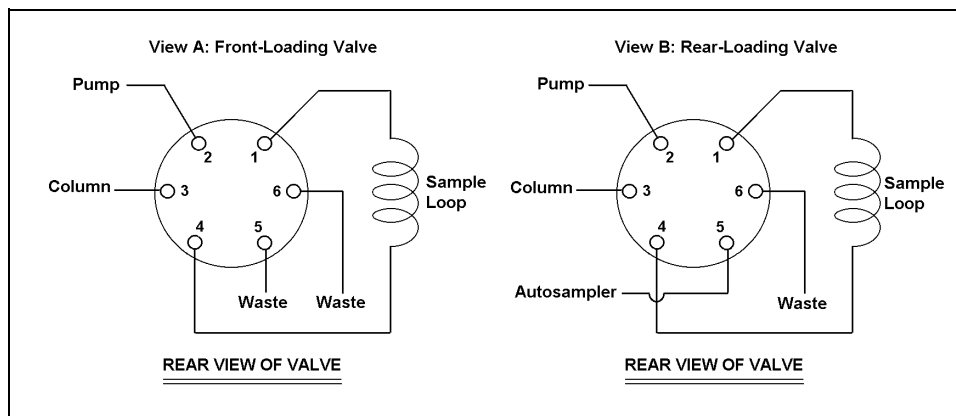


Figure B-8. Injection Valve Ports

5. For rear-loading valves:

Cut one piece of 0.5-mm (0.020-in) ID PEEK tubing for a waste line. Install a ferrule and fitting on one end. Attach this line to port 6 on the Rheodyne valve (see Figure B-8, view B).

Install a ferrule and fitting on the sample line from the autosampler. Attach it to port 5 on the Rheodyne valve.

Column and Cell Connections

1. Before installing the separator column, pump deionized water through the injection valve at 1.0 to 3.0 mL/min for 2 to 5 minutes to clear any air from the liquid lines. Trapped air reduces the separator column efficiency.
2. Switch the position of the injection valve control knob between **INJECT** and **LOAD** several times to allow water to flow through the sample loop and each valve port.
3. Set the flow rate to 2.0 mL/min and verify that the pressure through the system, with no columns installed, is less than 690 KPa (100 psi).
4. Stop the pump.
5. Each column is shipped with a manual containing specialized installation and start-up instructions. After consulting the column manual for any special requirements, install the column in the LC30.
 - a. Remove the end plugs from the separator column and store them in a safe place. You must reinstall the end plugs in the column before placing the column in storage.

NOTE

When connecting columns, observe the liquid flow direction, which is indicated by an arrow on each column. The arrow points away from the column inlet toward the column outlet.

Use the appropriate PEEK tubing with ferrule fittings for all column connections.

- b. **If connecting a guard column**, connect the inlet of the guard column to port 3 of the Rheodyne valve. Then, connect the outlet of the guard column to the inlet of the separator column.
 - c. **If no guard column is used**, connect port 3 of the Rheodyne valve to the inlet of the separator column.
 - d. Connect the outlet of the separator column as specified for your system (refer to Figures B-3 through B-7).
6. Install the column mounting clip (P/N 046699) by squeezing the open ends together and inserting them into one of the square openings on the component panel (see Appendix F for the recommended location for your application).

If you are using a 4-mm column, orient the clip with the larger clips toward the rear.

If you are using a 2-mm column, orient the clip with the smaller clips toward the rear.

NOTE

The Ship Kit contains two oversized black column clips (P/N 047992 and P/N 048389). These clips accommodate columns with diameters too large to fit in the standard column mounting clips. If needed, install one of these clips on a single pemnut on the component panel, using the provided Phillips screw.

7. Snap the separator column into the column clip. The guard column “floats” below the separator column, held in place only by the connecting tubing.
8. Connect a cell waste line, if required for your system.

SRS Connections (Optional)

1. If you are using an external regenerant:
 - a. Assemble and fill the regenerant reservoir as described in the instructions shipped with the reservoir.
 - b. Locate the 120-cm (48-in) piece of tubing (P/N 035727) in the SRS Ship Kit. Use this tubing to connect the reservoir to the **REGEN INLET** of the SRS.
 - c. Adjust the regenerant flow rate as instructed in the SRS manual.
2. If you are not using an external regenerant, connect the **REGEN INLET** of the SRS to the cell outlet.
3. Connect the **ELUENT OUTLET** to the cell inlet.
4. Connect a waste line to the **REGEN OUTLET**.
5. The SRS has a special mounting bracket that can be installed in several positions on the component panel, depending on your application (see Appendix F). If it is not already installed, mount the SRS bracket on the component panel (see Figure B-9). To install the SRS, orient it with the **REGEN OUT** port and the cable at the top; align the slots on the back of the SRS with the tabs on the mounting bracket. Press *in* and then *down* to lock the SRS in place. Lift *up* and pull *out* to remove the SRS if necessary.

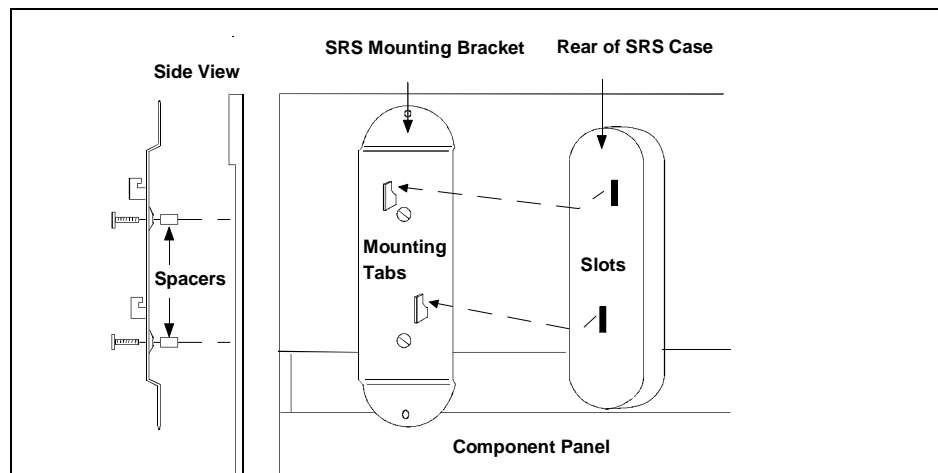


Figure B-9. Installing the SRS

B.4.2 Stainless Steel Systems

The LC30 Ship Kit contains PEEK-covered stainless steel tubing assemblies for connections between system components, and 0.5-mm (0.020-in) ID PEEK tubing (P/N 042855) for valve waste lines.

NOTE

The stainless steel tubing assemblies are made of microbore stainless steel tubing encased in PEEK. If you prefer, use plain stainless steel tubing (not encased in PEEK) in the appropriate size from 0.125-mm (0.005-in) to 0.5-mm (0.020-in) ID. Plain stainless steel tubing is not provided in the Ship Kit.

The LC30 is plumbed with Dionex 1.6-mm (0.062-in) ferrules (P/N 010262) and fittings (P/N 010277). For instructions on how to install ferrule fittings, refer to *Installation of Dionex Ferrule Fittings*.

Refer to Figure B-10 while plumbing the system.

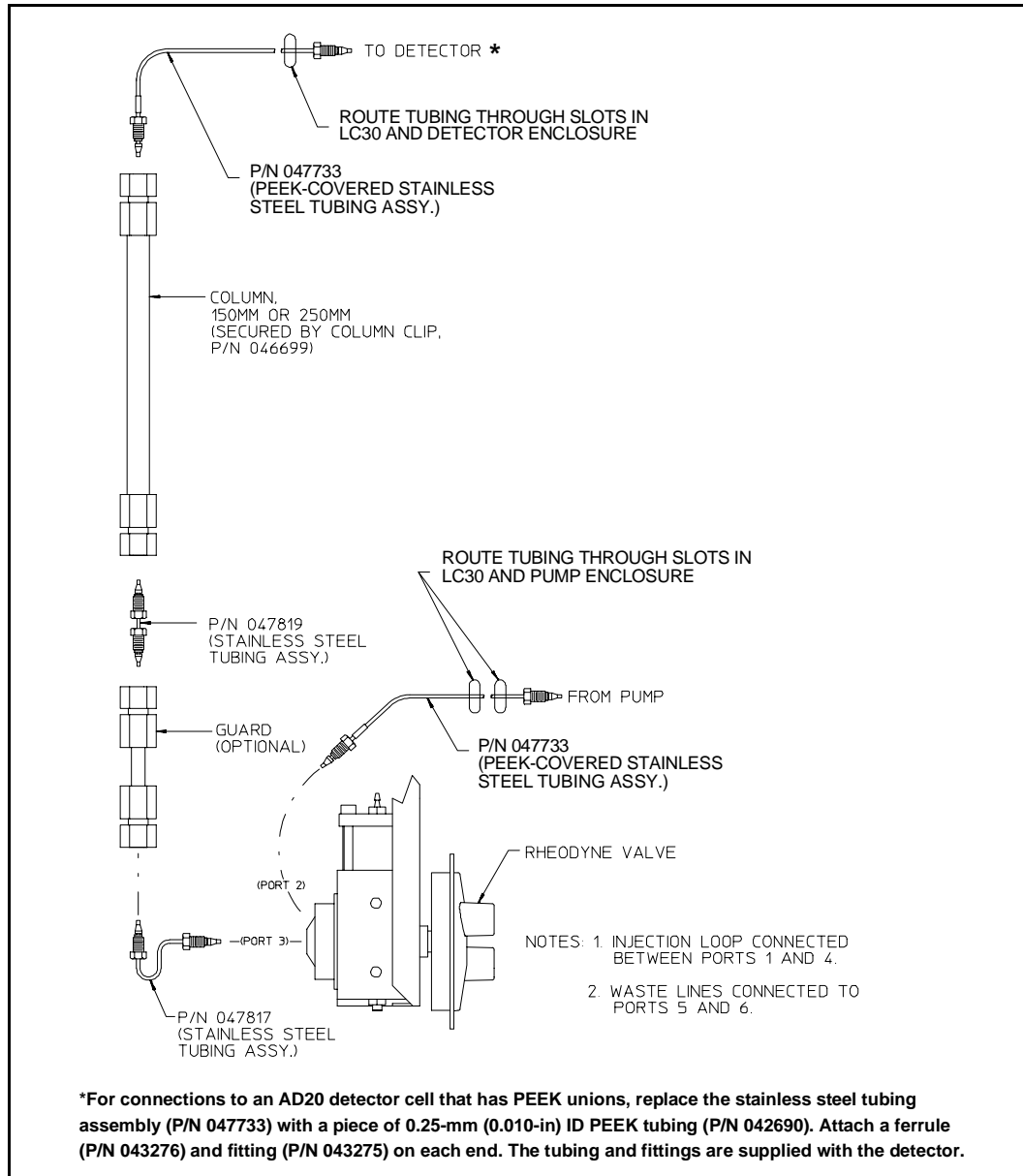


Figure B-10. Stainless Steel Liquid Line Connections

Injection Valve Connections

1. Locate stainless steel tubing assembly P/N 047733 in the Ship Kit. Connect one end of the assembly to port 2 on the Rheodyne injection valve. (Port numbers are etched on the back of the valve.) Route the tubing through the side slots on the LC30 and the GP40 or IP20 and connect it to the pump pressure transducer outlet.
2. Locate stainless steel tubing assembly P/N 047817 in the Ship Kit. Attach one end to port 3 of the Rheodyne valve. The other end will be connected to the separator column or guard column (if used).
3. **For front-loading valves:**
Cut two pieces of 0.5-mm (0.020-in) ID PEEK tubing for waste lines. The pieces should be long enough to route from the Rheodyne valve, through the rear service chase and into a waste container. Install a ferrule and fitting on one end of each of the pieces. Attach one of these lines to port 5 on the Rheodyne valve and attach the other to port 6 (see Figure B-8, view A).
4. **For rear-loading valves:**
Cut one piece of 0.5-mm (0.020-in) ID PEEK tubing for a waste line. The piece should be long enough to route from the Rheodyne valve, through the rear service chase and into a waste container. Install a ferrule and fitting on one end. Attach this line to port 6 on the Rheodyne valve (see Figure B-8, view B).

Install a ferrule and fitting on the sample line from the autosampler. Attach it to port 5 on the Rheodyne valve.

Column Connections

1. Before installing the column, pump deionized water through the injection valve at 1.0 to 3.0 mL/min for 2 to 5 minutes to clear any air from the liquid lines.

2. Activate the injection valve by switching the position of the control knob between **INJECT** and **LOAD** several times to make sure that no air is trapped in the hydraulic system. Trapped air reduces the column efficiency.
3. Set the flow rate to 2.0 mL/min and verify that the pressure through the system, with no columns installed, is less than 690 KPa (100 psi).
4. Stop the pump.
5. Install the column mounting clip (P/N 046699) by squeezing the open ends together and inserting them into one of the upper square openings on the component panel (see Figure F-1).

If you are using a 4-mm column, orient the clip with the larger clips toward the rear.

If you are using a 2-mm column, orient the clip with the smaller clips toward the rear.

NOTE

The Ship Kit contains two oversized black column clips (P/N 047992 and P/N 048389). These clips accommodate columns with diameters too large to fit in the standard column mounting clips. If needed, install one of these clips on a single pemnut on the component panel, using the provided Phillips screw.

6. Each column is shipped with a manual containing specialized installation and start-up instructions. After consulting the column manual for any special requirements, install the column in the LC30.
 - a. Remove the end plugs from the column and store them in a safe place. You must reinstall the end plugs in the column before placing the column in storage.
 - b. **If no guard column is used**, connect the inlet of the analytical column to the tubing assembly connected to port 3 of the Rheodyne valve.

- c. **If connecting a guard column**, connect the inlet of the guard column to the tubing assembly connected to port 3 of the Rheodyne valve. Then, locate stainless steel tubing assembly P/N 047819 in the Ship Kit. Connect one end of the tubing to the outlet of the guard column. Connect the other end to the inlet of the analytical column.
- d. **For detectors with PEEK cell unions:**
Cut a piece of 0.25-mm (0.010-in) ID PEEK tubing (P/N 042690) and attach a ferrule (P/N 043276) and fitting (P/N 043275) on each end. Connect one end to the outlet (top) of the column. Route the other end through the side slots on the oven and detector and connect it to the detector cell inlet.

For detectors with stainless steel cell unions:

Locate stainless steel tubing assembly P/N 047733 in the Ship Kit. Connect one end to the outlet (top) of the column. Route the other end through the side slots on the oven and the detector and connect it to the detector cell inlet.

NOTE

A heat exchanger is mounted in the center of the AD20 optical unit, just below the cell. For most applications, connect the column outlet to the inlet of the heat exchanger (the port on the right). Then connect the outlet of the heat exchanger to the detector cell inlet.

7. Snap the column into the column clip on the LC30. The guard column “floats” below the column, held in place only by the connecting tubing.

B.4.3 Completing the Liquid Line Connections

1. Remove the foam pad from the service chase located on the left-side of the rear panel below the solenoid valves (see Figure 2-10). Route the waste line tubing and electrical cable(s) through the service chase.
2. Pull the component panel out until it locks in the fully open position. Adjust any slack in the tubing and cables and then lock them in place by reinserting the foam pad into the service chase.



IMPORTANT

Be sure to replace the foam pad in the service chase to ensure thermal stability.

3. Press the rear slide release and push the panel back into the enclosure. Check the tubing and cables for pinching.
4. Place the end of the leak line and each waste line in a waste container (see Figure B-11). Make sure the tubing is not bent, pinched, or elevated at any point.



CAUTION

Neutralize acidic and caustic waste before disposal. Dispose of all wastes in accordance with local regulations.

LC30 Chromatography Oven

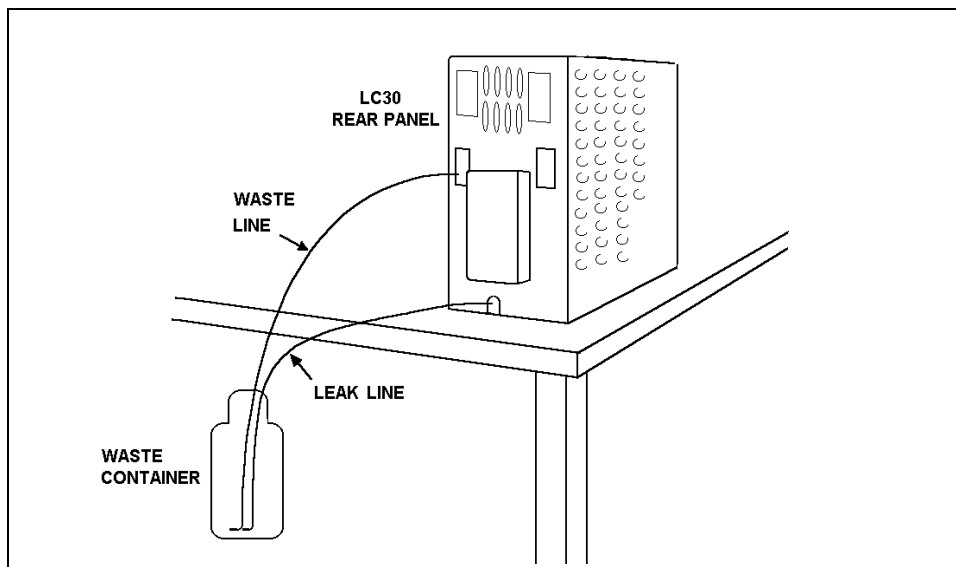


Figure B-11. Waste Lines Installation

B.5 Power

Connect the 3-prong (grounded) main power cord (P/N 960708) to the receptacle on the rear panel (see Figure 2-10). Connect the other end of the cord to the correct AC power source.

The LC30 can function as the system main power control. For each additional module in the system, connect an IEC jumper power cord (P/N 960748) to an IEC auxiliary receptacle on the LC30 rear panel (see Figure 2-10). Connect the other end of the cord to the main power receptacle on the module.

The oven is shipped with two IEC fuses rated 10 amps at 250 Vac. Refer to Section 5.1 for instructions on replacing the fuses.

B.6 Air Connections

The Rheodyne injection valve and, if plumbed, Dionex column switching valve are operated by a source of lab-quality nitrogen, helium, or air pressure regulated to between 530 and 800 KPa (80 and 120 psi); 690 KPa (100 psi) is recommended.



To avoid contamination and possible deterioration of the valves, make sure laboratory pneumatic air, if used, is oil-free, dry, and filtered, and maintained within the pressure limits specified above.

1. Locate the 1.57-mm ID (0.063-in) polyurethane air line tubing (P/N 047203) in the LC30 Ship Kit. Cut the tubing to the length needed to connect the air-in line extending from the solenoid valves on the rear panel to the source of gas/air pressure (see Figure B-12).
2. A quick-disconnect fitting (P/N 039167) is installed on the end of the air-in line. Connect the unattached half of the fitting to the air line tubing.

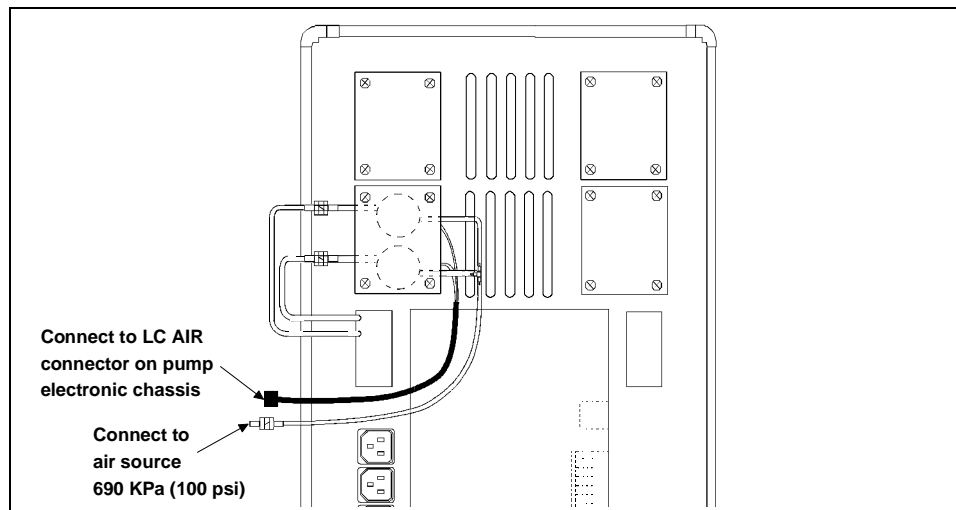


Figure B-12. LC30 Rear Panel Air Connections

LC30 Chromatography Oven

- The LC30 Ship Kit includes barbed fittings (P/N 030071), barbed-tee fittings (P/N 030538), and a pipe adapter (P/N 030087) for connecting the air line tubing to the source of air/gas pressure. Screw the barbed fitting into the regulator outlet of the air source and push the air tubing over the barbed fitting. If the regulator outlet is incompatible with the thread of the barbed fitting, screw the pipe adapter into the regulator outlet, and then screw the barbed fitting into the pipe adapter.

Use the barbed-tee fitting to connect to an existing air line, when the air source is used for more than one set of solenoid valves or other function.

- Connect the electrical cable extending from the solenoid valves to the **LC AIR** connector on the GP40 or IP20 pump electronic chassis (see Figures B-12 and B-13). The electronic chassis is located behind the pump's upper door.

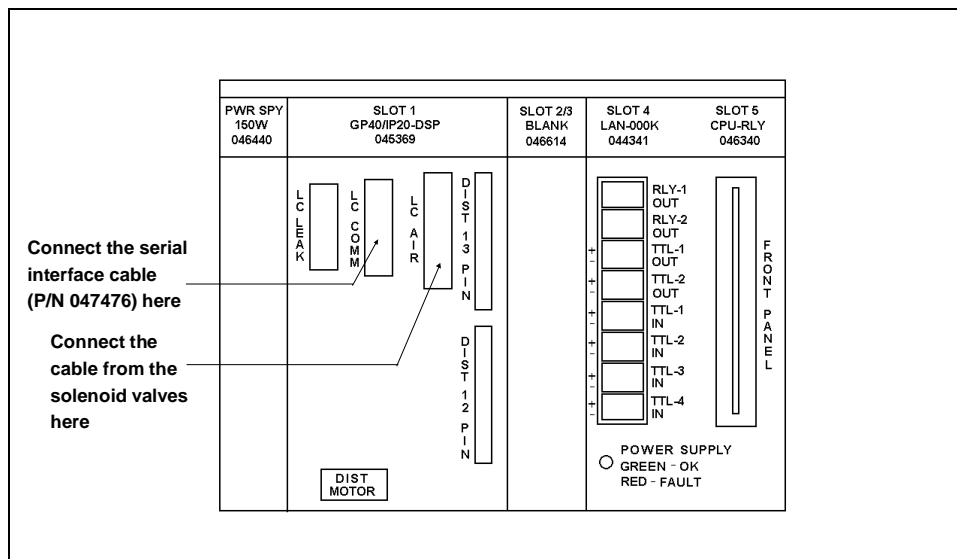


Figure B-13. GP40/IP20 Electronic Chassis
(Located behind pump upper door)

5. Verify that the air connections are correct, using one of the following methods:
 - From the pump **Main** screen, switch the position of the valve between **LOAD** and **INJECT** and back again. The position of the Rheodyne valve control knob on the front of the LC30 should change to match the position selected from the pump screen.
 - Disconnect the sample loop from port 1 of the Rheodyne valve. Switch the position of the valve between **LOAD** and **INJECT**, using either the pump **Main** screen or the Rheodyne valve control knob. In the inject position, eluent should pass from the pump through the loop. In the load position, eluent should not pass through the loop.
6. If the operation of the valve is reversed, reverse the air lines on the top of the Rheodyne valve.

B.7 DX LAN Connection (Optional)

1. Connect the serial interface cable (P/N 047476) to the DX LAN RJ-11 serial connector on the oven's rear panel. The connector is recessed in the right side of the oven and fan housing (see Figure 2-10).
2. Connect the other end of the cable to the **LC COMM** connector on the pump electronic chassis (see Figure B-13). A PeakNet workstation, operating through the pump, can then be used for remote control of the LC30 (see Figure B-14).

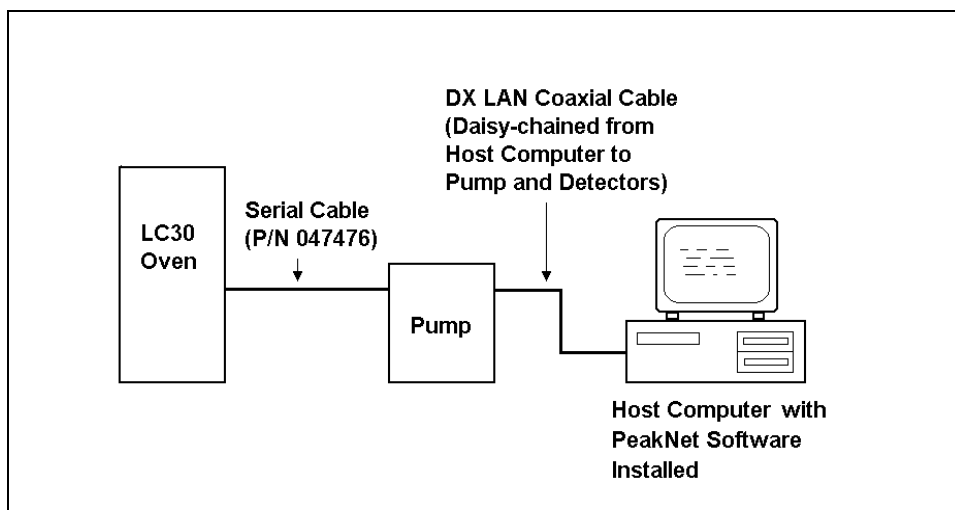


Figure B-14. LC30 Remote Interface

C • Error and Fault Codes

C.1	Error and Fault Code Displays	C-3
C.2	Clearing the Display	C-5
C.3	Clearing a Flammable Vapors Fault	C-6

LC30 Chromatography Oven

C • Error and Fault Codes

C.1 Error and Fault Code Displays

- An **Error** is a non-catastrophic event that permits the oven to continue operation. An Error is announced by a short (0.1-second), low frequency tone.
- A **Fault** is a catastrophic event for which the internal program shuts down the oven operation. A Fault is announced by a long (2-second), high frequency tone.

Whenever an Error or Fault occurs in the LC30, the **Set°C** 2-digit readout on the right side of the control panel will display either **En** to indicate an Error condition, or **Fn** to indicate a Fault condition, where $n = 1, 2, 3$, etc.

In addition, when a Fault occurs, the red **Fault** indicator below the arrow buttons turns on and remains on until the Fault is corrected.

The Error and Fault codes are described in Table C-1 and also on a label on the inside of the oven door.

NOTE

During troubleshooting, the Error beep can be turned off by setting DIP switch 3 to its on position. The DIP switches are located on the inside of the front door (see Figure 2-4). Be sure to reset the switch to off before resuming normal operation. The Fault tone cannot be disabled.

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Table C-1. Error and Fault Codes

Code	Error	Probable Cause	Corrective Action
Error Codes			
Door	Door Open	Both displays change to read “do” and “or” spelling the word “door;” Indicates the door is not fully closed.	Close the door fully.
E1	Liquid Leak	The liquid leak detector at the bottom left side of the oven is wet; indicates a probable leak in the hydraulic circuit. Warning only; operation may continue before stopping the leak.	Open the door. Fix the leak and dry the sensor and bottom of the oven. Close the door.
E2	Temperature not Regulating	DIP switch 1 is in the low range (off position) while attempting to operate above 41 °C. This is a warning only; the set point cannot be increased until switch 1 is set to the on position.	Set DIP switch 1 in the on position
Fault Codes			
F1	Thermal Over-range	The heatsink has reached a temperature higher than the maximum allowed. This may be due to heater drive failure, fan failure, etc. The program will attempt to shut down the heater and fan. The oven will go to Standby. In case of component failure, a second level of protection (temperature-sensitive fusible link) will shut down the heater regardless of any failure of any other circuit.	POWER DOWN! DO NOT ATTEMPT TO RESTART THE OVEN! This fault requires service by a Dionex representative; one or more components has failed and must be replaced.
F2	Flammable Vapors	The flammable vapors sensor has detected flammable vapors in excess of the internal threshold. To avoid possible fire or explosion, the heater is turned off, the fan is stopped, and the oven is set to Standby.	Open the door to air out the LC30. Remove the source of vapors. Close the door. See Section C.3 if the fault persists.

Code	Error	Probable Cause	Corrective Action
F3	Fan Failure	A sensor has detected the absence of sufficient air flow in the oven. This may be due to mechanical blockage of the fan blades, fan failure etc. The heater is turned off to prevent overheating.	Open the door. Check for obstructions and free fan rotation. Close the door. If Fault remains, call Dionex Service.
F4	Fuse Failure	The internal fuse to the heater has failed. The heater will not heat.	Call Dionex Service to replace the fuse.
F5	Out of Calibration	The oven has lost the absolute precision of temperature reading. The oven will still function and regulate temperature, but the reading may vary by up to 2 °C.	Call Dionex Service for recalibration. Oven may still operate, but probably not reliably.
F6	Bad Checksum	Program memory (ROM) failure.	Call Dionex Service.

C.2 Clearing the Display

Use the following steps to clear Error or Fault displays:

1. Open the oven door and check the label inside the door or Table C-1 to make sure you understand the meaning of the display.
2. Correct the condition causing the Error or Fault.
3. Close the door. This clears the Error or Fault reading and resets the display. The oven then goes to Standby and rechecks for the presence of an Error or Fault.
 - a. If an Error or Fault still exists, the display immediately shows the condition again. Repeat Steps 1 through 3 until no Error or Fault is detected when you close the door.
 - b. If no Error or Fault exists, the **Temp °C** and **Set °C** temperatures are displayed and the oven is ready to restart. Press **Actv / Stby** to start the oven.

NOTE

An F5 fault can be cleared by opening and closing the oven door. However, the fault will continue to be generated upon power up, until a factory calibration is performed.

C.3 Clearing a Flammable Vapors Fault

An F2 fault code in the display window indicates a flammable vapors alarm. To clear the fault, do the following:

1. Check for a heavy atmosphere of solvent in the lab. Wipe up any spills; provide additional ventilation, if possible.
2. Check for solvent leaks in the oven. Wipe up spills and repair leaks. Air out the oven.

NOTE

The factory-installed sensor is very sensitive to methylene chloride. If this solvent causes repeated failures, an alternate sensor (P/N 938914) is available. Contact your Dionex representative for information.

3. If the Fault still occurs, recalibrate the sensor.
 - a. Open the oven door; set DIP switch 2 to its on position (Calibration/Diagnostic mode). The DIP switches are located on the inside of the front door (see Figure 2-4). Close the door.
 - b. Wait 25 to 45 seconds; open the door again and set DIP switch 2 to its off position; close the door.
 - c. Restart the oven.
4. If the problem still persists after recalibration, make a note of the sensor reading and as many facts about the problem as possible, and call Dionex for technical assistance.

D • Calibration and Diagnostics

D.1	Power-Up Diagnostics	D-3
D.2	Calibration/Diagnostic Mode	D-4

LC30 Chromatography Oven

D • Calibration and Diagnostics

The LC30 Chromatography Oven performs certain diagnostic functions at power-up. Other diagnostic and calibration functions are available only when the oven is in the Calibration/Diagnostic mode.

D.1 Power-Up Diagnostics

The oven automatically performs the following diagnostic tests when powered up:

- All LEDs turn on and the alarm sounds.
- The Moduleware revision number displays, followed by a beep.
- The LC30 computes the ROM checksum over the relevant codespace and compares it to the stored checksum. If the values do not agree, an F6 (Bad Checksum) fault displays. Call Dionex Service if this fault occurs.
- The LC30 tests the battery backup memory (BBRam) for corruption. If memory is corrupted, the oven sets the set point and error threshold to defaults and displays an F5 (Out of Calibration) fault. Call Dionex Service for calibration information if this fault occurs.
- The LC30 tests that the temperature, amplifier gain, and offset calibration values are 1) reasonable and 2) the same as the shadow backup variable. If this test is not satisfactory, the offset and gain variables are set to defaults and an F5 fault displays. Call Dionex Service for calibration information if this fault occurs.

NOTE

The F5 fault can be cleared by opening and closing the oven door. However, the fault will continue to be generated upon power up, until a factory calibration is performed.

D.2 Calibration/Diagnostic Mode



The Calibration/Diagnostic mode is normally reserved for use by Dionex trained personnel. Use this mode only when, and as, directed by a Dionex representative.

1. Select the Calibration/Diagnostic mode by setting DIP switch 2 to the on position. The DIP switches are located on the inside of the front door (see Figure 2-4).
2. Close the door and set the oven to Standby. The temperature display changes to show a diagnostic function alternating every few seconds with a numeric value.
3. Press either the Δ or ∇ button to cycle the display through the remaining LC30 diagnostic functions. The functions include 11 AD channels, the offset and slope of the temperature sensor calibration, the ROM checksum, and a communications loopback function. Table D-1 shows the sequence of functions selected by the arrow buttons and the range of values for each function.



While in the Calibration/Diagnostic mode, it is possible to enter the Factory Calibration mode, allowing access to functions that can delete factory-set calibrations of the temperature amplifier gain and offset values. This mode is for use by Dionex trained personnel only.

The following describes how to enter and exit the Factory Calibration mode. This is for clarification only in the event that you accidentally enter the mode.

The Factory Calibration mode is entered by pressing **Actv/Stby** for at least five seconds. The display will show **Lo**.

To exit, press any button other than **Actv/Stby** to return to the previous Calibration/Diagnostic function, without affecting the factory set values.

Table D-1. Calibration/Diagnostic Functions

Display	Function	Range
Ch 0	Oven Temperature	Note 1
Ch 1	Heater Temp/Heat Sink	Note 2
Ch 2	±15V Voltage Monitor	800-900
Ch 3	Not Used	
Ch 4	+5V Voltage Monitor	2000-2100
Ch 5	Flammable Vapors Sensor	50-600 (Note 3)
Ch 6	Fan Fail Sensor	1500-2400
Ch 7	Liquid Leak Sensor	1500-2400
Ch 8	DIP Switch Settings	Note 4
Ch 13	Slope shadow backup variable	A hexadecimal number
Ch 14	Offset shadow backup variable	A hexadecimal number
Ch 15	RAM integrity check	55AA if the battery is fine
51o	Slope	3900-4100
OFF	Offset	-999 to +999
CHE	ROM Checksum	A hexadecimal number
Conn	Communication loopback where nn is a hexadecimal number that should start at 0 and increase to FF if a loopback connector is inserted and the communication functions correctly.	

Notes:

1. Varies with internal oven temperature: from about 600 at 20 °C, to 4000 at 80 °C.
2. Varies with heater temperature: from about 600 at 20 °C, to 4000 at 80 °C.
3. Up to 1000 for the first few minutes after powering-up with a new module, or one that has been unused for months.
4. A composite DIP switch position binary reading (Service only).

E • TTL and Relay Control

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E • TTL and Relay Control

The 10-pin connector on the LC30 rear panel (see Figure 2-10) provides three TTL outputs (Fault, Error, and Ready) and one TTL input (Active/Standby).

- Connect the outputs to the TTL or relay inputs of a Dionex or non-Dionex device that you want to respond to operating conditions in the oven.
- Connect the input to a Dionex or non-Dionex instrument that you want to control the oven's Active/Standby state.

See Section E.3 for connection instructions and an example.

E.1 TTL and Relay Outputs

The output on the pins is normally high and goes from high to low when oven operating conditions change. There are three outputs:

- The Fault output goes from high to low when a Fault condition is detected in the oven. Connect the Fault output to the input of an instrument that you want to respond to Faults. For example, connect it to the pump module to stop the pump in case of oven problems.
- The Error output goes from high to low when an Error condition is detected in the oven. Connect the Error output to the input of an instrument that you want to respond to Errors. For example, connect it to the pump module to stop the pump in case of oven problems.

See Appendix C for a description of each Error and Fault code.

- The Ready output goes from high to low whenever the **Ready** LED is on, and indicates to other instruments that the oven is regulating at the temperature set point. Connect the Ready output to the input of an instrument that you want to respond to the Ready status. For example, connect it to the detector module and

then create a method in which data collection starts when the oven sends a Ready signal.

The Error, Fault, and Ready outputs are open-collector devices pulled to +5 V by a 1K resistor. They are capable of withstanding +24 V in the high state and can sink to 50 mA in the low state.

The outputs can directly drive TTL or CMOS inputs, or act as solid-state relays capable of withstanding up to +24 V, and shorting to ground any DC signal current-limited to less than 50 mA. Do not attempt to control AC signals as these outputs will act as a short to ground for any negative input voltage regardless of the output's logic state.

E.2 Active/Standby Input

Connect the Active/Standby input to a Dionex or non-Dionex instrument capable of providing TTL or relay signals. When the connected device outputs a signal, the operating status of the oven switches from Active to Standby or vice versa. For example, connect the Active/Standby input to the pump module and then create a method in which the pump switches the oven to standby at the end of the method.

The Active/Standby input is pulled high to +5 V by a 10K resistor, and protected against input voltages up to +24 V. It can be driven by any device (TTL gate, CMOS buffered gate, open collector transistor, or mechanical relay, capable of bringing the signal below 0.8 V above ground by sinking 4 mA to ground.

E.2.1 Input Signal Modes

The Active/Standby input responds to four types of signals to accommodate different types of device output signals. Normal edge, the default signal mode, is compatible with the output signals provided by DX 500 modules. If the device connected to the oven outputs a different signal type, reset DIP switches 4 and 5 to select the required signal mode (see the following

table). The switches are located on the inside of the LC30 front door (see Figure 2-4).

Sw #	Function	Off	On	Default
4	TTL Mode	Edge	Pulse	Edge
5	Polarity	Normal (Negative)	Inverted (Positive)	Normal

The four input signal modes are:

- *Normal Edge*: In normal edge operation, the negative (falling) edge of a signal switches the oven to active and the positive (rising) edge switches the oven to standby (see Figure E-1).
- *Inverted Edge*: The inverted edge mode works identically to the normal edge mode except that the positive and negative edges are reversed in function.
- *Normal Pulse*: In normal pulse operation, the negative edge of a signal toggles the oven's Active/Standby state and the positive edge has no effect (see Figure E-1). For example, applying a negative pulse when the oven is in Standby toggles the oven to Active status.
- *Inverted Pulse*: The inverted pulse mode operates identically to the normal pulse mode except that the positive and negative edges are reversed in function.

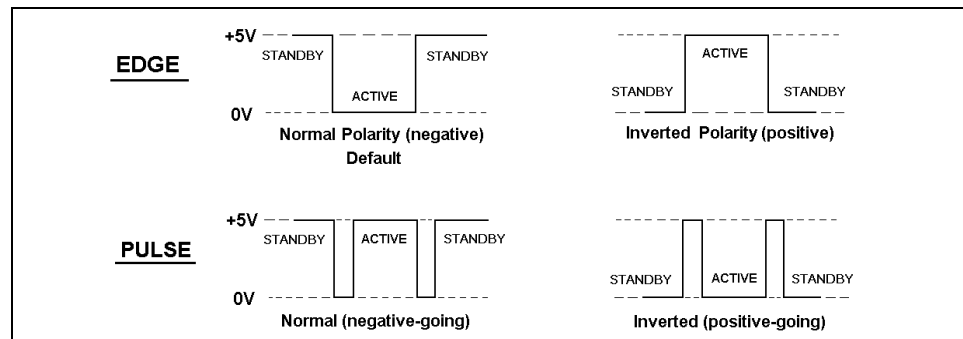


Figure E-1. TTL and Relay Input Signal Modes

E.3 TTL and Relay Connections

The 10-pin TTL/Relay connector is located on the right side of the heater and fan housing on the rear panel (see Figure 2-10). (The connector is recessed in the housing.) The connector has five pairs of pins, each with a signal pin and a ground pin. Figure E-2 illustrates the connector and its pin functions.

1. Locate the interface plug (P/N 923545) and twisted pairs of wires (P/N 043598) provided in the LC30 Ship Kit. Connect a pair of wires (one input and one ground) for each TTL input or output to be used. Strip the ends of the wires, insert into the plug, and use a screwdriver to tighten the locking screw.
2. Attach a two-pin connector plug to the other end of each pair of wires. The two-pin plugs (P/N 921019) are provided in the Ship Kits of the DX 500 detector and pump modules. Connect these plugs to the TTL or Relay connectors on the other modules as needed for your application. Check the polarity of the connection. Connect signal wires to signal pins and ground wires to ground pins. Figure E-3 shows an example connection.

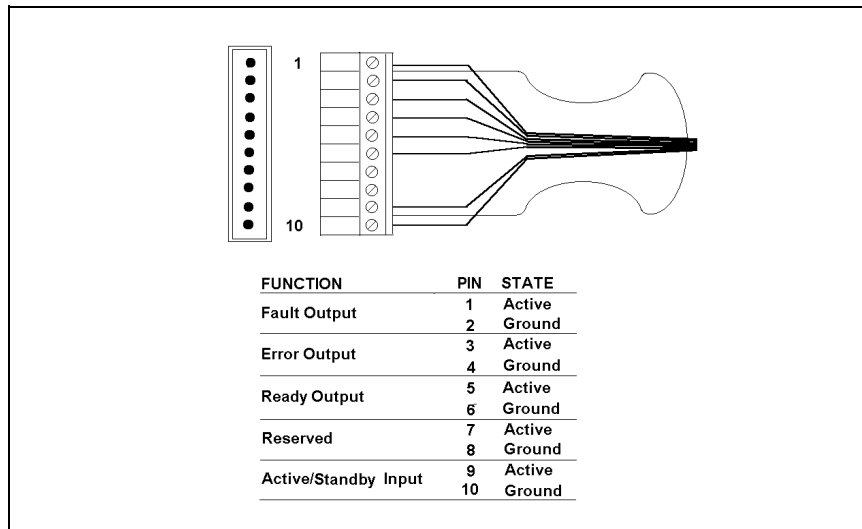


Figure E-2. TTL and Relay Input Connector

NOTE

The Fault and Error outputs can be connected in parallel to a common input (see Figure E-3). The outputs will be OR'ed, which means that the occurrence of a Fault or Error condition by itself, or of both a Fault and an Error condition at the same time, will send the TTL output signal to the common input.

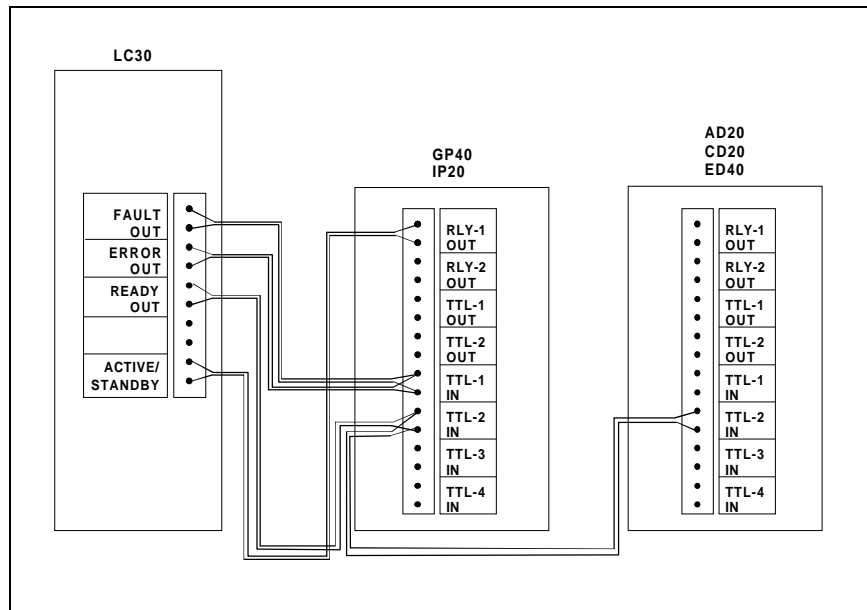


Figure E-3. Example TTL and Relay Connections

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F • Hardware Configurations

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F • Hardware Configurations

Components can be installed on the slide-out panel in several different configurations. Figure F-1 shows the possible mounting locations for each type of component.

Following Figure F-1 are illustrations of recommended hardware component layouts for six different system configurations.

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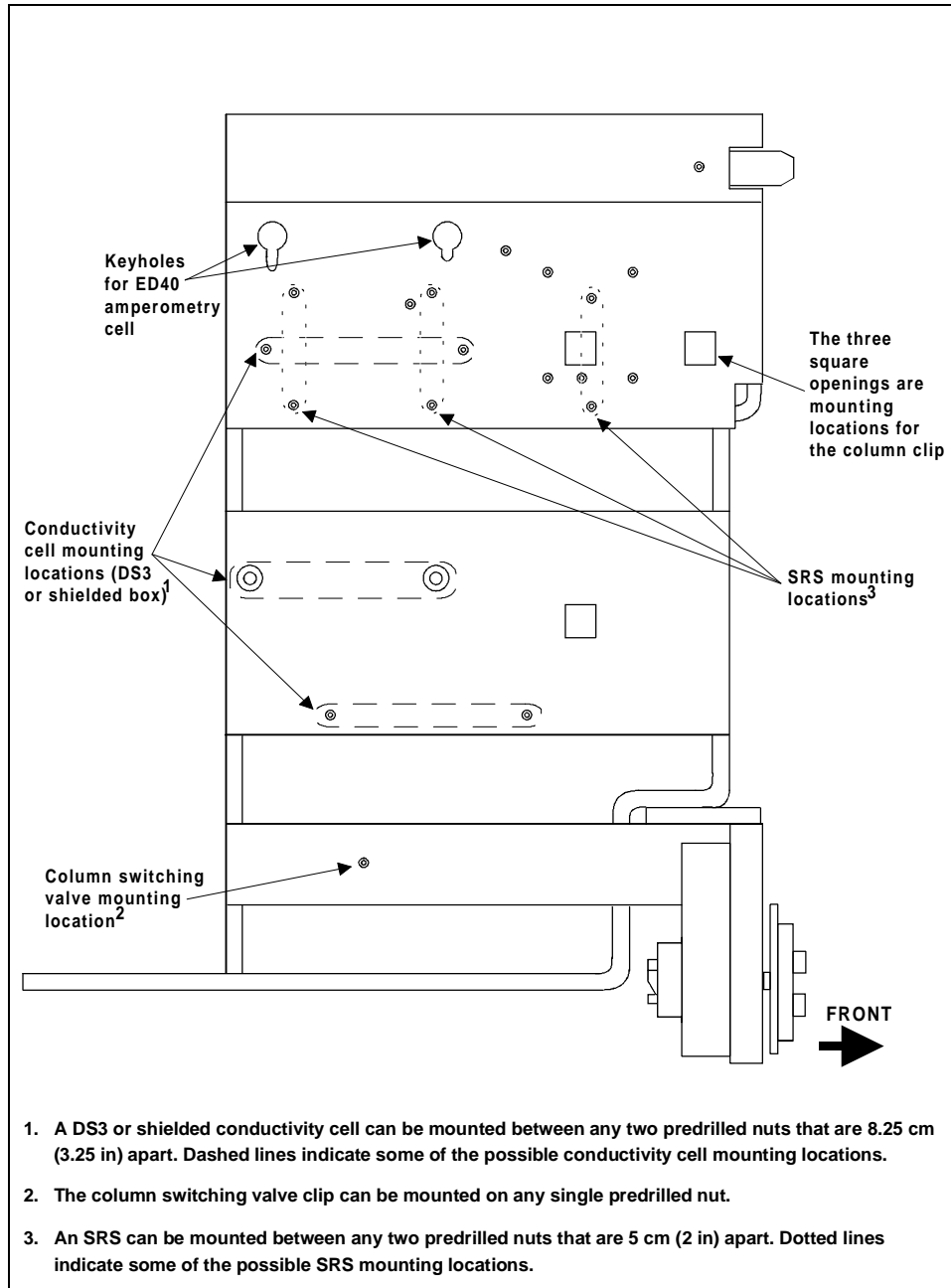


Figure F-1. Component Mounting Locations

F.1 Configuration 1: Non-Suppressed Conductivity

Configuration 1 is recommended for systems using non-suppressed conductivity which include a conductivity cell with either a DS3 Detection Stabilizer or a shield box, an analytical column, and a guard column.

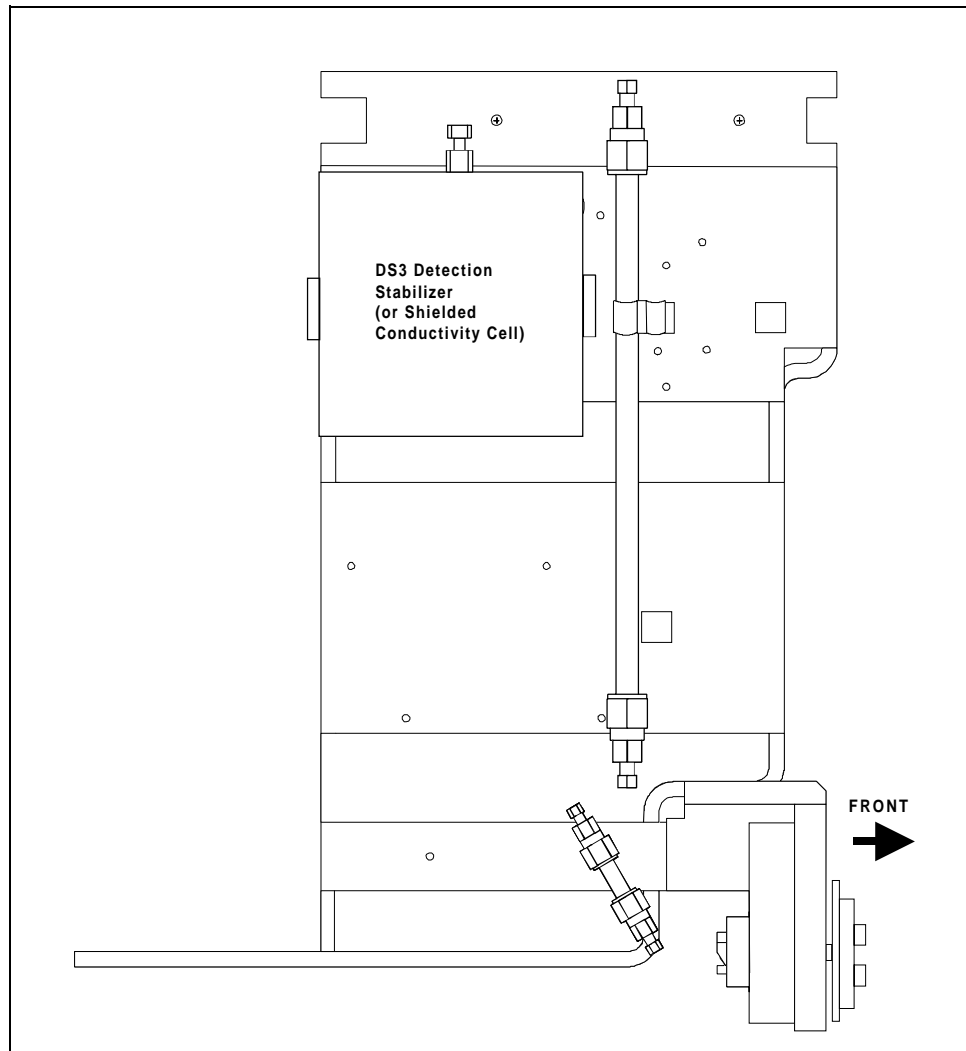


Figure F-2. Systems with a Conductivity Cell Using Non-Suppressed Conductivity

F.2 Configuration 2: Suppressed Conductivity

Configuration 2 is recommended for systems that include a conductivity cell with either a DS3 Detection Stabilizer or a shield box, an analytical column, a guard column, and a Self-Regenerating Suppressor (SRS).

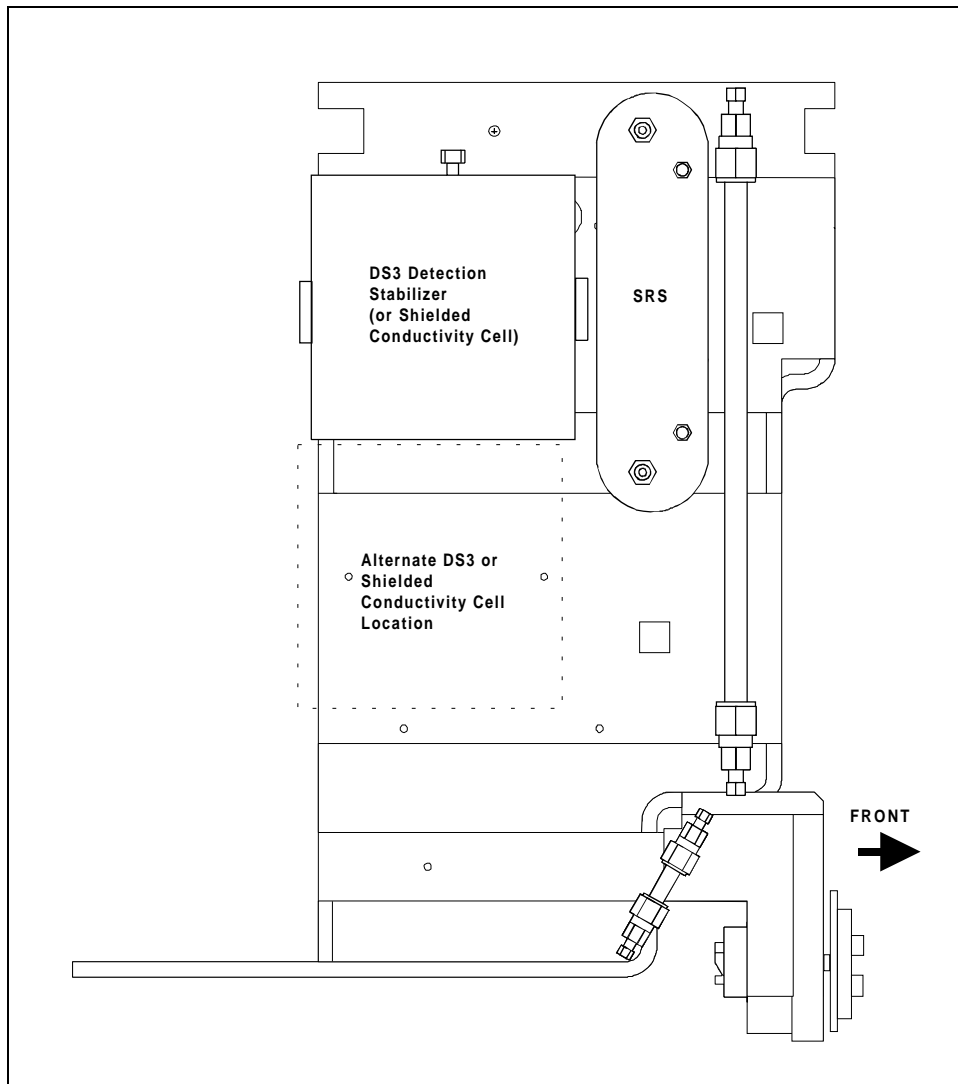


Figure F-3. Systems with a Conductivity Cell and an SRS

F.3 Configuration 3: Amperometry

Configuration 3 is recommended for systems that include an ED40 amperometry cell, an analytical column, and a guard column.

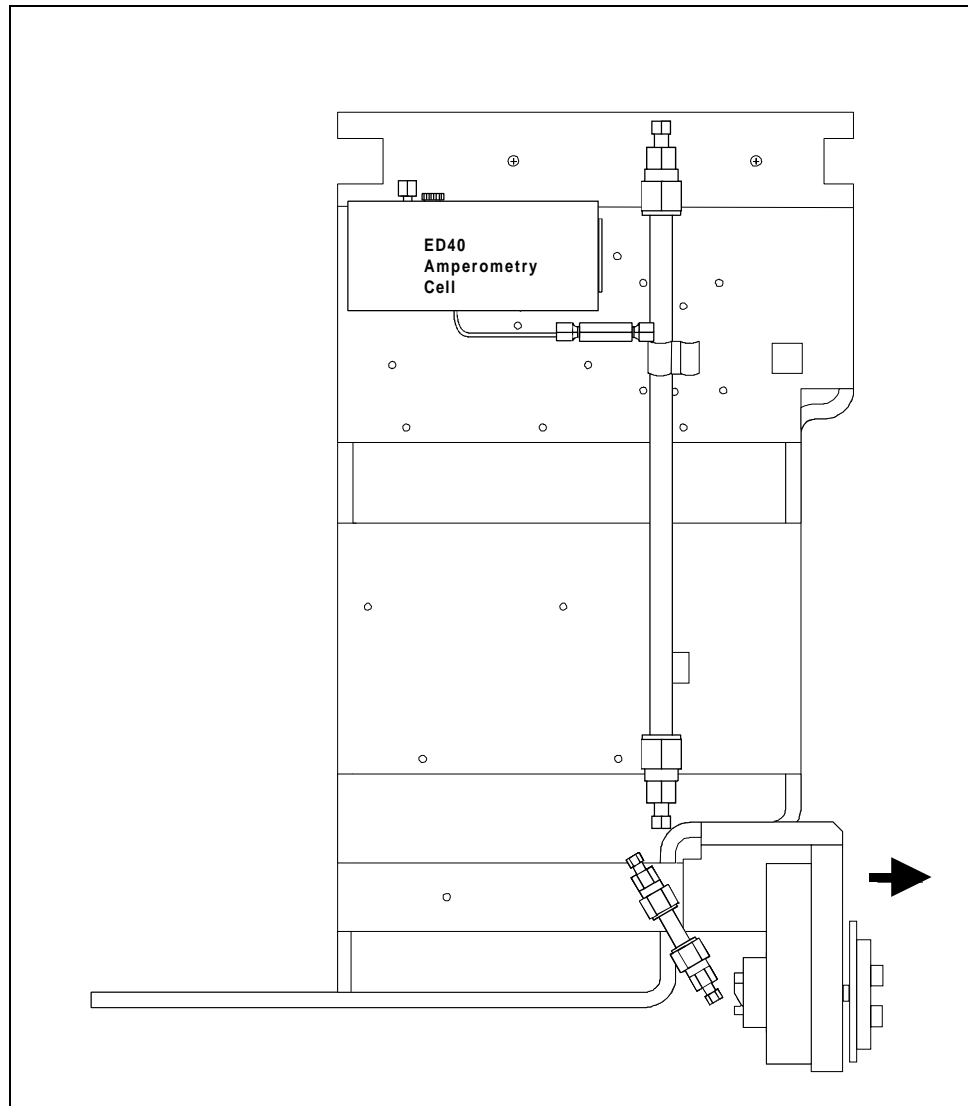


Figure F-4. Systems with an ED40 Amperometry Cell

F.4 Configuration 4: Conductivity and Amperometry

Configuration 4 is recommended for systems that include an ED40 amperometry cell, a conductivity cell with either a DS3 Detection Stabilizer or a shield box, two analytical columns, two guard columns, and a column switching valve.

NOTE

Only one cell is plumbed at a time, while the other is stored on the panel as shown.

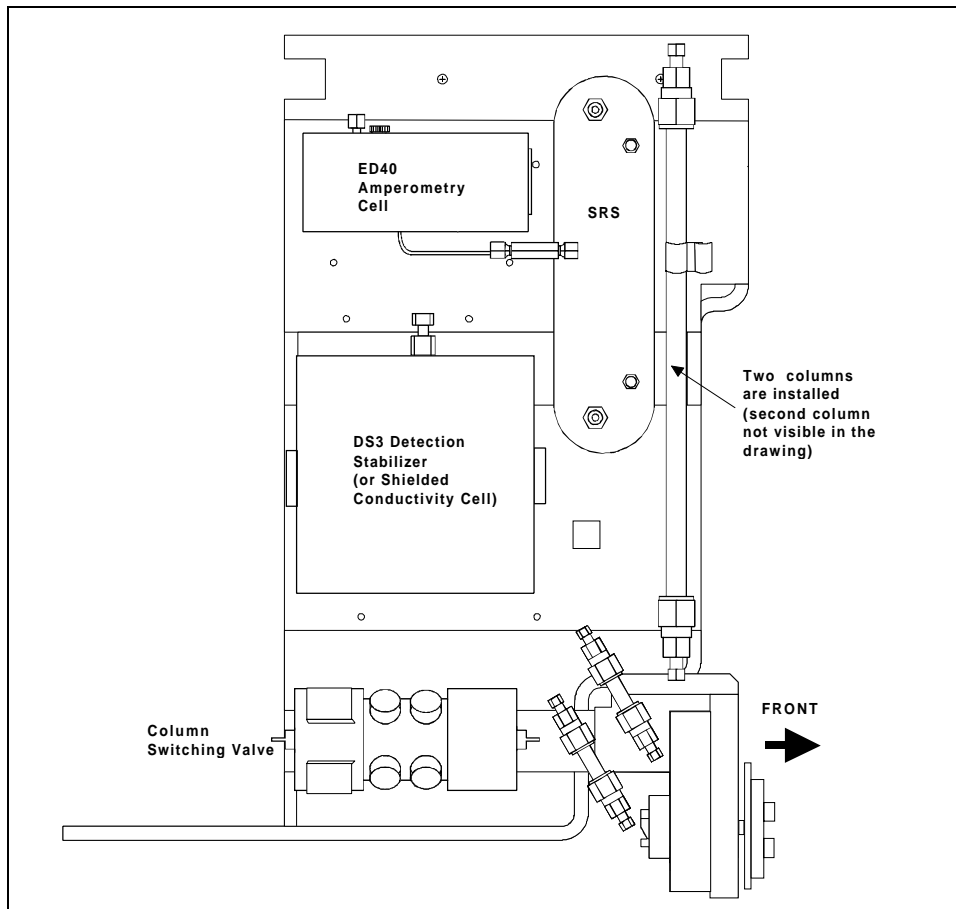


Figure F-5. Systems with a Column Switching Valve and Two Detector Cells

F.5 Configuration 5: Column Switching

Configuration 5 is recommended for systems that include a conductivity cell with either a DS3 Detection Stabilizer or shield box, two analytical columns, two guard columns, a column switching valve, and one or two Self-Regenerating Suppressors (SRS).

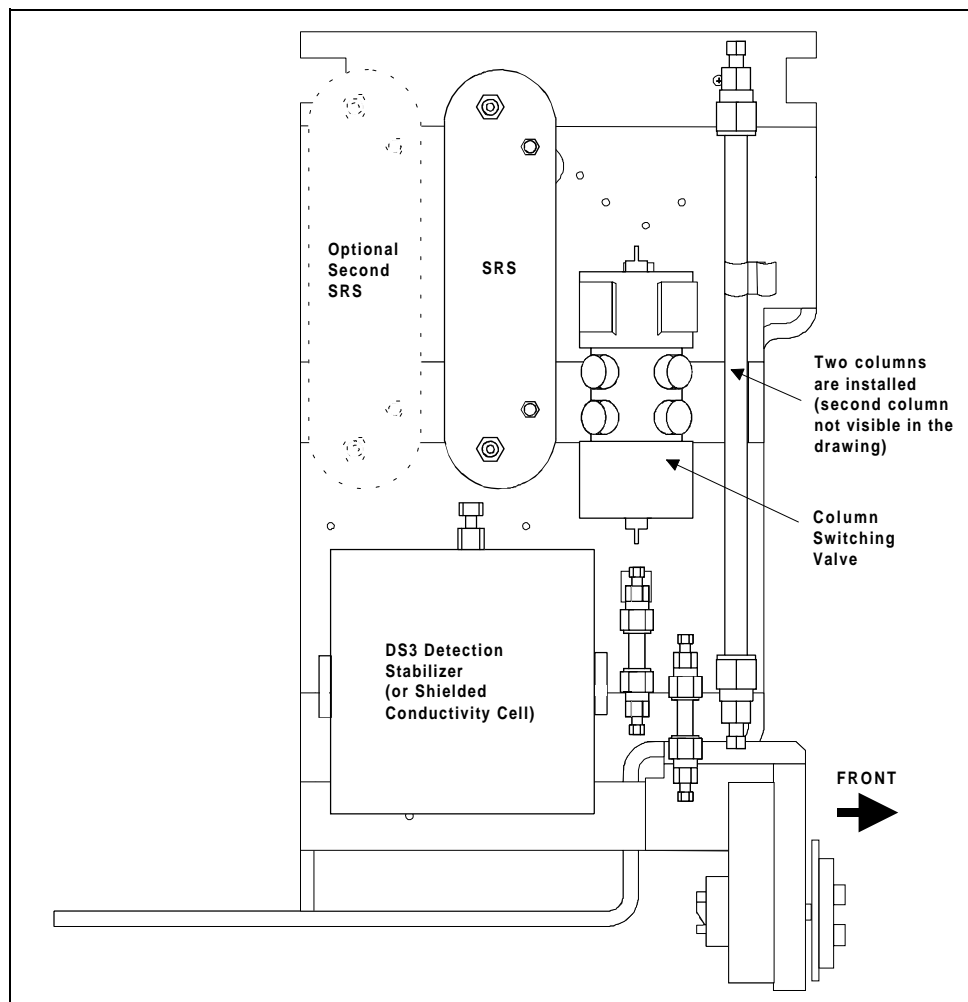


Figure F-6. Systems with a Column Switching Valve, a Conductivity Cell, and One or Two Suppressors

F.6 Configuration 6: Membrane Reactor

Configuration 6 is recommended for systems that include a Membrane Reactor. Figure F-7 shows the component layout and Figure F-8 shows the system plumbing.

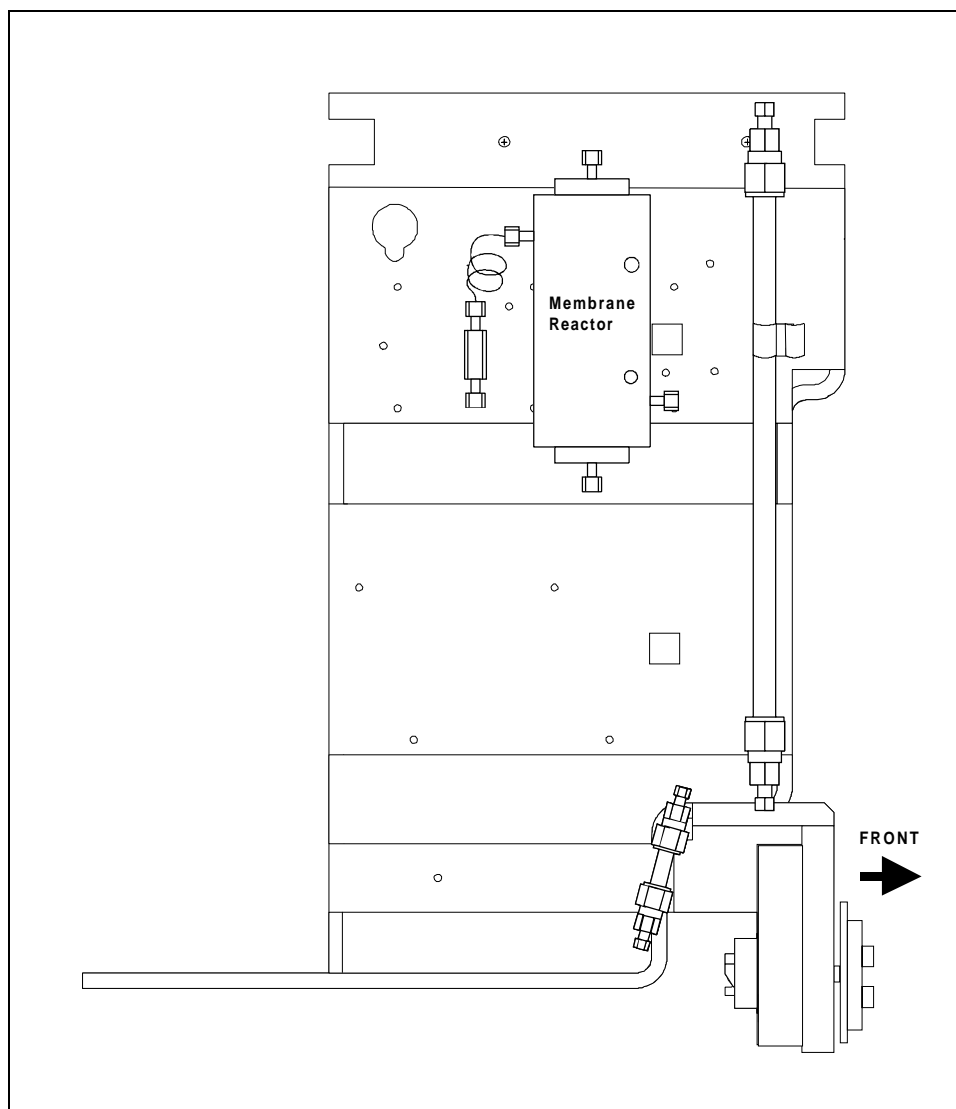


Figure F-7. Systems with a Membrane Reactor

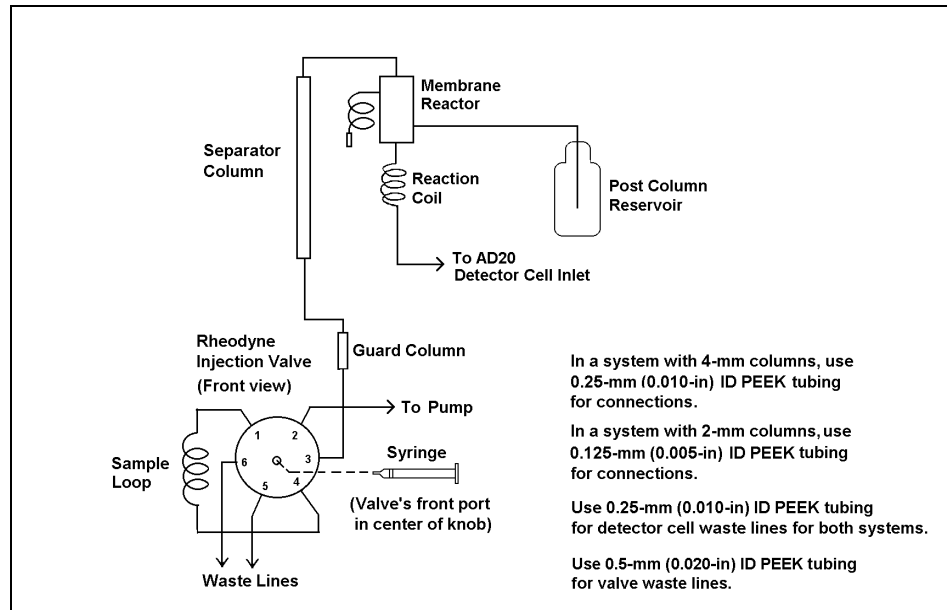


Figure F-8. Membrane Reactor Plumbing Schematic

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