

**Dionex AS-AP
Sample Conductivity and pH Accessory
Setup and Operation Guide**

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Sample Conductivity and pH Accessory Setup and Operation

This guide provides installation, configuration, and operation instructions for the Thermo Scientific Dionex™ AS-AP Sample Conductivity and pH Accessory.

The instructions in this guide assume that the Thermo Scientific Dionex AS-AP Autosampler is already installed and operational.

For autosampler installation and operation instructions, refer to the *Dionex AS-AP Operator's Manual* (Document No. 065361) provided on the Thermo Scientific Reference Library DVD (P/N 053891).

Contents

• Sample Conductivity and pH Accessory Description	2
• Configuration Requirements	3
• Installing the Accessory in the Dionex AS-AP	4
• Plumbing the Accessory	9
• Auxiliary Valve Operation	14
• Configuring the Accessory in Chromeleon	16
• Theory of Operation	20
• Creating an Instrument Method or Program	21
• Viewing the Conductivity and pH Data	28
• Calibrating the Accessory	40

1 Sample Conductivity and pH Accessory Description

The Dionex AS-AP Sample Conductivity and pH Accessory (P/N 074923) (see [Figure 1](#)) is an optional device that measures the conductivity and pH of a sample before it is sent to the injection valve. The accessory mounts in the upper-right corner of the Dionex AS-AP Autosampler (see [Figure 2](#)). It connects to Chromeleon with a USB cable built-into the Dionex AS-AP.



Figure 1. *Dionex AS-AP Sample Conductivity and pH Accessory*

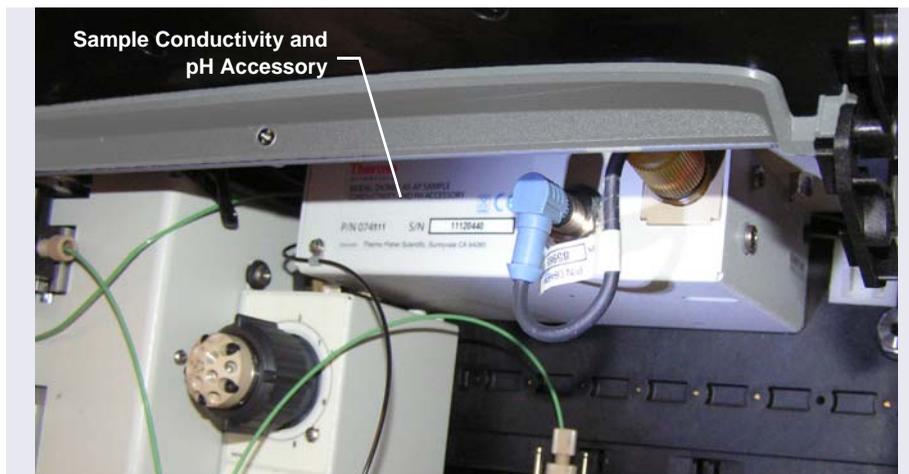


Figure 2. *Dionex AS-AP Front View with Sample Conductivity and pH Accessory*

2 Configuration Requirements

Valves

The accessory must be connected to the system's injection valve, which is typically installed in the system chromatography compartment (for example, a Dionex ICS-5000 DC or a Dionex ICS-2100). Alternatively, the injection valve can be installed in the Dionex AS-AP.

IMPORTANT

For Dionex AS-AP push mode configurations, a Dionex AS-AP auxiliary valve is also required. For auxiliary valve installation instructions, refer to the *Dionex AS-AP Operator's Manual* (Document No. 065361).

For pH measurement

- A 5000 μL syringe (P/N 074308) and 8500 μL buffer line (P/N 075520, revision 04 or higher), installed in the Dionex AS-AP.
- A pH electrode (P/N 075529), installed in the accessory. The pH electrode is provided with the accessory.

NOTE Check the label on the 8500 μL buffer line to verify that the revision number is 04 or higher. If it is not (or if there is no label), install a new buffer line. For installation instructions, refer to *Dionex AS-AP Autosampler Operator's Manual* (Document No. 065361).

For conductivity measurement only (no pH)

- A 1000 μL syringe (P/N 074307) can be installed, if preferred. Use either the standard 1200 μL buffer line (P/N 074989) or an 8500 μL buffer line (P/N 075520, revision 04 or higher) with the 1000 μL syringe.
- The pH electrode port plug with seal must be installed in the accessory.

Flush fluid

Always use flush fluid that has been degassed (either offline or online). For details, refer to the *Dionex AS-AP Autosampler Operator's Manual* (Document No. 065361).

Firmware and software

- Dionex AS-AP firmware (revision 1.10 or later).
- Thermo Scientific Dionex Chromeleon™ Chromatography Data System: either Chromeleon 7 (release 7.1 SR1 or later) or Chromeleon 6.8 (release 6.80 DU11c or later).

3 Installing the Accessory in the Dionex AS-AP

Item needed: Phillips head screwdriver

1. Press the main power switch on the Dionex AS-AP rear panel to turn off the Dionex AS-AP power.
2. Lift up the Dionex AS-AP front panel.
3. Locate the accessory mounting location on the underside of the Dionex AS-AP top cover (see [Figure 6](#)). Be careful to clear all tubing and cables from being trapped between the accessory and the mounting location. Use the two cable ties shown in [Figure 6](#) to keep tubing and cables out of the way.

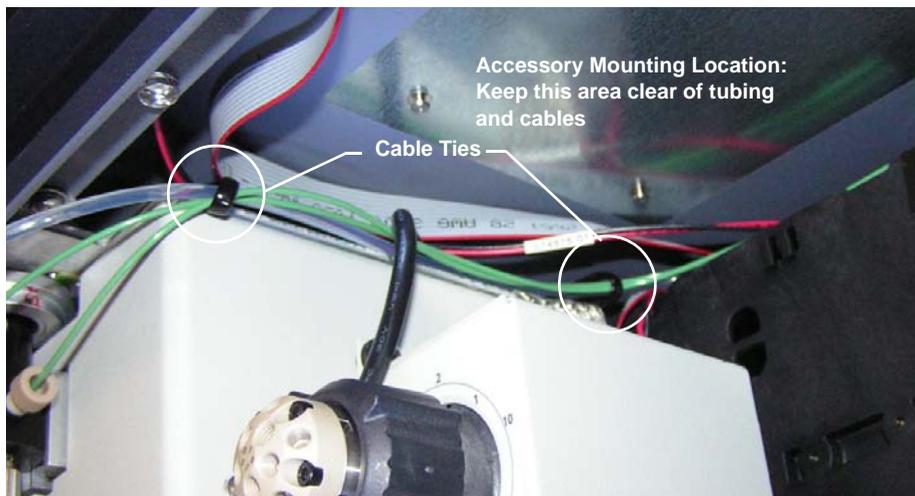


Figure 3. Underside of the Dionex AS-AP Top Cover

Sample Conductivity and pH Accessory Setup and Operation

4. Locate the USB cable for the Sample Conductivity and pH Accessory inside the Dionex AS-AP in the upper-left back corner (see [Figure 4](#)).

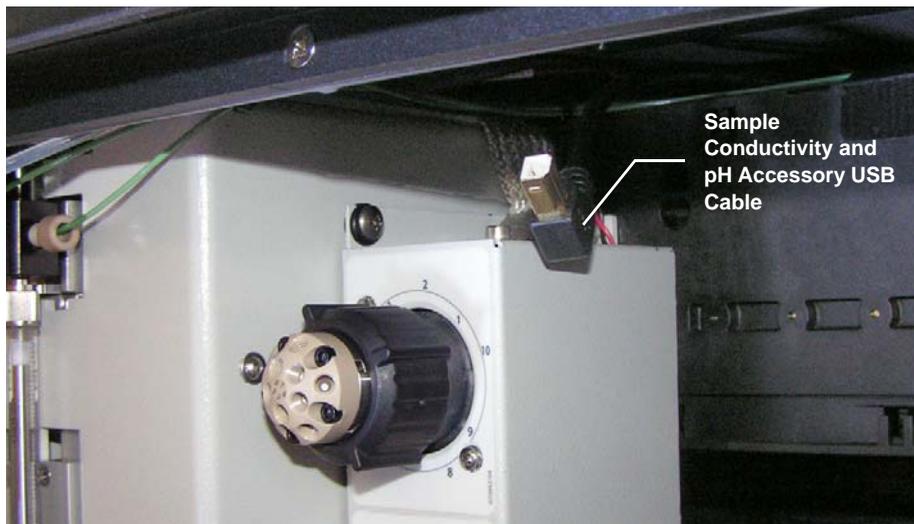


Figure 4. Left Side of Dionex AS-AP Compartment
(Dionex AS-AP with Optional High-Pressure Valve Shown)

5. Pull out the cable slightly and plug the cable into the USB connector on the left side of the accessory (see [Figure 5](#)).

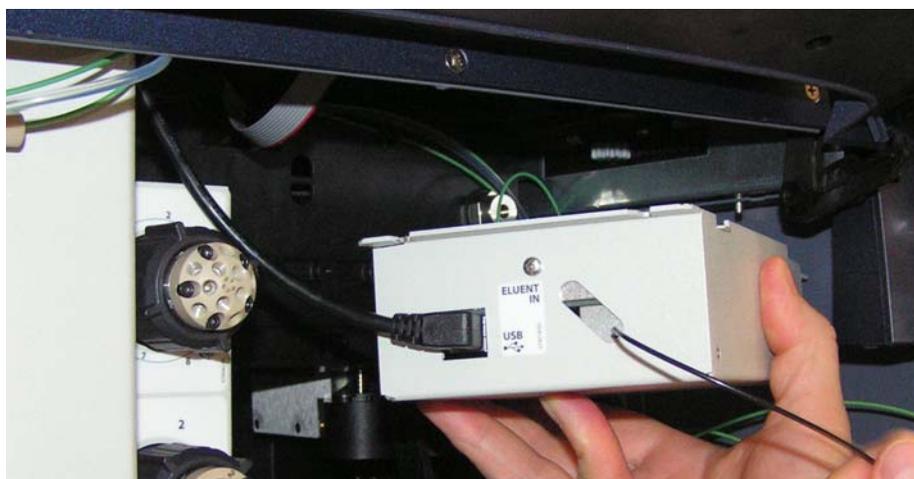


Figure 5. Sample Conductivity and pH Accessory USB Cable Connected

Sample Conductivity and pH Accessory Setup and Operation

6. Locate the two mounting pins on the underside of the Dionex AS-AP top cover, on the left side (see [Figure 6](#)). Also locate the screw hole on the underside of the top cover, on the right side (not pictured).

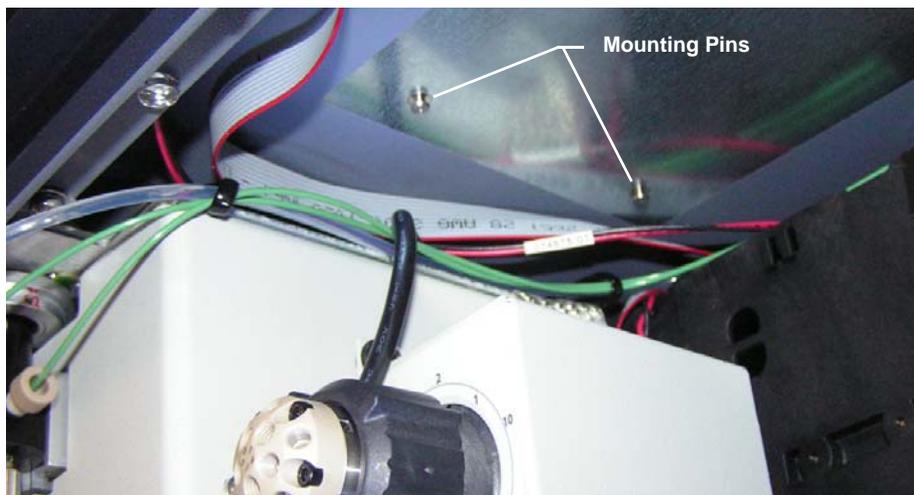


Figure 6. *Mounting Pins on Underside of Dionex AS-AP Top Cover*

7. Make sure the mounting location is clear of tubing and cables, and then position the accessory near the mounting location.

IMPORTANT

Loop the USB cable to the left of the accessory, so it is not caught behind the accessory during installation.

- Slide the slots on the top left side of the accessory over the mounting pins (see [Figure 7](#)).

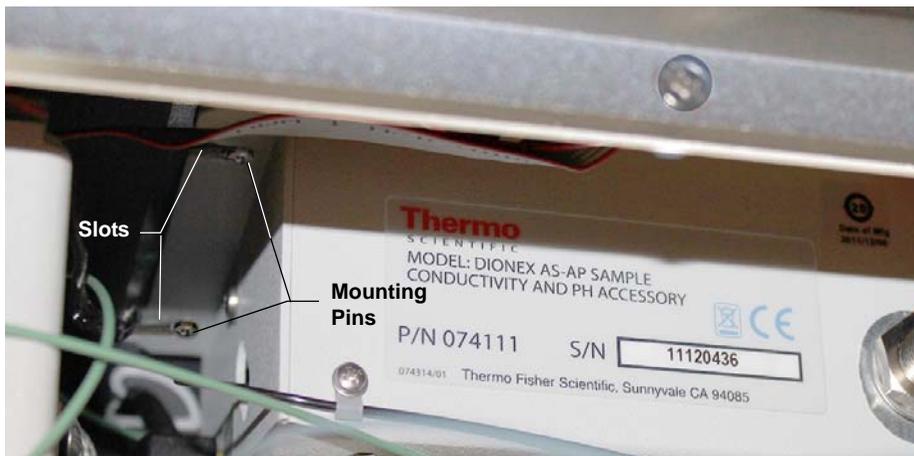


Figure 7. Mounting the Accessory to the Top Cover of the Dionex AS-AP (Left Side View)

- Using a Phillips head screwdriver, tighten the mounting screw on the right side of the accessory.



Figure 8. Accessory Mounting Screw (Right Side View)

3.1 Installing the pH Electrode (Optional)

If you will be measuring sample pH, follow the steps below to install the pH electrode.

1. Remove the plug from the pH electrode port (see [Figure 8](#)).
2. Make sure the plug's seal also comes out of the cell when you remove the plug (see [Figure 9](#)). Save the plug and seal and install them on the pH electrode's storage cap after you complete [Step 4](#) below.



Figure 9. pH Electrode Port Plug and Seal

NOTE Whenever you remove the pH electrode, reinstall the plug with seal in the port.

3. Remove the pH electrode (P/N 075529) from its box (see [Figure 10](#)).



Figure 10. Dionex AS-AP pH Electrode in Storage Cap

IMPORTANT

The Dionex AS-AP pH electrode is similar in appearance to the Dionex ICS-5000 ED reference electrode. However, these two electrodes are not interchangeable. Before continuing, check the label on the electrode to verify that you have the correct type.

Sample Conductivity and pH Accessory Setup and Operation

4. Hold the electrode vertically, with the cable up and the storage cap down to prevent spilling the storage fluid in the cap. Unscrew the storage cap from the electrode. Be careful not to spill the contents.
5. Install the plug and seal that were removed from the pH electrode port ([Step 1](#) above) on the storage cap. This prevents the storage solution in the cap from evaporating. Save the storage cap and plug.

IMPORTANT

Always store the pH electrode in the storage cap filled with saturated KCl solution when the cell is not in use. This prevents the pH electrode membrane from drying out and damaging the electrode.

6. Rinse the pH electrode thoroughly in ASTM Type I (18 megohm-cm) filtered and deionized water to remove any precipitated salt.
7. Hold the electrode at an upward slant (the cable end should be at a 15 degree angle up from horizontal) and screw the pH electrode into the port. Plug in the electrode cable (see [Figure 11](#)).

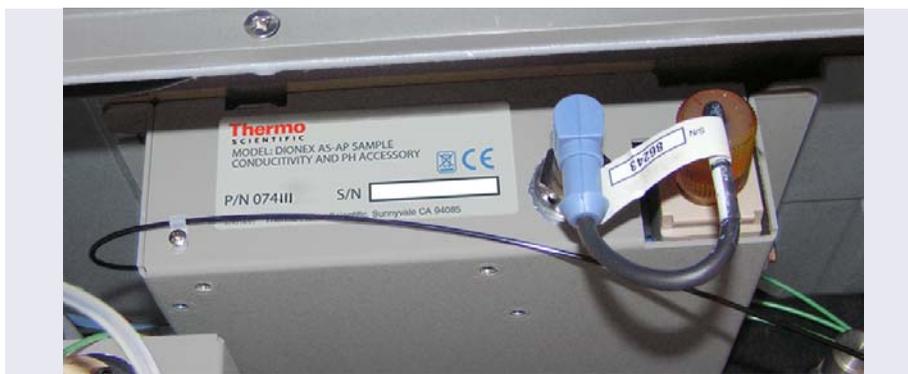


Figure 11. Accessory with pH Electrode Installed

4 Plumbing the Accessory

NOTE Use high-pressure (blue) 10-32 fitting bolts (P/N 074449) and high-pressure (blue) 10-32 double-cone ferrules (P/N 074373) for all connections.

1. Remove the red cap from the end of the line exiting the **ELUENT OUT** port on the upper right side of the accessory. Route this line to the right side of

Sample Conductivity and pH Accessory Setup and Operation

the Dionex AS-AP and secure it with the flexible tubing tie in the upper-right corner of the autosampler (see [Figure 12](#)).

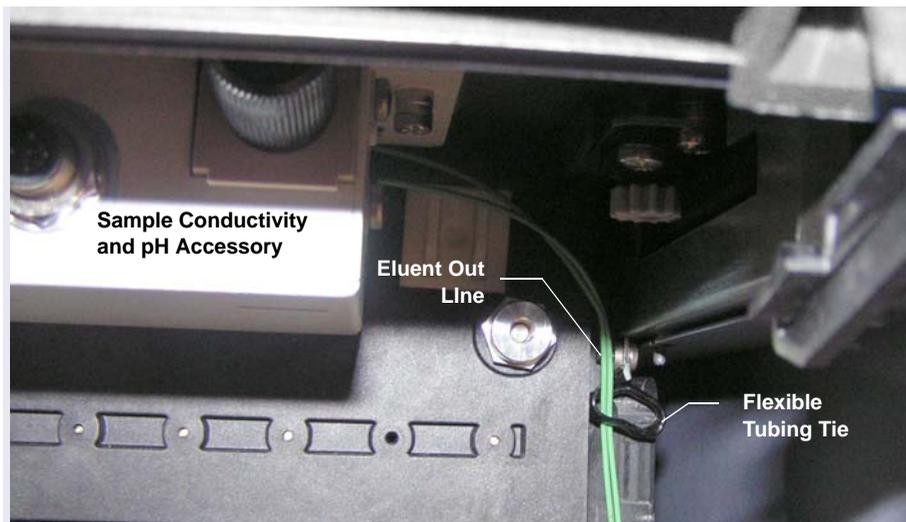


Figure 12. Eluent Out Line and Tubing Tie in Upper-Right Corner Inside the Dionex AS-AP

2. Continue routing the line to the Dionex AS-AP waste port and insert the line into one of the round openings in the waste port (see [Figure 13](#)).

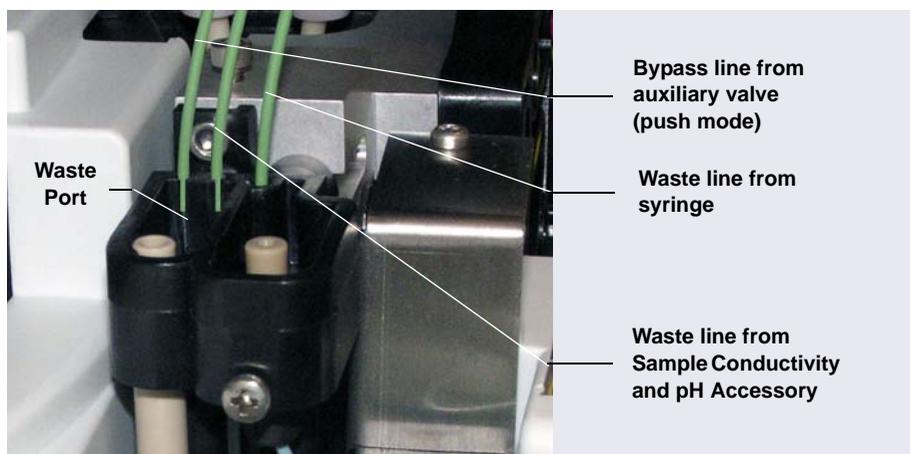


Figure 13. Sample Conductivity and pH Accessory Waste Line Installed in Waste Port

For Push Mode Injections

NOTE For push mode injections, the accessory must be connected to a Dionex AS-AP auxiliary valve. A 6-port valve, installed in the top position on the valve mounting bracket, is typically used. A 10-port valve can be used as an alternative.

1. Remove the injection valve waste line from the Dionex AS-AP waste port and connect the line to port 2 on the auxiliary valve (see [Figure 14](#)).

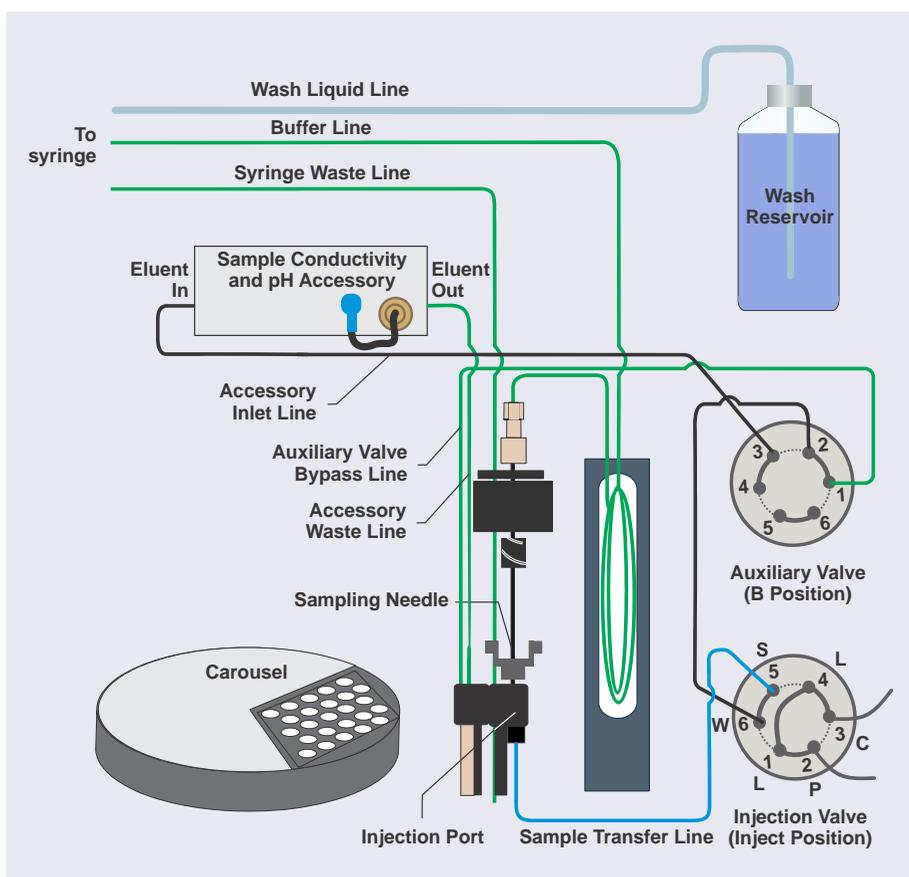


Figure 14. Dionex AS-AP Plumbing Schematic for Push Mode with a Sample Conductivity and pH Accessory

Sample Conductivity and pH Accessory Setup and Operation

2. Remove the union on the **ELUENT IN** line of the accessory and connect the line to port **3** on the auxiliary valve. Save the union for possible future use.
3. Cut a length of 0.75 mm (0.030 in) ID green PEEK™ tubing (P/N 044777) long enough to connect between the auxiliary valve and the Dionex AS-AP waste port. Connect one end of the tubing to port **1** on the auxiliary valve.
4. Route the other end to the Dionex AS-AP waste port and insert the line into the unused round opening in the waste port. To ensure the line does not interfere with needle arm movement, secure the excess tubing with the flexible tubing ties in the slotted compartment next to the needle and in the upper right corner of the autosampler.

For Pull Mode Injections

NOTE An auxiliary valve is not required for pull mode injections.

A length of 0.33 mm (0.013 in) ID blue PEEK tubing is connected to the Dionex AS-AP injection port. Connect the open end of this line to the union on the **ELUENT IN** line of the accessory (see [Figure 15](#)).

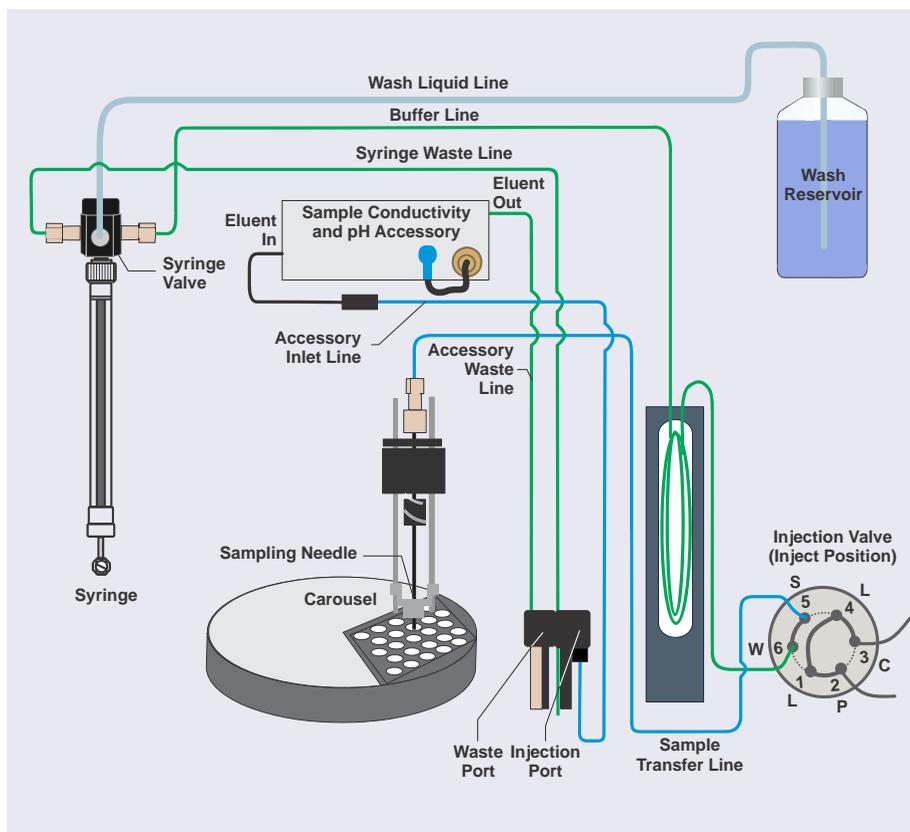


Figure 15. Dionex AS-AP Plumbing Schematic for Pull Mode with a Sample Conductivity and pH Accessory

5 Auxiliary Valve Operation

When the Sample Conductivity and pH Accessory is plumbed for push mode injections, the auxiliary valve directs sample to either the inlet port of the accessory or to waste, depending on the selected valve operating position.

Flow schematics for each auxiliary valve operating position are shown below. For the 6-port valve, see [Figure 16](#). For the 10-port valve, see [Figure 17](#).

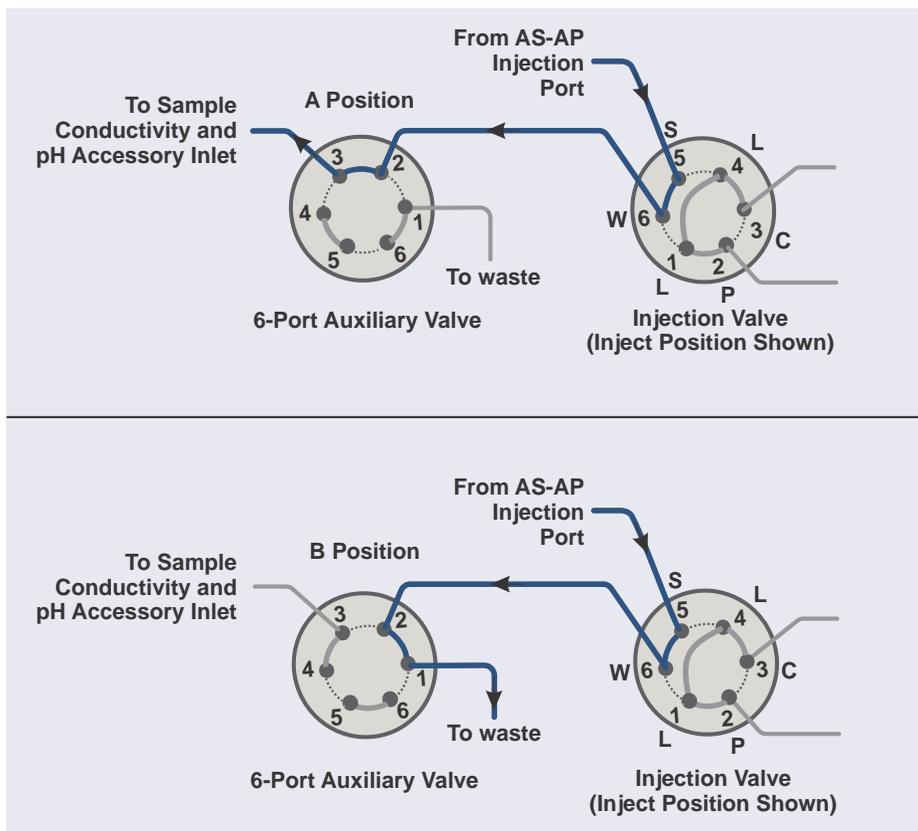


Figure 16. 6-Port Auxiliary Valve Flow Schematics for the Sample Conductivity and pH Accessory

Sample Conductivity and pH Accessory Setup and Operation

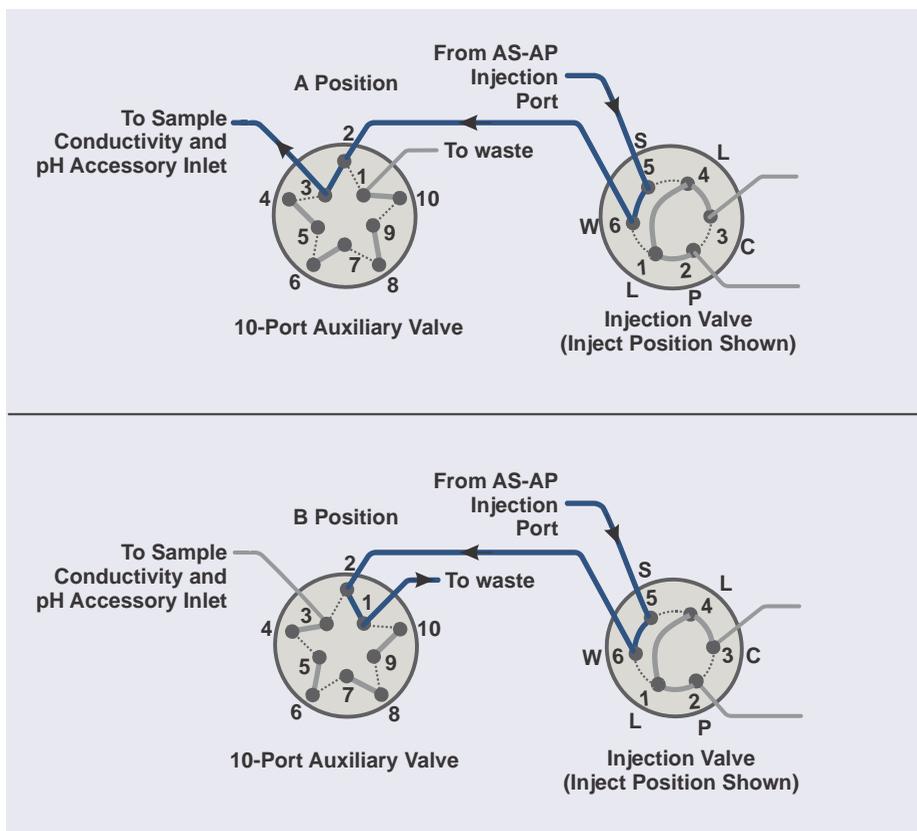


Figure 17. 10-Port Auxiliary Valve Flow Schematics for the Sample Conductivity and pH Accessory

- When the auxiliary valve is in the A position, the valve directs sample to the inlet port of the Sample Conductivity and pH Accessory. The A position is selected when the conductivity and pH is being measured.
- When the auxiliary valve is in the B position, the valve directs sample to waste. The B position is selected when the Dionex AS-AP is loading the sample loop and injecting the sample onto the column.
- The Dionex AS-AP controls the auxiliary valve automatically when the accessory is configured in the Chromeleon instrument or timebase (see [Section 6](#)) and the **Measure Sample Conductivity** and/or **Measure Sample pH** options are selected in the Instrument Method Wizard or Program Wizard (see [Section 8.2](#)).

6 Configuring the Accessory in Chromeleon

Before you begin, make sure the following items have been completed:

- Install the Chromeleon software and license.
- Install the Dionex AS-AP device driver.
- Configure the Dionex AS-AP in Chromeleon.

For instructions, refer to the *Dionex AS-AP Autosampler Operator's Manual* (Document No. 065361).

To configure the accessory in Chromeleon:

1. Press the main power switch on the Dionex AS-AP rear panel to turn on the power.
2. Windows[®] automatically detects the new USB device. Depending on the Windows version, Windows either automatically installs the device driver or it launches the Found New Hardware Wizard. Complete the wizard (if it appears) by selecting the following options:
 - If asked whether Windows can connect to Windows Update to search for software, select **No, not this time**.
 - Accept the default option (**Install the software automatically**) and click **Next >**. It is not necessary to insert a hardware installation disk.
3. Start the Chromeleon 7 Instrument Configuration Manager or Chromeleon 6.8 Server Configuration program.
4. Right click the name of the instrument or timebase that includes the Dionex AS-AP and click **Add Device**.

5. Select the Sample Conductivity and pH Accessory in the list of devices (see [Figure 18](#)) and click **OK**.

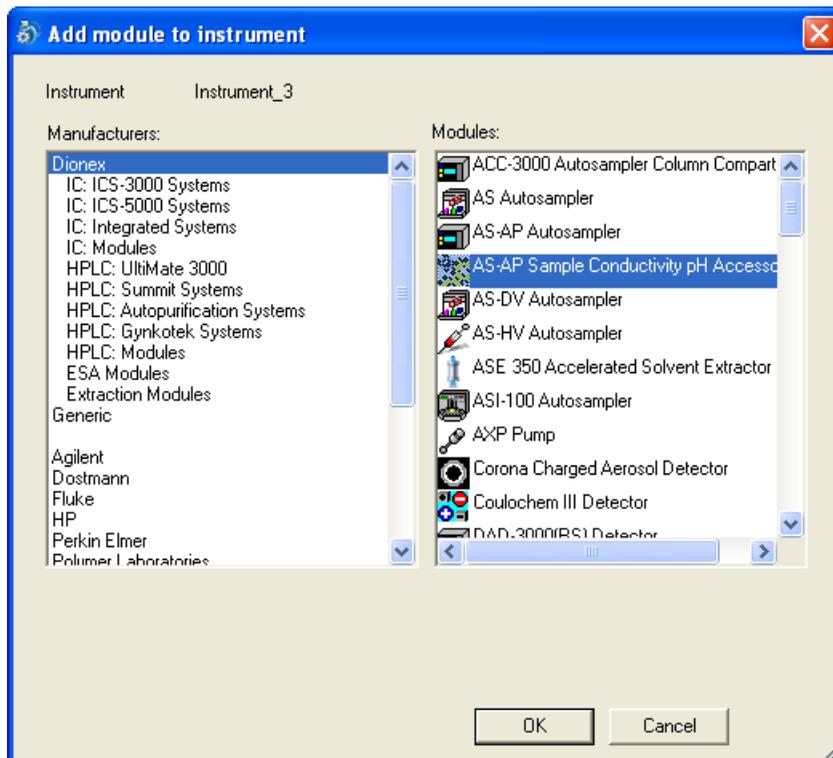


Figure 18. Add the Sample Conductivity and pH Accessory to the Timebase

6. The **General** page of the device configuration properties opens. Under **Mode**, select the **Module Serial No.** and click **OK**.
7. In the instrument or timebase, double-click the Dionex AS-AP device name to open the device configuration properties. Click the **Segments / Pump Link** tab.

- Under **Monitor Link**, select **pH Conductivity**.

NOTE For data acquisition to occur, the accessory must be linked to the instrument or timebase.

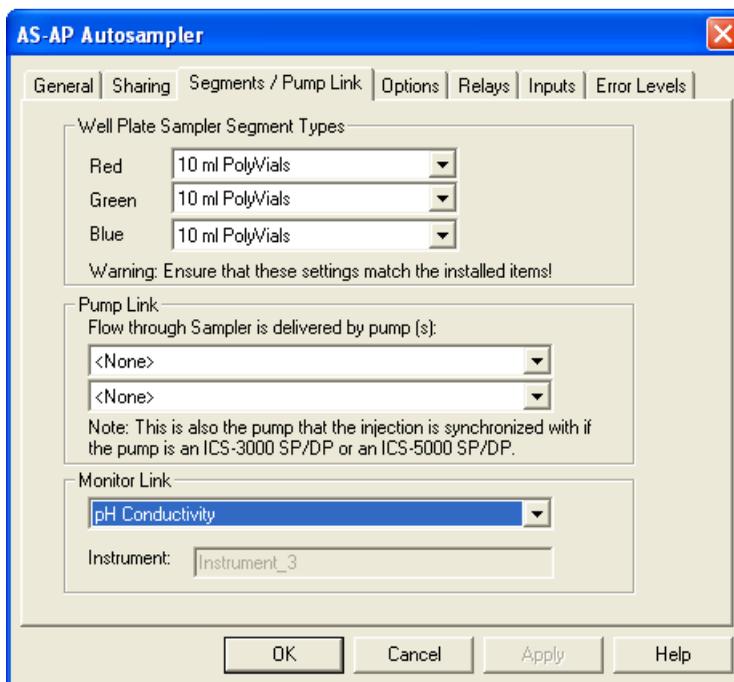


Figure 19. Link the Sample Conductivity and pH Accessory to the Dionex AS-AP

- Click the **Options** tab and select the options installed in the Dionex AS-AP.

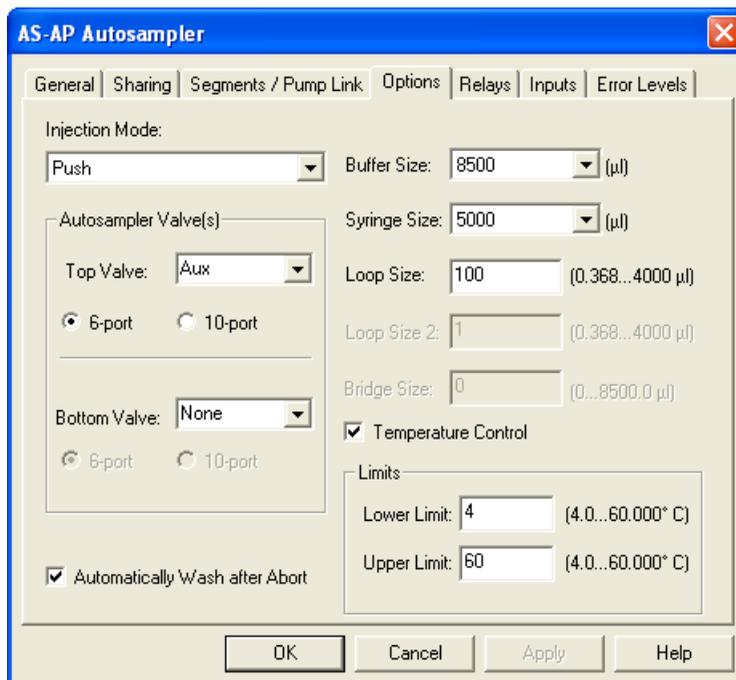


Figure 20. Select Options for the Sample Conductivity and pH Accessory

- If an auxiliary valve is installed in the Dionex AS-AP, select **Aux** in the **Top Valve** (or **Bottom Valve**) list under **Autosampler Valve(s)** and click the button for the number of valve ports.

NOTE An auxiliary valve is required for push mode injections, but not required for pull mode injections.

- If the injection valve is installed in the Dionex AS-AP, select **Inject** in the **Bottom Valve** (or **Top Valve**) list.
- In the **Buffer Size** list, select the size of the installed buffer line (either **1200** or **8500**). An 8500 μL buffer size is required for pH measurement.

- In the **Syringe Size** list, select the size of the installed syringe (either **1000** or **5000**). A 5000 μL syringe is required for pH measurement.
10. Click **OK**.
 11. On the **File** menu, click **Save Installation** and then close the program.

NOTE If you will be measuring sample pH, calibrate the accessory before beginning routine operation. For instructions, see [Section 9.3](#).

7 Theory of Operation

Before injecting a sample onto the column, the autosampler dispenses a portion of sample to the injection port and sends it to the Dionex AS-AP auxiliary valve. The valve directs the sample portion to the Sample Conductivity and pH Accessory. The accessory measures the conductivity and/or the pH of the sample and Chromeleon records the values in the Audit Trail. The Audit Trail values can be viewed on an ePanel or Control panel, included in reports, and displayed in sequence report columns (Chromeleon 6.8 only).

If the Chromeleon 7 instrument method or Chromeleon 6.8 program does not specify any conditional actions (described below), the autosampler needle then returns to the sample vial and performs the injection as specified in the instrument method or program.

The instrument method or program can include conditional actions to be performed if the conductivity or pH falls outside a specified range. The conditional actions are:

- Skip the current sample
- Perform custom commands entered into the current program
- Chromeleon 6.8 only: Process the current sample with a different program. For example, run a partial-loop injection.

8 Creating an Instrument Method or Program

To create an instrument method or program for the Sample Conductivity and pH Accessory, the accessory must be configured in the same instrument or timebase as the Dionex AS-AP and the accessory must be linked to the Dionex AS-AP (see [Section 6](#)).

8.1 Selecting Wash Volumes and Syringe Speeds

The Chromeleon 7 Instrument Method Wizard or Chromeleon 6.8 Program Wizard includes a page for setting autosampler wash volume and syringe speed parameters (see [Figure 21](#)). The default values on the page change, depending on the configuration of the Dionex AS-AP. When using the Sample Conductivity and pH Accessory, the parameters should be set to within the recommended ranges given in [Table 1](#).

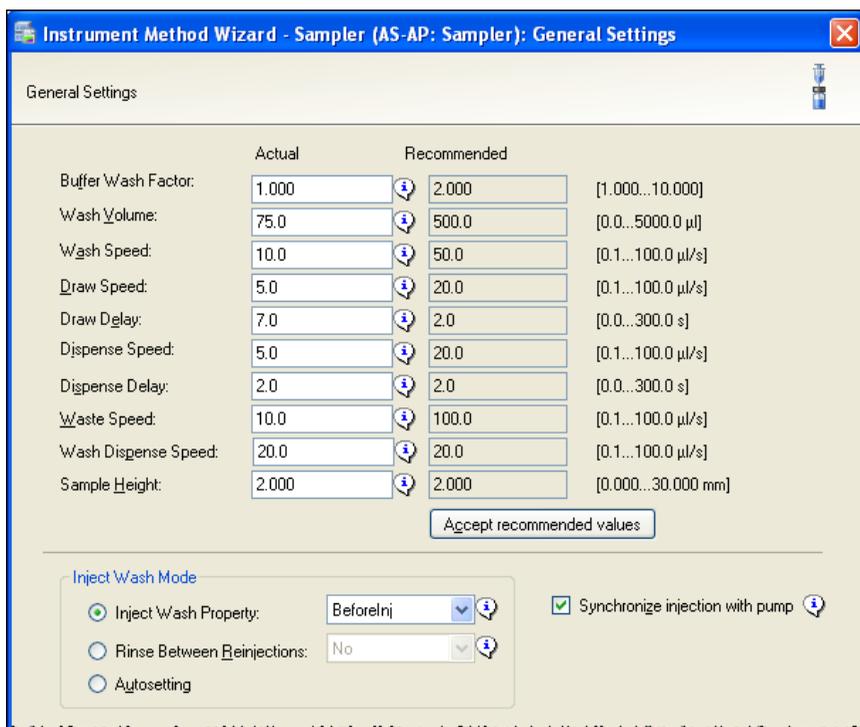


Figure 21. Chromeleon 7 Instrument Method Wizard: Sampler Settings for Wash Volumes and Syringe Speeds

Sample Conductivity and pH Accessory Setup and Operation

Parameter	Description	Recommended Values for Shortest Run Time	Recommended Values for Best Precision
Buffer Wash Factor	After an injection or delivery of sample to the accessory, the buffer tube, needle ID, injection port, transfer tubing, and accessory cells are washed by a volume equal to the amount of sample that entered the buffer tube * the BufferWashFactor. A smaller value decreases the run time.	1.0	1.5
Wash Volume	Sets the volume used to wash the outside of the needle. A smaller volume decreases the run time.	250 µL	1000 µL
Draw Speed	Sets the syringe speed when drawing sample from the vial for the accessory as well as any other injection process. A faster speed decreases the run time, but may cause cavitation, depending on sample viscosity.	20 µL/s	15 µL/s
Draw Delay	Sets the delay after drawing fluid before the next operation.	2 sec	10 sec
Dispense Speed	Sets the syringe speed when dispensing sample to the injection port for the accessory as well as any other injection process. A faster speed decreases the run time.	25 µL/s	8.3 µL/s
Dispense Delay	Sets the delay after dispensing fluid before the next operation.	2 sec	10 sec

Table 1. Recommended Autosampler Wash Volumes and Syringe Speeds for the Sample Conductivity and pH Accessory

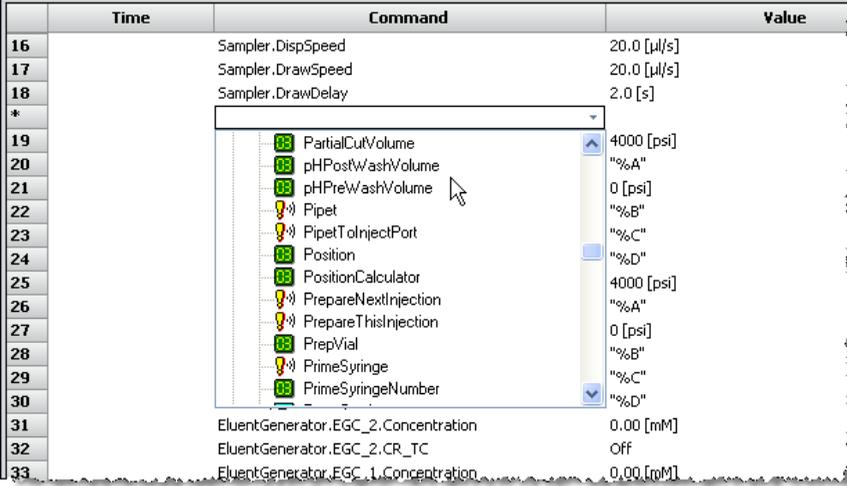
Sample Conductivity and pH Accessory Setup and Operation

Parameter	Description	Recom- mended Val- ues for Shortest Run Time	Recom- mended Val- ues for Best Precision
pHPreWashVolume	Sets the volume used to wash the buffer tubing, injection port, and tubing up to the auxiliary valve, before delivering sample to the accessory. The default value for this parameter is 500 μL . To change the volume, this parameter must be added to the instrument method or program manually. For instructions, see page 24 (Chromeleon 7) or page 25 (Chromeleon 6.8). A smaller volume decreases the run time.	200 μL	800 μL
pHPostWashVolume	Sets the volume used to wash the buffer tubing and ID of the needle after delivery of sample to the accessory. The default value for this parameter is 1000 μL . To change this volume, this parameter must be added to the instrument method or program manually. For instructions, see page 24 (Chromeleon 7) or page 25 (Chromeleon 6.8). A smaller volume decreases the run time	500 μL	2000 μL
Pipet To Inject Port Volume	Sets the volume of sample drawn from the sample vial for delivery to the accessory. The volume actually delivered is 30% less than the volume drawn to avoid laminar flow mixing effects. Enter this volume on the Sample Conductivity and pH Accessory options page of the Instrument Method Wizard or Program Wizard (see Section 8.2).	1500 μL	2000 μL
Resulting Run Time		76.8 min	14.2 min

Table 1. Recommended Autosampler Wash Volumes and Syringe Speeds for the Sample Conductivity and pH Accessory (Continued)

To manually add a parameter to a Chromeleon 7 instrument method

1. After completing the wizard, display the instrument method in the Script Editor. Place the cursor below the last sampler parameter in the Instrument Setup section and insert a new command.
2. Type the name of the new parameter (**pHPostWashVolume** or **pHPreWashVolume**) or select the name from the drop-down list (see [Figure 22](#)). Press **Enter** and then enter a value for the parameter.



Time	Command	Value
16	Sampler.DispSpeed	20.0 [µl/s]
17	Sampler.DrawSpeed	20.0 [µl/s]
18	Sampler.DrawDelay	2.0 [s]
*		
19	PartialCutVolume	4000 [psi]
20	pHPostWashVolume	"%A"
21	pHPreWashVolume	0 [psi]
22	Pipet	"%B"
23	PipetTolInjectPort	"%C"
24	Position	"%D"
25	PositionCalculator	4000 [psi]
26	PrepareNextInjection	"%A"
27	PrepareThisInjection	0 [psi]
28	PrepVial	"%B"
29	PrimeSyringe	"%C"
30	PrimeSyringeNumber	"%D"
31	EluentGenerator.EGC_2.Concentration	0.00 [mM]
32	EluentGenerator.EGC_2.CR_TC	Off
33	EluentGenerator.EGC_1.Concentration	0.00 [mM]

Figure 22. Chromeleon 7 Instrument Method Script Editor: Command and Parameter List

To manually add a parameter to a Chromeleon 6.8 program

1. After completing the wizard, display the list of commands and parameters in the program. Place the cursor on an empty line below the **InjectWash** parameter and press **F8**.
2. In the **Commands** dialog box, under **Sampler**, select **pHPostWashVolume** or **pHPreWashVolume**, enter a volume, and click **OK**. The new parameter is added to the program (see [Figure 23](#)).

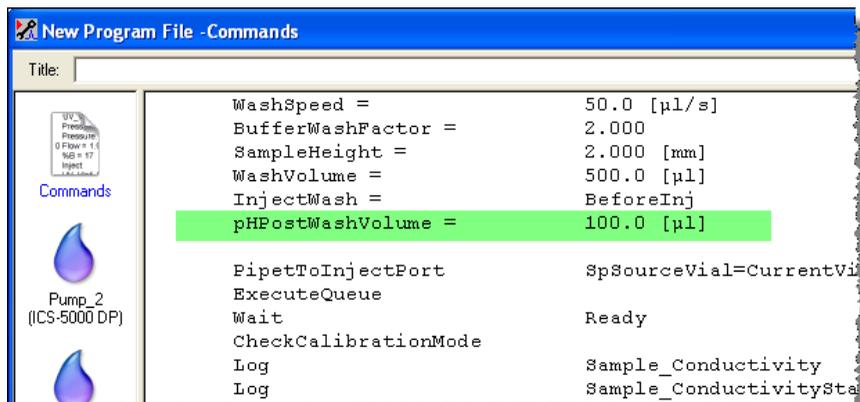


Figure 23. Chromeleon 6.8 Program: pHPostWashVolume Parameter Added to the Program

8.2 Selecting Accessory Functions

The Chromeleon 7 Instrument Method Wizard or Chromeleon 6.8 Program Wizard includes a page for specifying Sample Conductivity and pH Accessory functions (see [Figure 24](#)).

The screenshot shows the 'Program Wizard: Sampler Options' dialog box. The 'Operation' dropdown is set to 'Measure pH and/or Conductivity'. The 'Measure sample Conductivity' and 'Measure sample pH' checkboxes are checked. The 'Volume to use' is set to 2000.0 µl. The 'Use conditionals based on measurement results' checkbox is checked, and the 'Skip current sample and move to next sample' radio button is selected. The 'Conductivity' section has 'Use' checked, with 'Min' at 0 and 'Max' at 30000. The 'pH' section has 'Use' checked, with 'Min' at 0 and 'Max' at 14. Navigation buttons '< Back', 'Next >', 'Cancel', and 'Help' are at the bottom.

Figure 24. Chromeleon 6.8 Program Wizard: Sampler Options for the Sample Conductivity and pH Accessory

To enable sending sample to the accessory

1. In the **Operations** list, select **Measure pH and/or Conductivity**.
2. Select the check box for each type of measurement to be performed and then enter the **Volume to use** (the volume of sample to send to the accessory).

Sample Conductivity and pH Accessory Setup and Operation

To compensate for dilution that occurs when the sample initially enters the tubing, the autosampler draws 30% more than the volume specified, but only dispenses 30% less than the amount specified.

The volume entered in the **Volume to use** box is the **Pipet To Inject Port Volume** described in [Table 1](#). When sample conductivity or pH measurement is enabled, the wizard automatically adds the command and volume to the instrument method or program (see the example below).

	Time	Command	Value
54		DP.Pump_2. %C.Value	0.0
55		DP.Pump_2. %D.Value	0.0
56		DP.Pump_2.Curve	5
57		Sampler.PipetToInjectPort	CurrentVial, 2000.0
58		Sampler.ExecuteQueue	
59		Wait	Sampler.Ready
60		Cond_pH.Cond_pH_Calibration.CheckCalibrationMode	
61		Log	Sample_Conductivity
62		Log	Sample_ConductivityStability
63		Log	Sample_pH
64		Log	Sample_pHStability
65		Sampler.Wash	
66		Wait	Sampler.Ready
67	0.000	Inject	
68		Wait	Sampler.CycleTimeState, Hold,
69		Sampler.Inject	

To enable conditional actions

Select the **Use conditionals based on measurement results** check box and select the preferred option.

To define the limits for triggering a conditional action

Select the **Use** check box for **Conductivity** and/or **pH** and then enter the minimum and maximum limits. If a conductivity or pH reading falls outside of the entered limits, the conditional action is performed.

Note Regarding Blank Run Injections

If an instrument method or program that includes the Sample Conductivity and pH Accessory is used in a blank run, Chromeleon does not execute the **Inject** command. This means that other injection-related commands in the instrument method or program are ignored, including the **Inject Wash Mode**

parameters. In a blank run, the sample that is not flushed from the system can cause contamination.

To prevent contamination, add a manual wash operation before the **Inject** command in the instrument method or program to be used for the blank run. Add a **Sampler.Wash** command and a **Wait Sample.Ready** command as shown in the example below:

	Time	Command	Value
50		DP.Pump_1.%C.Value	0.0
51		DP.Pump_1.%D.Value	0.0
52		DP.Pump_1.Curve	5
53		DP.Pump_2.%B.Value	0.0
54		DP.Pump_2.%C.Value	0.0
55		DP.Pump_2.%D.Value	0.0
56		DP.Pump_2.Curve	5
57		Sampler.Wash	
58		Wait	Sampler.Ready
59	0.000	Inject	
60		Wait	Sampler.CycleTimeState, Hold, Timeout-
61		Sampler.Inject	
62	0.000	Start Run	
63		DP.Pump_1.Pump_1_Pressure.AcqOn	
64		DP.Pump_2.Pump_2_Pressure.AcqOn	

Figure 25. Example Sampler.Wash Commands for a Blank Run Injection

9 Viewing the Conductivity and pH Data

For each injection in which **Measure pH and/or Conductivity** is enabled in the instrument method or program (see [Section 8](#)), the Sample Conductivity and pH Accessory measures the conductivity and/or pH of the sample and logs the values in the Chromeleon Audit Trail. In addition, you can:

- View the data on an ePanel in Chromeleon 7 or a Control panel in Chromeleon 6.8
- Include the data in a report
- Chromeleon 6.8 only: Display the data in a sequence

9.1 Viewing Conductivity and pH Readings on an ePanel or Control Panel

To view conductivity and pH readings in Chromeleon 7

1. On the Chromeleon 7 ePanel Set, click the **Sampler** tab.
2. On the **Sampler** ePanel, click the **Conductivity/pH** button (see [Figure 26](#)).

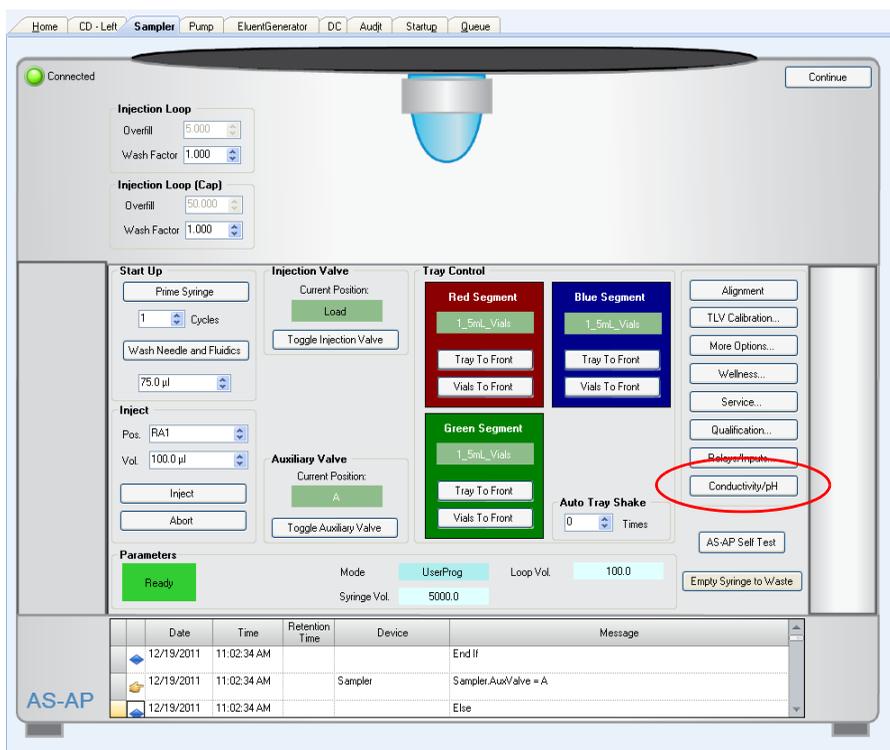


Figure 26. Example Chromeleon 7 ePanel Set: Dionex AS-AP ePanel

Sample Conductivity and pH Accessory Setup and Operation

The conductivity and pH readings are displayed on the **AS-AP Conductivity/pH ePanel** (see [Figure 27](#)).

AS-AP Conductivity/pH

Conductivity / pH Calibration: AS-AP

Instrument: Instrument_3

Connected

Conductivity

Value	3.1 µS/cm
Cell Status	Working
Cell Constant	149.98
Temperature Compensation	1.7 % / °C

Conductivity Standard

Position: RA1

Reading: 1000 µS

Calibrate Conductivity

General

Temperature	25.0 °C
Temperature Sensor Status	Working

pH

Value	-4.54
pH Electrode Status	Connected

Flush Cell

Last pH 7 Calibration: 12/19/2011 9:38 AM

Offset: 0.00

Last pH 4 Calibration: 12/19/2011 9:38 AM

Slope 1: -59.16

Last pH 10 Calibration: 12/19/2011 9:38 AM

Slope 2: -59.16

Figure 27. Chromeleon 7 Conductivity/pH ePanel

To view conductivity and pH readings in Chromeleon 6.8

1. On the Chromeleon 6.8 panel tabset, click the **Autosampler** tab.
2. On the **Autosampler** Control panel, click the **Cond-pH Accessory** button (see [Figure 28](#)).

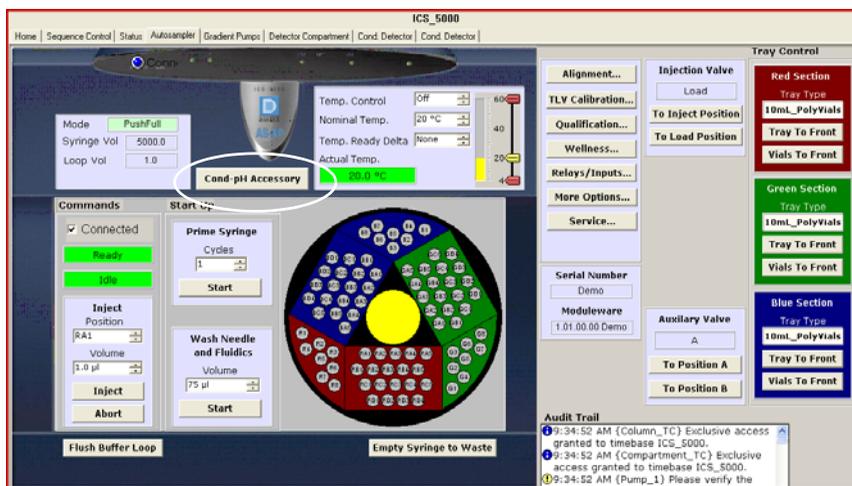


Figure 28. Example Chromeleon 6.8 Panel Tabset: Dionex AS-AP Control Panel

Sample Conductivity and pH Accessory Setup and Operation

The conductivity and pH readings are displayed on the **Conductivity/pH Values Control panel** (see [Figure 29](#)).

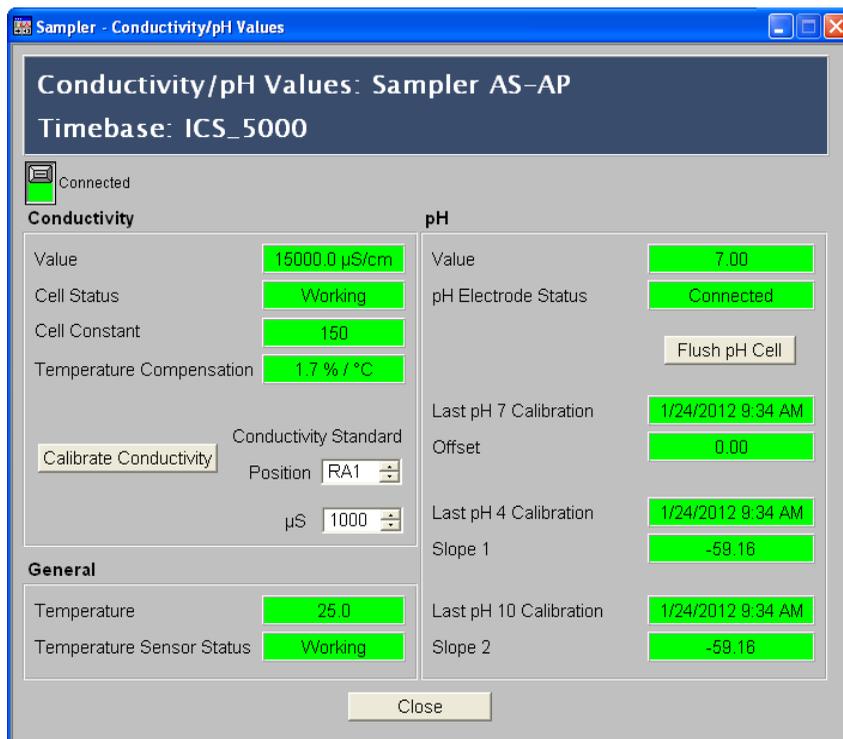


Figure 29. Chromeleon 6.8 Conductivity/pH Values Control Panel

9.2 Including Conductivity and pH Readings in Chromeleon Results Tables

Chromeleon provides several sample conductivity and pH report variables, which can be included in results tables. The variables are in the Audit Trail category.

Variable Name	Description
Sample_Conductivity	Reports the conductivity reading measured by the accessory.
Sample_pH	Reports the pH reading measured by the accessory.
Sample_Conductivity Stability	Reports whether the conductivity reading is stable. The reading is stable if the reading and the previous four data points collected every 2 seconds are within 1% of each other.
Sample_pH Stability	Reports whether the pH reading is stable. The reading is stable if the reading and the previous four data points are within 0.1 pH unit of each other.

Table 2. Sample Conductivity and pH Audit Trail Report Variables

To include readings in Chromeleon 7 results tables

1. In the Data Processing or Report Designer view, select an existing Results table (for example, a **Peak Summary** table) or insert a new table.
2. Add a new column for the sample conductivity or sample pH readings. In the **Add Report Column** dialog box, select the **Audit Trail** category and

Sample Conductivity and pH Accessory Setup and Operation

select the variable (for example, **Sample_Conductivity** or **Sample_pH**) (see [Figure 30](#)).

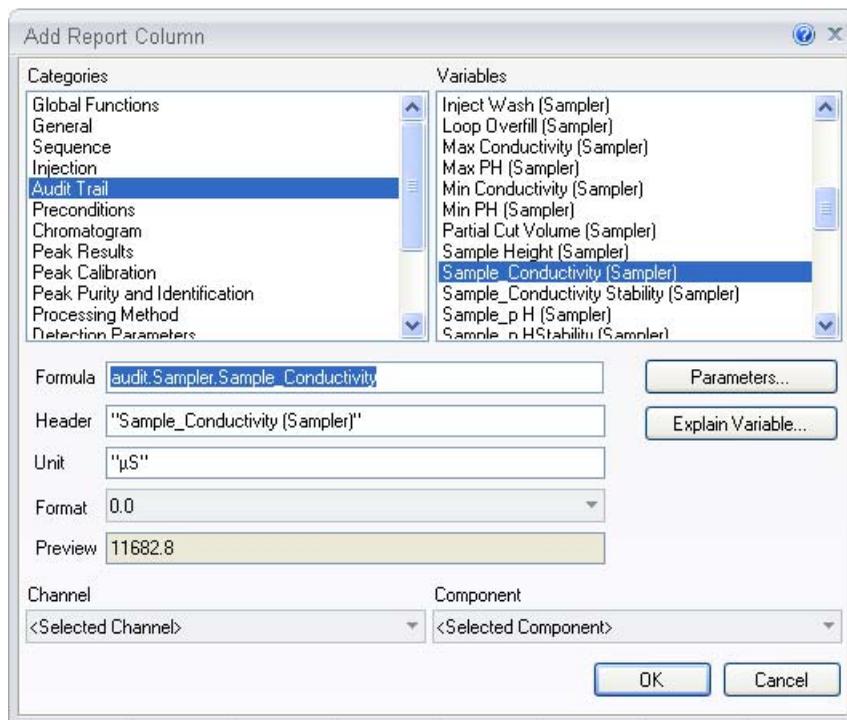


Figure 30. Sample Conductivity and pH Report Variables in Chromeleon 7

The table displays values for the selected variables for all completed injections. Interrupted injections (for example, if a vial was missing) do not appear in the results table.

To include readings in Chromeleon 6.8 results tables

1. In the report, open an existing Sample Results table (for example, a **Peak Summary** table) or insert a new table.
2. Add a new column for the sample conductivity or sample pH readings. In the **Add Report Column** dialog box, select the **Audit Trail** category and

select the **Sample_Conductivity** variable or the **Sample_pH** variable (see [Figure 31](#)).

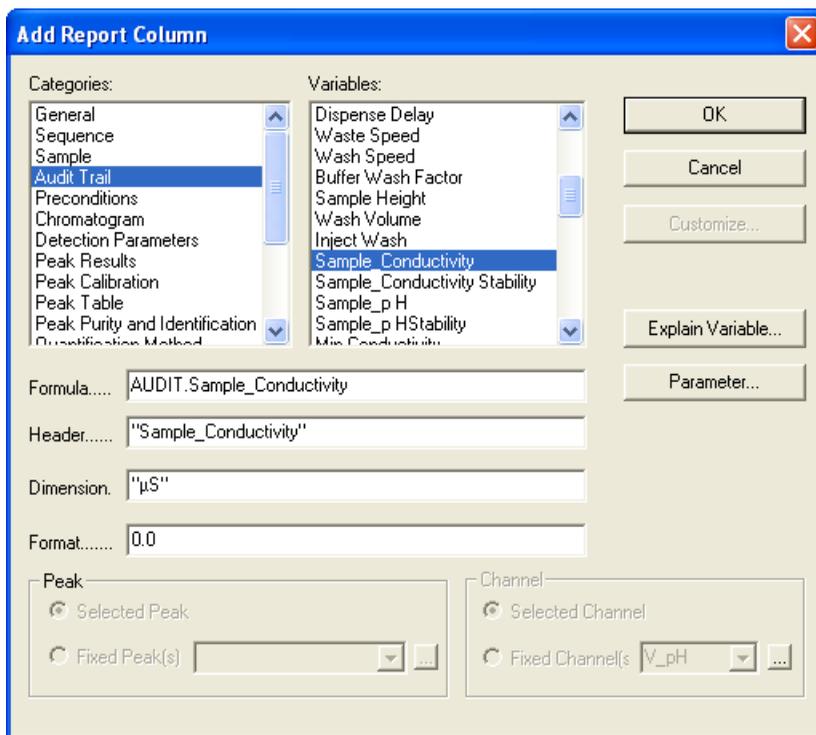


Figure 31. Sample Conductivity and pH Report Variables in Chromeleon 6.8

The table displays values for the selected variables for all completed injections. Interrupted injections (for example, if a vial was missing) do not appear in the results table.

NOTE A pre-defined report is available for reporting conductivity and pH results. The report (**Conductivity pH Summary Results.rdf**) is in the **Dionex Templates\Reports** folder. The report includes the conductivity and pH report variables described in [Table 2](#).

9.3 Including Conductivity and pH Readings in Chromeleon 6.8 Sequences

If you are using Chromeleon 6.8, you can add columns to a sequence table to display the conductivity and pH readings. Before adding the columns, run a sequence that includes injections in which the accessory measures the conductivity and/or pH of the sample. This creates the necessary Audit Trail variables, which can then be added to the sequence. It is also possible to manually add the variables without first running a sequence, if preferred.

To include readings in a Chromeleon 6.8 sequence

1. (Optional) Run a sequence that includes injections in which the accessory measures the conductivity and/or pH.
2. Open the sequence in the Chromeleon 6.8 Browser and right-click any of the column headings in the sequence table.
3. Select **Report Columns > New Report Column**.

4. In the **Create Sequence Report Column** dialog box, click the browse (...) button in the **Formula** row (see [Figure 32](#)).

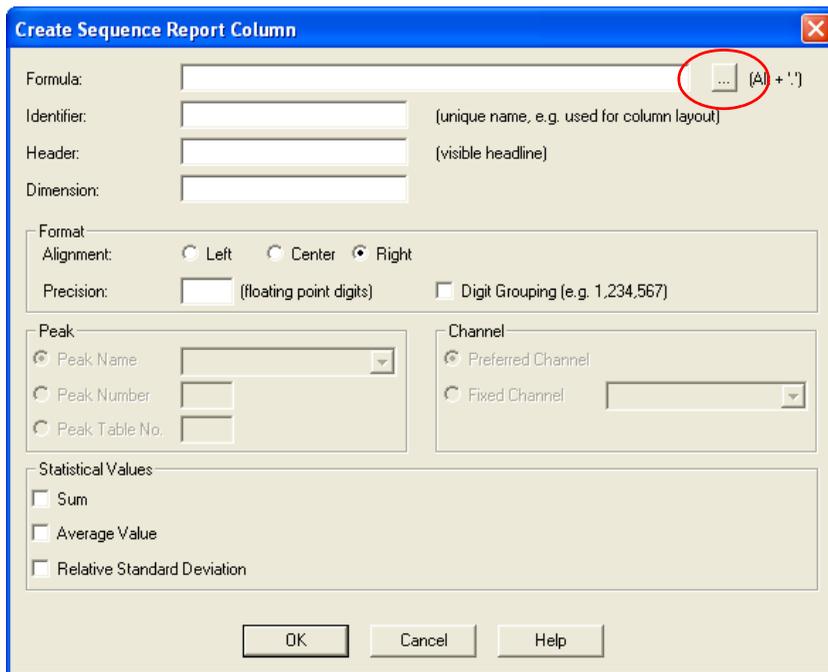


Figure 32. Chromeleon 6.8 Create Sequence Report Column Dialog Box

NOTE If you did not run a sequence to measure conductivity and/or pH first, type the variable information in the **Formula** box and enter additional column definition information (**Identifier**, **Header**, etc.). For an example, refer to [Figure 35](#).

- In the **Select Result Formula** dialog box, under **Categories**, select **Audit Trail**. Under **Variables**, select **Sample_Conductivity** or **Sample_pH** (see [Figure 33](#)).

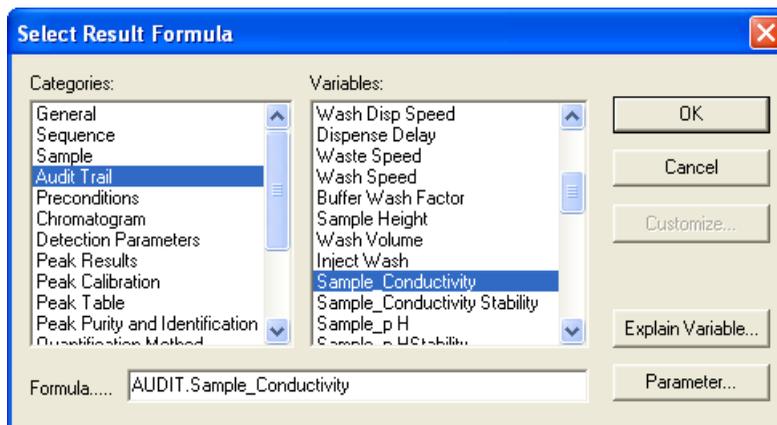


Figure 33. Chromeleon 6.8 Select Result Formula Dialog Box

- Click the **Parameter** button.
- In the **Parameter Input** dialog box, enter **0.000** in the **Retention Time** box and select **forward** in the **Search Direction** list.

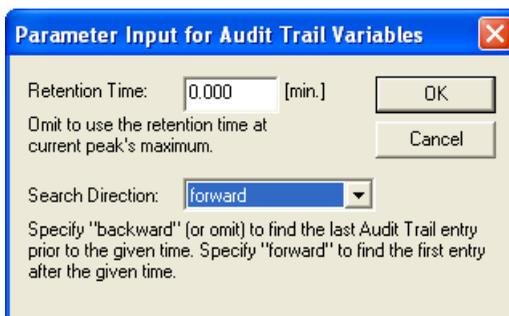


Figure 34. Chromeleon 6.8 Parameter Input Dialog Box

The **Create Sequence Report Column** dialog box now includes the Audit Trail variable that you added. Click **OK**.

Create Sequence Report Column

Formula: ... (Alt + ':')

Identifier: (unique name, e.g. used for column layout)

Header: (visible headline)

Dimension:

Format

Alignment: Left Center Right

Precision: (floating point digits) Digit Grouping (e.g. 1,234,567)

Peak

Peak Name

Peak Number

Peak Table No.

Channel

Preferred Channel

Fixed Channel

Statistical Values

Sum

Average Value

Relative Standard Deviation

OK Cancel Help

Figure 35. Chromeleon 6.8 Create Sequence Report Column Dialog Box with Sample Conductivity Variable Added

Sample Conductivity and pH Accessory Setup and Operation

The new column appears in the sequence table.

No.	Name	Pos.	Inj. Vol.	Status	Program	Method	Inj. Date/Time	Comment	Sample Conductivity [µS]	Sample_p H
2	Calibrate 7	RA1	25.0	Finished	Cal_Offset	NoInt	11/30/2011 5:09:49		n.a.	n.a.
3	Calibrate 4	RA2	25.0	Finished	Cal_Slope1	NoInt	11/30/2011 5:18:23		n.a.	n.a.
4	Calibrate 10 NK	RA3	25.0	Finished	Cal_Slope2	NoInt	11/30/2011 5:26:51		n.a.	n.a.
5	10 K	RA4	25.0	Finished	Measure_pH	NoInt	11/30/2011 5:44:53		11682.800	10.110
6	10 NK	RA5	25.0	Finished	Measure_pH	NoInt	11/30/2011 5:55:30		7485.800	9.910
7	9	RB1	25.0	Finished	Measure_pH	NoInt	11/30/2011 6:06:09		7059.900	9.010
8	9 K	RB2	25.0	Finished	Measure_pH	NoInt	11/30/2011 6:16:47		6455.600	9.060
9	9.18	RB3	25.0	Finished	Measure_pH	NoInt	11/30/2011 6:27:25		1481.700	9.120
10	8	RB4	25.0	Finished	Measure_pH	NoInt	11/30/2011 6:38:02		6638.100	8.020
11	7	RB5	25.0	Finished	Measure_pH	NoInt	11/30/2011 6:48:40		5897.000	7.010
12	6	RC1	25.0	Finished	Measure_pH	NoInt	11/30/2011 6:59:18		4260.400	6.010
13	5	RC2	25.0	Finished	Measure_pH	NoInt	11/30/2011 7:09:55		4637.100	5.040
14	4	RC3	25.0	Finished	Measure_pH	NoInt	11/30/2011 7:20:34		3414.700	3.980
15	10 K	RA4	25.0	Finished	Measure_pH	NoInt	11/30/2011 7:31:12		11573.200	10.110
16	10 NK	RA5	25.0	Finished	Measure_pH	NoInt	11/30/2011 7:41:50		7479.900	9.880
17	9	RB1	25.0	Finished	Measure_pH	NoInt	11/30/2011 7:52:28		7055.700	8.990
18	9 K	RB2	25.0	Finished	Measure_pH	NoInt	11/30/2011 8:03:06		6437.900	9.050
19	9.18	RB3	25.0	Finished	Measure_pH	NoInt	11/30/2011 8:13:44		1482.400	9.100
20	8	RB4	25.0	Finished	Measure_pH	NoInt	11/30/2011 8:24:23		6640.600	8.010

Figure 36. Sequence Table with Sample Conductivity and pH Columns Added

NOTE If an injection is interrupted (for example, because a vial is missing), the sequence table displays values in the sample conductivity and pH columns, even though data was not acquired for the interrupted injection. These values can be ignored. They will not appear in results tables in reports.

10 Calibrating the Accessory

Calibrate the pH measurement before you begin using the accessory. For instructions, see [Section 10.1](#)

The conductivity measurement is calibrated at the factory and does not need calibration at installation. Recalibrate the conductivity every three months. For instructions, see [Section 10.2](#).

10.1 Calibrating the pH

The pH measurement of the accessory must be calibrated before you begin using the accessory and then periodically thereafter. During pH calibration, the pH of a pH 7 buffer solution is measured first and the offset determined. Then, the pH of either a pH 4 or a pH 10 buffer solution is measured and a

Sample Conductivity and pH Accessory Setup and Operation

slope between pH 7 and pH 4 (or pH 10) is determined. Optionally, the pH of a third buffer solution (pH 4 or pH 10) can be measured and a slope between pH 7 and the third buffer determined.

Items needed: a pH 7 buffer solution and a pH 4 or pH 10 buffer solution (or both). [Table 3](#) lists recommended buffer solutions and their part numbers.

	Purpose	Thermo Scientific Dionex P/N	Fisher Scientific P/N	
pH		500 mL Bottle	500 mL Bottle	1 L Bottle
4	Calibration and Check Standard	033238	SB101-500	SB101-1
6	Check Standard Only	080220	SB104-500	SB104-1
7	Calibration and Check Standard	033239	SB107-500	SB107-1
8	Check Standard Only	080169	SB112-500	SB112-1
10(K) ^a (K based)	Calibration and Check Standard	033240 ^a	SB116-500 ^a	SB116-1 ^a
10(Na) ^b (Na based)	Calibration and Check Standard	080221 ^b	SB141-500 ^b	SB141-1 ^b

Table 3. Recommended pH Buffer Solutions

a. This pH 10 standard is based on only potassium compounds. Use this standard when sodium is *not* present in the sample.

b. This is a concentrate that must be diluted 10:1 before use. Take a clean 1 L bottle; measuring gravimetrically add 105 g of concentrate; fill with deionized water for a total of 1 L of pH 10 buffer. This pH 10 standard is based on NaOH and KCL. Use this standard when sodium *is* present in the sample.

NOTE Choose the pH of the calibration buffer solution to use, based on the range of pH values to be measured in the sample.

NOTE A small error can be observed at pH 9 or higher when sodium is present in the sample or calibration buffer. If sodium is present in the samples to be measured, it is best to use a pH 10 calibration buffer made with sodium or sodium and potassium. See [Table 3](#) for a recommended buffer solution.

To calibrate the pH

1. Open the Instrument Method Wizard in Chromeleon 7 or the Program Wizard in Chromeleon 6.8.
2. Create an instrument method or program for the pH 7 calibration:
 - a. In the wizard, on the **Sampler Options** page for the accessory, select **Calibrate pH 7** in the **Operation** list.

Instrument Method Wizard - Sampler (AS-AP: Sampler): pH and Conductivity

pH and Conductivity

Operation: **Calibrate pH 7**

Measure sample Conductivity Volume to use: [1.0...10,000.0 μ l]

Measure sample pH

Use conditionals based on measurement results

If sample pH or conductivity is outside of limits:

Skip current sample and move to next sample

Perform custom commands (An IF-ENDIF block will be inserted into IM)

Conductivity _____

Use Min: [0.0...30000.0 μ S] Max: [0.0...30000.0 μ S]

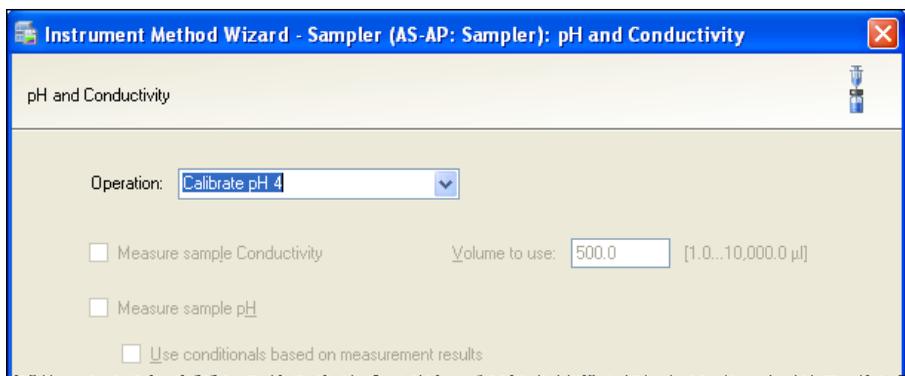
pH _____

Use Min: [0.00...14.00] Max: [0.00...14.00]

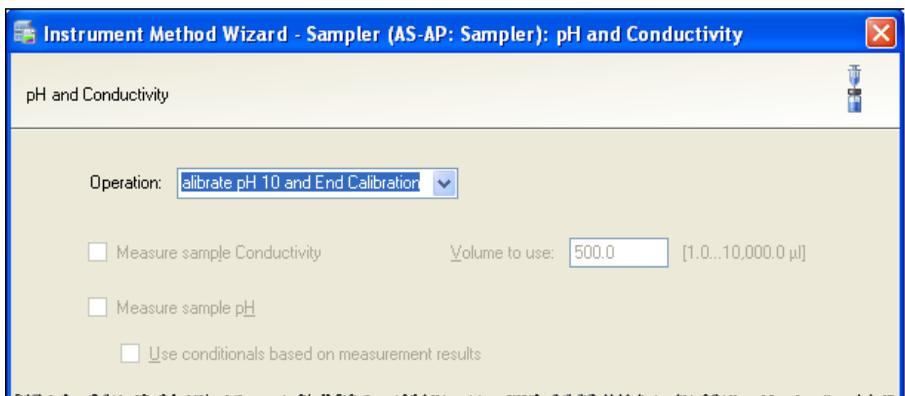
< Back Next > Cancel Help

- b. Complete the wizard and save the instrument method or program. Assign a name that identifies it as the pH 7 calibration method or program.

3. (Optional) If you are including two additional buffer solutions in the calibration, create another instrument method or program for the next pH buffer solution to be measured (either pH 4 or pH 10).
 - a. On the **Sampler Options** page, in the **Operation** list, select **Calibrate pH 4** (or **Calibrate pH 10**).



- b. Complete the wizard and save the instrument method or program. Assign a name that identifies it as the pH 4 (or pH 10) method or program.
4. Create an instrument method or program for the last buffer solution:
 - a. On the **Sampler Options** page, in the **Operation** list, select **Calibrate pH 4 and End Calibration** (or **Calibrate pH 10 and End Calibration**).



- b. Complete the wizard and save the instrument method or program. Assign a name that identifies it as the pH 4 (or pH 10) end of calibration instrument method or program.
5. Fill vials with the pH buffers and place them in the vial tray in the carousel.
6. Create a sequence and copy the calibration instrument methods or programs that you created into the sequence.
7. For each calibration buffer to be run, specify the appropriate instrument method or program and enter the vial position. Make sure the pH 7 calibration is run first and that the end calibration instrument method or program is specified for the last buffer run.
8. Verify that the specified tray positions contain the correct pH buffer solution.

When the calibration instrument methods or programs are run, Chromeleon displays the values on the **AS-AP Conductivity/pH** panel in Chromeleon 7 (see [Figure 27](#)) or the **Conductivity/pH Values** panel in Chromeleon 6.8 (see [Figure 29](#)). The pH offset value should be between -50 and 50. The pH slope values should be between -49 and -69. The theoretical slope is -59.16.

10.2 Calibrating the Conductivity

NOTE The conductivity measurement of the Sample Conductivity and pH Accessory is calibrated at the factory. It does not need calibration at installation. Recalibrate the conductivity every three months.

The conductivity calibration procedure consists of determining the conductivity zero point of the accessory and then measuring the conductivity of a 1000 μS standard. Chromeleon determines the calibration offset and slope and calculates a new cell constant.

Item needed: 1000 μS conductivity standard; Thermo Scientific Dionex 1000 μS conductivity standard, 473 mL (PN 080172) is recommended

1. Fill a vial with the 1000 μS conductivity standard and place it in the vial tray in the carousel.

2. In Chromeleon 7, on the autosampler ePanel, click the **Conductivity/pH** button to open the **AS-AP Conductivity/pH** ePanel (see [Figure 37](#)).

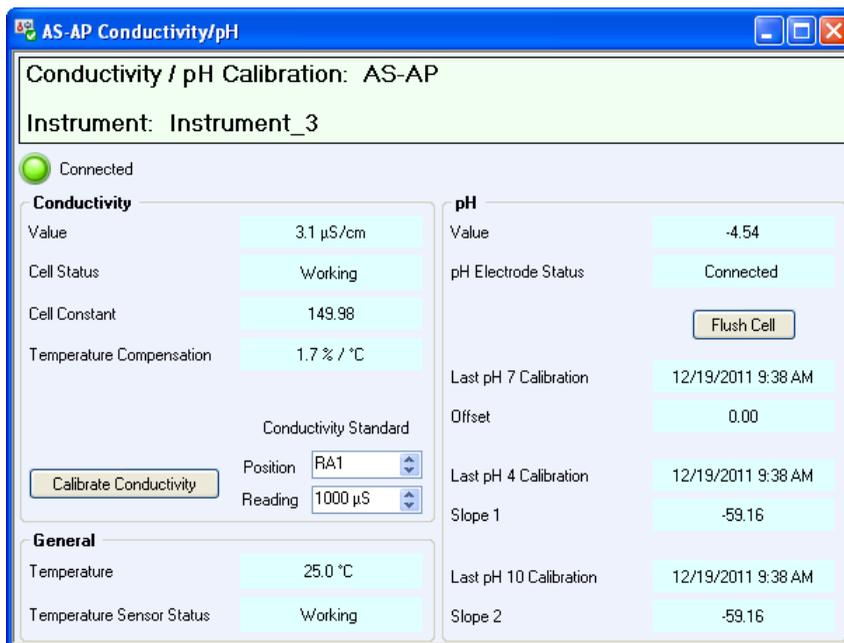


Figure 37. Chromeleon 7 Conductivity/pH ePanel

In Chromeleon 6.8, on the autosampler Control Panel, click the **Cond-pH Accessory** button to open the **Conductivity/pH Values** panel (see [Figure 29](#))

3. Under **Conductivity Standard**, enter the carousel position of the standard vial and the exact conductivity of the standard.
4. Click **Calibrate Conductivity**. The autosampler begins the calibration procedure. The procedure takes several minutes to complete.

At the start of the procedure, the zero point is measured and the autosampler performs a wash cycle. After the wash, the autosampler draws the standard from the vial and sends it through the accessory where the conductivity is measured. Chromeleon then determines the calibration offset and slope and calculates a new cell constant. The new cell constant is displayed on the panel. At the end of the procedure, another wash cycle is performed.

11 Specifications

Dionex Sample Conductivity and pH Accessory Specifications	
Conductivity Specifications of Electronics with Flowing Cell	
Calibration	Offset and slope calibration
Accuracy	1000 μ S: \leq 0.3% at 1000 μ S/cm after calibration
Range	1–30000 μ S/cm
pH Specifications of Electronics with pH Electrode and Flowing Cell	
Calibration	Offset calibration Slope 1 calibration pH 4–7 Slope 2 calibration pH 7–10
Accuracy using certified buffers	\leq 0.1 pH unit at calibration points (including sensor)
Range	2–12 pH