

# Capillary Electrophoresis Sample Setup Method for the Maxprep™ Liquid Handler Technical Manual

Instructions for Use of Products AS9100, AS9101, AS9200, AS9201



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# Description

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The Maxprep™ Liquid Handler automates the preparation of samples for fragment analysis by capillary electrophoresis (CE) including loading cocktail preparation, ladder placement and sample transfer. The CE sample setup method offers administrators the flexibility to create variant methods in the Maxprep™ software that specify CE setup options to meet the needs of the laboratory. The method can take up to four input plates and prepare up to two CE plates.

# Before You Begin

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## 2.1. Maxprep™ Capillary Electrophoresis Sample Setup Method

As new Maxprep™ Liquid Handler methods are released, they will be listed on the Promega web site and available for download at: [www.promega.com/resources/software-firmware/maxprep-liquid-handler-methods/](http://www.promega.com/resources/software-firmware/maxprep-liquid-handler-methods/)

This document provides guidelines for interaction with the capillary electrophoresis (CE) setup method on the Maxprep™ Liquid Handler. Loading cocktail formulation, placement of allelic ladder and CE-specific settings are specified in variant methods and cannot be altered at run time. After selecting a variant method to run, you will enter processing parameters (e.g., Input Labware, Output Labware) and be led through a series of user interface screens that detail placement of labware and reagents on the Maxprep™ Liquid Handler. The Maxprep™ Liquid Handler is provided with a PC and touch-screen monitor. Interactions with the user interface screen can occur using the mouse and keyboard, touch gestures on the monitor or a combination of both approaches.

## 2.2. Materials to Be Supplied by the User

- CE injection plate(s) (user-specified)
- 1.5ml tubes (e.g., ClickFit Microtube, 1.5ml [Cat.# V4741])
- Maxprep™ 50µl Conductive Disposable Tips, Filtered (Cat.# AS9301)
- Maxprep™ 300µl Conductive Disposable Tips, Filtered (Cat.# AS9302)
- **Optional:** amplification plate base(s) (e.g., Thermo Fisher MicroAmp® 96-well base, Cat.# N8010531 for strip tubes, unskirted or partially skirted amplification plates)

## 2.3. Selecting a Maxprep™ CE Sample Setup Method

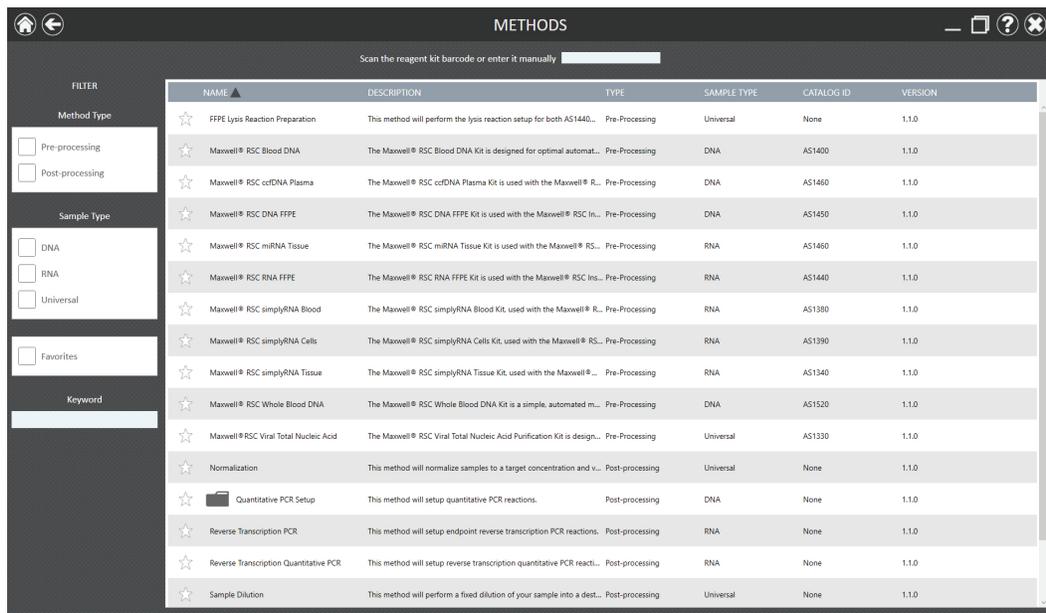
To start a method on the Maxprep™ Liquid Handler, perform the following steps:

1. Start the Maxprep™ software by double-clicking the Maxprep™ software icon on the Windows® desktop. Alternatively, click the **Windows Start** button in the lower left corner of the screen, choose **All Programs**, open the Promega folder and click the **Maxprep** software icon.
2. From the Maxprep™ software 'Home' screen (Figure 1), press the **Start** button.



**Figure 1. Maxprep™ software 'Home' screen.** From the Maxprep™ software 'Home' screen, select the **Start** button to begin running a method.

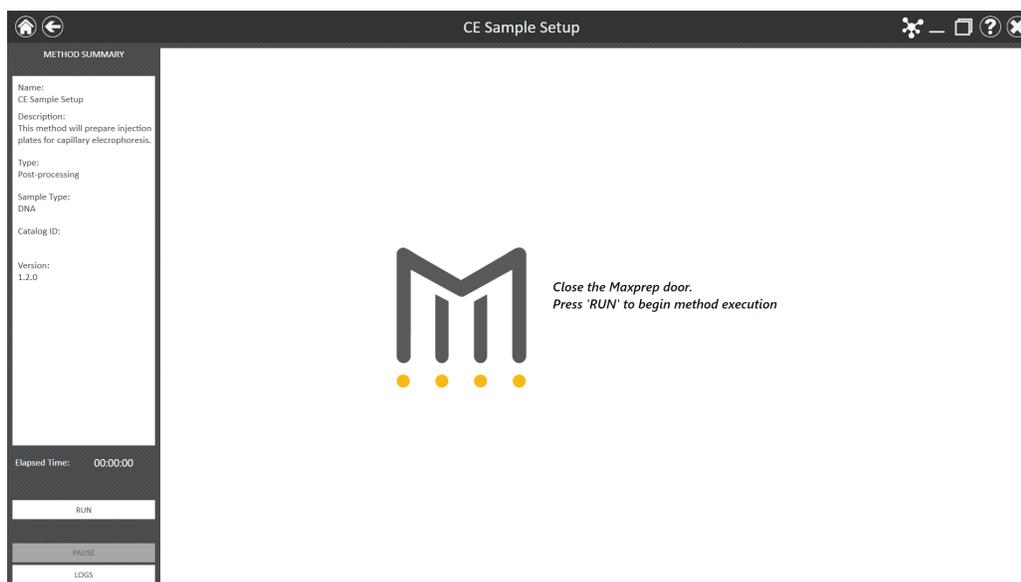
3. The 'Methods' screen (Figure 2) displays all of the methods that are installed in the Maxprep™ software. Methods are shown either as single line entries or with a folder icon if the administrator has defined lab-specific variant versions of the Promega-supplied methods. Select the folder icon for the CE sample setup method to expand the list of variant methods.



**Figure 2. 'Methods' screen.** The 'Methods' screen displays the methods installed in the Maxprep™ software. Select the method to run, and then press the **Proceed** button.

4. Use one of the following two mechanisms to select a CE sample setup method:
  - a. Select the method or variant from the list.
  - b. Use the Filter check boxes on the left side of the screen to display only post-processing methods, display only methods marked as Favorites or perform a keyword search for a specific word or phrase in any of the descriptive fields for the method. After filtering the list, select the method or variant from the list of displayed methods.

Regardless of the mechanism used to select a method, the selected method is highlighted and will display a **Proceed** button on the right side of the entry. Press the **Proceed** button to open the Method Run Environment (Figure 3).



**Figure 3. Method Run Environment screen.** The Method Run Environment screen displays a summary of the selected method on the left side of the screen. Close the door of the instrument and select the **Run** button to begin method execution.

## 2.4. Starting a Maxprep™ Method

The Method Run Environment displays the name of the selected method in the title bar and a summary of the information describing the selected method on the left side of the screen. If an incorrect method is chosen, select the **Home** or **Back** button at the top left corner of the screen to return to the 'Home' screen or return to the 'Methods' screen, respectively.

To start method execution, close the door of the instrument and select the **Run** button in the lower left corner of the screen. Once method execution is started, the timer under the *Elapsed Time:* header will start, and the main portion of the screen will indicate that the system is initializing.

## 2.5. Entering Run-Specific Information

After the system has initialized, a user interface is displayed in the main portion of the Method Run Environment. The user interface requests information necessary to process this method.

The first screen requests information regarding Input Labware and Injection Labware (Figure 4). Specific information about the general method run parameters are detailed in Section 4.

**Note:** When creating variant CE sample setup methods, the administrator defines the parameters specific to the analysis being performed. These parameters cannot be modified at run time. See Section 4 for information on creating a CE sample preparation variant method.

**Figure 4. Example 'General Run Parameters' screen.** The 'General Run Parameters' screen requests information necessary to perform this CE sample setup. Select the **Variant Information** button to view the administrator-defined settings for this CE sample setup.

1. Use the drop-down menus to specify the Input Labware and Injection Labware to be used for this run. Samples are placed on the system in the Input Labware, and the CE sample injection is prepared in the Injection Labware. Plates are the only acceptable labware type for this method.
2. At the top right corner of the screen is an indication of the Maximum Number of Samples allowed within this CE sample setup run. The number displayed is based on:
  - The number of sample positions in the input labware
  - The number of ladders and controls specified
  - The available space in the injection labware

- To view the administrator-defined settings for this CE sample setup, press the **Variant Information** button (Figure 4).
- After entering values for Input Labware and Injection Labware, select the **Next** button.

## Input Plate Sample Information

After selecting **Next**, the user interface requests information regarding the samples present in the input labware. A bar code is required for each input plate to be processed (Figure 5).

Full Plate	Input Plate Barcodes	Edit	Total Imported
<input checked="" type="checkbox"/>	SwabPlate1	65	109
<input type="checkbox"/>	PunchPlate1	44	
<input type="checkbox"/>			
<input type="checkbox"/>			

Excess samples will be saved for later processing.

PREV NEXT

Figure 5. Querying Portal for Sample IDs.

Scan or enter the plate bar codes for each of the input sample plates. When connected to the Portal software, pressing **Enter** after typing the labware bar code will query Portal for Sample IDs associated with the plate bar code. The number of samples associated with that plate bar code will be indicated by the number overlaying the plate icon next to the plate bar code. When querying a plate bar code, the system will first search for any unprocessed samples from a prior CE setup run. The “Full Plate” check box next to the plate bar code will not be checked if a partially processed plate is identified. If desired, check the box to process all samples present on the plate, or leave it unchecked to process only the samples that have not been previously processed. The check box will remain inactive if there is no record of unprocessed samples.

Once a plate bar code is entered, the next bar code entry field will become active. Each plate bar code must be unique. If duplicate plate bar codes are entered, the **NEXT** button will be inactive. The total number of samples imported is tallied on the right-hand side of the screen. You can enter more samples than the maximum input sample number, but the system will only process samples until the maximum number is reached. Portal will retain a record of the unprocessed samples for a future CE sample setup run. This record is accessible by entering the plate bar code as previously described.

You can view and edit the samples associated with a plate by selecting the plate icon button next to the plate bar code. The user interface will display a representation of the labware. If applicable, any sample identifiers returned from the Portal software query are populated on the labware display and shown as black well positions. Labware positions with no sample identifiers are displayed as gray well positions. To enter or modify sample identifiers, select the desired labware position, then select the text box on the right side of the screen (Figure 6). Scan or enter the sample identifier information for the position. When entering sample identifiers, press the **Add Sample** button to accept the entry or press **Enter** on the keyboard to accept the information and move to the next position.

To remove samples from processing, select a position, Ctrl-click to select multiple positions, or click and drag across several consecutive positions to select them. After selecting positions, press the **Remove Sample** button to remove them from being processed during this run. Press the **Close** button to close the plate detail screen and return to the plate entry screen.

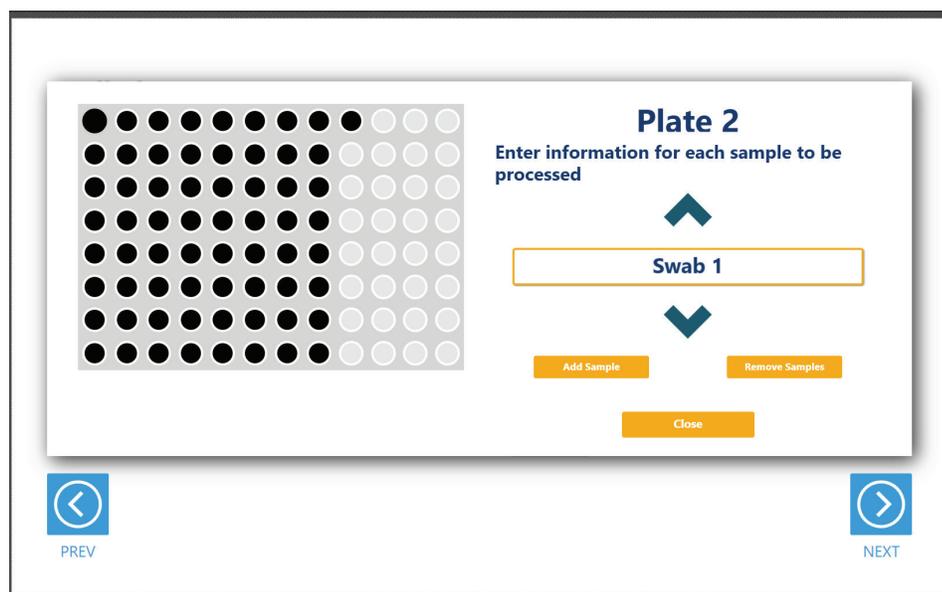


Figure 6. Input plate details.

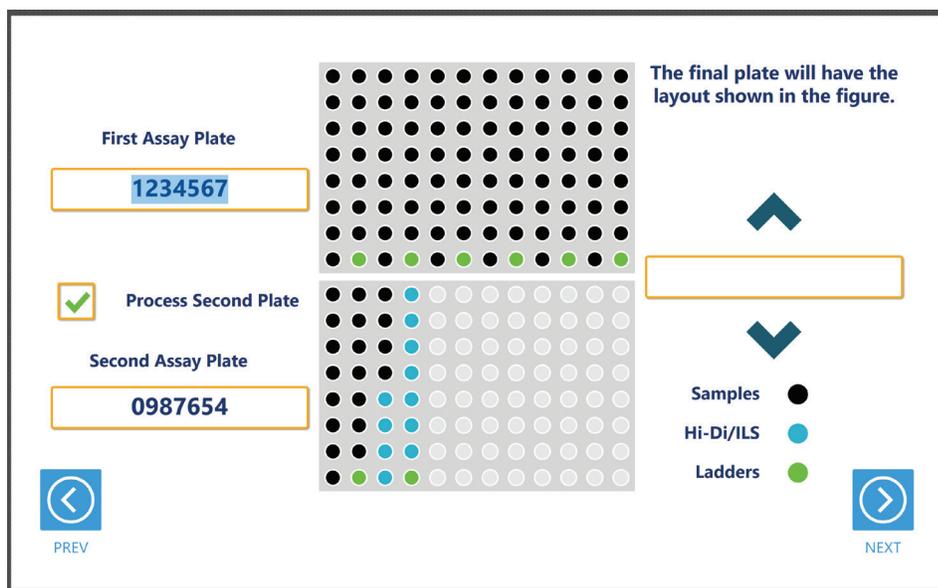
If the system is not connected to Portal, all sample information should be entered using the plate details screen. Samples exceeding the maximum input sample number will not be processed. The record of unprocessed samples will be in the local report, but future runs will not have access to this information.

## CE Plate Maps

After selecting the input labware positions used for the CE sample setup, the user interface presents a screen that displays the CE plate maps (Figure 7). Here you can enter the plate bar codes for the CE injection plates. The locations of samples, ladders and Hi-Di/ILS loading cocktail are indicated on the plate with samples displayed in black, ladders in green and Hi-Di/ILS in blue. Wells that will not receive Hi-Di/ILS loading cocktail, samples, controls or ladders are indicated in gray. Select any well position on the CE plate map to view the identifying information for that well. By toggling the check box for “Process Second Plate”, the user can prepare 1 or 2 CE injection plates.

The placement of samples, ladders and Hi-Di/ILS loading cocktail are managed automatically. Ladders and controls are placed in the wells identified in the method variant for ladder and control wells. Both CE injection plates will have the same default ladder and control layout. Samples are placed in the remaining wells in the order that they are in the input plates. The system also uses the capillary count identified in the method variant to determine the final injection of a partially filled plate. The remaining wells in that injection will receive loading cocktail. All ladder and control positions after that last injection are removed.

After reviewing the CE plate map, press the **Next** button to begin instrument setup or press the **Back** button to return to the input samples screen.



**Figure 7. CE Plate Maps.** CE Plate Maps are displayed to show the positions of samples, ladders and Hi-Di/ILS (as appropriate to the CE sample setup method). Samples are shown as black wells, Hi-Di/ILS wells as light blue, controls as yellow (not shown) and ladders as green wells. Select any well position to view identifying information for that well.

## 2.6. Instrument Setup Instructions

Instrument setup proceeds from left to right on the Maxprep™ Liquid Handler. The loading platform of the Maxprep™ Liquid Handler uses a track system to indicate where carriers are loaded on the system. In these instructions each carrier referenced will list the starting and ending track number that are spanned by the carrier. Make sure that carriers are placed correctly on the instrument at each step of the user interface. Screens are presented to indicate the types of labware that should be placed on the instrument, volumes of reagents that should be provided and reagent bar code information that can be entered.

All deck setup screens display a miniature view of the entire instrument in the upper left corner of the screen with the current position highlighted. Below this image is a summary of the selected run parameters. On the right side of the screen is a depiction of the carrier and instructions for what should be present at each position on the carrier. For each position where labware or reagents must be placed, there is a check box. As labware is loaded at each position, check the box to indicate that the instruction was performed. You cannot proceed to the next instrument setup screen until a check is present in all check boxes on the screen.

## Utility Carrier (Tracks 1–6)

The Utility Carrier is a fixed position and cannot be removed from the instrument. It contains a Heater/Shaker unit at Site 1 (back of the instrument), instrument tools (gripper paddles, plunger tools) at Site 2 and two labware positions at Sites 3 and 4 (front of the instrument; Figure 8).

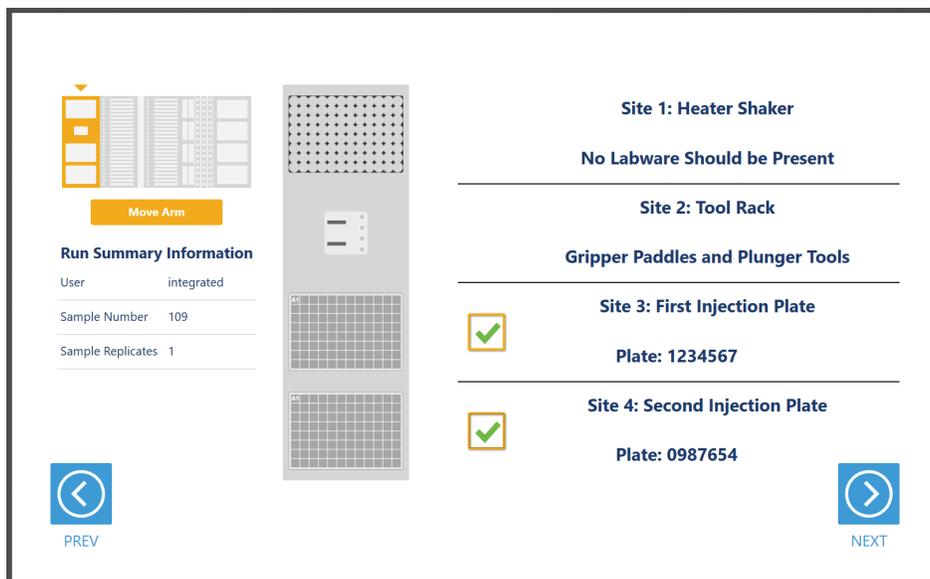
Follow the information on the right side of the screen regarding placement of labware. For example, on the screen in Figure 8, there should be no labware present on the Heater Shaker device at Site 1, the Gripper Paddles and Plunger Tools are present at Site 2, the first Injection Plate is present at Site 3 and the second Injection Plate is present at Site 4. The bar codes for the Injection Plates are displayed for your reference.

**Note:** Strip tubes, unskirted and partially skirted amplification plates should be seated in an Amplification Plate Base before being placed on the system. Fully skirted amplification plates can be placed directly on the system.

After placing the indicated labware, check the boxes next to each position to activate the **Next** button at the bottom right corner of the screen. Press the **Next** button to continue instrument setup.



**Note:** Refer to the miniature instrument image on the left side of the screen to see which position the displayed reagent carrier should occupy on the instrument.

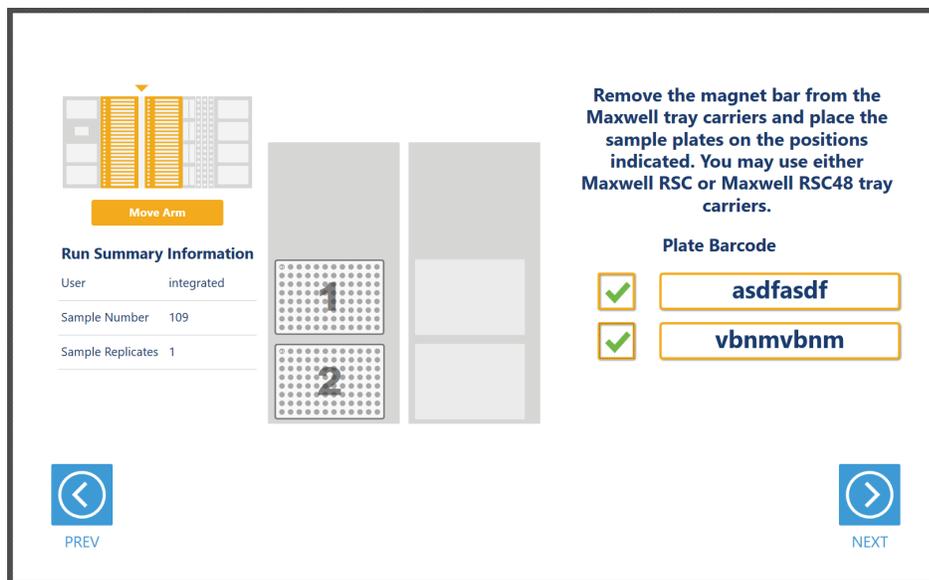


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**Figure 8. Deck Setup screen for the Utility Carrier.** This carrier cannot be removed from the system. It contains a Heater/Shaker for incubation of samples, tools and two labware positions. Place the indicated labware on the carrier, and check the boxes to activate the **Next** button. Press **Next** to continue instrument setup.

## Maxwell® Deck Tray Carriers (Tracks 7–12, 14–19)

The Maxwell® Deck Tray Carriers are used to place the input plates on the instrument. Either type of Maxwell® Deck Tray Carrier can be used for positioning the sample plates. Remove the Maxwell® deck trays (if present) and the elution magnet from the left Maxwell® Deck Tray Carrier. Place the sample plates on the plate positions of the Maxwell® Deck Tray Carriers as indicated. The bar codes of the sample plates are shown on the right side of the screen. After placing the sample plates, check the box to activate the **Next** button. Press the **Next** button to view the next instrument setup screen.

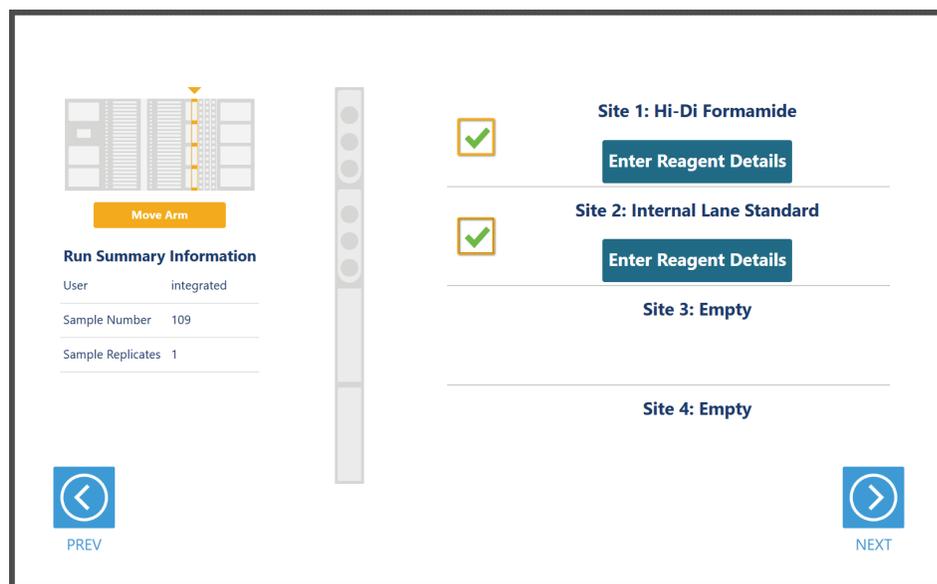


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**Figure 9. Sample Plate Positions.** Input plates are placed on the plate positions of the Maxwell® Deck Tray Carriers as indicated. Either type of Maxwell® Deck Tray Carrier can be used. Remove any Maxwell® deck trays and the elution magnets from the Maxwell® Deck Tray Carriers before placing the sample plates. Plate bar codes are listed in order 1–4. Plates 3 and 4 (not shown) will be placed in the right-hand carrier in the rear and forward positions, respectively.

## Reagent Carriers (Tracks 20, 21)

The Reagent Carrier screens display the reagents that should be placed at each site on a reagent carrier (Figure 10). Reagents are placed in either a Maxprep™ 3-Position Reagent Tube Holder or a Maxprep™ Reagent Reservoir, 50ml, as indicated on each screen.



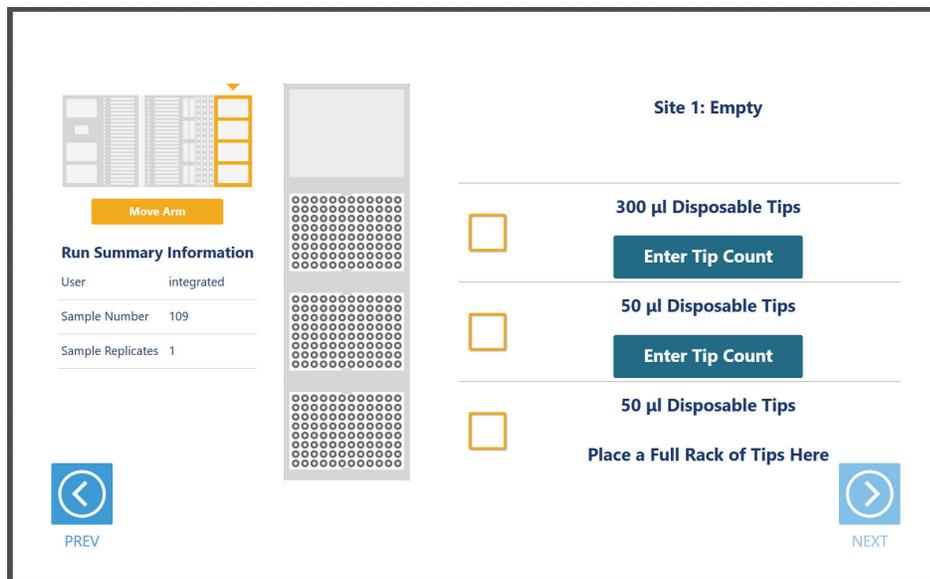
**Figure 10. Reagent Carrier Screen.** The name of the reagent to be placed at each carrier site is indicated. Press the **Details** button for any individual site to see details and enter reagent lot information.

Press the **Enter Reagent Details** button to see details specific to the reagent(s) and labware that should be placed at each site on the reagent carrier (Figure 10). The details will minimally indicate the type of reagent, volume of reagent required and type of labware required to be placed at a given site. When finished viewing instructions for a reagent site, press **Next Site** to move to the next occupied site on the reagent carrier or press **Close** to leave the reagent details and return to the main reagent carrier screen. The act of viewing reagent details will cause the check box for the reagent to be checked. All check boxes must be checked to activate the **Next** button on the main reagent carrier screen. Press **Next** to move to the second reagent carrier screen.

Place a Maxprep™ 3-Position Reagent Tube Holder (Cat.# AS9409) at the site and add individual tubes containing the reagent specified at the indicated positions in the tube holder. For ladder and controls, place a single tube of each at the indicated positions in the 3-Position Reagent Tube Holder. For other components (e.g., Hi-Di™ Formamide), add up to three tubes containing the total volume of reagent specified to the 3-Position Reagent Tube Holder. The instrument will use the reagent present in the first reagent tube until it is consumed, and then it will move to the second and third tube in the Reagent Tube Holder for these reagents. If there is not sufficient reagent present in all three tubes to complete the run, a warning prompt will be shown to place a new tube of reagent at the first position for this reagent.

## Tip and Plate Carrier (Tracks 25–30)

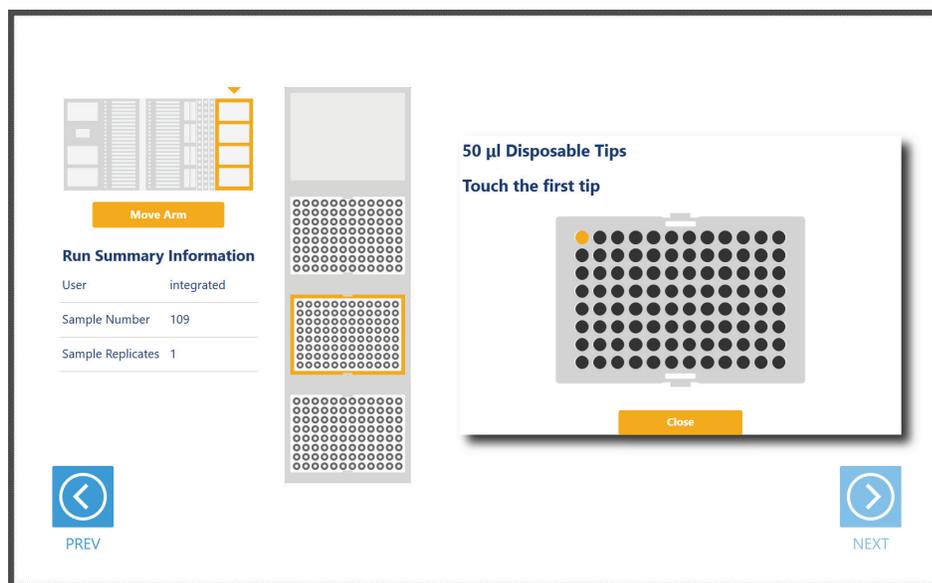
Tips may be placed on the tip and plate carrier (Figure 11). Site 1 on this carrier is not used.



**Figure 11. Example Tip and Plate Carrier screen.** Place the specified labware at each site. Site 1 should be empty. Sites containing a tip rack indicate the type of tips that should be placed there and whether a partial or full rack of tips needs to be placed. For partial tip racks, press the **Enter Tip Count** button to specify the first available tip in the partial tip rack. Check all check boxes after loading labware to proceed.

Sites 2–4 on this carrier are used to hold tip racks. Place tips of the specified type at each site on the carrier. Sites at which either a full or partially filled tip rack can be placed will have an **Enter Tip Count** button. Press the **Enter Tip Count** button and select the first available tip present in the tip rack (Figure 12). Entering a tip count and pressing the **Close** button will act to check the check box for the specified site. If a tip count is not entered, the software will assume a full rack of tips is located at the specified position. For all other sites, once you have added the requested labware, check the check box next to the site. Once all check boxes on the screen are marked, the **Next** button become active. Press the **Next** button to move to the next screen.

**Note:** Confirm that the appropriate tips are placed at each position before starting the method. Tip types used at each position differ between methods.



**Figure 12. Selecting the first tip in a partial tip rack.** For sites at which a partial or full tip rack can be placed, press **Enter Tip Count** to specify the first tip present (in gold) in the partial tip rack. Press **Close** to return to the display of all sites on the carrier.

## Final Screen

The final screen of the instrument setup presents a list of items that should be checked before starting the run. Confirm that:

- All carriers are completely seated in the instrument
- All labware are loaded at the correct locations
- Tip waste bin is empty if necessary
- The door of the instrument is closed

Once the items in the list are checked and the door of the instrument is closed, press **Next** to start automated sample processing (Figure 13). This is the last chance to return to any of the instrument setup screens and confirm instrument setup before sample processing will begin.

During the run, if there is a need to pause instrument operation to resolve any unforeseen issues, press the **Pause** button in the lower left corner of the screen. If you need to abort the run for any reason, after pressing **Pause**, press the **Abort** button in the lower left corner of the screen.



**Figure 13. Final instrument setup screen.** This screen presents a list of items that should be checked before starting automated processing. It also provides a final chance to return to any of the previous instrument setup screens before automated processing begins. To start processing, close the instrument door and press the **Next** button.

## 2.7. Maxprep™ Liquid Handler CE Sample Setup Protocol

The Maxprep™ Liquid Handler prepares samples for CE analysis as indicated by the method type and variant selected.

1. Prepare loading cocktail in one or more 1.5ml tubes for all samples and ladders based on the volumes of the following components specified in the variant method:
  - a. Hi-Di™ Formamide
  - b. Internal Lane Standard
  - c. Optional: Stabilizer
2. Transfer loading cocktail to the CE injection plate.
3. Transfer samples to the CE injection plate.
4. Transfer controls and allelic ladders to the CE injection plate.

Once the CE sample setup method is complete, open the instrument door, remove CE injection plate and cover the wells with appropriate septa. Prepare the plate per your CE protocol. Remove samples, plates and used tips from the waste bin and discard as hazardous waste following your institution's recommended guidelines. Either discard or tightly cap and store remaining reagents.



Consumables for Maxprep™ methods are designed to be used with potentially infectious substances. Use appropriate protective equipment (e.g., gloves and safety glasses) when handling infectious substances. Adhere to your institutional guidelines for the handling and disposal of all infectious substances when used with this system.

# Potential Errors and Warnings

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The Maxprep™ Liquid Handler CE sample setup method is designed to provide notification and resolution options for several potential error/warning states. Below are listed several possible error/warning states that may be observed during a method run. Always carefully read any warning or error messages to find out how to proceed. If in doubt about how to proceed with any error state, the safest option is to choose the **Abort** button to end the run.

## Intrusion Sensor

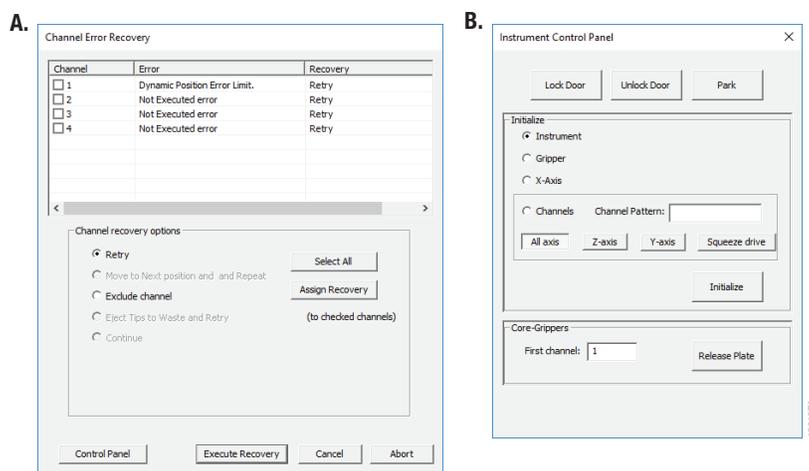
The intrusion sensor on the Maxprep™ Liquid Handler checks for any potential physical obstructions that could prevent gantry movement on the instrument. Prior to any instrument movement (e.g., initialization, bar code scanning, arm movement, resuming a method after a pause, performing a maintenance method), always be sure to check that all carriers on the system are fully pushed to the back of the instrument and that nothing could impede the progress of gantry movements. An LED on the left front side of the deck provides a visual indicator of the intrusion sensor state. When no physical obstruction is detected, the LED is orange, but when the LED is green, a carrier or other physical obstruction has been detected by the intrusion sensor. Make sure that all carriers are fully seated on the system and that the intrusion sensor LED is orange before proceeding with any instrument operation that will result in movement of the gantry.

If the intrusion sensor does detect a physical obstruction to gantry movement, the system will display an error message (Figure 14) when the gantry attempts to move. This error does not result in an aborted run and the run can continue if you follow the steps below.

**Note:** During automated bar code scanning, if the intrusion sensor detects an obstruction, the error below will not be displayed and recovery is not possible. In this case, abort the run, power cycle the Maxprep™ Liquid Handler, and start the method run again.

1. On the 'Channel Error Recovery' screen (Figure 14, Panel A), press the **Control Panel** button in the lower left corner to open the 'Instrument Control Panel' screen (Figure 14, Panel B).
2. On the 'Instrument Control Panel' screen, press the **Unlock Door** button. Open the door of the instrument and push all carriers back. Confirm that the intrusion sensor does not detect an obstruction by checking that the intrusion sensor LED on the left side of the instrument is orange.

3. Close the instrument door and then press the **Lock Door** button on the 'Instrument Control Panel' screen.
4. In the Initialize area of the 'Instrument Control Panel' screen, make sure the radio button for Instrument is selected and then press the **Initialize** button. The Maxprep™ Liquid Handler gantry will initialize.
5. Close the 'Instrument Control Panel' screen using the **X** button in the upper right corner of the screen.
6. On the 'Channel Error Recovery' screen, in the Channel Recovery Options area, press the **Select All** button. This will check the boxes for each channel at the top of the screen.
7. Press the **Execute Recovery** button at the bottom of the 'Channel Error Recovery' screen to retry the gantry movement and continue the method run.



**Figure 14. Error caused by a physical obstruction detected by the intrusion sensor. Panel A.** When the intrusion sensor on the Maxprep™ Liquid Handler detects a physical obstruction that would impede gantry movement prior to gantry motion, the error above is displayed. **Panel B.** Follow the instructions in the text above to reinitialize the instrument and continue processing.

## Unable to Load Tips

As part of a normal method run, the instrument needs to load tips on the pipetting channels. The instrument will attempt to load tips at a position twice and will automatically move to the next tip position. If the instrument runs out of tips of a given type, a warning will be displayed to replace that tip type with a full tip rack.

## Insufficient Tips

While the CE setup method was developed to minimize the chance of consuming all available tips during a run, there is still a possibility that a warning message will be displayed, indicating that there are no longer tips available on the tip and plate carrier (Figure 15). If this warning occurs, the instrument will pause operation and unlock the door. Open the door of the instrument, add the appropriate tip type to the first site for that tip type, close the door and press **OK** to resume processing.



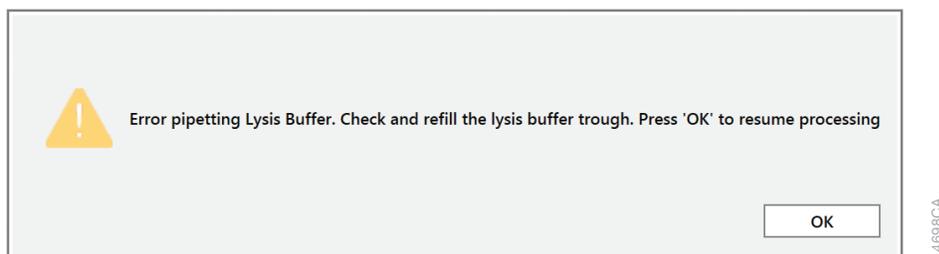
**Figure 15. Insufficient tips on the system to complete a method.** In the event that all tips of a given tip type are consumed during a run, the instrument will pause and unlock the door. Open the door, load more tips of the indicated type onto the tip and plate carrier, close the door and press **OK** to resume processing.

## Insufficient Sample

Because of the low volumes of sample used for CE sample setup, the system does not check that sufficient sample is present in sample wells or allelic ladder tubes. Make sure to provide sufficient volume of samples and allelic ladder to prepare the CE sample setup based on the sample volume indicated in the variant method.

## Insufficient Liquid

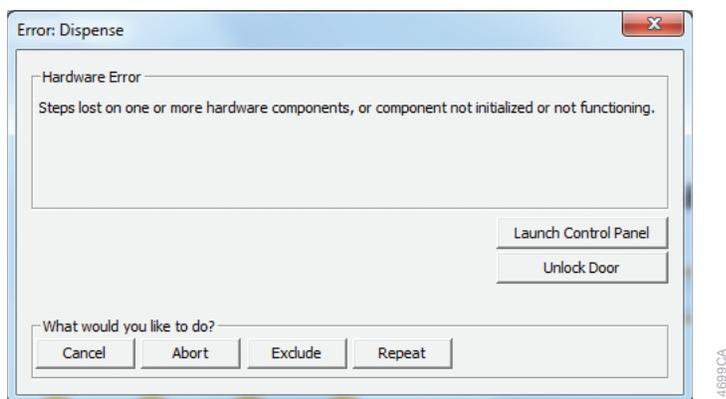
If the system detects an insufficient volume of reagent to transfer the amount specified for the run, a warning is displayed (Figure 16), the system will pause and the doors will unlock. Open the instrument door and ensure that sufficient reagent is present at the position in question by either adding more reagent to a trough or to the first tube of that reagent type. Make sure the door of the instrument is closed before pressing the **OK** button.



**Figure 16. Insufficient reagent on the system to complete a method.** In the event that insufficient reagent is detected in a trough or tube position, a warning will be displayed; the instrument will pause and unlock the door. Open the door, replenish the indicated reagent, close the door and press **OK** to resume processing.

## Hardware Crash

If the instrument experiences a physical crash of the pipetting channels into an object during a method run, an error message is displayed (Figure 17). This error message will indicate that there was a Hardware Error and the instrument has lost steps. For any situation where a physical crash of the instrument has occurred, press the **Abort** button to end the method run. Follow the instructions below for an aborted run.

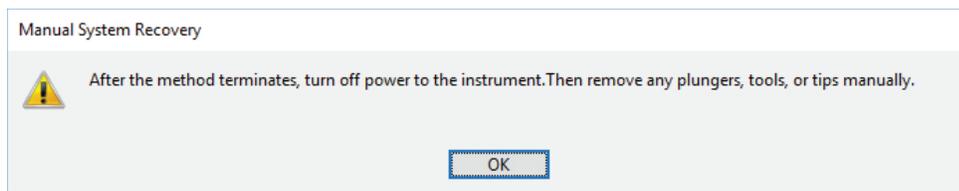


**Figure 17. Hardware Crash.** If there is a physical crash of hardware components that results in an error message, press the **Abort** button on the error screen to end the method run.

## Aborted Run

Once the CE sample setup has started, aborting a run should be considered a last resort. However, there are situations where manually aborting a run (by pressing the **Abort** button in the lower left corner of the screen) may be necessary. Alternatively, there may be conditions where an instrument error could cause a run to be aborted. In the case of an aborted run, you will see a warning message (Figure 18), indicating that the instrument should be powered off. If the instrument has experienced a physical crash or there are tools or tips loaded on the pipetting channels, after powering the instrument off, resolve the crash state by following the instructions regarding recovering from an instrument crash found in the *Maxprep™ Liquid Handler Technical Manual #TM509*. Power the instrument back on and restart the Maxprep™ software. After any instrument crash, if there is not visible damage to the pipetting channels, we recommend running the Weekly Maintenance method to check instrument calibration. If the Weekly Maintenance method produces failing results, contact Promega Technical Services to schedule a service visit prior to further instrument use.

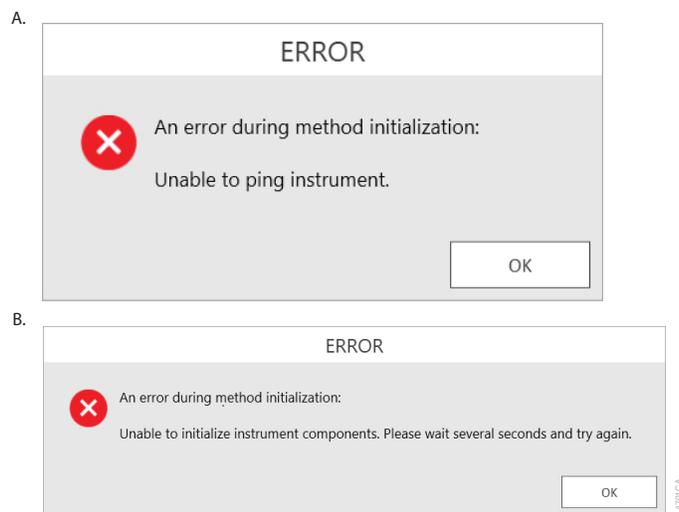
**Note:** Wait 1 minute after power cycling the Maxprep™ Liquid Handler before starting the software to re-establish communication.



**Figure 18. Aborted Method.** A message will be displayed after aborting a run indicating that the instrument should be powered off. After turning the instrument off, open the door and manually resolve the crash state as instructed in the *Maxprep™ Liquid Handler Technical Manual #TM509*. After any instrument crash, contact Promega Technical Services to determine whether the instrument may require a service visit.

## Instrument Connection Errors

After turning the instrument on, wait at least 1 minute after the green light on the automated bar code scanner turns on before starting a method run. If the instrument has not fully performed its internal initialization before starting a run, one or more warning messages may be displayed (Figure 19). These warning messages will indicate an error in instrument connection. A message indicating “Unable to ping instrument” is displayed if the instrument is not powered on. Power on the instrument and wait at least 1 minute after the green light on the bar code scanner turns on before attempting to restart the method. Press the **OK** button, wait several seconds and attempt to start the method again.



**Figure 19. Instrument Connection Errors.** Connection errors will be displayed during a run if the instrument has not completed its full internal initialization before a method run is started. The errors shown in **Panels A** and **B** may be displayed. Confirm that the instrument is powered on and has fully initialized, then press the **OK** button, wait several seconds and attempt to start the method again.

# Variant Method Variables

Administrators should create laboratory-specific variants of the CE Sample Setup method to match their laboratory needs. The general process of creating variant methods is discussed in the *Maxprep™ Liquid Handler Technical Manual #TM509*. Below is a list of the types of variables that can be adjusted by administrators for CE sample setup. None of the variables can be adjusted at run time by the user. For all of the values listed, the administrator should define the default value for the variable within the displayed minimum and maximum allowable values, where applicable.

## Ladders and Controls

These variables define the layout of allelic ladder and amplified DNA controls on the CE injection plate. Up to three ladders and amplified DNA controls can be used, and multiple well locations can be defined for that ladder. Only one ladder or control can be placed in a single well.

Setting	Details
Ladder Well Numbers <sup>1</sup>	Well locations where the allelic ladder should be placed. For multiple ladder wells, specify the well locations as a comma-delimited list (e.g., 1, 17). The same placements will be used for both CE injection plates. All values should be between 1 and 96.
Ladder Sample Matching Text	Maxprep™ STR setup methods allow users to leave empty wells in their STR reaction plates. This facilitates manual CE setup, but these samples should not carry into automated CE setup. This value is the text that will be used to identify the empty spaces left for ladders. The default value of “ladder” is compatible with Maxprep™ STR setup methods.
X Amplified Control Name	The name of the Xth amplified control.
X Amplified Control Wells	Well locations where the Xth amplified control should be placed. For multiple control wells, specify the well locations as a comma-delimited list (e.g., 1, 17). The same placements will be used for both CE injection plates. All values should be between 1 and 96.

<sup>1</sup>Well numbering proceeds down columns and across the plate. For example, A1 = 1, B1 = 2, A2 = 9, etc. A well numbering diagram is displayed in Section 6, Appendix.

## Reagents

These variables define the volumes of reaction components used to create the CE sample loading cocktail.

<b>Setting</b>	<b>Details</b>
Hi-Di Volume ( $\mu\text{l}$ )	The volume of Hi-Di™ formamide per sample.
ILS Volume ( $\mu\text{l}$ )	The volume of internal lane standard per well.
Stabilizer Volume ( $\mu\text{l}$ )	The volume of Stabilizer per well.

## CE Capillary Array

The administrator may specify the capillary array size for the CE instrument being used. This value is used to determine the last injection in the plate. The system will dispense loading cocktail in any unused wells of the final injection. Any ladders after the last injection are removed. To deactivate this feature, set the value of the array size to 1.

# Troubleshooting

For questions not addressed here, please contact your local Promega Branch, Office or Distributor. Contact information available at: [www.promega.com](http://www.promega.com). E-mail: [techserv@promega.com](mailto:techserv@promega.com)

Symptoms	Causes and Comments
Cannot modify an option available to users on the method setup screen	<p>The most likely cause of this is that the administrator has disabled the ability of a user to modify this option in the variant method being run.</p> <p>If the administrator has specified that users cannot change the value of a specific variable during a run, it will not be possible to alter the value at run time.</p> <p>Check the settings specified for the variant method that is being run.</p>
The desired labware type is not an available input or output labware option	<p>Many common labware types are available; however, if a specific labware used in the laboratory is not present, contact Promega Technical Services to help resolve this issue.</p>
Cannot advance to the next instrument setup screen	<p>Confirm that all check boxes present on the screen are checked. If at a sample entry screen, confirm that the number of sample positions indicated in the input sample labware exactly matches the number of samples that was set for the run. It is not possible to proceed from a labware setup screen if there is a mismatch between the number of samples that can be processed and the sample number specified.</p>
Instrument error/crash during method run	<p>Double-check that the labware specified during instrument setup exactly matches the labware being used for the method run. Plate movement and pipetting are dependent on precise labware definitions. Do not substitute “similar” labware for the labware specified in the method.</p>
Inaccurate pipetting	<p>Make sure that Daily and Weekly Maintenance methods are being run on a regular basis. They will check that the pipetting functions of the Maxprep™ Liquid Handler are working within expected parameters.</p>

	1	2	3	4	5	6	7	8	9	10	11	12
A	1	9	17	25	33	41	49	57	65	73	81	89
B	2	10	18	26	34	42	50	58	66	74	82	90
C	3	11	19	27	35	43	51	59	67	75	83	91
D	4	12	20	28	36	44	52	60	68	76	84	92
E	5	13	21	29	37	45	53	61	69	77	85	93
F	6	14	22	30	38	46	54	62	70	78	86	94
G	7	15	23	31	39	47	55	63	71	79	87	95
H	8	16	24	32	40	48	56	64	72	80	88	96

**Figure 20. Plate map well numbering conversion.** On the side and top of the plate image are the alphanumeric row and column labels. Within the wells are the corresponding numeric designations for each well.

## Related Products

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PRODUCT	SIZE	CAT.#
Nunc 2.0ml Deep Well Plates (Sterile)	60/pack	AS9307
2.0ml Deep Well Plates (Non-Sterile)	60/pack	AS9309
Maxwell® RSC Plunger Pack	1 each	AS1670
Maxprep™ 1000µl Conductive Disposable Tips, Filtered	40/pack (3,840 tips)	AS9303
Maxprep™ 300µl Conductive Disposable Tips, Filtered	60/pack (5,760 tips)	AS9302
Maxprep™ 50µl Conductive Disposable Tips, Filtered	60/pack (5,760 tips)	AS9301
Maxprep™ 3-Position Reagent Tube Holder	1 each	AS9409
Maxprep™ Plunger Holder	1 each	AS9408
Maxprep™ Reagent Reservoir, 50ml	28/pack	AS9304
Maxprep™ Waste Bags, Clear	100/pack	AS9305
Maxwell® RSC/CSC Deck Tray	1 each	SP6019
Maxwell® RSC/CSC 48 Front Deck Tray	1 each	AS8401
Maxwell® RSC/CSC 48 Back Deck Tray	1 each	AS8402
Maxwell® RSC Instrument	1 each	AS4500
Maxwell® RSC 48 Instrument	1 each	AS8500
1.1ml, Square-Well V-Bottom Deep Well Plate	25/pack	V6821

# Summary of Changes

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The following changes were made to the 10/21 revision of this document:

1. Cat.# AS9309 was added to Section 7.
2. Cat. AS8401 and AS8402 were updated in Section 7 to add “CSC”.
3. Cat.# AS9307 updated in Section 7 to add “(Sterile)”.

It is the manufacturer’s responsibility to provide equipment electromagnetic compatibility information to the customer or user.

It is the user’s responsibility to ensure that a compatible electromagnetic environment for the equipment can be maintained in order that the device will perform as intended.

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