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CD25 CONDUCTIVITY DETECTOR
OPERATOR'S MANUAL

© 2000 Dionex Corporation

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Revision 01
April 2000

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1 • Introduction

1.1 Overview

The CD25 Conductivity Detector is a sensitive, accurate, and versatile instrument for detecting and quantifying ionic analytes in liquid and ion chromatography. It is especially useful for analytes that lack UV chromophores and cannot be determined with adequate sensitivity by UV absorbance. Conductivity detection, especially when combined with chemical eluent suppression, provides excellent sensitivity and selectivity for numerous ionic species, both organic and inorganic.

The major organic analytes are carboxylic, sulfonic, and phosphonic acids; and primary, secondary, tertiary, and quaternary amines. Inorganic analytes include strong acid anions such as the halides, sulfate, nitrate, and phosphate; alkali metal and alkaline earth cations.

The CD25 can be controlled locally, from the front panel, or remotely (via the Dionex DX-LAN™ interface) from a host computer running PeakNet 6, Release 6.1 (or later) software.

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1.2 About This Manual

Chapter 1 Introduction	Provides a brief overview of the CD25 Conductivity Detector. Explains the meaning of safety messages and icons in the manual and safety labels on the detector.
Chapter 2 Description	Describes physical aspects of the CD25, including the front panel controls, electronics, and flow cell. Explains the detector operating modes.
Chapter 3 Operation and Maintenance	Describes operating features and how to create, edit, and run methods from the CD25 front panel. Lists routine preventive maintenance requirements.
Chapter 4 Troubleshooting	Lists possible causes of problems and step-by-step procedures to isolate and eliminate them.
Chapter 5 Service	Contains step-by-step instructions for routine service and parts replacement procedures.
Appendix A Specifications	Lists the CD25 specifications and installation site requirements.
Appendix B Installation	Describes how to install the CD25.
Appendix C Display Screens	Illustrates and describes all operating and diagnostic screens that can be displayed on the front panel.
Appendix D TTL and Relay Control	Describes TTL and relay control functions. Provides connection instructions.
Appendix E Signal Processor Functions	Lists the functions of the Signal Processor (SP) card.
Appendix F Connector Pinouts	Describes the pinouts for all CD25 connectors.
Appendix G Reordering Information	Lists spare parts for the detector.

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1.2.1 Typefaces

- Capitalized bold type indicates a front panel button:

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

- Uppercase bold type indicates the name of a menu or a screen, or an on-screen entry:

  Go to the **METHOD** screen.

  Move the cursor to the **EDIT** field.

1.2.2 Safety Messages and Notes

This manual contains warnings and precautionary statements that can prevent personal injury and/or damage to the CD25 when properly followed. Safety messages appear in bold type and are accompanied by icons, as shown below.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



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

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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 instrument performance, etc.

1.3 Safety Labels

The CE and GS safety label on the CD25 attests to compliance with the following European, EMC, and safety requirements: Council Directives 73/23/EEC and 89/336/EEC, EN 61010-1:1993 (safety), EN 50082-1:1992 (susceptibility), and EN 55011:1991 (emissions).

The symbols below appear on the CD25 or on CD25 labels.



Alternating current



Protective conductor terminal (earth ground)

Power supply is on



Power supply is off

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2 • Description

2.1 Front Control Panel

The control panel on the front door of the CD25 contains the liquid crystal display (LCD), the membrane keypad, and the actuator for the main power switch. The electronics chassis, described in Section 2.1.3, is located behind the front door.

Power Switches

The main power switch is on a bulkhead inside the electronics chassis (in the front, left-hand corner). The actuator for the power switch is on the front door, below the control panel (see Figure 2.1.2). The actuator functions only when the front door is fully closed. When the door is open, press the main power switch to turn the CD25 on and off.

2.1.1 Control Panel Display

The LCD, also called the *screen*, displays CD25 status and operating information. Fields on the screen that are in reverse video (blue letters on a white background) can be edited, while normal video fields are simply informational displays.

- To adjust the screen contrast, rotate the knurled knob in the recess below the **Help** and **Menu** buttons (see Figure 2-1).
- To adjust the brightness of the screen backlight, select a different **DISPLAY PANEL BACKLIGHT** option on the **MODULE SETUP** screen (see Section C.1.5).

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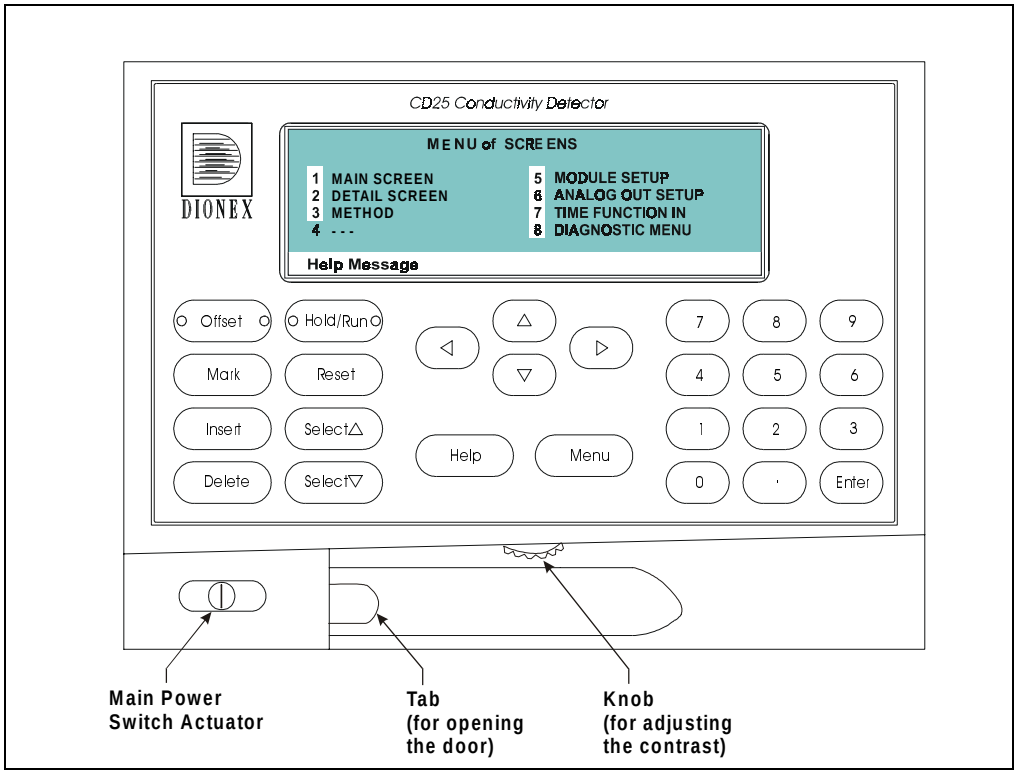


Figure 2-1. CD25 Front Panel

2.1.2 Control Panel Keypad

The buttons on the front panel keypad are used to affect screen functions, to directly control CD25 operation, and to create and modify programmed series of timed events, called methods. For example, pressing **Hold/Run** turns the method clock off (**Hold**) and on (**Run**), while pressing **Menu** displays a list of available screens. In summary:

- To go from a menu to a screen, press the number button that corresponds to the screen's number on the menu, or move the cursor to the desired screen name and press **Enter**.
- To edit a reverse video entry field on a screen, move the cursor to the field using the four directional arrow buttons. Then, use the numeric

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buttons to enter variable values or the **Select** ∆ and **Select** ∇ buttons to choose predetermined values.

- In most cases, confirm the selected value, by pressing either a cursor arrow button or **Enter**. In certain fields and/or screens, however, you must press **Enter** to confirm the selected value. These exceptions are the **METHOD SAVE TO** field, the **METHOD RUN** field, any calibration command, the **DIAGNOSTIC TESTS** screen, and all menu screens.

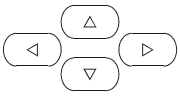
NOTE **A beep sounds each time you press a keypad button, and a lower frequency beep sounds whenever an error occurs. You can disable the beeps from the MODULE SETUP screen (see Section C.1.5).**

Keypad Buttons	Function
Offset	Returns the analog (recorder) output to a predetermined baseline and zeros the display. The resultant value of the offset required is displayed on the **DETAIL** screen. This function can be programmed in a method.
Mark	Sends a 10% positive event mark to the analog (recorder) output. A mark is typically used to indicate a sample injection. This function can be programmed in a method.
Insert	Inserts a new step into a method. To add a new step, move the cursor to the **TIME** field and press **Insert**. A new blank step appears below the cursor position. After entering a time value, press **Enter** or a cursor arrow button. Insert steps in any order and they will be automatically reorganized in the correct chronological order.

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Keypad Buttons	Function
Delete	Removes the value from the current entry field. To restore the previous value, move the cursor from the field before entering a new value. Pressing **Delete** when the cursor is in a step entry field on the **METHOD** screen "blanks" the step parameter value. Moving the cursor to another field does not restore the previous value; instead, the step remains blank, indicating no change from the previous step. To delete an entire method step: 1. Position the cursor in the method's time field and press **Delete**. The time is removed and the help line prompts you to press **Delete** again to delete the step. 2. Press **Delete** again. Or, to restore the original time and step parameters, press any button except **Delete**.
Hold/Run	Turns the method clock off (**Hold**) and on **(Run)**. This button functions only when the detector is under Method control (see Section 2.5.3). When the method clock is in Hold, pressing **Hold/Run** starts the clock at either the initial step of a new method or, if resuming an interrupted method, at the time at which the clock was put in Hold. When the method clock is in Run, pressing **Hold/Run** stops the method clock, thereby "holding" the method and freezing the current conditions.
Reset	Changes the method clock time to **INIT**, causing the initial conditions specified by the method to occur. This button functions only when the detector is under Method control (see Section 2.5.3). If the method is running, it continues running. If the method is in Hold, the method clock executes the initial conditions and holds.
Select Δ **and Select** ∇	When the cursor is positioned at a field with predetermined parameters, these buttons cycle through the options. In fields with predetermined numerical values, pressing **Select** Δ increases the value by one unit; pressing **Select** ∇ decreases the value by one unit. Holding down a **Select** button increases (or decreases) the value continuously. Press **Enter** or a cursor arrow button to confirm the selected value.

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Keypad Buttons	Function
	The four cursor buttons move the cursor, in the direction of the arrow, to the next entry field. If there is no changeable field in that direction, the cursor moves diagonally or remains in its current location. In most cases, after entering a new value in an entry field, pressing an arrow button saves and/or executes the change. The exceptions are the **METHOD SAVE TO** field, the **METHOD RUN** field, any calibration command, the **DIAGNOSTIC TESTS** screen, and all menu screens.
Help	Displays a help screen with information pertaining to the current entry field.
Menu	Displays one of two menus, depending on the current screen: • From an operational screen, pressing **Menu** displays the **MENU of SCREENS**. • From a diagnostic screen, pressing **Menu** once returns you to the **DIAGNOSTIC MENU**; pressing **Menu** again returns you to the **MENU of SCREENS**.
Numeric Buttons	Enters numeric values into the current entry field. The numeric buttons are 0 through 9 and the decimal. From a menu screen, pressing a numeric button opens the corresponding screen.
Enter	Saves and/or executes changes made in entry fields. If a menu screen is displayed, pressing **Enter** opens the highlighed screen.

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2.1.3 Initial Display Screens

When the CD25 has successfully powered-up and passed all diagnostic tests, the **POWER-UP** screen (see Figure 2-2) displays briefly, followed by the **MAIN** screen (see Figure 2-3). If one of the diagnostic tests fails at power-up, the **DIAGNOSTIC TEST** screen displays instead of the **MAIN** screen. See Section C.2.7 if this occurs.

NOTE **The information on the POWER-UP screen can be reviewed at any time by selecting the screen from the DIAGNOSTIC MENU.**

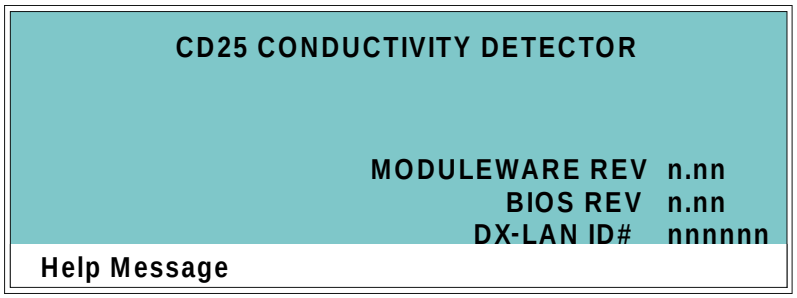


Figure 2-2. Power-Up Screen

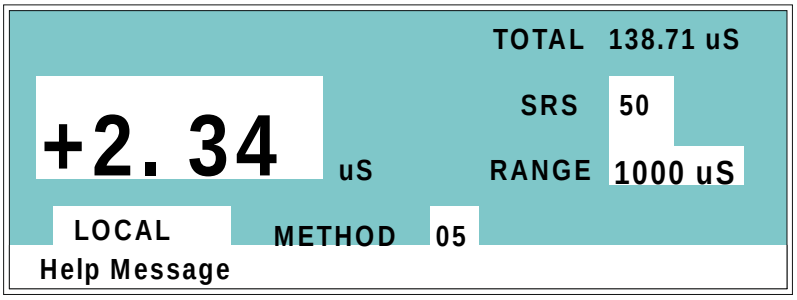


Figure 2-3. Main Screen

The **MAIN** screen displays status information in enlarged characters to facilitate viewing from a distance. Operating parameters (flow rate, method number to run, etc.) are selected here.

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To access other screens, press the **Menu** button on the front panel to display the **MENU of SCREENS** (see Figure 2-4). To select an option, move the cursor to a screen name and press **Enter**, or enter the screen number on the keypad and press **Enter**. See Appendix C for a description of each screen.

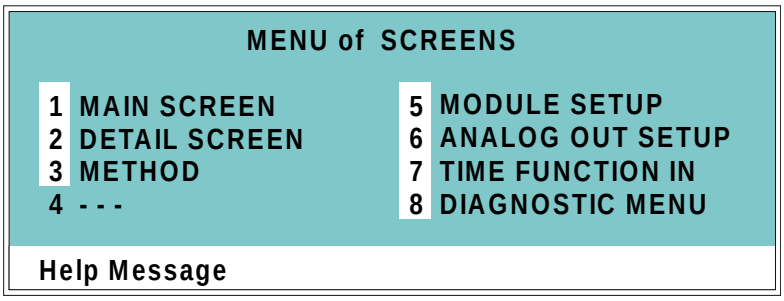


Figure 2-4. Menu of Screens

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2.2 Electronics Chassis

The electronics chassis is located immediately behind the front door of the CD25. The chassis contains several electronics cards (printed circuit boards) that are used to control the CD25. Various connectors on the cards allow communication between the CD25 and other system modules and accessories. Figure 2-5 identifies the cards and their connectors.

CAUTION

Do not remove any of the electronics cards from the detector. There are no user-serviceable components on the cards. If servicing is required, it must be performed by qualified personnel using appropriate electrostatic discharge (ESD) handling procedures.

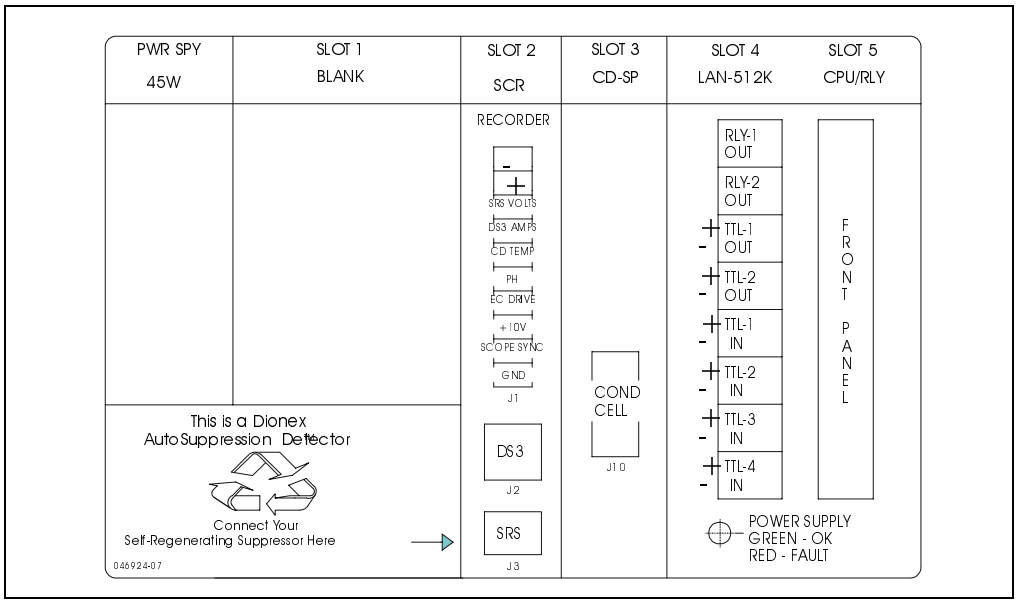


Figure 2-5. CD25 Electronics Chassis Components

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2.2.1 Connectors

Recorder (Slot 2)

This connector is typically used for a recorder/integrator or diagnostic instruments. For a description of the connector pinouts, see Table F-1 in Appendix F. For connection instructions, see Section B.2.7.

DS3 (Slot 2)

The control cable from the DS3 Detection Stabilizer connects here.

SRS® (Slot 2)

The control cable from the Self-Regenerating Suppressor® connects here.

Conductivity Cell (Slot 3)

The conductivity cell cable connects here.

TTL/Relay (Slot 4)

This strip of eight connectors provides an interface with Dionex and non-Dionex modules for TTL and relay control of the detector. See Appendix D for a description of relay and TTL functions and the connections between the CD25 and other modules.

60-pin Ribbon Connector (Slot 5)

The 60-pin ribbon cable to the CD25 front panel (display and keypad) connects here.

2.2.2 Cards

Power Supply Card

Provides 45 watts of power for the detector electronics.

Blank Card

Slot 1 contains a blank card that must be present to complete the electromagnetic interference (EMI) shielding.

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SCR (Supply Control/Relay) Card

Interfaces to the CPU; the card contains three functions:

- *16-bit Recorder Output Digital-to-Analog Converter*—Includes an electronic switch for selection of full-scale outputs of 0.01, 0.1, and 1.0 V.
- *SRS Power Supply*—Supplies a regulated current (set by the user) of 50, 100, 300, or 500 mA to the suppressor. An over-voltage detector shuts off the power if the voltage exceeds 8.5 V. An over-temperature detector shuts off the power if the SRS temperature exceeds 40 °C. If either of these events occurs, the SCR card sends an "SRS Alarm" error message to the CPU.
- *DS3 Power Supply*—Supplies heating power to the DS3 Detection Stabilizer. While warming or cooling to a lower set point, a "BELOW TEMP" or "ABOVE TEMP" message is displayed. Once a set point in the range of 25 to 45 °C is reached, proportional heat control maintains a constant temperature.

SP (Signal Processor) Card

Contains all the analog circuitry needed by the CD25, as well as the digital circuitry required to interface to the CPU. See Appendix E for a list of SP card functions.

Relay/DX-LAN and CPU Cards

- The CD25 control Moduleware and BIOS reside on the CPU card. The CPU card provides control and monitoring of other modules. A 60-pin ribbon cable assembly links the logic to the CD25 front panel display and keypad.
- The Relay I/O card provides two isolated low voltage relay outputs, two TTL outputs, and four TTL inputs.

The cards are installed in slot 5 of the card cage. The Relay card is a half-card which rides piggyback on the CPU card and sits behind slot 4.

The Relay I/O card is short enough to allow the optional detector interface card (P/N 044196) to be mounted behind it in slot 4. The interface card is required for communication between the CD25 and PeakNet software via the DX-LAN.

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Power Supply LED

The multicolored LED below the TTL/Relay connections indicates the power supply status:

- A green LED indicates normal operation.
- A red LED indicates a fault condition. When a fault occurs, the CD25 enters its diagnostic state and no other control is permitted until the problem is corrected. Turning off the power for a few seconds may clear the fault; however, if the red LED is lighted when you turn on the power again, notify Dionex.

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2.3 Conductivity Cell

The flow-through conductivity cell has an active volume of about 1.0 µL. Two 316 stainless steel electrodes are permanently sealed into the PEEK cell body. The cell constant has a nominal value of 160 cm^{-1} and is calibrated electronically. A sensor located slightly downstream from the electrodes senses the temperature of liquid passing through the cell. The measured value is used to provide temperature compensation.

The advanced geometry of the cell provides several benefits:

- Excellent accuracy and linearity over the working range
- Efficient sweepout and low volume for low dispersion
- Reduced sensitivity to electrode surface conditions
- Low electrode mass
- Effective temperature compensation

You can order the conductivity cell installed in a DS3 Detection Stabilizer (P/N 044130) for temperature control, or installed in an electrical shield (P/N 044132) which provides no temperature control. Because the DS3 maintains a constant temperature, thus reducing the effects of variations in laboratory temperature, the DS3 is recommended for conductivity detection.

Temperature Control and Compensation

Temperature directly affects the conductivity of a solution. As conductivity increases, the effect of temperature changes becomes more pronounced. For example, building temperature control systems can cause a regular oscillation in the baseline. This, in turn, can affect the reproducibility of an analysis.

In ion chromatography, suppressing eluent conductivity minimizes the effect of temperature variation. Temperature compensation further improves baseline stability. When the conductivity cell is housed in a DS3 Detection Stabilizer, the DS3 enhances the ability of these techniques to reduce temperature effects below the detection limit.

Temperature compensation also ensures that there will be no major change in the baseline or peak heights, should it be necessary to change the DS3 operating set point. Readings will be normalized to 25 °C.

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2.3.1 DS3 Detection Stabilizer

The DS3 is a temperature-controlled chamber consisting of a cast aluminum base and cover enclosed in insulating foam. The chamber houses both the conductivity cell and the eluent heat exchanger. Figure 2-6 identifies the major components of the DS3.

The DS3 provides the following benefits:

- Conductivity measurements that are nearly impervious to laboratory temperature variation
- Very low dispersion in the eluent heat exchanger
- Excellent peak height reproducibility
- Remote mounting after either the column or suppressor
- User-settable temperature

Power input to a pair of transistors on opposite sides of the DS3 heats it to a set temperature from 25 °C to 45 °C. A sensor near the heat exchanger outlet senses the eluent temperature. The CD25 circuitry compares this temperature with the user-selected temperature and adjusts the heat input in real time to hold the temperature within a few millidegrees.

The DS3 is sealed with an O-ring to trap eluent that may leak from the cell. If 5 mL of liquid accumulates, a thermistor sensor becomes immersed and signals a leak to the CPU. Any additional leakage will be discharged via the spill/overflow line. A second thermistor, above the discharge level, acts as a temperature reference for the leak sensor.

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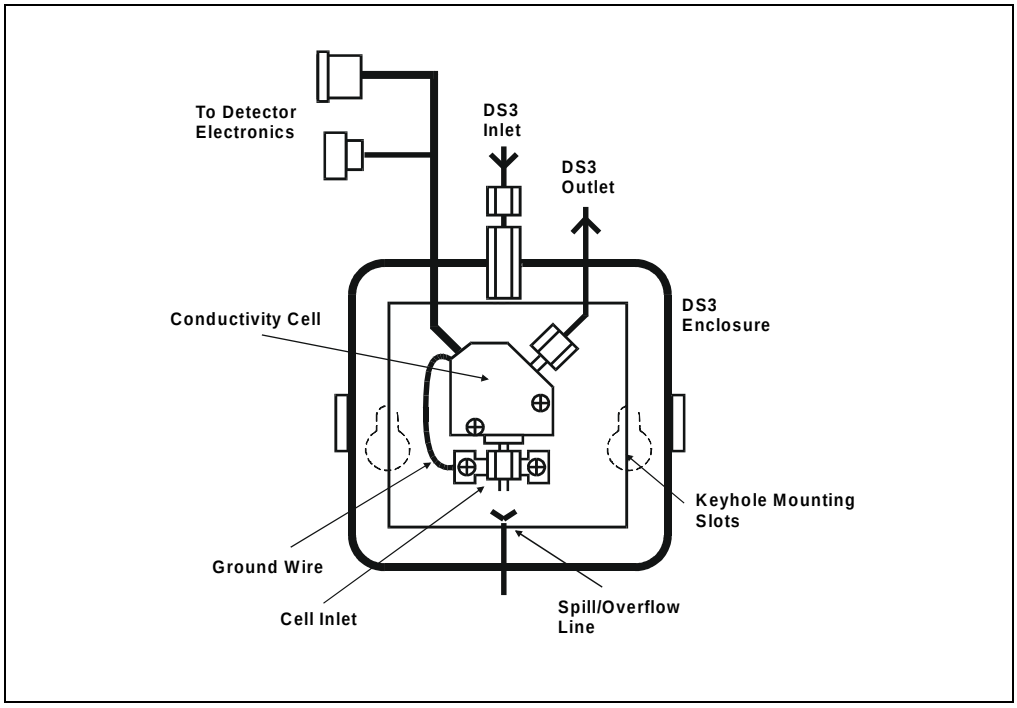


Figure 2-6. DS3 Detection Stabilizer

2.3.2 Shielded Cell

A conductivity cell installed in an electrical shield (P/N 044132) is available. The shield is a stainless steel housing that protects the cell from electromagnetic interference (EMI), but does not provide temperature control.

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2.4 Rear Panel

The CD25 rear panel (see Figure B-1) contains fuses, connectors for line power, and a connection for the optional DX-LAN interface.

DX-LAN Connection (Optional)

When you order the DX-LAN network, a DX-LAN connector is factory-installed in the upper left corner of the CD25 rear panel (see Figure B-1). See Appendix B for DX-LAN interface connection instructions.

External Connection Access

Connections to the front of the electronics chassis, such as TTL and relay cables, are usually routed to the back of the detector through the cable chase in the bottom of the electronics chassis. They may also be passed through slots at the front of the detector. Cables exit the CD25 through an opening in the rear panel (see Figure B-1).

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2.5 Functional Description

2.5.1 Operating and Control Modes

The operating mode determines *how* the CD25 receives operating commands:

- In Local mode, the CD25 receives commands from the front control panel buttons and screens.
- In Locked Remote mode, PeakNet 6 software sends commands from the host computer via the DX-LAN interface.

The control mode determines *when* operating commands are executed.

- In Direct control, the CD25 executes commands immediately.
- In Method control, the CD25 executes commands according to the timed steps in a method. The method is programmed from the CD25 front panel.

The table below summarizes the various operating and control mode configurations. Select the modes from the **MAIN** screen (see Section C.1.2), **DETAIL** screen (see Section C.1.3), or chromatography software.

Operating/Control Mode	Detector Operation
Local/Direct Control	Commands are entered from the CD25 front control panel and executed immediately after being entered.
Local/Method	Commands are entered from the CD25 front control panel and executed by running a method programmed from the front panel.
Locked Remote/Direct Control	Commands are sent from PeakNet 6 and executed immediately when received.

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2.5.2 Local and Remote Modes

Local Mode

When the CD25 is powered up, it is always in Local mode. In Local mode the detector accepts operating commands from two sources:

- Direct input from the front panel keypad and screens. All operating functions are available with direct input.
- TTL inputs from a remote controller (for example, a Dionex gradient pump module or an integrator). TTL signals can be used to offset the recorder, run a method, turn the SRS off and on, send a mark to the recorder, and increase the recorder range.

Locked Remote Mode

In Locked Remote mode, the CD25 accepts operating commands from a Dionex data station via the DX-LAN.

In Locked Remote mode, all operating changes from the front panel are disabled. Selecting the Connect command from PeakNet 6 immediately selects the Locked Remote mode. To return the CD25 to Local mode, select the Disconnect command, or turn off the CD25 power.

2.5.3 Method Control

In Method control, commands are executed according to the time-based steps specified in a method. Methods are created, edited, and saved on the **METHOD** screen (see Figure 2-7). See Section 3.3 for programming instructions.

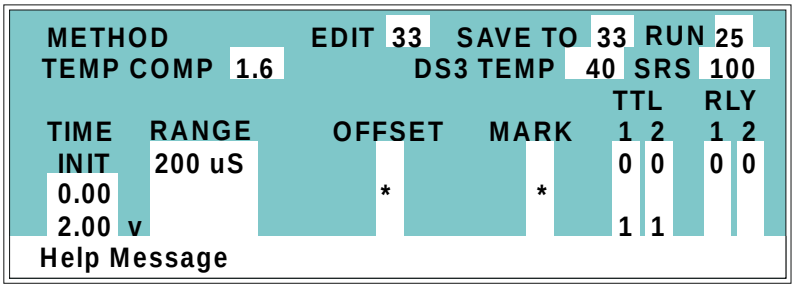


Figure 2-7. Method Screen

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The following summarizes basic information about using methods:

- The CD25 can run under method control while you are entering or editing any method (including the one that is currently running).
- When saving changes to the currently running method, or switching to a different method, the method clock continues running unaffected. Only those parameter changes which affect the method after the current time will be implemented in the current run.
- The CD25 can store up to 100 separate methods (0 through 99) in memory. The actual number, which depends on the size of each method and the amount of available memory, is typically less than this.
- Methods are retained in memory even after the CD25 is powered down.
- Each method can have a maximum of 32 time-based steps. Step 1 always starts at **INIT** (initial conditions). Step 2 always starts at **TIME = 0.0.**

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3 • Operation and Maintenance

3.1 Getting Ready to Run

NOTE The CD25 is designed for use with IC (ion chromatography) and HPLC (high-performance liquid chromatography) applications and should not be used for any other purpose. If there is a question regarding appropriate usage, contact Dionex before proceeding.

After installing the CD25 Conductivity Detector, or after the power has been off for some time, use the following check list to ready the detector for operation.

- Verify that all cables are correctly connected to the CD25.
- Verify that the CD25 power cord is plugged into the main power.
- Press the power switch actuator on the CD25 front panel (see Figure 2-1) to turn on the power. The **POWER-UP** screen displays briefly and then some diagnostic tests begin running. If the tests are successfully completed, the **MAIN** screen appears after a few seconds. If one or more tests fails, the **DIAGNOSTIC TEST** screen appears, instead.
- If the conductivity cell is in a DS3 Detection Stabilizer, set the DS3 temperature from the **DETAIL** screen (see Section C.1.3), according to these guidelines:

  If the DS3 is installed in a non-temperature controlled module, for example, an LC10 Chromatography Organizer or LC20 Chromatography Enclosure, select a temperature at least 5 °C above the highest expected ambient temperature surrounding the DS3.

  If the DS3 is installed in an LC30 Chromatography Oven, select a temperature at least 5 °C above the oven temperature. Do not set the oven temperature above 40 °C (104 °F).

- Turn on the DS3 power. The DS3 will begin warming up at about 1 °C/minute. Baseline conductivity should stabilize once the DS3 reaches the selected temperature.

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- As soon as the proper current is determined and eluent is flowing through the Self-Regenerating Suppressor (SRS) at the correct rate, turn on the SRS. (The SRS power is always off when the CD25 is powered up.) After start-up, the usual direction of drift is downward as SRS efficiency improves.
- While waiting for acceptable drift, you may want to select a lower sensitivity. Set the offset to 50%.
- When you are ready to start a run, select the desired sensitivity and offset (if you have not already done so). Press **Offset** before injection and during a run, also, if necessary.

3.2 Running Under Direct Control (Local Mode)

In the Direct control operating mode, commands are carried out immediately after they are entered. All detector parameters remain in effect until new commands are entered. Because there are no time-based steps, the method clock is not used. The **Hold/Run** and **Reset** buttons are not operable in Direct control.

Select Direct control from the **MAIN** or **DETAIL** screen, as follows:

- If **DIRECT CNTRL** is displayed, this mode is already selected and no action is necessary.
- If **METHOD** is displayed, move the cursor to **METHOD** and press the **Select** Δ or **Select** ∇ button to toggle to **DIRECT CNTRL**. Press **Enter** or a cursor arrow button to activate the selection.

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3.3 Running Under Method Control (Local Mode)

In the Method control operating mode, the CD25 is controlled by a series of programmed timed events, known as a *method*. Methods are retained in memory even after the detector power is turned off.

3.3.1 Running a Method

1. Go to the **MAIN** or **DETAIL** screen. If necessary, toggle from **DIRECT CNTRL** to **METHOD**.
2. In the **METHOD** field, enter the desired method number and press **Enter** or a cursor arrow button.

   NOTE The method can also be selected from the METHOD screen. Enter the method number in the RUN field and press Enter.

3. If the method clock is already running, the method will start as soon as you enter the method number. If the clock is in Hold, press **Hold/Run** to start the method.
4. The elapsed time on the method clock when the method begins determines at which step the method begins running:
   - If the method clock is at **INIT** or time zero, the method begins running using the **INIT** condition parameters, followed by the time zero step. The remaining steps are executed according to their programmed times.
   - If the method clock is greater than zero, the method begins running using the parameters specified in the step for the elapsed time. To start the method at the **INIT** conditions instead, press **Reset**.

3.3.2 Changing the Running Method

To switch from the method currently running to a different method, enter the new method number in the **RUN** field on the **METHOD** screen and press **Enter**. The new method will begin running, using the parameters specified in the step for the current elapsed time. If you prefer to start the method at the **INIT** conditions, press **Reset.**

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3.3.3 Creating a New Method

1. Go to the **METHOD** screen. In the **EDIT** field, enter an *unused* method number from 0 through 99 and press **Enter** or a cursor arrow button. This displays a blank method on the screen.

   The first step of every method is an initial conditions step with **INIT** in the **TIME** field. The second step is always a time step with 0.00 in the **TIME** field. You cannot delete these steps, although you can change their parameters.

2. Enter the parameters for the initial conditions and time 0.00 steps.

   NOTE **The TIME field is the only field in each method step that *must* have an entered value. Leaving any other field blank indicates that the value selected for that parameter in the preceding step is still in effect.**

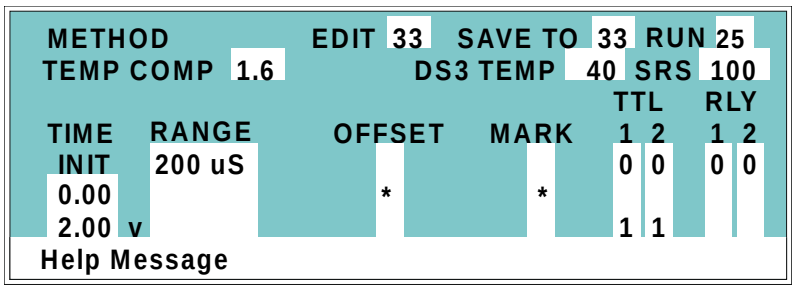


Figure 3-1. Method Screen

3. To create a new method step, move the cursor to a blank **TIME** field, enter the time (in minutes) for the action to be performed, and press **Enter** or a cursor arrow button. Enter a value for each step parameter, or leave a field blank if you want the value selected in the preceding step to remain in effect.

4. Repeat Step 3 for each additional step. Up to 30 steps can be added after the time 0.00 step.

   Sometimes a method contains more steps than can be seen on the screen at one time. If there is a small **v** next to the time entry at the bottom of the screen, move the cursor *down* to view additional steps. If there is a caret (^) next to the top time entry, move the cursor *up* to view additional steps.

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5. To save the new method, move the cursor to the **SAVE TO** field, enter the number that appears in the **EDIT** field, and press **Enter**.

3.3.4 Editing an Existing Method

NOTE **Once you save changes to a method, there is no way to recall the original method. To make experimental changes while retaining the original method, be sure to save the new method, or a copy of the original method, under a *different* method number.**

You can modify an existing method by changing, adding, or deleting steps and/or parameters. If the method you are editing is currently running, the changes are stored in memory and implemented when you save the method.

To edit an existing method, go to the **METHOD** screen, enter the method number in the **EDIT** field, and press **Enter** or a cursor arrow button.

Follow the editing instructions in the appropriate section below. When you finish, save the changes to the current method number or select a new number.

Changing Method Parameters

Move the cursor to the desired field and enter a new value, using the CD25 front panel buttons. Press **Enter** or a cursor arrow button after each editing change.

Adding a Method Step

There are two ways to add a step to an existing method:

- Move the cursor on the **METHOD** screen to any **TIME** field. Enter the time and parameters for the new step, and press **Enter** or a cursor arrow button. If necessary, the step will automatically be moved to the correct chronological point in the method.
- Move the cursor on the **METHOD** screen to the line immediately preceding the intended location of the new step. Press **Insert** to insert a blank line below the cursor location. Enter the time and parameters for the new step, and then press **Enter** or a cursor arrow button.

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Deleting a Method Step

Move the cursor on the **METHOD** screen to the time of the step to be deleted and press **Delete** twice.

Deleting an Entire Method

Move the cursor on the **METHOD** screen to the **EDIT** field and press **Delete** twice.

Saving a Modified Method

To ***replace*** the original method with a modified version, enter the number of the original method in the **SAVE TO** field and press **Enter**.

To ***retain*** the original method and save the modified version elsewhere in memory, enter an unused method number in the **SAVE TO** field and press **Enter**.

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3.4 Optimizing Temperature Compensation

The CD25 built-in temperature compensation stabilizes conductivity readings by correcting for changes in ambient temperature that occur during a run. For more information about temperature control and compensation, see Section 2.3.

3.4.1 With a DS3 and Conductivity Cell

IMPORTANT

If the ambient temperature exceeds 45 °C, the DS3 may be permanently damaged. If the DS3 is installed in an LC30 Chromatography Oven, do not set the oven temperature above 40 °C (104 °F).

Housing the cell in a DS3 Detection Stabilizer ensures that there is no more than a minor temperature variation in liquid reaching the cell. Thus, the **TEMP COMP** setting on the **DETAIL** screen can remain at 1.7% per °C.

Many users are able to keep their systems at a single operating temperature. For optimal accuracy, calibrate the cell at this temperature, using the proper temperature coefficient setting. If you later reset the temperature, the CD25 temperature compensation will normalize conductivity measurements to 25 °C (77 °F) to prevent a major upset in system calibration. If you change the DS3 set point, recalibrate the cell.

If temperature-induced baseline cycling occurs, it is probably caused by another component of the chromatography system. If the variation increases as the eluent reservoir empties, move the reservoir to a more temperature-stable environment and/or wrap the reservoir in thermal insulation.

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3.4.2 With a Shielded Conductivity Cell

When the conductivity cell is not inside a DS3 Detection Stabilizer, actual conductivity drifts up and down with fluctuations in laboratory temperature. This is especially noticeable when the thermostat cycles on and off in laboratories with very high air turnover rates and controlled temperature. Selecting the proper temperature compensation factor will minimize the effect of temperature fluctuations.

Start by setting **TEMP COMP** on the **DETAIL** screen to 1.7%. If a sinusoidal baseline variation of the same period as the laboratory cooling or heating occurs, increase or decrease the temperature compensation setting. Continue adjusting it until you find the optimal setting. This is typically between 1.5% to 2% per ºC, suppressed or non-suppressed.

If you notice a slowly increasing or decreasing baseline drift in a laboratory without a temperature control system, look for a corresponding temperature drift. If there is a correlation, adjust the temperature compensation setting until you find the optimal setting.

3.5 Routine Maintenance

This section describes routine maintenance procedures that can be performed by the user. Any other maintenance procedures must be performed by qualified Dionex personnel.

NOTE The CD25 electronic components are not customer-serviceable. Repair of electronic components must be performed by Dionex.

- Periodically check liquid line connections to the cell (inside the chromatography module) for leaks, and clean up any spills.

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4 • Troubleshooting

This chapter is a guide to troubleshooting problems that may occur while operating the CD25 Conductivity Detector. Turn to the section that best describes the operating problem. There, the possible causes of the problem are listed in order of probability, along with the recommended courses of action. For additional help, refer to Appendix C for instructions on running the CD25 diagnostics program.

If you are unable to eliminate a problem, contact Dionex. In the U.S., call 1-800-346-6390 and select the Technical Support option. Outside the U.S., call the nearest Dionex office.

4.1 No Detector Response

- **Cell is off**

  Turn on the cell (from the **MAIN** or **DETAIL** screen).

- **Analog output range set too high; although the display indicates a response, no recorder response observed**

  Select a more sensitive analog output range.

- **Wrong full-scale output (or no full-scale output) selected**

  Select 0.01, 0.10, or 1 volt full-scale.

- **No flow from pump**

  Check the pressure reading on the pump to verify that the pump is on.

- **Detector offset out of range**

  Press **Offset** on the CD25 front panel.

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4.2 Low Detector Output

- **Analog output range set too high; although the display indicates a response, no recorder response observed**

  Select a more sensitive analog output range.

- **Insufficient sample injected**

  Increase the injection size or concentration.

- **Cell out of calibration**

  Recalibrate the cell (see Section 5.4).

4.3 High Detector Output

- **Auto offset not activated recently**

  Press **Offset** on the CD25 front panel before making an injection.

- **Background not suppressed by SRS**

  Check the SRS regenerant out line for bubbles; if there are no bubbles, the suppressor may be contaminated. Refer to the SRS manual for troubleshooting guidance.

4.4 Noisy or Drifting Baseline

- **Flow system leak ahead of cell; erratic baseline**

  Check all fittings and liquid lines for leaks. Tighten or, if necessary, replace all liquid line connections. If the connections are made with ferrule fittings, first refer to *Installation of Dionex Ferrule Fittings* for tightening requirements.

- **Pump not properly primed**

  Prime the pump as instructed in the pump manual.

- **Rapid changes in ambient temperature**

  Redirect heating and air conditioning vents away from the cell.

  Purchase a cell in a DS3 Detection Stabilizer (P/N 044130).

  When using a shielded cell, install the cell in a chromatography oven.

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- **Insufficient system equilibration following any changes to operating parameters; especially apparent when operating at high sensitivities**

  Allow longer system equilibration before beginning operation.

- **Air trapped in cell; excessive regular pulses in baseline**

  Remove the trapped air (see Section 5.2). To prevent air from becoming trapped in the cell in the future, increase backpressure on the cell by reducing the inner diameter of the tubing installed after the cell and before the SRS.

- **Inappropriate SRS operating conditions**

  Refer to the SRS manual for the correct operating conditions.

- **Temperature compensation setting not optimized**

  Optimize the selected setting (see Section 3.4).

- **DS3 above or below set point**

  See Section 4.6.

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4.5 Liquid Leaks from the DS3

When a leak is detected, the DS3 leak sensor signals the CPU. If more than 5 mL of liquid accumulates in the DS3, the excess will be drained via the spill overflow line (see Figure 2-6).

- **Loose or defective fittings, or overpressurization caused by a restriction**

  Check the waste line for blockage; a trapped particle can plug the line, causing a restriction and/or leak. If necessary, clear the waste line by reversing the direction of flow.

  Make sure the plumbing downstream from the DS3 is clear; a blockage in the plumbing may overpressurize the DS3, causing it to leak.

  Make sure the downstream backpressure coils are appropriate for the operating flow rate (see Section B.2.4).

  Follow the steps below to disassemble the DS3 and inspect it for the source of the leak. Test and dry the DS3 before reassembly.

  1. Turn off the CD25 power.
  2. Disconnect the DS3 cables.
  3. Disconnect the DS3 inlet and outlet lines. Do not misplace the ferrule fittings at the end of the tubing (see Figure 4-1).
  4. Remove the DS3 by lifting it upward and then pulling it away from its mounting location. Place the DS3 on the workbench.
  5. Open both latches on the DS3 and carefully lift off the top half of the cover, along with its insulating foam insert, exposing an aluminum box (see Figure 4-1).
  6. Remove the box from the bottom half of the cover.
  7. Remove the four Phillips screws securing the top of the box to its bottom plate. Carefully separate the two parts, exposing the cell (see Figure 4-2). Lay the top aside, being careful not to pull or stress the group of wires that connect the two parts.
  8. Check the inlet and outlet cell fittings for leaks. Tighten or replace if necessary.
  9. Dry the DS3, test for leaks, and reassemble. Make sure the foam insert is adjusted evenly around the various DS3 components, with no pinching or

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folding. Check that the top and bottom inserts meet on all sides before latching the cover.

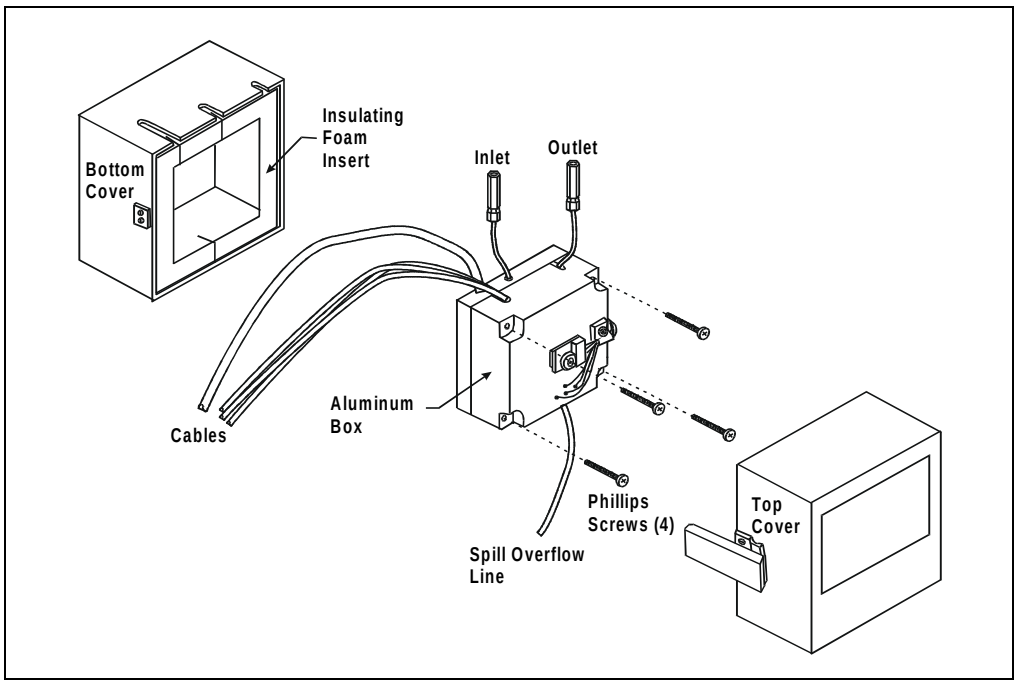


Figure 4-1. DS3 Exploded View

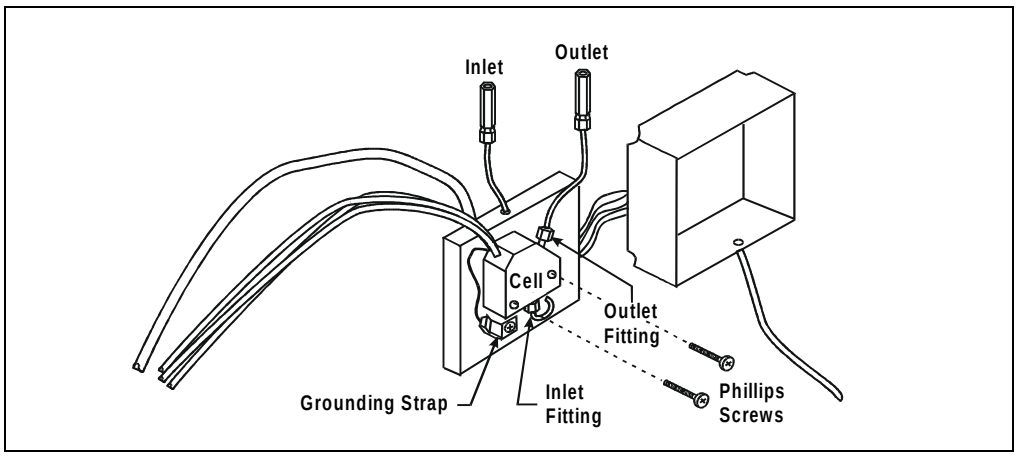


Figure 4-2. DS3 Interior Components

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- **Liquid seeping from around cell cables**

  The cell is inoperable; return it to Dionex for repair or exchange.

4.6 DS3 Temperature Inaccurate

- **"DS3 SET POINT XX C READY" message displays continuously**

  The control sensor may be faulty. Remove the DS3 cover and measure the temperature of the housing, using any surface thermometer. The cell sensor can be read on the detector and should be within 1 or 2 degrees of the DS3 set point temperature.

- **"DS3 SET POINT XX C UNDER TMP" or "DS3 SET POINT XX C OVER TMP" message displays continuously**

  Verify that the set temperature is at least 5 °C above the external DS3 temperature. Allow 30 to 60 minutes for the DS3 to heat or cool.

  At high flow rates and temperature settings far above ambient, the DS3 requires more time to heat. In extreme cases, such as a very cold room and a high DS3 set point, the DS3 may not be able to reach the set point temperature.

- **DS3 does not heat**

  Remove the cover and inspect the DS3 for broken or shorted wires or for moisture bridging the control thermistor. If a wire is broken or shorted, replace the wire or call Dionex for assistance. If a leak has caused a short, fix the leak and dry the control sensor.

- **"DS3 SET POINT XX C READY" message displays intermittently**

  Make sure that the heater transistors are snug and the control sensor has not been pulled out of the heat exchanger plate.

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4.7 Conductivity Inaccurate

- **Cell constant reported on CONDUCTIVITY CALIBRATION screen after cell calibration is not 130 to 190 µS**

  The DS3 has not reached its set point temperature. Set the intended operating temperature and wait until 5 minutes after the "NOT READY" message is displayed, or until the reading is stable.

  Make sure the selected temperature compensation setting is 1.7%/°C. Except at 25 °C, an incorrect temperature compensation setting can cause an incorrect reading.

  The 1 mM KCl calibration solution is spoiled, or there was a mixing error. Remake the solution.

  The electrodes are fouled by grease, precipitate, etc. Flush with a suitable solvent, such as acid, and then flush with 1 mM KCl until the reading is stable.

  The cause is internal leaks, broken or shorted cell or sensor wires. Check the sensor by comparing the cell temperature readout with the actual DS3 temperature. If necessary, return the cell to Dionex for repair. **Do not disassemble the cell; this will break the seal and void your warranty.**

- **Cell temperature readout deviates by more than 2°C from DS3 set temperature**

  This indicates a serious cell or DS3 sensor problem. Call Dionex for assistance.

4.8 Faulty DX-LAN Communication

- **DX-LAN interface incorrectly installed**

  See Section B.2.2 for 10BASE-T connection instructions or Section B.2.3 for BNC connection instructions.

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4.9 Diagnostics

NOTE **The CD25 electronic components are not customer-serviceable. Before running a diagnostic test, use the troubleshooting information in earlier sections of Chapter 4 to isolate problems that are unrelated to the CD25 electronics.**

The CD25 Moduleware includes several diagnostic tests of the electronics. To access these, select the **DIAGNOSTIC MENU** from the **MENU of SCREENS**. The diagnostic screens are illustrated and described in Appendix C.

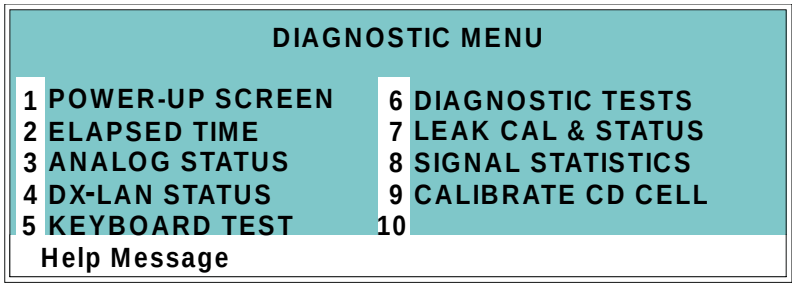


Figure 4-3. Diagnostic Menu Screen

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5 • Service

This chapter describes routine service procedures that the user can perform. All other procedures must be performed by Dionex personnel.

NOTE **The CD25 electronics components are not customer-serviceable. Repair of electronics components must be performed by Dionex.**



The CPU card contains a lithium battery. If the CPU card is replaced, dispose of the used battery according to the manufacturer's instructions.

Before replacing any parts, refer to the troubleshooting information in Chapter 4 to isolate the cause of the problem. To contact Dionex in the U.S., call 1-800-346-6390 and select the Technical Support option. Outside the U.S., call the nearest Dionex office.

Substituting non-Dionex parts may impair CD25 performance, thereby voiding the product warranty. Refer to the warranty statement in the Dionex Terms and Conditions for more information.

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5.1 Eliminating Liquid Leaks

The PEEK version of the CD25 is plumbed with 1.60-mm (1/16-in) OD PEEK tubing, Dionex ferrule fittings (P/N 043276), and 10-32 fitting bolts (P/N 043275). For tightening requirements, refer to *Installation of Dionex Ferrule Fittings*.

5.2 Removing Trapped Air from the Cell

Air bubbles in the cell can cause regular pulsations of the baseline, random noise, and low readings. Air may have been introduced in the columns during installation, or may result from outgassing of the mobile phase. Connecting a backpressure line to the cell applies enough backpressure to shrink bubbles, thereby allowing them to pass more easily through the cell.

1. Connect a piece of 0.25-mm (0.010-in) ID tubing (P/N 042690), with fittings on both ends, to the cell outlet. Make the line 1 m long for a flow rate of 1.0 mL/min, 2 m for 0.5 mL/min, etc.
2. Use tubing with an inner diameter of at least 1mm (0.04 in) the rest of the way to the waste container. Use a union (P/N 042627) to connect the backpressure line to the waste line.

IMPORTANT **Make sure the added backpressure does not exceed 0.20 MPa (30 psi). Avoid large increases in flow rate that would result in more than 1.4 MPa (200 psi) being applied to the cell.**

5.3 Replacing the DS3 Cell

Follow the steps below to disassemble the DS3 and replace the cell. After replacing the cell you must recalibrate it (see Section 5.4).

1. Turn off the CD25 power.
2. Disconnect the DS3 cables.
3. Disconnect the DS3 inlet and outlet lines. Do not misplace the ferrule fittings at the end of the tubing (see Figure 5-1).
4. Remove the DS3 by lifting it upward and then pulling it away from its mounting location. Place the DS3 on the workbench.

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5. Open both latches on the DS3 and carefully lift off the top half of the cover, along with its insulating foam insert, exposing an aluminum box (see Figure 4-1).
6. Remove the box from the bottom half of the cover.
7. Remove the four Phillips screws securing the top of the box to its bottom plate. Carefully separate the two parts, exposing the cell (see Figure 5-1). Lay the top aside, being careful not to pull or stress the group of wires that connect the two parts.
8. Disconnect the grounding strap. Remove the two cell mounting screws.
9. Rotate the cell inlet tube fitting counterclockwise. Let the cell body back away from the fitting until the fitting threads are fully disengaged. **Do not lose the ferrule**.
10. Check that the end of the inner Tefzel tubing is flush with the end of the plastic sleeve. If necessary, trim the sleeve slightly to prevent dispersion. Push the tubing into the new cell until it bottoms out in the hole; then, hold the tubing in place while tightening the nut.
11. After testing for liquid leaks, dry the DS3 and reassemble. Make sure the foam insert is adjusted evenly around the various components, with no pinching or folding. Before latching the cover, make sure the top and bottom inserts meet on all sides.
12. Reconnect the DS3 cables and turn on the CD25 power. Calibrate the cell constant (see Section 5.4).

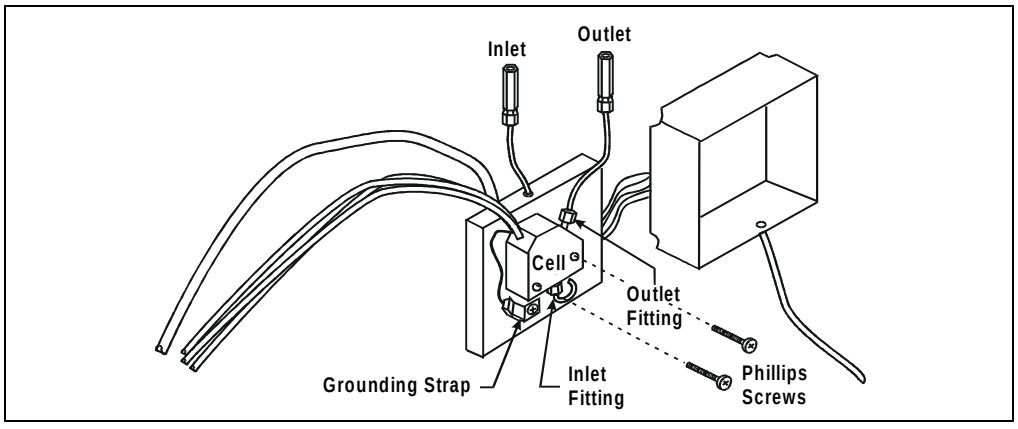


Figure 5-1. DS3 Interior Components

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5.4 Calibrating the Cell

Every conductivity cell is calibrated before it is shipped from the factory. The cell calibration constant is recorded on a tag attached to the cell cable, and is also stored in permanent detector memory for use when calculating the measured conductivity.

The calibration constant normally remains unchanged, unless the cell is damaged. To check the value entered in memory, select **CALIBRATE CD CELL** from the **DIAGNOSTIC MENU** to display the **CALIBRATE CONDUCTIVITY CELL** screen. If the cell calibration constant shown on the screen does not match the value recorded on the tag, do **one** of the following:

- Enter a new value, regardless of the composition of the solution in the cell.
- Calibrate the cell at 147.00 µS/cm. This automatically enters a new value for the cell calibration constant into CD25 memory.

To calibrate the cell, follow the steps below.

1. Disconnect the pump output line from the injection valve.
2. Connect the pump output directly to the inlet of the DS3 or the shielded cell.
3. Pump 0.001 M KCl calibration solution through the cell. Conductivity is slightly flow-rate sensitive, so select the flow rate used in the majority of your applications.
4. Set **TEMP COMP** on the **DETAIL** screen to 1.7%.
5. If using a DS3, set **DS3 SETPOINT** on the **DETAIL** screen to the intended operating point. Wait until the "DS3 READY" message appears.
6. Wait until the conductivity reading stabilizes (within 0.1 µS), and then, on the **CALIBRATE CONDUCTIVITY CELL** screen, select **CAL** and press **Enter** to calibrate the cell.
7. After calibration, the conductivity reading should be exactly 147.00 µS/cm. A new value for the cell constant will be shown on the **CALIBRATE CONDUCTIVITY CELL** screen; this value will also be entered in memory.
8. Flush the KCl solution from the system by pumping deionized water through the DS3 or cell lines. When the conductivity reading drops to near zero, stop the pump.
9. Disconnect the pump from the DS3 or shielded cell.

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10. Reconnect the pump to the chromatography module.
11. Reconnect the liquid line from the suppressor outlet to the cell inlet.
12. Reset **TEMP COMP** to the optimal value for the eluent.
13. Set the pump to a flow rate that is safe for the system in use.

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5.5 Replacing the Main Power Fuses

The fuse holder is in the main power receptacle on the CD25 rear panel.

1. Turn off the main power.

WARNING

HIGH VOLTAGE—Disconnect the main power cord from its source and also from the rear panel of the CD25.

2. A recessed lock is located on each side of the fuse holder (see Figure 5-2). Using a small screwdriver, push each lock toward the center to release it. The fuse holder pops out approximately slightly when the locks release. When both locks are released, pull the fuse holder straight out of its compartment.
3. The holder contains two fuses. Replace both with new 3.15 amp fast-blow IEC127 fuses (P/N 954745). Dionex recommends replacing both fuses even though only one is open.
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.

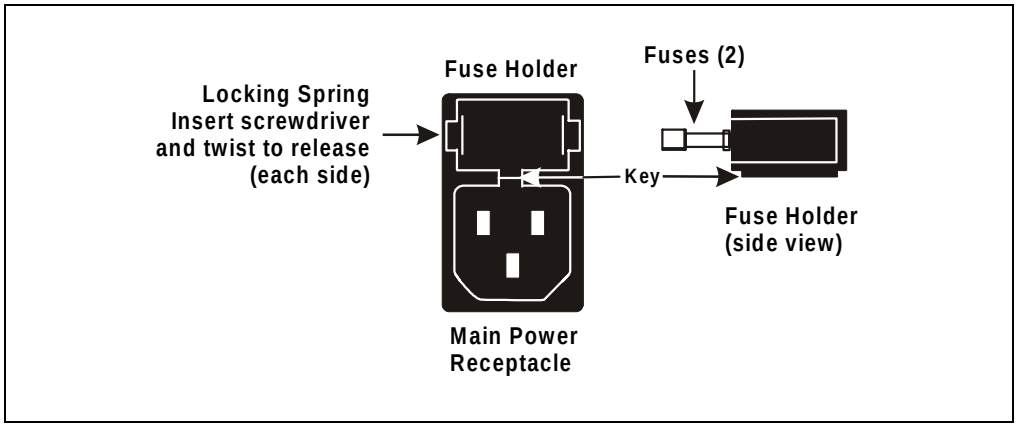


Figure 5-2. Main Power Fuse Holder

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A • Specifications

5.6 Physical

Dimensions	22.5 cm W x 17.0 cm H x 42.0 cm D (8.8 in W x 6.6 in H x 16.4 in D) 6 cm (2.4 in) clearance required behind the detector
Weight	8.2 kg (18 lb)
Decibel Level	50 db (“A WEIGHING” setting)

A.1 Environmental

Operating Temperature	4 ºC to 40 ºC (40 ºF to 104 ºF)
Operating Humidity	5 to 95% relative humidity, non-condensing

A.2 Electrical

Main Power	85 to 270 Vac, 47/63 Hz; 40 W Max, 25 W typical. The CD25 power supply is auto-sensing and requires no voltage adjustment.
Fuses	Two 3.15 amp fast-blow IEC127 fuses (P/N 954745)
Analog Output	User-selectable full-scale output of 10, 100, or 1000 mV

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A.3 Display and Keypad

Display	Liquid crystal display with adjustable backlighting
Keypad	26-button keypad for entering commands and numerical values for screen parameters

A.4 Detector

Range	0.01 µS to 3000 µS, full-scale
Temperature Compensation	0.0 to 3.0% per ºC
Cell Drive	Variable 8 kHz square wave
Local Operation	Front panel controls and display status of all functions
Remote Operation	Control of four functions via TTL or Relay contacts
DX-LAN Operation (Optional)	All functions can be controlled by PeakNet software on a PC connected to the CD25 via the DX-LAN interface

A.5 Conductivity Cell

Cell Body	PEEK
Active Volume	1.0 µL
Maximum Pressure	2.0 MPa (300 psi)
Electrodes	316 stainless steel

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A.6 SRS Power Supply

Supply Current	50, 100, 300, 500 mA at 1.5 to 7.5 V
Over-Voltage Alarm	8.5 V
Over-Temperature Alarm	40 ºC (104 ºF)

A.7 DS3 Detection Stabilizer (Optional)

Operating Temperature	25 ºC to 40 ºC (50 ºF to 104 ºF)
Warm-up Time	10 minutes (typical)
Temperature Alarms	*Not Ready* message displayed when under or over the set temperature

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B • Installation

B.1 Facility Requirements

- Make sure the CD25 installation site meets the electrical and environmental specifications listed in Appendix A.
- Install the CD25 on a sturdy table or workbench, at a height that ensures convenient viewing of the front panel display.
- Allow at least 6 cm (2.4 in) clearance behind the CD25 for power connections and ventilation.

B.2 Installation

IMPORTANT **During installation, or whenever it is necessary to move the detector, lift it only from the bottom or side. Lifting the CD25 by the front panel door will damage the door hinges.**

B.2.1 Power Connection

The power to the CD25 can be controlled from the main power switch on either the CD25 or the LC30 Chromatography Oven (if present). In either case, no adjustment is required to select the line voltage.

For power on/off control from the CD25, connect the modular power cord (IEC 320 C13), from the main power receptacle on the rear panel (see Figure B-1) to a grounded, single-phase, power source.

CAUTION **The power supply cord is used as the main disconnect device. Ensure that the socket-outlet is located/installed near the module and is easily accessible.**

For power on/off control from the LC30 Chromatography Oven, connect the IEC jumper power cord (P/N 960748) provided in the LC30 Ship Kit from the main power receptacle on the CD25 rear panel to one of the four IEC auxiliary receptacles on the rear panel of the LC30. Leave the CD25 power switch on continuously and use the LC30 main power switch to

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turn the CD25 on and off. Other modules in the system can be connected to the LC30 in the same way, allowing the LC30 to function as the main power source for the system.

WARNING

SHOCK HAZARD—To avoid electrical shock, a grounded receptacle must be used. Do not operate or connect to AC power mains without an earthed ground connection.

CAUTION

Operation at AC input levels outside of the specified operating voltage range may damage the CD25.

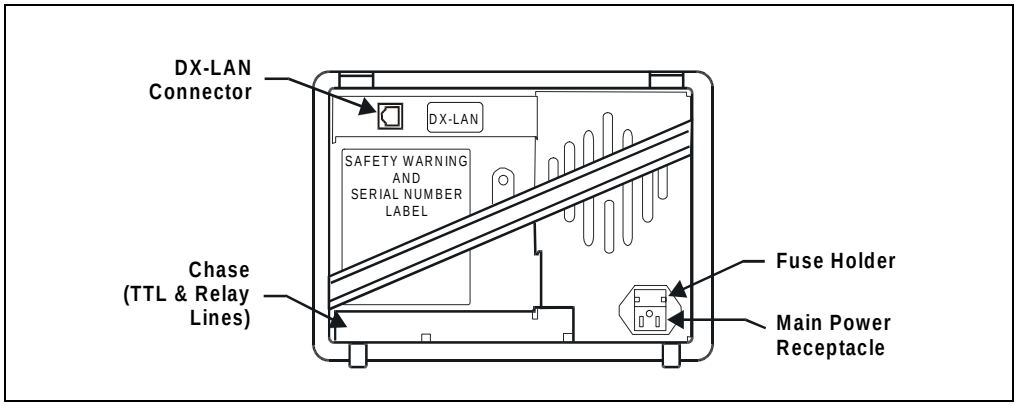


Figure B-1. CD25 Rear Panel

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B.2.2 DX-LAN Interface: 10BASE-T Connections (Optional)

NOTE There are two types of DX-LAN connectors. Before proceeding, check the CD25 rear panel. If a DX-LAN 10BASE-T RJ-45 (telephone-style) connector is installed, follow the interface instructions in Section B.2.2. However, if a DX-LAN 10BASE-2 BNC connector is installed, follow the interface instructions in Section B.2.3.

In order to communicate with a host computer running Dionex chromatography software, the CD25 must contain a detector interface card (P/N 056798) and an unshielded twisted-pair DX-LAN cable (P/N 960281) must be connected from the RJ-45 (10BASE-T) connector on the rear panel to a "combo" 10BASE-T Ethernet hub (P/N 056909).

Installing or Replacing the Detector Interface Card

NOTE If the DX-LAN option was not installed at the factory, order the detector interface card kit (P/N 057007). The kit includes all the components required for DX-LAN communication.

IMPORTANT **STATIC—The CD25 electronics cannot be serviced by the user. The detector interface card must be installed by qualified personnel. Standard anti-static procedures must be observed when installing the interface card or handling the CPU card.**

CAUTION **To prevent damage to the CD25, turn off the main power before installing the detector interface card. After confirming that the LED on the CPU card is off (not green or red), unplug the power. Do not rely on the front panel power switch.**

1. To replace an existing detector interface card, remove the DX-LAN cable from the 10BASE-T connector on the CD25 rear panel (see Figure B-1).
2. Remove any TTL/Relay plugs from the connectors at slot 4 of the electronics chassis (see Figure 2-5).

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3. Disconnect the 60-pin ribbon cable from the inside of the front panel by opening the ejector latches on the connector.
4. Using a screwdriver as a lever, open the white ejector latch at the bottom of the CPU card. Remove the CPU card, cable, and Relay card as a single unit.
5. Remove the detector interface card (if present) from slot 4 of the electronics chassis.
6. Insert the new detector interface card (P/N 056798) into slot 4:
   a. Slide the card to the rear.
   b. Verify that the 10BASE-T connector is aligned with the opening at the rear and that the card is aligned with the card connector.
   c. Press firmly on the card until it mates fully with the connector on the rear panel. Pull on the card to verify that it cannot move.
7. Reinstall the CPU/Relay card. Press firmly until the card is inserted into the connector on the rear panel.
8. Reconnect the ribbon cable to the 60-pin connector on the inside of the front panel. The header and connector are key-polarized near the center. The ejector latches should be partially open to accept the cable connector.
9. Install the 10BASE-T DX-LAN cable (see the following section).

Installing the 10BASE-T DX-LAN Cable

1. Install the "combo" 10BASE-T Ethernet hub (P/N 056909) on a workbench or on the wall. For installation instructions and site requirements, refer to the installation guide shipped with the hub.
2. Plug the 10BASE-T DX-LAN cable (P/N 960281) into a 10BASE-T port on the front panel of the hub.

IMPORTANT

The 10BASE-T DX-LAN cable is a Category 5 unshielded twisted-pair cable. Do not substitute a cable of an inferior grade. Failure to use the correct cable will cause the detector to lose communication with the host computer.

3. Connect the other end of the cable into the 10BASE-T DX-LAN connector on the CD25 rear panel (see Figure B-1).

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4. Connect a 10BASE-T cable (P/N 960281) from a 10BASE-T port on the hub to the 10BASE-T port on the host computer's internal DX-LAN card. If the connection is via port 8 on the hub, set the Normal/Uplink push button to Normal.

NOTE **Installation instructions for the host computer's internal DX-LAN card are in *Installing the Dionex PeakNet 6 System* (Document No. 031631).**

IMPORTANT **When using 10BASE-T cabling, you must use a hub. If you simply plug the 10BASE-T cable from the detector into the connector on the host computer's DX-LAN card, the connection will either not work or will be unreliable.**

Network Upgrades

If you upgrade the network from a BNC connector to a 10BASE-T connector, turn off the computer power briefly and then turn it on again to allow the host computer's internal Ethernet DX-LAN card to detect the 10BASE-T connector. The Ethernet card searches for the type of installed cabling only at power-up.

Cascading Hubs

Cascading, or connecting hubs together through their 10BASE-T ports, increases the number of ports or the number of users supported on the network. For instructions, refer to the installation guide for the hub.

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B.2.3 DX-LAN Interface: BNC Connections (Optional)

NOTE There are two types of DX-LAN connectors. Before proceeding, check the CD25 rear panel. If a DX-LAN 10BASE-2 BNC connector is installed, follow the interface instructions in Section B.2.3. However, if a DX-LAN 10BASE-T RJ-45 (telephone-style) connector is installed, go on to Section B.2.2.

In order to communicate with a host computer running Dionex chromatography software, the CD25 must contain a detector interface card (P/N 046341) and a coaxial DX-LAN cable (P/N 960405) must be connected to the BNC tee connector (P/N 921914) on the rear panel. From the CD25, connect the DX-LAN cable to one of the following:

- Another instrument equipped with a BNC connector, *or*
- A "combo" 10BASE-T Ethernet hub (P/N 056909). The hub has one BNC port and eight 10BASE-T (RJ-45) ports.

Installing or Replacing the Detector Interface Card

NOTE If the DX-LAN option was not installed at the factory, order the detector interface card kit (P/N 044195). The kit includes the components required for DX-LAN communication.

IMPORTANT **STATIC—The CD25 electronics cannot be serviced by the user. The detector interface card must be installed by qualified personnel. Standard anti-static procedures must be observed when installing the interface card or handling the CPU card.**

CAUTION **To prevent damage to the CD25, turn off the main power before installing the detector interface card. After confirming that the LED on the CPU card is off (not green or red), unplug the power. Do not rely on the front panel power switch.**

1. To replace an existing detector interface card, remove the hex nut securing the DX-LAN BNC connector to the CD25 rear panel (see Figure B-1).

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2. Remove any TTL/Relay plugs from the connectors at slot 4 of the electronics chassis (see Figure 2-5).
3. Disconnect the 60-pin ribbon cable from the inside of the front panel by opening the ejector latches on the connector.
4. Using a screwdriver as a lever, open the white ejector latch at the bottom of the CPU card. Remove the CPU card, cable, and Relay card as a single unit.
5. Remove the detector interface card (if present) from slot 4 of the electronics chassis.
6. Insert the new detector interface card (P/N 046341) into slot 4:
   a. Slide the card to the rear.
   b. Verify that the BNC connector is aligned with the opening at the rear and that the card is aligned with the card connector.
   c. Press firmly on the card until it mates fully with the connector on the rear panel. Pull on the card to verify that it cannot move.
7. Reinstall the CPU/Relay card. Press firmly until the card is inserted into the connector on the rear panel.
8. Reconnect the ribbon cable to the 60-pin connector on the inside of the front panel. The header and connector are key-polarized near the center. The ejector latches must be partially open to accept the cable connector.
9. Install the hex nut, BNC tee connector, and coaxial DX-LAN cable (see the following section).

Installing the BNC Tee Connector and Coaxial DX-LAN Cable

1. Install the BNC tee connector (P/N 921914):
   a. Note the two small locking pins on either side of the DX-LAN BNC connector on the rear panel (see Figure B-1).
   b. Push the tee connector onto the BNC connector on the rear panel and twist until the locking pins are fully engaged in the slots on the tee connector.
   c. Pull firmly on the tee connector to verify that it cannot move.
2. Install the coaxial DX-LAN cable (P/N 960405):

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a. Push the metal sleeve on the end of the DX-LAN cable onto one port of the BNC tee connector.

b. Twist the metal sleeve until the locking pins on the tee are fully engaged in the slots on the cable's metal sleeve.

c. Pull the end of the cable to verify that it cannot move.

IMPORTANT **The DX-LAN cable (P/N 960405) is a 50 ohm coaxial impedance cable. (Fifty ohm cables are imprinted with "RG-58U.") Do not substitute cables. Failure to use the correct cable or to lock it into place on the BNC connector will cause the CD25 to lose communication with the host computer.**

3. If the CD25 is the last module in the network to be connected, install a terminator resistor plug (P/N 921034) on the remaining port of the BNC tee connector. (These terminator resistor plugs are shipped with Dionex chromatography software.)

   If the CD25 is not the last module in the network, connect the cable from the next module to the BNC tee.

4. Plug the free end of the coaxial DX-LAN cable into one of these:

   - The BNC connector on another instrument, *or*
   - The BNC port on the rear panel of the "combo" 10BASE-T Ethernet hub (P/N 056909).

   If the connection terminates at the hub, install a BNC terminator (included with the hub) on the BNC tee connector.

IMPORTANT **50 Ohm terminator resistor plugs must be installed at each end of the DX-LAN network. Before beginning operation, verify that both ends of the DX-LAN have terminator resistor plugs installed.**

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B.2.4 DS3 Detection Stabilizer Installation

Install the DS3 with the conductivity cell (P/N 044130) in a chromatography module—for example, an LC20 Chromatography Enclosure—or on a laboratory workbench. The instructions for installing the DS3 vary somewhat, depending on the type of enclosure. See Section B.2.6 for installation and plumbing instructions.

NOTE To install a DS3 or shielded cell in an AS50 autosampler chromatography compartment or oven, refer to the AS50 operator's manual.

B.2.5 Shielded Conductivity Cell Installation

The installation instructions for the shielded conductivity cell (P/N 044132) are the same as for the DS3, except that the shielded cell does not have a heater power cord.

B.2.6 DS3 or Shielded Cell Plumbing

The DS3 or shielded cell can be plumbed for three operating modes:

- AutoSuppression™ Recycle mode (SRS required), shown in Figure B-2.
- AutoSuppression with External Regenerant mode (SRS required), shown in Figure B-3. Also plumb the system in this way for the AutoSuppression Chemical Suppressor and MMS Pressurized Regen System configurations.
- Nonsuppressed mode, shown in Figure B-4. Note that conductivity measurements made when no suppressor is in-line may show noticeable baseline drift.

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The CD25 Ship Kit includes certain items required when installing the SRS:

- SRS gas separator waste tube (P/N 045460)
- Backpressure coil for 4 mm SRS (P/N 045877)
- SRS-to-CD25/ED50 control cable (P/N 046346)

NOTE **The instructions here do not replace the instructions in your SRS manual. For detailed SRS installation instructions, and for the initial start-up procedure that must be performed before you begin routine operation, please refer to the SRS manual.**

Backpressure Requirements

Detector cells require enough backpressure to prevent mobile phase in the cell from degassing due to abrupt volume changes between the small inner diameter of the connecting tubing and the larger volume of the cell. Degassing creates bubbles in the cell and disrupts detector responsiveness.

Before plumbing a system for the AutoSuppression mode, check the SRS manual for backpressure requirements.

NOTE **The backpressure generated by the DS3, cell, and backpressure tubing is applied to the SRS. For example, with 1 meter of 0.25-mm (0.01-in) ID tubing at a flow rate of 1.0 mL/min, the backpressure is about 200 kPa (30 psi).**

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For backpressure requirements for the Nonsuppressed mode, see the following table. The minimum backpressure should be 0.21 to 0.34 MPa (30 to 50 psi) per minute.

Flow Rate (mL/min)	Tubing ID	Coil Length	Number of Coils
0.5 to 1.5	0.25-cm (0.010-in)	0.76 M (2.5 feet)	2
1.5 to 3.0	0.25-cm (0.010-in)	0.76 M (2.5 feet)	1
0.12 to 0.37	0.12-cm (0.005-in)	0.30 M (1.0 feet)	2
0.37 to 0.75	0.12-cm (0.005-in)	0.30 M (1.0 feet)	1

Table B-1. Coils for Backpressure Requirements (Nonsuppressed Mode)

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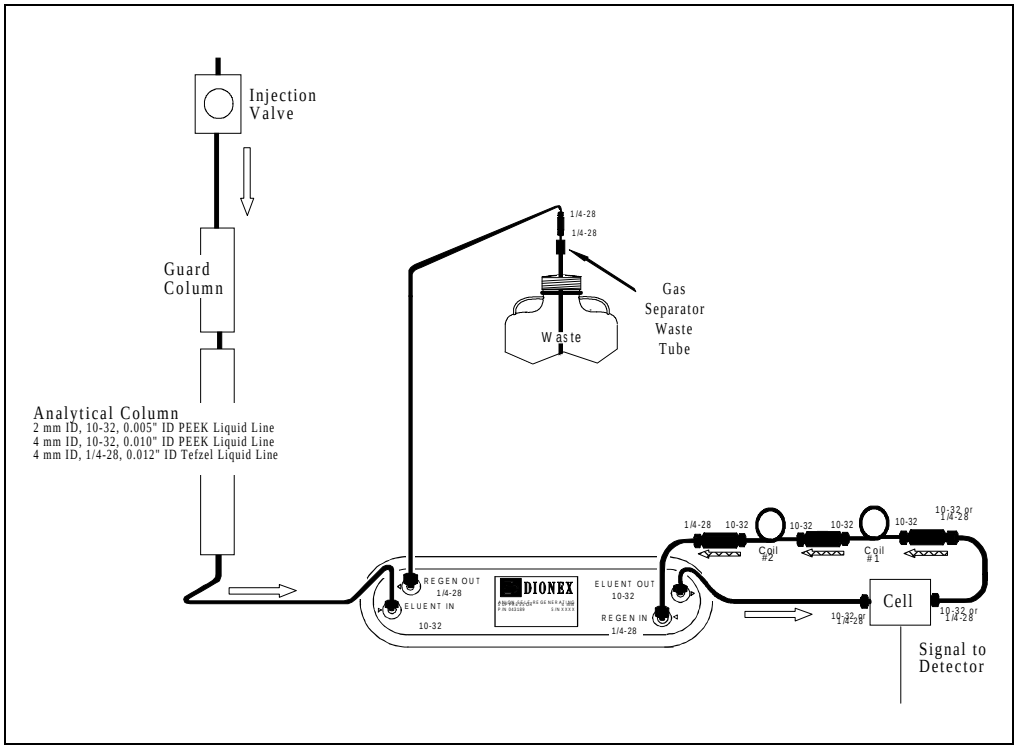


Figure B-2. AutoSuppression Recycle Mode

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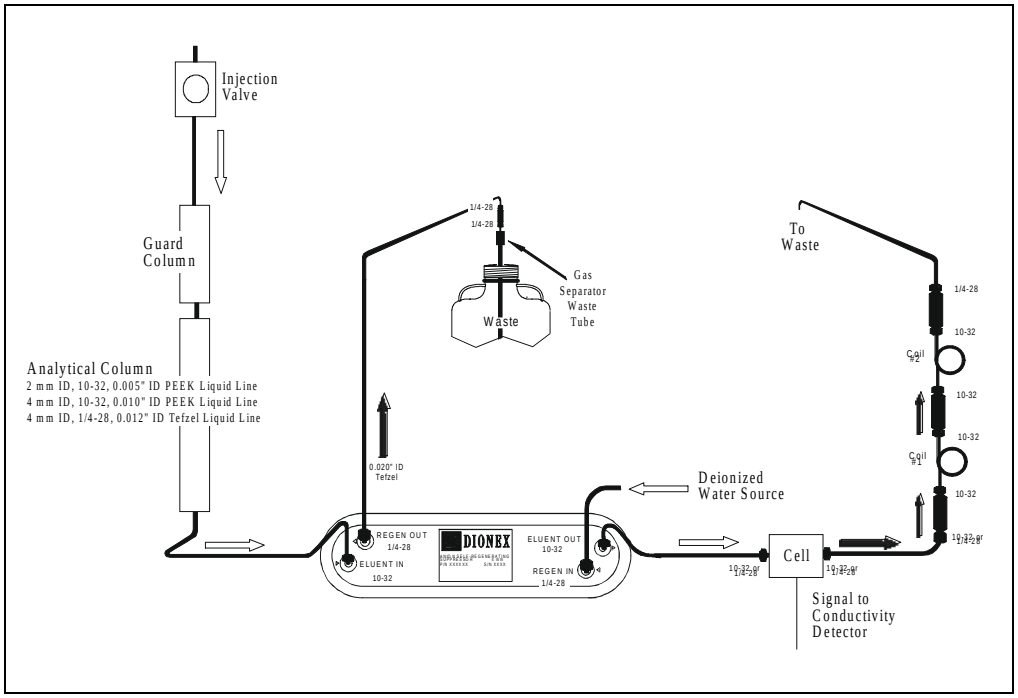


Figure B-3. AutoSuppression Mode, External Regenerant

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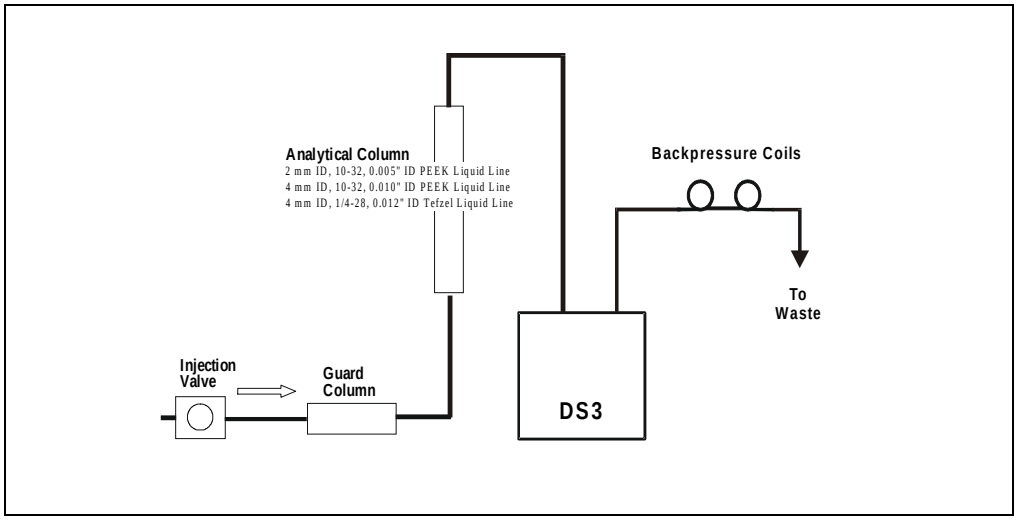


Figure B-4. Nonsuppressed Mode

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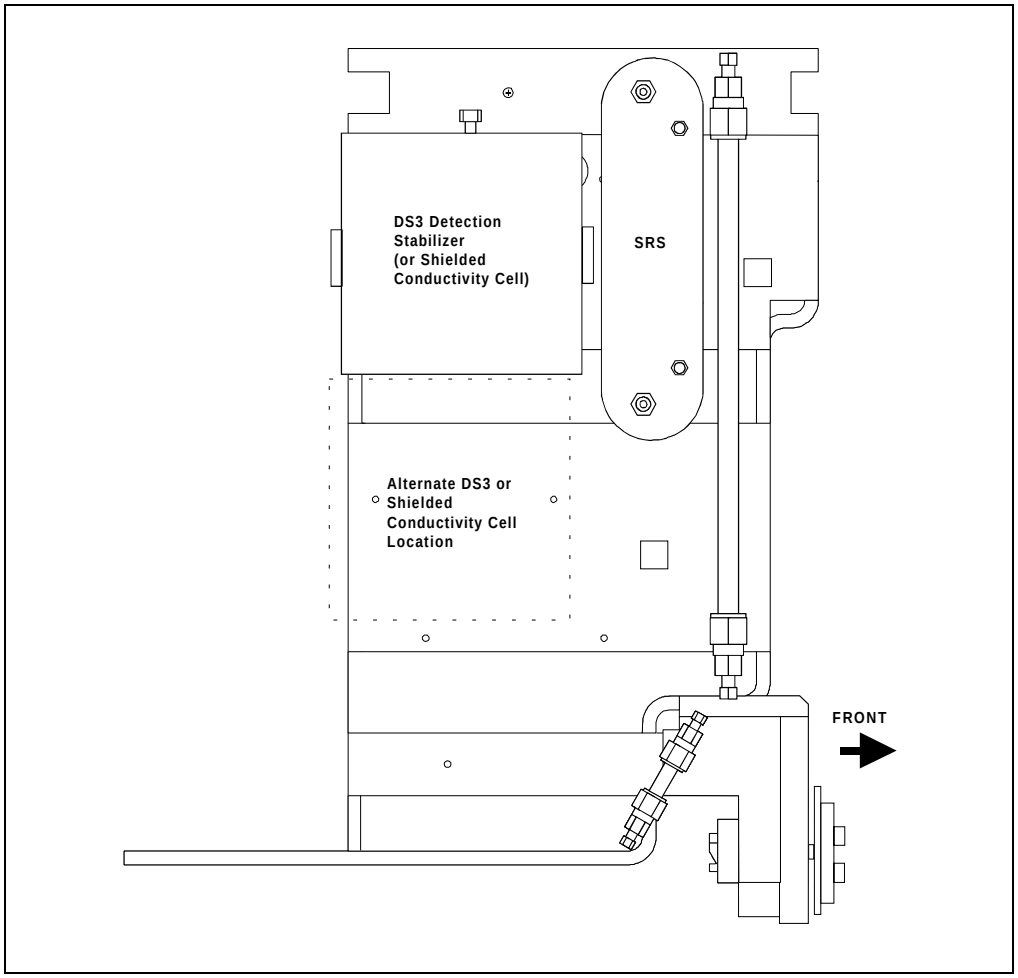


Figure B-5. Typical DS3 Installation in LC20 or LC30

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Installing a DS3 or Shielded Cell in an LC20, LC25, or LC30

1. Position the keyhole slots on the rear of the DS3 or cell over the shoulder washers on the LC20, LC25, or LC30 component mounting panel, then pull the DS3 or cell down into position.
2. Route the DS3 or cell cables out the hole located at the back of the LC20, LC25, or LC30 and into the cable chase at the base of the detector. Next, route the cables through the cable chase to the front of the detector. (You can also route the cables into the detector through the slots on the sides of the detector.)
3. Plug the connectors on the cables into the appropriate jacks on the SCR card. (To identify the card location and connector positions, see the label on the inside of the CD25 front door or to Figure 2-5 in this manual.)
4. Connect the eluent outlet of the column or suppressor to the DS3 or cell inlet, using 0.25-mm (0.010-in) ID tubing (P/N 042690), 10-32 fittings (P/N 043275), and ferrules (P/N 043276).
5. Connect the outlet of the DS3 or cell to either the SRS REGEN IN port (for AutoSuppression Recycle mode) or to the backpressure line leading to waste (for AutoSuppression with External Regenerant mode or Nonsuppressed mode).
6. Direct the spill/overflow tubing to the spill tray at the bottom front of the LC20, LC25, or LC30.

Installing a DS3 or Shielded Cell in an LC10

1. If installing a DS3, cut the spill/overflow tubing within 2.0 cm (3/4 in) of the DS3 enclosure.
2. Position the keyhole slots on the rear of the DS3 or cell over the shoulder washers located on the LC10. Push the DS3 or cell down to secure it in place.
3. Route both DS3 or cell cables through the hole located at the base of the detector cable chase. Next, route the cables through the cable chase to the front of the detector. (You can also route the cables into the detector using the slots on the sides of the detector.)

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4. Plug the connectors into the appropriate jacks on the SCR card. (To identify the card location and connector positions, see the label on the inside of the CD25 front door or to Figure 2-5 in this manual.)
5. Connect the eluent outlet of the column or suppressor to the DS3 or cell inlet, using 0.25-mm (0.010-in) ID PEEK tubing (P/N 042690), 10-32 fittings (P/N 043275), and ferrules (P/N 043276). See Table B-1 for backpressure requirements.
6. Connect the outlet of the DS3 or cell (the 10-32 coupler) to the SRS REGEN IN port (for AutoSuppression Recycle mode) or to the backpressure line leading to waste (for AutoSuppression with External Regenerant mode or Nonsuppressed mode).

B.2.7 Recorder/Diagnostic Connection

Connecting a strip chart recorder or integrator to the CD25 lets you record or monitor several parameters besides the cell analog output. For the recorder/diagnostic signal cable pinouts, see Table E-1 in Appendix E.

Use the twisted black and red wires (P/N 043598) provided in the CD25 Ship Kit to connect a recorder or integrator to the SCR card in the electronics chassis. Strip the ends of the wires and insert into the plugs; the signal wire (red) goes on the top of each plug and the ground wire (black) goes on the bottom. Tighten the locking screws with the screwdriver (P/N 046985) provided in the CD25 Ship Kit.

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B.3 Automatic SRS Power Control (Optional)

TTL connections can be used to automatically switch off the power to a Self-Regenerating Suppressor (SRS) when the flow from the pump stops.

1. On the **PUMP OPTIONS** screen, set **TTL2 OUTPUT USAGE** to **0 Flow**. (For more details, see the operator's manual for the GP50 Gradient Pump or IP25 Isocratic Pump.)
2. On the CD25 **TTL FUNCTION IN** screen, assign **TTL3** to **SRS OFF/ON**.
3. Locate the twisted black and red wires (P/N 043598) and two green TTL connector plugs (P/N 921019) provided in the CD25 Ship Kit.
4. Strip the ends of the wires and insert them into the plugs, with the signal wire (red) on top of each plug and the ground wire (black) on the bottom. Tighten the locking screws with the screwdriver (P/N 046985) provided in the CD25 Ship Kit.
5. Plug one end of the cable into TTL2 OUT on the pump (see Figure B-6).
6. Route the cable through the upper chase of the pump and the CD25, and then plug the free end of the cable into TTL3 IN on the CD25.
7. Turn off the flow (from the pump) and confirm that the detector automatically turns off the SRS. First, however, expect a 5-minute delay from the time the CD25 receives the signal until the power to the SRS is turned off; this delay allows momentary flow interruptions without disturbing the SRS.

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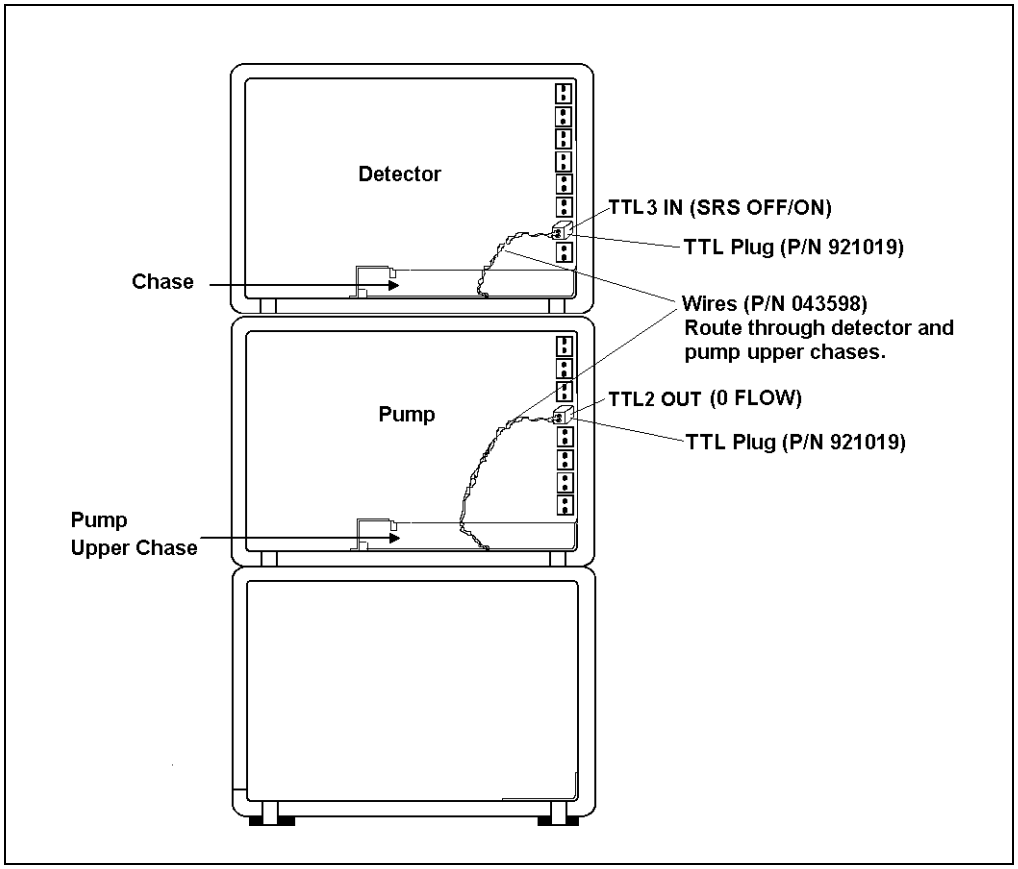


Figure B-6. TTL Connections for SRS Power Control

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C • User Interface

This appendix illustrates and describes all of the screens available for display on the front panel of the CD25 Conductivity Detector. There are two categories of screens: operational and diagnostic.

- ***Operational*** screens enable you to create, edit, and run methods that control CD25 operation, and to select default parameters for the detector.
- ***Diagnostic*** screens provide access to diagnostic information and tests, including some screens that enable you to calibrate various CD25 functions.

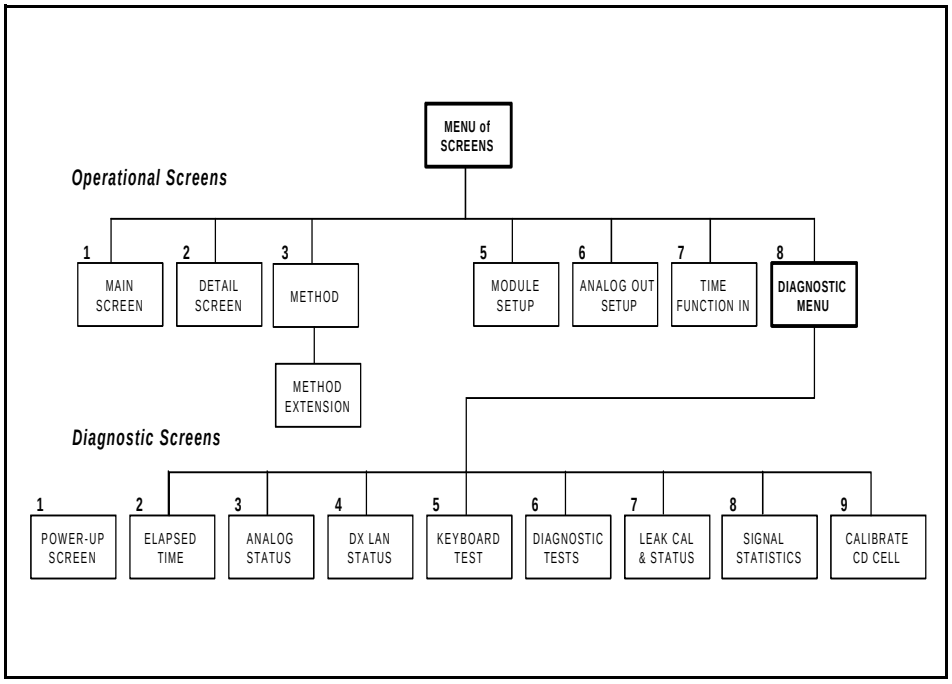


Figure C-1. CD25 Menu Structure

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C.1 Operational Screens

C.1.1 Menu of Screens

The **MENU of SCREENS** provides top-level access to the menu structure.

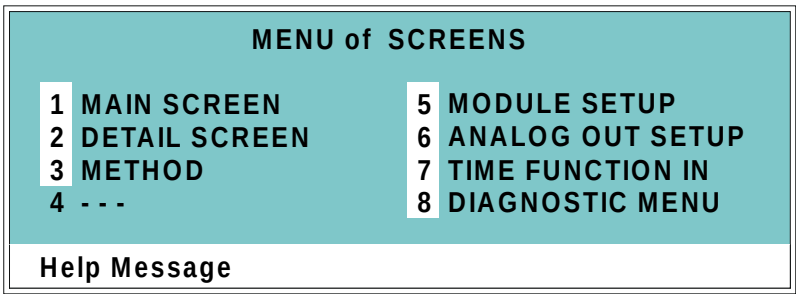


Figure C-2. Menu of Screens

There are two ways to select a screen from this menu:

- Use the cursor arrow buttons to move the cursor to the field containing the screen number and press **Enter**.
- Press the number button on the front panel keypad that corresponds to the screen.

To display a brief description of each menu option, press the **Help** button.

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C.1.2 Main Screen

The **MAIN** screen displays the measured conductivity (siemens) and other primary functions in large characters to make viewing easier from a distance.

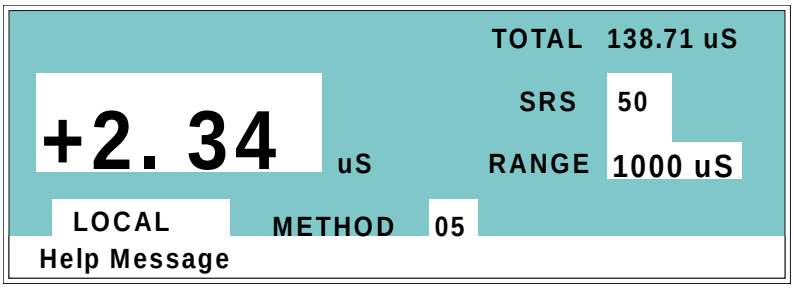


Figure C-3. Main Screen

Screen Field	Description
TOTAL	Displays total conductivity (without an offset).
SRS	Selects the amount of current sent to the suppressor. Current selection depends on the eluent concentration, flow rate, etc. The discrete settings are Off, 50, 100, 300, and 500 mA.
RANGE	Sets the analog output scale factor. Select a range between 0.01 and 3000 µS.
LOCAL/ REMOTE	Local mode is used for front panel control. The CD25 will automatically switch to Locked Remote mode when a Connect command is given from PeakNet 6. Locked Remote mode prevents operation from the keypad. The Locked Remote mode can be canceled only by a Disconnect command from PeakNet 6 or by turning off the CD25 and then turning it back on. **Note:** PeakNet 6 does not use the regular (unlocked) Remote mode.
DIRECT CONTROL/ METHOD	Press either **Select** button to toggle between the Direct Control and Method operating modes.

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C.1.3 Detail Screen

The **DETAIL** screen includes all the fields contained on the **MAIN** screen, as well as the TTL and Relay fields and fields to control detection. Refer to the **MAIN** screen for a description of fields that are common to both screens.

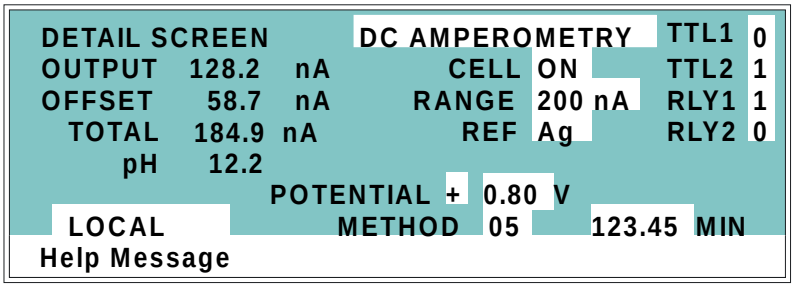


Figure C-4. Detail Screen

Screen Field	Description
TEMP COMP	Sets the temperature compensation factor. The range is 0 to 3%. 1.7% is appropriate for most eluents.
DS3 SETPOINT	Sets the temperature of the DS3 Detection Stabilizer.
TTL1 **TTL2**	Provides TTL control of accessories. In a method, these values occur according to the method timing. In Direct control, select off (0) or on (1).
RLY1 **RLY2**	Provides relay contact closure control of accessories. In a method, these values occur according to the method timing. In Direct control, select off (0) or on (1).

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C.1.4 Method

A method consists of a series of timed steps. Each step has a set of parameters associated with it.

Initial conditions are applied when a method is invoked. A lower case **v** next to the last step on the display indicates that the method contains more steps.

Blank fields denote no change from the previous step. The **Delete** button blanks the field.

NOTE **TEMP COMP, DS3 TEMP, and SRS CURRENT are not time-programmable.**

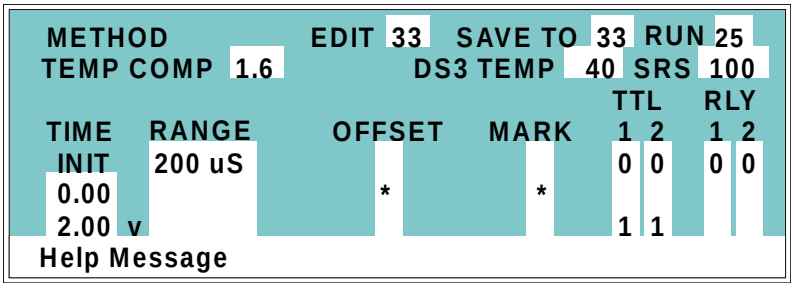


Figure C-5. Method Screen

Screen Field	Description
EDIT	Specifies the method number (1 through 99) to edit. **Note:** Method number 0 is reserved for methods downloaded from PeakNet 5.2 (or later), for remote control of the CD25.
SAVE TO	Specifies the method number (1 through 99) to save the current method to.
RUN	Specifies the method number (1 through 99) to run. The **Hold/Run** button controls the running of the method.
TEMP COMP	Sets the Temperature Compensation factor.
SET TEMP	Sets the temperature for the DS3 Detection Stabilizer.
SRS	Sets the Self-Regenerating Suppressor current.

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Screen Field	Description
TIME	Specifies the start time for each step. Times are displayed chronologically.
RANGE	Sets the analog output range.
OFFSET	Stores the offset value. The baseline is set by subtracting the offset measured when this step is executed from all subsequent measurements. An asterisk (*) indicates that OFFSET will occur at this time.
MARK	Sends a positive pulse to the analog output (recorder) as an event marker. An asterisk (*) indicates that a MARK will occur at this time.
TTL	Sets TTL1 and TTL2 to off (0) or on (1).
RLY	Sets RLY1 and RLY2 to off (0) or on (1).

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C.1.5 Module Setup

The backlight intensity, key beep, and error beep are configured from the **MODULE SETUP** screen.

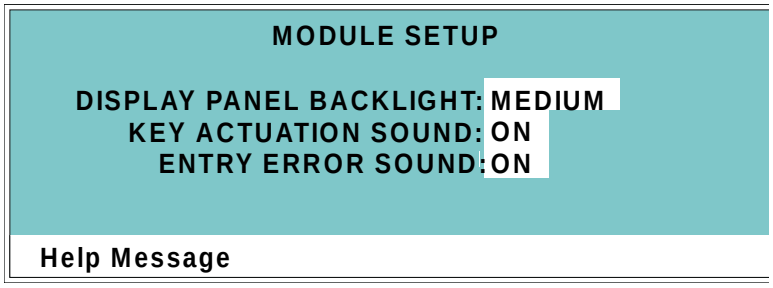


Figure C-6. Module Setup Screen

Screen Field	Description
DISPLAY PANEL BACKLIGHT	Sets the display panel backlight to **LOW**, **MEDIUM**, **HIGH**, or **OFF**.
KEY ACTUATION SOUND	Toggles the keypad touch sound. When this option is selected, the detector sounds a beep when a button is pressed.
ENTRY ERROR SOUND	Toggles the error sound. When this option is selected, the detector sounds a beep when an invalid entry is made.

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C.1.6 Analog Out Setup

The **ANALOG OUT SETUP** screen contains parameters for setting the analog output, such as for a recorder or oscilloscope.

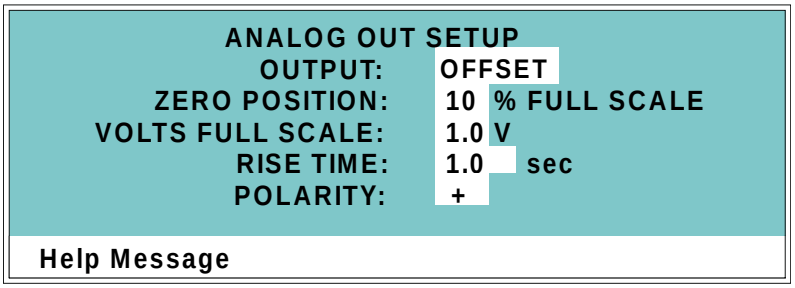


Figure C-7. Analog Out Setup Screen

Screen Field	Description
OUTPUT	Sets the analog output to one of the following: **OFFSET** uses the offset level value. **TOTAL** sets the detector output to the total cell conductivity, charge or current, disabling the offset function. **ZERO** sets the detector output to zero volts. **FULL SCALE** sets the output to the full-scale setting.
ZERO POSITION	Sets the analog (recorder) offset level (0 to 100%).
VOLTS FULL SCALE	Sets the full-scale voltage for a signal equal to the range setting. The discrete settings are 1.0, 0.1, and 0.01 volts.
RISE TIME	Sets the output filter rise time to 0.05, 0.1, 0.2, 0.5, 1.0, 2.0, 5.0, or 10.0 seconds. Rise time is a measure of how quickly the detector goes from 10% to 90% of step input changes. A digital filter is used with zero undershoot or overshoot for minimal peak distortion.
POLARITY	Determines the output voltage polarity. The output is usually set to positive polarity. Negative polarity is used to reverse peaks from indirect detection.

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C.1.7 Time Function In

This screen displays the detector functions that can be controlled with TTL input from another device and lets you assign any four of the functions to the four TTL inputs. The **MODE** field selects the type of input signal the detector will respond to. The signal type can be changed to match the signal of the controlling device. See Section D.3 for details.

Use the **Select** buttons to select the TTL input signal mode and to assign TTL1 through TTL4 to any four of the functions.

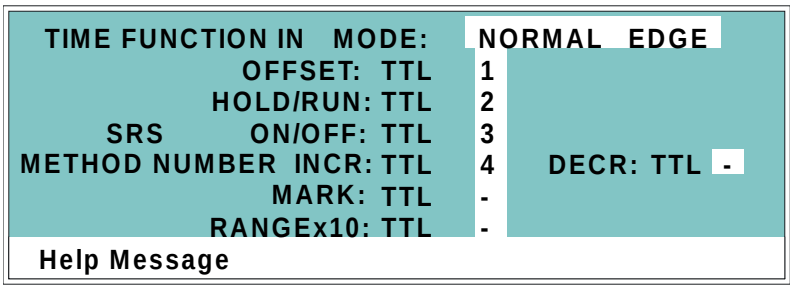


Figure C-8. Time Function In Screen

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C.2 Diagnostic Screens

To access the CD25 diagnostics, select the **DIAGNOSTIC MENU** from the **MENU of SCREENS**. While a diagnostic screen is displayed, pressing the **Menu** button returns you to the **DIAGNOSTIC MENU**. From the **DIAGNOSTIC MENU**, pressing **Menu** returns you to the **MENU of SCREENS**.

C.2.1 Diagnostic Menu

Figure C-9 shows the **DIAGNOSTIC MENU**. The nine menu options are explained in detail in the following sections.

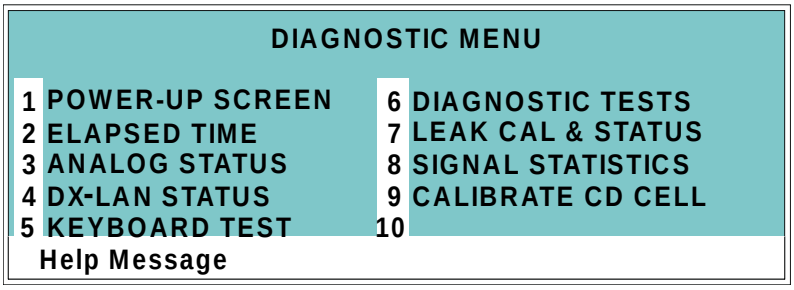


Figure C-9. Diagnostic Menu Screen

There are two ways to select a screen from this menu:

- Use the cursor arrow buttons to move the cursor to the field containing the screen number and press **Enter**.
- Press the number button on the front panel keypad that corresponds to the screen.

To display a brief description of each menu option, press the **Help** button.

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C.2.2 Power-Up Screen

The **POWER-UP** screen displays the revision numbers for the Moduleware and BIOS code. It also displays the identification number of the optional DX-LAN interface, if connected.

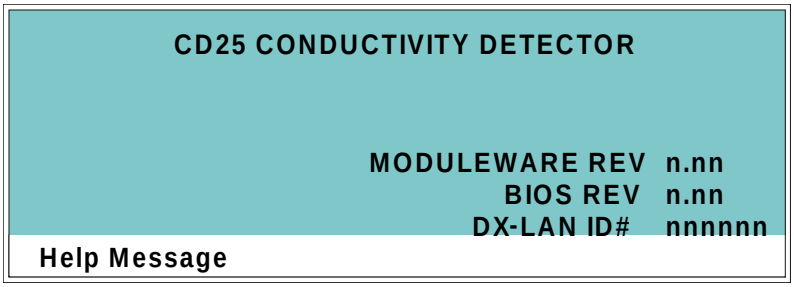


Figure C-10. Power-Up Screen

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C.2.3 Elapsed Time

This screen reports for how long various CD25 parameters have been in use. The status of each parameter updates in real time.

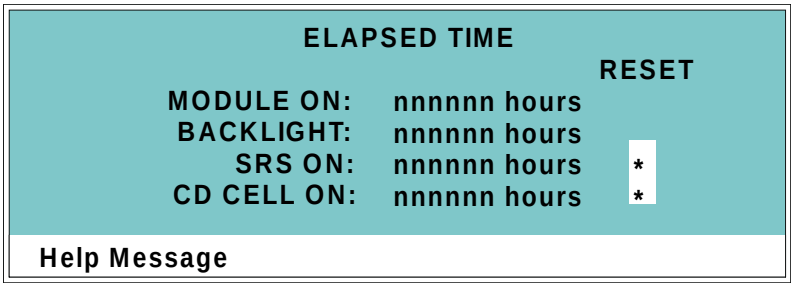


Figure C-11. Elapsed Time Screen

Screen Field	Description
MODULE ON	Reports the total time the detector has been powered up in its lifetime.
BACKLIGHT	Reports the total time the LCD backlight has been on in its lifetime.
SRS ON	Reports the total time the SRS has run. Reset this field to zero after changing the SRS.
CD CELL ON	Reports the total time the conductivity cell has run. Reset this field to zero after replacing the cell.
RESET	Allows a timer to be reset to zero to restart the counter. Reset the appropriate timer after installing a new component.

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C.2.4 Analog Status

This screen reports the status of several analog test points. If a run is in progress, the status updates are from the last idle state. If no run is in progress, the values are in real time.

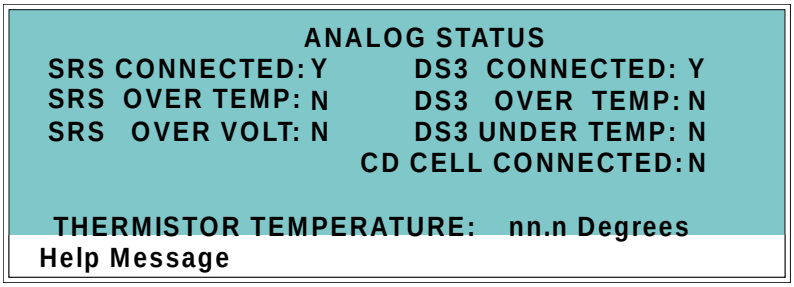


Figure C-12. Analog Status Screen

Screen Field	Description
SRS CONNECTED	Indicates whether a Self-Regenerating Suppressor is connected to the detector.
SRS OVER TEMP	Indicates whether the SRS is over the temperature specified.
SRS OVER VOLT	Indicates whether the SRS is over the voltage range specified.
DS3 CONNECTED	Indicates whether a DS3 Detection Stabilizer is connected to the detector.
DS3 OVER TEMP	Indicates whether the DS3 is over the temperature specified.
DS3 UNDER TEMP	Indicates whether the DS3 is under the temperature specified.
CD CELL CONNECTED	Indicates whether a conductivity cell is connected to the detector.
THERMISTOR TEMPERATURE	Indicates the temperature recorded from the conductivity cell thermistor.

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C.2.5 DX-LAN Status

The DX-LAN driver monitors several types of errors that may occur on the network. The detector reads the DX-LAN error counts and displays them on this screen, along with the DX-LAN addresses. Most errors are caused by a defective cable, missing or incorrectly terminated cable. The coaxial DX-LAN cable must be RG58U or RG58AU.

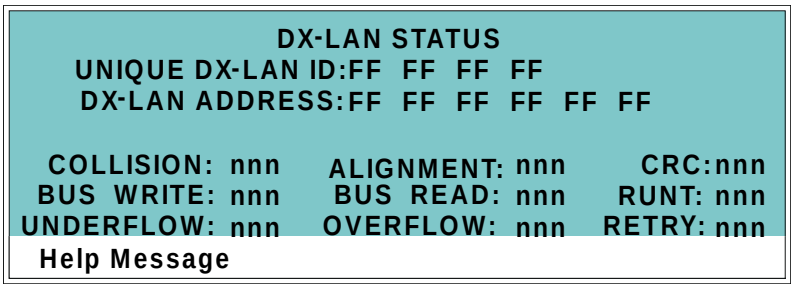


Figure C-13. DX-LAN Status Screen

Screen Field	Description
UNIQUE DX-LAN ID	Displays the three-byte DX-LAN ID programmed into the detector Moduleware (in HEX). The ID is unique to the detector and never changes.
DX-LAN ADDRESS	Displays the six-byte DX-LAN address assigned by the PC (in HEX). The first three bytes are the system assignment and the last three bytes are the assignment within the system.
COLLISION	Indicates that 16 unsuccessful transmissions of the same packet occurred, due to collisions.
BUS WRITE	Indicates that a ready response could not be issued within 2.4 microseconds after the WR signal was asserted. This occurs when the transmit buffer memory is full.
UNDERFLOW	Indicates that data from the transmit section of the hardware buffer memory is not available for serial transmission. The DX-LAN will continue to send out this data frame.

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Screen Field	Description
ALIGNMENT	Indicates that a packet was received with an alignment error, meaning that there were one to seven extra bits at the end of the packet. This is usually caused by a collision or a faulty transceiver.
BUS READ	Indicates that a ready response could not be issued within 2.4 microseconds after the ready signal was asserted. This occurs when reading an empty buffer.
OVERFLOW	Indicates that the DX-LAN hardware receive buffer became full and had to reject a packet for lack of space.
CRC	Indicates that a packet was received with a CRC error. This usually means that a collision has corrupted the packet.
RUNT	Indicates that a “runt” packet (one less than 15 bytes in length) was received. This usually occurs after a collision has truncated the original length.
RETRY	Indicates the number of retries required to transmit the last packet.

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C.2.6 Keyboard Test

You can conduct an interactive test of the CD25 front panel keypad from this screen. Pressing any front panel button changes the corresponding button indicator on the screen to reverse video. This confirms proper operation of that button. When you release the button, the display returns to normal video.

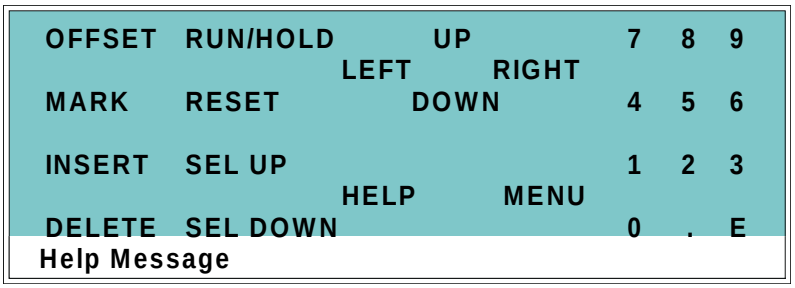


Figure C-14. Keyboard Test Screen

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C.2.7 Diagnostic Tests

These tests verify the integrity of the detector electronics and functions.

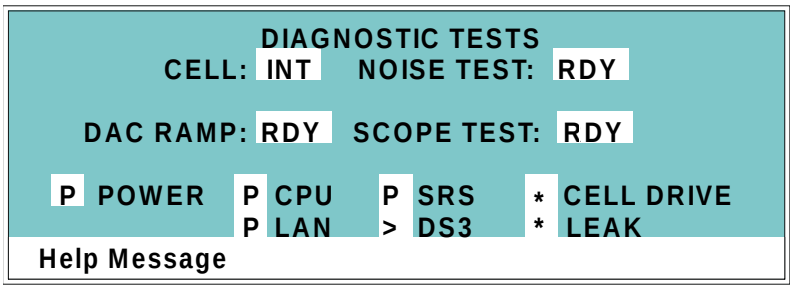


Figure C-15. Diagnostic Tests Screen

Screen Field	Description
CELL	Specifies whether the cell to be tested is internal (INT) or external (EXT).
NOISE TEST	Selects one of the following test modes: RDY—The system is idle and ready to begin a test. CD—Selects the conductivity cell for testing.
DAC RAMP	Selects the DAC test mode. The test linear ramps the output of the selected DA on the SP or SCR card from 0 to full-scale and can be plotted from the recorder output or from PeakNet. The ramp test modes are: RDY—The system is idle and ready to begin a test. CDO—Tests the CD Offset DAC (eight iterations, one for each gain; the eighth iteration is flat on top). Disconnect the conductivity cell before running this test. REC—Tests the Recorder Output DAC.
SCOPE TEST	Generates test waveforms that can be monitored on test points on the SCR and SP cards, using an oscilloscope or chart recorder. The test modes are: RDY—The system is idle and ready to begin a test.

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Screen Field	Description
	CDF—Tests the CD Offset DAC output (TP9 on the SP card) and the CD fine filter circuit (TP19 on the SP card). TP9 outputs a square wave with a frequency of 200 ms and an amplitude from 0 to -0.1 V. TP19 outputs a sine wave with a frequency of 200 ms. The peak-to-peak amplitude is 4.40 V. CDT—Tests the CD Temperature Compensation DAC (TP26 on the SP card). The output is a square wave in which the bottom and top amplitudes increase and decrease from 11 V to 12 V. Before running this test, connect the DS3 and set the temperature to 45 °C, or connect a dummy thermistor value of 42 kΩ to pins 2 and 3 of the conductivity cell connector. SCR—Tests the SCR DAC for the DS3 set point temperature (TP13 on the SCR card) and SRS current set point (TP17 on the SCR card). The output on each test point is a linear ramp that goes from 0 to 10 V in 2.5 seconds. Disconnect the DS3 and SRS before running this test.

The following tests can be run from the **DIAGNOSTIC TESTS** screen. To begin a test, select the asterisk (*) in the field beside the test name and press **Enter**. When the test is complete, the entry field displays either **P** (pass) or **F** (fail).

NOTE **Running the following tests disturbs the equilibration of the detector as services cycle on and off and the system runs through its test modes. After testing, allow the system to equilibrate before resuming operation.**

POWER	Checks the +5, ±15, and +24 volt monitor on the Relay card.
CPU	Checks the CPU internal configuration and the Moduleware checksum.
DX-LAN	Checks the DX-LAN hardware configuration and loop-back.
SRS	Varies the SRS power supply and checks the flags.
DS3	Varies the DS3 temperature set point and checks the flags.
CELL DRIVE	Switches in a resistor in place of the cell to provide a calibrated signal to read.
LEAK	Checks the detector's leak sensor for a correct, open circuit, or short circuit condition.

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C.2.8 Leak Sensor Calibration and Status

This screen reports the status of leak sensor parameters.

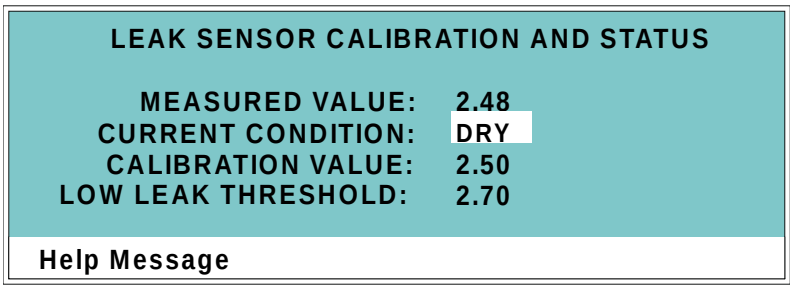


Figure C-16. Leak Sensor Calibration and Status Screen

Screen Field	Description
MEASURED VALUE	Reports the measured voltage from the leak sensor.
CURRENT CONDITION	Reports the current (error) condition of the leak sensor: WET, DRY, or ERR. Error indicates an open or short circuit. To calibrate a leak sensor, select **CAL** and press **Enter**. After calibration, the field will revert to DRY, unless an error condition exists.
CALIBRATION VALUE	Reports the value saved when the leak sensor was last calibrated.
LOW LEAK THRESHOLD	Reports the threshold value below which a leak is indicated. This is based on the calibration value.

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C.2.9 Signal Statistics

This screen enables you to monitor the selected input to the A/D circuitry. When the screen is first displayed, the **MAX** and **MIN** status values are equal to the **INPUT** value, and **DURATION** reads 0. Status values are reported in A/D volts and are updated dynamically.

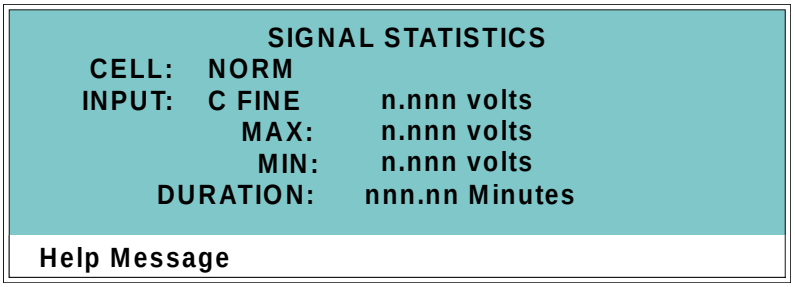


Figure C-17. Signal Statistics Screen

Screen Field	Description
CELL	Selects the cell test mode: NORM—Uses input data from the cell. FIXED—Uses a fixed dummy cell for input.
INPUT	The measured data from the A/D circuit: C FINE—Conductivity cell fine input C COARSE—Conductivity cell coarse input C THER—Conductivity cell thermistor input LEAK—Leak detector input DRIVE—Cell drive circuit input
MAX	The maximum input data value during the duration of the test.
MIN	The minimum input data value during the duration of the test.
DURATION	The duration (in minutes) of the test. The test starts when you enter this screen and terminates when you exit.

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C.2.10 Calibrate Conductivity Cell

This screen allows you to calibrate the conductivity cell with 1 mM KCl. See Section 5.4 for detailed instructions.

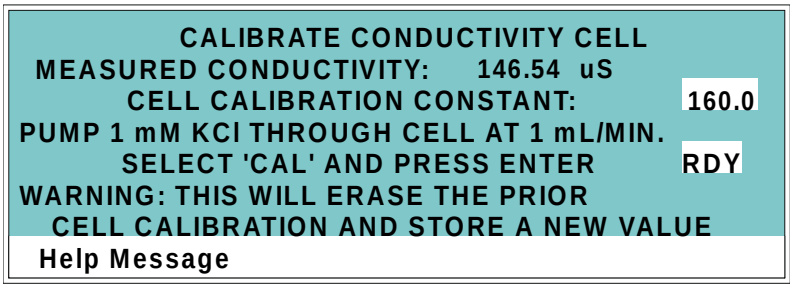


Figure C-18. Calibrate Conductivity Cell Screen

Screen Field	Description
MEASURED CONDUCTIVITY	Reports the measured conductivity from the conductivity cell.
Calibration	Select **CAL** and press **Enter** to calibrate the conductivity cell to the value displayed in the conductivity field. The calibration assumes that uncontaminated 1 mM KCl is flowing through the cell at normal backpressure. The new value replaces the previous calibration value.

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D • TTL and Relay Control

The strip of eight 2-pin connectors on the CD25 electronics chassis provides two relay outputs, two TTL outputs, and four TTL inputs (see Figure D-1).

- Connect the outputs to the TTL or relay inputs of a Dionex or non-Dionex device to control functions in the connected device. The devices must be compatible with the CD25's TTL and relay signals.
- Connect the inputs to a Dionex or non-Dionex device to control four detector functions.

Connection instructions are in Section D.1.

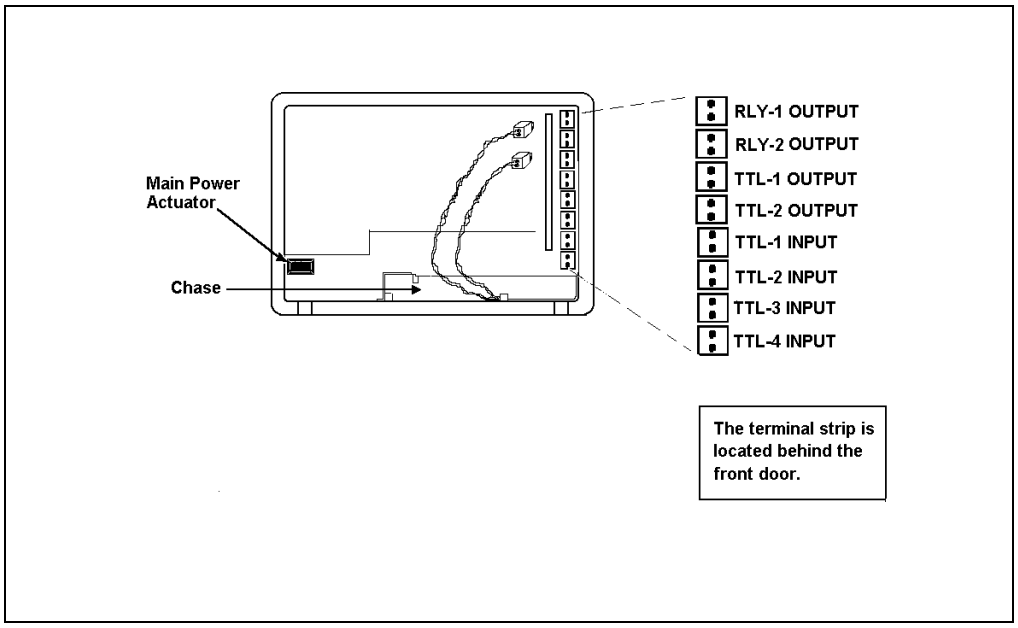


Figure D-1. TTL Connector Strip
(CD25 Front View without Upper Door)

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D.1 TTL and Relay Connections

The TTL/relay connector strip is located on the electronic chassis behind the upper door (see Figure D-1). Each 2-pin connector includes a signal pin and a ground pin.

1. Twisted pairs of wires (P/N 043598) and two-pin connector plugs (P/N 921019) are provided in the CD25 Ship Kit. Attach a two-pin plug to each end of the twisted pair of wires to be connected. The signal wire goes on top and the ground wire goes on the bottom of each plug.
2. Connect these plugs to the TTL or relay connectors on the CD25 and the other module(s) as needed for your application. Check the polarity of each connection. Connect signal wires to signal (+) pins and ground wires to ground (-) pins. If necessary, remove wires from the two-pin plugs and reinsert them in the correct positions.
3. Route the wires from the CD25 electronics chassis through the upper chase to the rear panel.

NOTE **Relay outputs 1 and 2 can be programmed to switch any low-voltage control (see Section D.2). Switched current must be less than 200 mA and 42 V peak**.



The relay outputs, TTL inputs, and TTL outputs all use a connector of the same style. Do not inadvertently connect relay loads that include power supplies to the TTL inputs or TTL outputs. Relay loads in excess of 200 mA or with included power supplies over 42 V may damage the relay drivers on the CPU module.

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D.2 TTL and Relay Output Operation

The CD25 provides two TTL outputs and two relay contacts to control functions in external devices such as an integrator, autosampler, or another Dionex module.

After connecting the TTL and Relay outputs (see Section D.1), toggle the output states on and off from either the **DETAIL** screen or from the **METHOD** screen. The **METHOD** screen allows programming of the output states in method steps for timed operation.

- To turn on a TTL or relay output, set the corresponding output field in the **DETAIL** screen or **METHOD** screen to **1** (closed).
- To turn off a TTL or relay output, set the corresponding output field to **0** (open).

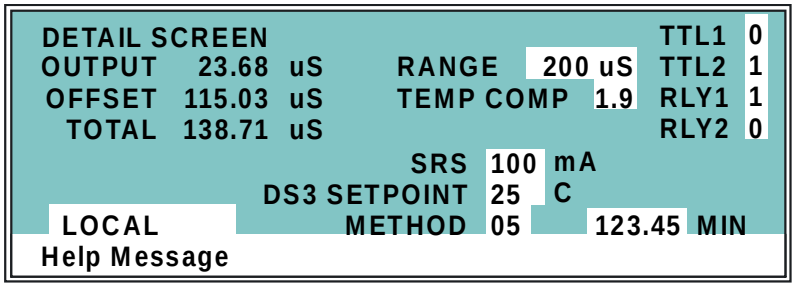


Figure D-2. Detail Screen

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D.3 TTL Input Operation

D.3.1 TTL Input Functions

The four TTL inputs can be connected to devices capable of providing TTL output signals. Signals from the connected devices can control up to four of the functions listed below. In the **TIME FUNCTION IN** screen (see Figure D-3), use the **Select** buttons to assign TTL1 through TTL4 to any four of the functions.

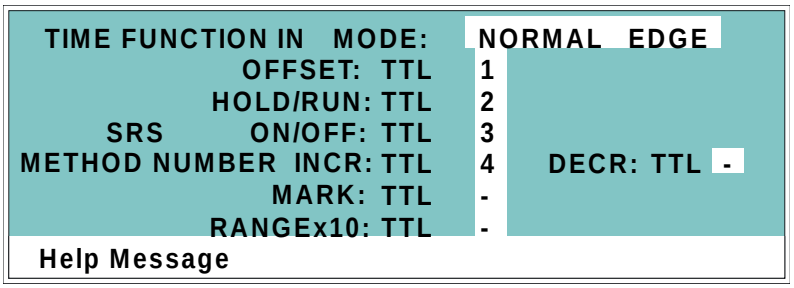


Figure D-3. Time Function In Screen

OFFSET — Returns the analog (recorder) output to a predetermined baseline and zeros the display.

HOLD/RUN — Controls the detector method clock. A signal from the controlling device can turn the method clock on (Run) and off (Hold/Reset). Hold/Reset resets the method clock to zero and executes **INIT** conditions.

SRS OFF/ON — Turns the SRS current off and on.

METHOD NUMBER INCRement — Increases the method number by one. Each additional signal increases the method number by one more.

When the method clock is zero (or **INIT**), increasing the method number executes the **INIT** conditions of the new method. When the method clock is greater than zero, increasing the method number begins running the new method at the current elapsed method clock time. This has the same result as selecting a new method number when the detector is in Local mode.

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METHOD NUMBER DECRement	Decreases the method number by one. The operation is as described under TTL input 3 above, except that the method number decreases.
MARK	Sends a 10% positive event mark to the analog (recorder) output.
RANGE x10	Sets the analog output scale factor between 0.01 and 3000 µS.

D.3.2 TTL Input Signal Modes

The CD25 TTL inputs respond to four types of signals to accommodate different types of device output signals. The default signal mode, normal edge, is compatible with the output signals provided by Dionex modules. If the device connected to the CD25 outputs a different signal type, select the appropriate signal mode from the **TIME FUNCTION IN** screen (see Figure D-3).

The four input signal modes are:

- *Normal Edge*: In normal edge operation, the negative (falling) edge of a signal turns on the function and the positive (rising) edge turns off the function (see Figure D-4).
- *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 (falling) edge of the TTL signal is the active edge and the positive (rising) edge is ignored.

  The minimum pulse width guaranteed to be detected is 50 ms. The maximum pulse width guaranteed to be ignored as noise or invalid is 4 milliseconds. The action of the CD25 is undefined for pulses less than 50 ms or greater than 4 ms.
- *Inverted Pulse*: The inverted pulse mode operates identically to the normal pulse mode except that the positive and negative edges are reversed in function.

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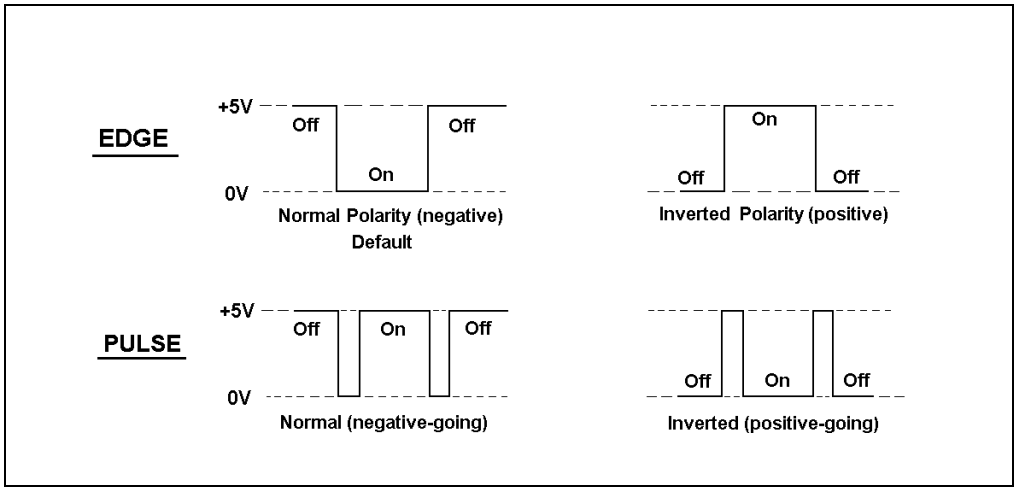


Figure D-4. TTL and Relay Input Signal Modes

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E • Signal Processor Functions

The functions of the Signal Processor (SP) card are as follows:

- Temperature compensation digital-to-analog converter
- Cell chopper, driver
- Offset digital-to-analog scaling switch
- Conductivity signal receiver
- Second stage amplifier and gain switch
- Synchronous rectifier
- 5 mS Noise filter
- DC amplifier 100 mS filter
- Signal selection (MUX)
- 16-bit Analog-to-digital converter
- Digital interface

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F • Connector Pinouts

F.1 Recorder/Diagnostic Signal Pinouts

This section describes the Recorder/Diagnostic Signal pinouts. The connector is supplied plugged into the socket. The pins are numbered consecutively from 1 to 10.

Pin	Signal
1	Recorder Negative
2	Recorder Positive
3	SRS Supply Voltage
4	DS3 Supply Current
5	Conductivity Cell Flow Stream Temperature
6	This pin is not used by the CD25.
7	This pin is not used by the CD25.
8	+10 V Reference from SCR Card
9	This pin is not used by the CD25.
10	Common Ground for Signals 3 through 9

Table E-1. Recorder/Diagnostic Cable Pinouts

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F.1.1 Signal Electrical Parameters

Pin 1 Attach the negative input of the chart recorder to pin 1.

Pin 2 The full-scale output range setting (0 to 0.01 V, 0 to 0.1 V, or 0 to 1.0 V) is selected from the **ANALOG OUTPUT** screen.

The output resistance is 1 to 2 kΩ.

Pin 3 The voltage is equal to that developed across the SRS. The SRS is driven by a regulated current source.

The output resistance is 10 kΩ.

Pin 4 The voltage is proportional to the DS3 heater current. The maximum heater power produces approximately 1.2 V.

The output resistance is 5 kΩ.

Pin 5 The voltage is related to the inverse exponential of the temperature. Table - lists the conductivity flow stream temperatures.

The output resistance is 1 kΩ.

°C	Volts	Slope (-mV/°C)
0	2.00	88
5	1.71	75
10	1.42	63
15	1.18	52
20	0.97	43
25	0.80	35
30	0.65	28
35	0.53	23
40	0.45	20
45	0.35	15
50	0.30	13

Table E-2. Conductivity Flow Stream Temperatures

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Pin 6	This pin is not used by the CD25.
Pin 7	This pin is not used by the CD25.
Pin 8	The signal is 10.00 ± 0.01 V. The output resistance is 0 W. The maximum load current capability is 10 mA. This output may be divided with a resistor network to provide an offset to a monitoring device. Shorting or overloading this output will disrupt operation of the SCR module.
Pin 9	This pin is not used by the CD25.
Pin 10	A signal ground (0 volts) for monitoring only. Avoid connecting this pin to any grounds or sources of AC or DC current. This ground may be used in common for any of the signals on pins 3 through 9.

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F.2 TTL/Relay Pinouts

The TTL and Relay connectors are on the DX-LAN/Relay card. The TTL and Relay connectors all have the same pinout configuration; be careful to use the correct connector.

Connector Number	Pin Number	Description
Relay 1	1 and 2	Solid State Relay Contacts Out
Relay 2	1 and 2	Solid State Relay Contacts Out
Relay 3	1	TTL Out (1 kΩ pull up to +5, 100 mA sink)
	2	Ground
Relay 4	1	TTL Out (1 kΩ pull up to +5, 100 mA sink)
	2	Ground
Relay 5	1	Input TTL 1
	2	Ground
Relay 6	1	Input TTL 2
	2	Ground
Relay 7	1	Input TTL 3
	2	Ground
Relay 8	1	Input TTL 4
	2	Ground

Table E-3. TTL/Relay Connector Pinouts

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F.3 DS3 Connector Pinouts—SCR

The DS3 Detection Stabilizer connects to the SCR card. The connector is a double-row, 1.6 cm (0.63 in) latching displacement connector.

Pin Number	Description
1	DS3 Ground (body)
2	+24 V
3	Base Drive
4	Emitter
5	Emitter
6	Thermistor Ground
7	Thermistor
8	Leak +5 V
9	Leak
10	Leak Ground
11	Disconnect
12	Disconnect Ground Sense

Table E-4. DS3 Connector Pinouts

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F.4 SRS Connector Pinouts—SCR

The SRS (Self-Regenerating Suppressor) connects to the SCR card. The connector is a double-row, 0.84 cm (0.33 in) latching displacement connector.

Pin Number	Description
1	Ground
2	Thermistor
3	SRS Positive
4	SRS Negative
5	Disconnect Sense
6	Disconnect (Ground)

Table E-5. SRS Connector Pinouts

F.5 Conductivity Cell Connector Pinouts—SP

The conductivity cell connects to the SP card. The connector is a single-row, shielded, latching displacement connector.

Pin Number	Description	Color (inside cable)
1	Cell Drive	Red COAX
2	Ground (Thermistor and Shield)	All COAX shields
3	Thermistor	Black COAX
4	Cell Return	Red COAX
5-8	Grounded (Plug Body Shield)	On receptacle only, not on plug

Table E-6. Conductivity Cell Connector Pinouts

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G • Reordering Information

Part Number	Item	Quantity
044130	DS3 Detection Stabilizer	1
044132	Shielded Cell	1
043276	Dionex Ferrule Fittings	1
043275	10-32 Fitting Bolts	1
042690	0.25-mm (0.010-in) ID Tubing (for cell outlet backpressure)	1
042627	Union (for connecting backpressure tubing to waste line)	1
045460	SRS Gas Separator Waste Tube	1
045877	Backpressure Coil for 4 mm SRS	1
046346	SRS Control Cable	1
042690	0.25-mm (0.010-in) ID Tubing (for DS3 or cell inlet connection)	1
043598	Twisted Black and Red Wires (for recorder/diagnostic and TTL/Relay connections)	1
921019	Green TTL Connector Plugs	1
954745	3.15 Amp Fuse (Fast-Blow IEC127, type 1)	2
960748	IEC Jumper Power Cord	1

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