Database and Security User Guide

January 2004

Contents

1 Introduction

This chapter:

- Tells you who should read this guide and what software versions it supports
- Gives an overview of the Velocity11® security and database software
- Explains how to move a database to another computer

About This Guide

Intended Audience

This guide is for everyone who uses the:

- ❑ VPrep®
- ❑ BioCel®
- ❑ BenchCel™
- ❑ VStack®

Relevant Software Versions

This version of the guide is for use with the following software components:

- ❑ Labware editor, versions 7.0 and 8.0
- ❑ Liquid library editor, version 3.0
- ❑ Security, version 3.0

Note: Labware editor version 8.0 is identical to version 7.0 except for the addition of two properties used with the BenchCel. These are "Gripper holding lidded plate position" and "Gripper holding lid position."

Finding Your Software Versions

BioCel, BenchCel and VPrep

For the BioCel, BenchCel and VPrep you can find the version numbers of your software components after installing the protocol controlling software, VWorks™, BenchWorks™ or PrepWorks™, respectively.

To find a component's version number using protocol-controlling software:

1. In your Velocity11 application, select **Help > About <*application name*>.**

   The version numbers of the components are listed.

VStack

For the VStack, there is no protocol controlling software and you have to locate the files for the individual components.

To find a component's version number from its file:

1. In your Windows® operating system, search for one of the following files:
   - ◆ V11security.dll
   - ◆ V11labware.dll
   - ◆ V11liquids.dll
2. Right-click the file and select **Properties**.
3. In the **<*filename*> Properties** dialog box, click the **Version** tab.

   The version number is displayed.

What Else To Read

In addition to this guide, read the user guide for your Velocity11 product.

What This Guide Covers

This guide covers:

- ❑ Moving databases between computers
- ❑ Managing passwords and permissions for your protocol controlling software
- ❑ Configuring the labware database
- ❑ Configuring the liquid library database

About Database and Security Components

Software Components

The Velocity11 database and security functions are managed by software components that are shared across Velocity11 products. The software components are small applications named:

- ❑ V11security.dll
- ❑ V11labware.dll
- ❑ V11liquids.dll

User Interfaces

BioCel, BenchCel and VPrep

Each of the three software components has a user interface to collect information that you enter, which is then stored in a database. The user interfaces are accessed through the protocol controlling software for the product you are using, in other words, either VWorks, BenchWorks or PrepWorks.

VStack

When it is used in stand-alone mode, the VStack does not have protocol controlling software equivalent to VWorks, BenchWorks or PrepWorks — it can only be operated in real time. In this situation, you can access the labware and liquid library components through the VStackBioNet Diagnostics software. For more information, see "Diagnostics Software" on page 4 below.

Note: The security component is not used by the VStack in stand-alone mode.

Diagnostics Software

You can also access the labware and liquid library components directly through the ActiveX diagnostics software when setting up manual, real-time control of your product.

For more information about how to access the diagnostics software, see the user guide for your product.

Moving a Database to Another Computer

Who Should Read This Section

Read this section if you are an administrator for your lab automation system.

About Shared Databases

The labware and liquid library databases are maintained in the Windows registry of the controlling computer.

When you use platform software (VWorks or BenchWorks) to make a change to a database, the same change is seen when accessing the database from the networked module's software (PrepWorks or VStackBioNet Diagnostics software). This is because the platform software and module software run on the same controlling computer and access the same databases.

About Moving Data

If you make changes to a database, and want to propagate those changes to products that have different controlling computers, you need to export the Windows registry keys that contain the data to a file and then import the file to the registry of the other computers.

Exporting a Registry Key

To export a Windows registry key:

1. From the Windows **Start** menu, select **Run**.
2. In the **Open** text box, type `regedit`.
3. Click **OK**.

   The Windows registry editor opens.
4. Expand folders to display the following folder:

   HKEY_LOCAL_MACHINE\SOFTWARE\Velocity11\Shared
5. Expand the Shared folder and select either:
   - Labware
   - Liquid Library
6. From the **Registry** menu, select **Export Registry** File.

   The **Export Registry File** browse box opens.
7. Navigate to the folder in which you want to save the file.
8. In the **File name** text box, type a name of your choice for the file.
9. If you are moving the file to a computer with a different Windows operating system, select the appropriate recipient operating system from the **Save as type** list box, if one is available.
10. Click **Save**.
11. Select **Registry** > **Exit** to close the registry editor.

Importing a Registry Key

To import a Windows registry key:

1. Copy the registry file to any location on the recipient computer.
2. On the recipient computer, double-click the registry file.

2 Security

Read this chapter if you use a:

- ❑ VPrep®
- ❑ BioCel®
- ❑ BenchCel™

The chapter explains user accounts and privileges, and gives procedures for logging in, setting your own password, and administering privileges.

User Accounts and Privileges

Introduction

You must have a user account to log in to PrepWorks™, VWorks™ or BenchWorks™ software. Your user account is associated with a user role that determines the privileges you have to perform particular functions within the software.

If you are an administrator and need to know how to create a user account, refer to "Adding and Deleting User Accounts" on page 10.

The Effect of Privileges

If you do not have the privilege to perform a function associated with a particular menu command, the text of the command is gray.

If you do not have the privilege to perform functions associated with a tabbed page, the tab is not visible to you.

In some cases, if you do not have the privilege to perform an operation, when you attempt the operation you will get an error message telling you that your privileges are insufficient.

User Roles and Privileges

User roles enforce the following privileges:

User Role	Has Privileges To...
Velocity11®	Perform any function. Used by Velocity11® personnel only.
Administrator	❑ Perform Technician functions (see below). ❑ Manage devices through the device manager. ❑ Create and delete user accounts.
Technician	❑ Perform Operator functions (see below). ❑ Create and save protocols. ❑ Edit the labware database and liquid library database.
Operator	❑ Perform Guest functions (see below). ❑ Operate devices in real time using diagnostics software.
Guest	Run existing protocols.

Logging In and Changing Your Password

User Account

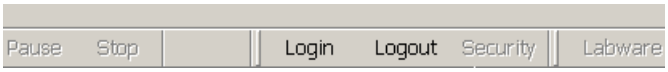
To log in to VWorks, PrepWorks, or BenchWorks you need a user account, created by an administrator. For more information about user accounts, see "User Accounts and Privileges" on page 8.

Logging In

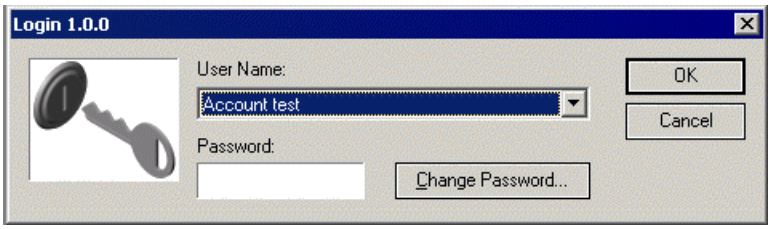
To log in to your application:

1. Click the **Login** button.

   The **Login** button for PrepWorks is shown below.



2. Select your account **User Name** from the list box.



3. Enter your password and click **OK**.

Changing Your Password

You can change the password for your user account at any time.

To change your user account password:

1. Follow the procedure in Logging In above to open the **Login** dialog box.
2. Click the **Change Password** button.
3. In the **Change Password** dialog box:
   a. Type your old password in the **Old** text box.
   b. Type your new password in the **New** text box.
   c. Type your new password again in the **Confirm New** text box.
   d. Click **OK** to close all dialog boxes.

Adding and Deleting User Accounts

Introduction

Administrators create accounts to enforce privileges for different levels of users.

!! IMPORTANT !! If you do not assign a password to a user, a blank password will automatically be assigned. This means that anybody can log in.

For more information about privileges, see "User Accounts and Privileges" on page 8.

Adding a User Account

You must be logged in as an administrator to add a user account.

To add a user account:

1. Either:
   - Select **Tools** > **Manage Users** (VWorks and BenchWorks).
   - Click **Security** (PrepWorks).
2. In the **User Editor** dialog box, click **Add**.
3. In the **User Name** text box, type a name for the user.
4. From the **Access Level** list box, select the privilege that you want to assign to the user.
5. Assign a password:
   a. Click **Change Password**.
   b. Enter a password in the **New** text box.
   c. Re-type the password in the **Confirm New** text box.
   d. Click **OK**.
6. Click **OK**.

Deleting a User Account

You must be logged in as an administrator to delete a user account.

To delete a user account:

1. Either:
   - Select **Tools** > **Manage Users** (VWorks and BenchWorks).
   - Click **Security** (PrepWorks).
2. In the **User Editor** dialog box, click **Delete**.
3. In the **Confirm Delete** dialog box, click **Yes**.

   The password is deleted.

3 Labware Database

Read this chapter if you have a user account with privileges of Technician or higher and operate the:

- ❑ BenchCel™
- ❑ BioCel®
- ❑ VStack®
- ❑ VPrep®

Labware Editor Functions

Introduction

The labware editor is a user interface through which users with login privileges of Technician or higher enter basic information about microplates. This information is stored in the Velocity11® labware database, which is maintained in the Windows® Registry. From there, it is referenced by the software used to run the VPrep, BenchCel, BioCel and VStack.

In the broadest sense, the labware editor and labware database work together to:

- ❑ Store values that define the physical properties of microplates
- ❑ Define labware classes

About Properties

Plates have physical properties, such as width, length, number of wells, well depth, well-bottom shape, and so on. These correspond to properties in the labware database. When you need to describe a new type of plate, in the labware editor you enter or select a specific value for each relevant property.

Without the labware database you would have to enter values for the many properties associated with a plate each time you set up a protocol, or run certain real-time diagnostics commands.

With the labware database, all you have to do is select the type of plate to use. All of the data you need is then supplied by the labware database through the association of the property values with the type of plate. This assumes, of course, that the data has been pre-entered into the database.

About Labware Classes

Labware classes are only used with the Velocity11 platform products: the BioCel and BenchCel.

Labware classes are used in combination with the device manager of VWorks™ or BenchWorks™ to restrict which types of labware can be used on which devices during a protocol run. This helps to prevent wasted runs and damage to the modules on the platform. An example of how damage can be prevented by labware restriction is where a tipbox that is too tall for a device crashes into the device as the robot delivers it.

Components That Use the Labware Database

To summarize, the labware database's class information is used by the:

- ❑ BioCel VWorks software
- ❑ BenchCel BenchWorks software

The labware database's plate property information is used by the:

- ❑ BioCel VWorks software, to run protocols using multiple lab automation modules, such as a centrifuge and plate sealer
- ❑ BenchCel BenchWorks software, to run protocols using multiple lab automation modules, such as a centrifuge and plate sealer
- ❑ VPrep PrepWorks™ software, to run protocols on the VPrep in stand-alone mode
- ❑ VStack VStackBioNet diagnostics software, to perform operations in real time

Note: The labware database cannot be used by third-party systems into which Velocity11 modules are integrated.

Use of Properties

Each component that uses the labware database only uses some of the database properties. For each property described in this guide, the components that use it are listed.

Software Overview

Labware Editor Pages

The labware editor has two tabbed pages:

- ❑ Labware Entries
- ❑ Labware Classes

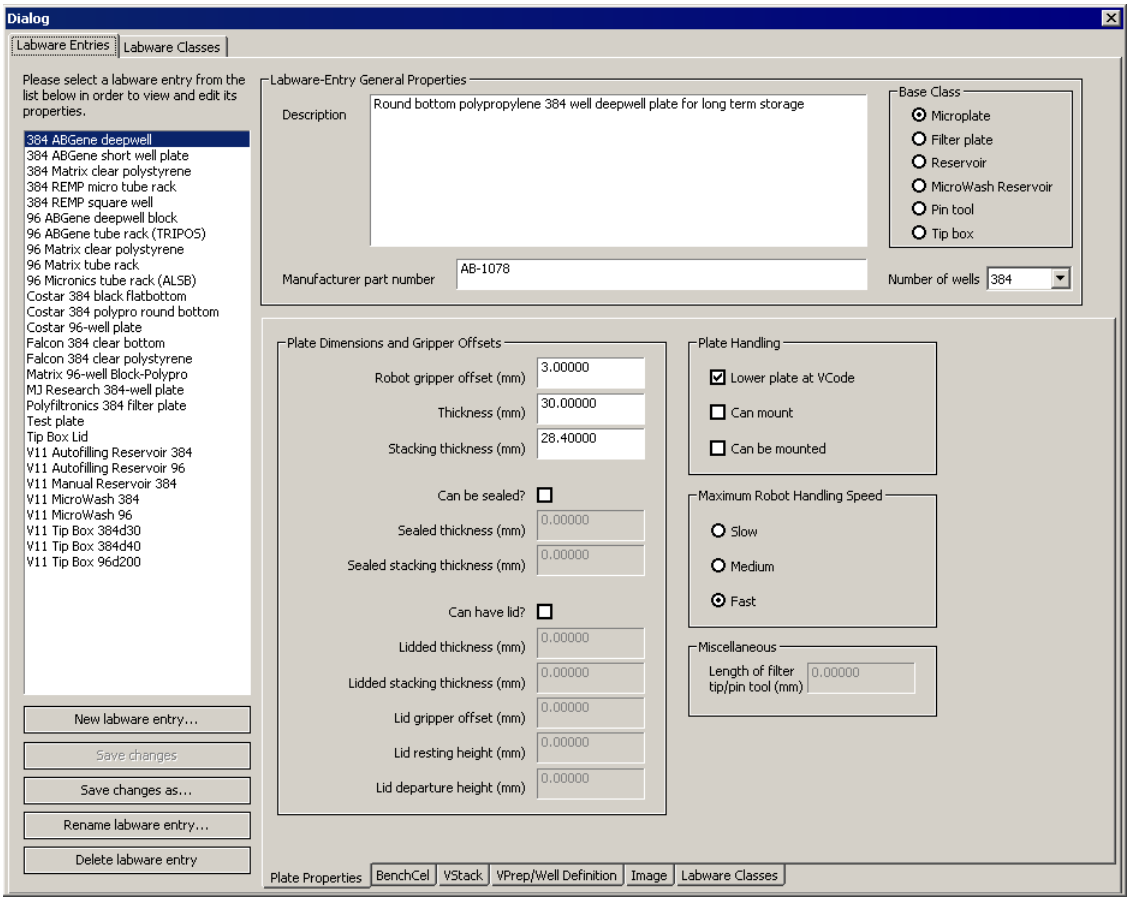
Note: The labware selection box, which is the left-hand column, is the same on each page.

Labware Entries Page

The Labware Entries page has six sub-pages:

- ❑ Plate Properties
- ❑ BenchCel
- ❑ VStack
- ❑ VPrep/Well Definition
- ❑ Image
- ❑ Labware Classes

The sub-tabs are located at the bottom of the page.



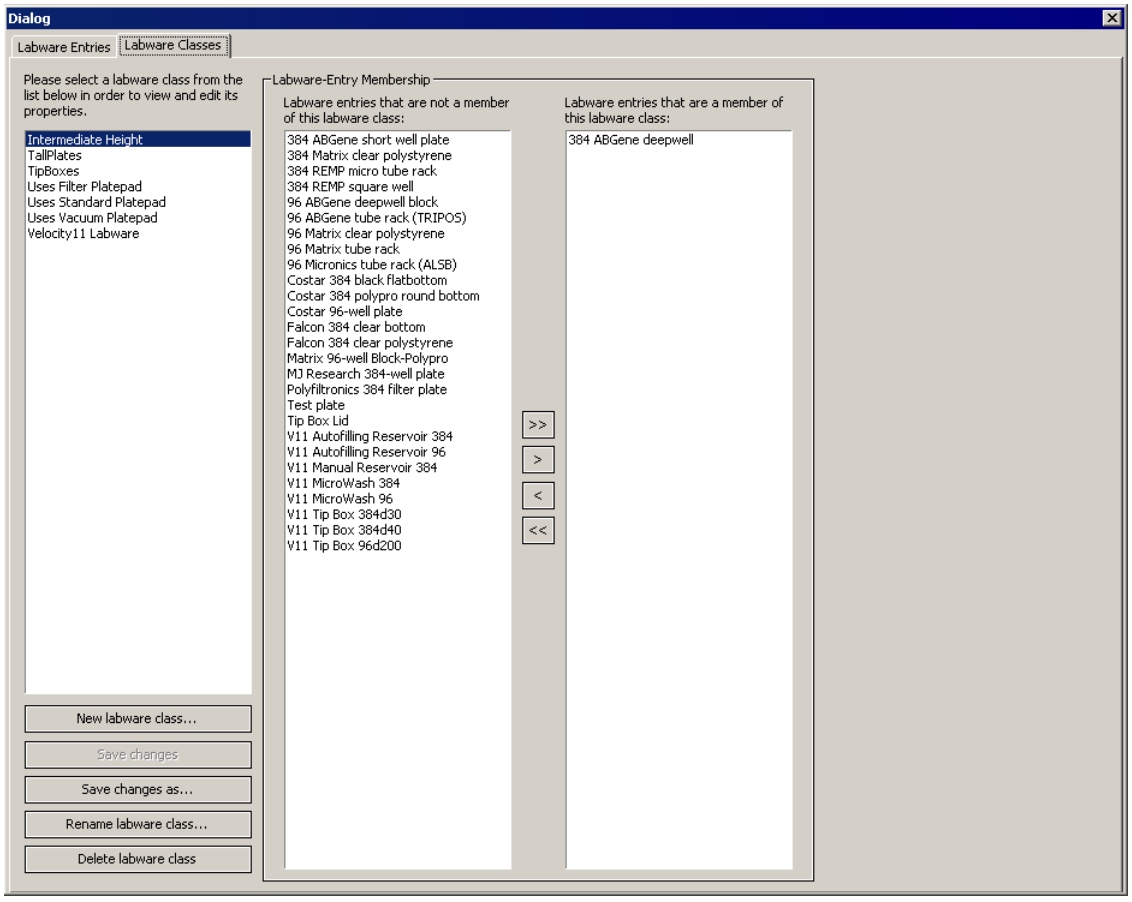
You only need to use the VStack and VPrep/Well Definition sub-pages if you are using those particular products.

If you are using the BenchCel, you will need to use both the BenchCel and VStack tabs.

Note: Each of the sub-pages has an identical Labware-Entry General Properties group box.

Labware Classes Page

For general information about labware classes, see "About Labware Classes" on page 12.



Labware Standards

!! IMPORTANT !! All labware (including deepwell and PCR plates) used with Velocity11 products must conform to the SBS microplate standards. Please visit www.sbsonline.org/msdc/crevs.html **for current SBS standards, or contact your labware's manufacturer.**

Overview of Defining Plates

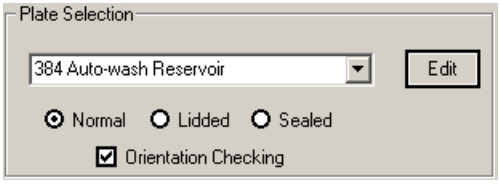
Plate Selection List Box

If a plate you want to use is not already defined in the labware database you will need to define it yourself.

To find out if a type of plate is already defined:

1. In VWorks, PrepWorks, BenchWorks or VStackBioNet diagnostics software, locate the **Plate Selection** list box.

   The **Plate Selection** list box for the VStack is shown below. Consult the user guide for the product you are using for more information about how to select a plate.



2. Click the down arrow on the text box and look for the name of the plate.

   If there is no entry for the plate, it is not defined.

Overall Process

To define a plate you:

1. Add a labware entry.
2. View each sub-page of the Labware Entries page in turn, entering values that are appropriate for the product you are using.
3. If you are using the BioCel or BenchCel, use the Labware Classes page to optionally associate the labware with one or more labware classes

Adding a Labware Entry

Introduction

The first step in defining a new plate type is to add a labware entry for the plate.

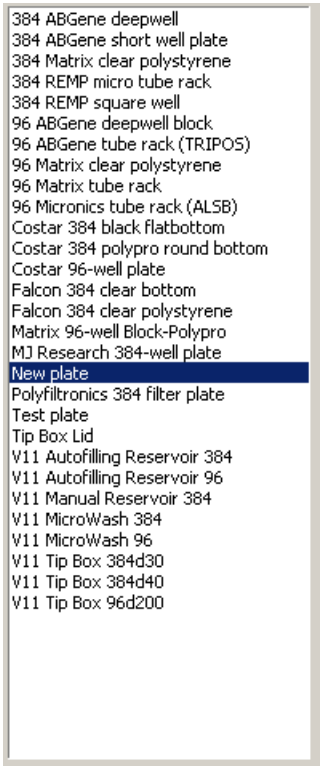
For an overview of defining a plate type, see "Overview of Defining Plates" on page 16.

Procedure

To add a labware entry:

1. Refer to the user guide for the product you are using for how to open the labware editor.
2. In the labware selection box on the left of the window, click **New labware entry**.
3. In the **New labware entry** dialog box, enter a name for the plate.

   The entry appears in the labware selection box.



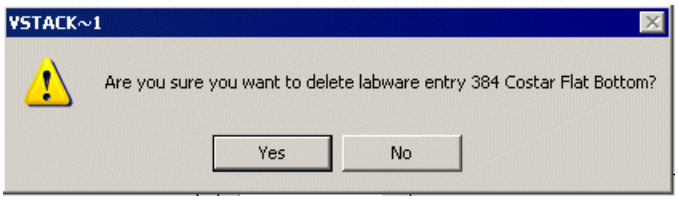
Deleting a Labware Entry

Procedure

If there is a labware entry that you no longer need, you can delete it.

To delete a labware entry:

1. Refer to the user guide for the product you are using for how to open the labware editor.
2. In the labware selection box on the left of the window, select the labware entry to be deleted.
3. Click **Delete labware entry**.
4. Click **Yes** to delete the labware entry.



Renaming a Labware Entry

Introduction

You can change the name of a labware entry. In general, this is something you might do if you just named a labware type and decided to give it a different name.

!! IMPORTANT !! If you rename a labware entry that is already referenced in protocols, the link between the protocol and the labware data will be broken and the protocol will not run.

Procedure

To change the name of a labware entry:

1. Refer to the user guide for the product you are using for how to open the labware editor.
2. In the labware selection box on the left of the window, select the labware entry to be deleted.
3. Click **Rename labware entry**.
4. In the **New Labware Entry** dialog box, enter the new name for the plate and click **OK**.
5. Click **Yes** in the confirmation dialog box.

Copying a Labware Entry

Introduction

To save time when creating a new entry that is similar to an existing one, you can copy an existing labware entry.

Procedure

To copy a labware entry:

1. Refer to the user guide for the product you are using for how to open the labware editor.
2. In the labware selection box on the left of the window, select a labware entry.
3. Click **Save Changes As**.
4. In the **Save Labware Entry** dialog box, type a name for the new entry that is different from the selected one, and click **OK**.

Defining General Properties

Introduction

After adding a labware entry, define the general properties of the plate.

For an overview of defining a plate type, see "Overview of Defining Plates" on page 16.

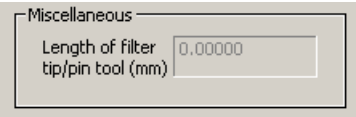
Procedure

To define general properties:

1. In the **Description** text box, optionally type in a description of the plate.
2. For your reference, in the **Manufacturer part number** text box, enter the part number for the plate.
3. In the **Base Class** group box, select one of the options.

   Note that there is no relationship between the **Base Class** and labware classes.

   The option you select determines which labware editor properties are available for you to enter values. For example, when a base class of **Microplate** is selected, the **Length of filter tip/pin tool (mm)** property is unavailable.



4. From the **Number of wells** list box, select the number of wells in the plate.

Defining Plate Properties

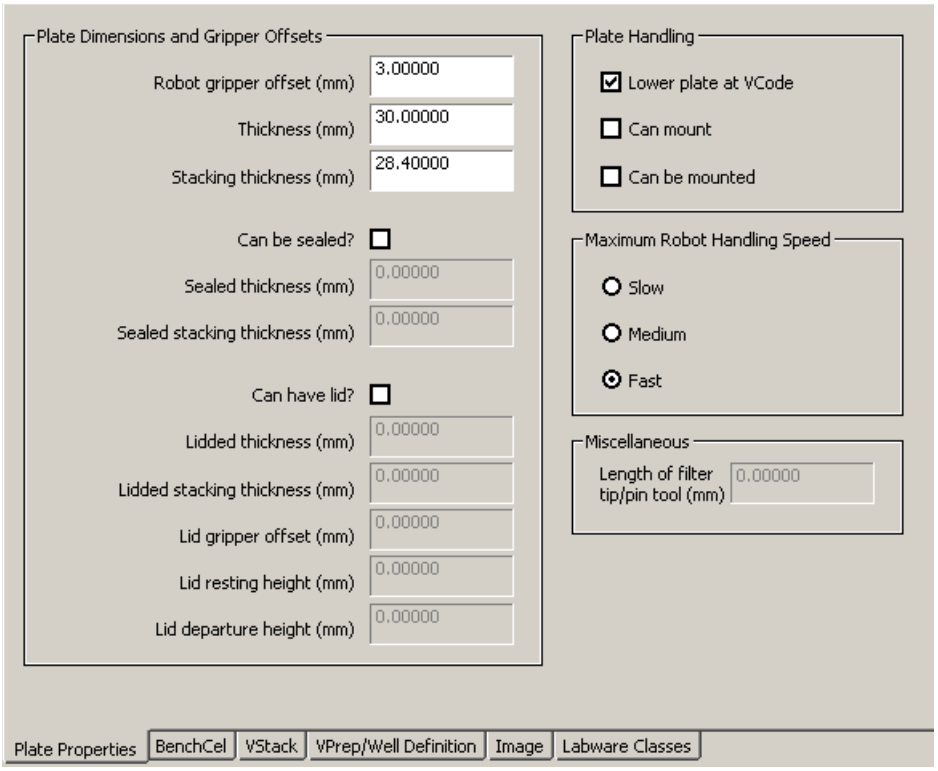
Introduction

For an overview of defining a plate type, see "Overview of Defining Plates" on page 16.

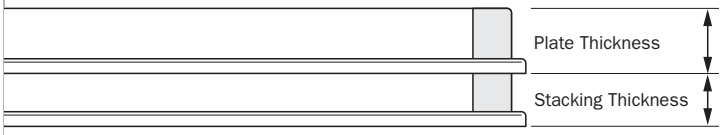
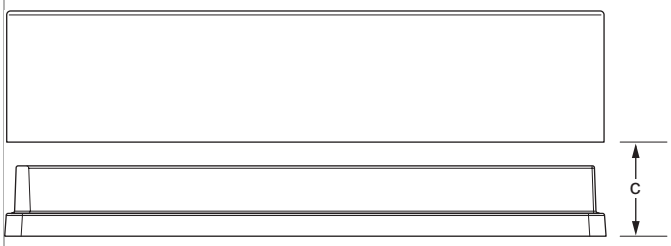
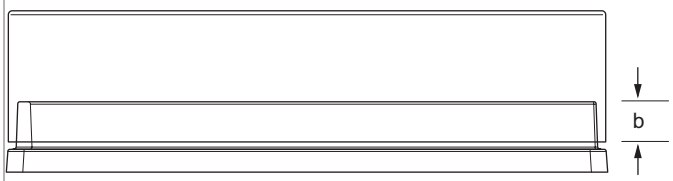
All plate properties, with the exception of the Robot gripper offset, apply to both VWorks and BenchWorks. The Robot gripper offset on this sub-page only applies to VWorks.

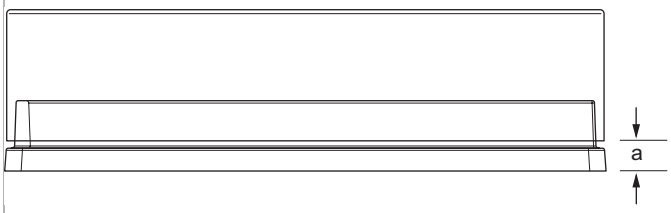
Plate Properties

The properties on the Plate Properties sub-page are described in the following screenshot and table.



Property	Description
Robot gripper offset	Height of the gripper above any teachpoint when the BioCel robot is picking or placing a plate of this type. The value is typically 0–3 mm. This property is used by VWorks when running protocols. The similar gripper offset property in the BioCel Robot Diagnostics software performs the same function when picking and placing using diagnostics software. The robot gripper offset property on the BenchCel sub-page performs an equivalent function for the BenchCel.
Thickness	The distance, in millimeters, from the bottom surface of the plate to the top surface of the plate. Measure using calipers.

Property	Description
Stacking thickness	The thickness, in millimeters, of two stacked plates minus the thickness of one plate (see above row). Measure using calipers. Example: Thickness of two stacked plates (x) = 23.14 mm Thickness of one plate = 14.14 mm Stacking thickness: 23.14 mm - 14.14 mm = 9.00 mm 
Can be sealed?	Select if the plate can be sealed.
Sealed thickness	Thickness of the plate with a seal in place. Available only if **Can be sealed?** is selected.
Sealed stacking thickness	Stacking thickness of the plate with the a seal in place. Available only if **Can be sealed?** is selected.
Can have lid?	Select if the plate can have a lid.
Lidded thickness	Thickness of the plate with a lid in place. Available only if **Can have lid?** is selected.
Lidded stacking thickness	Stacking thickness of the plate with the a lid in place. Available only if **Can have lid?** is selected.
Lid departure height	Height above the bottom of the plate to which the lid is lifted. 
Lid gripper offset	Height above the lid resting height at which to grip the lid. 

Property	Description
Lid resting height	Height above the bottom of the plate at which the bottom of a plate lid rests. 
Lower plate at VCode®	Select if the plate has a thick skirt and must be lowered when on the stage of the VCode. This allows the VCode to place the bar code above the thick skirt.
Can mount	Select if the plate can be placed on top of another plate. This property is for filter plates that are placed on top of waste plates during filtration steps of a protocol. An example filter plate is the Whatman DNA Binding Plate.
Can be mounted	Select if another plate can be placed on top of this plate. This property is for waste plates that collect filtrate from filter plates during the filtration steps of a protocol. Many different plates may be able to fit under any one type of filter plate. **!! IMPORTANT !! The wells of the waste plate must have a large enough diameter that the filter plate does not stick on the waste plate. The robot must be able to pick up the filter plate without the waste plate lifting up with it.**
Maximum robot handling speed	Defines the maximum speed at which this type of plate should be run. General robot speed is set in other software, such as VWorks. If the plate-specific robot speed (set here) is different from the general robot speed, the slower of the two speeds prevails.
Length of filter tip/pin tool	Use calipers to measure the length (in millimeters) of the filter tip or pin tool in filter and pintool plates.

Defining BenchCel Properties

Introduction

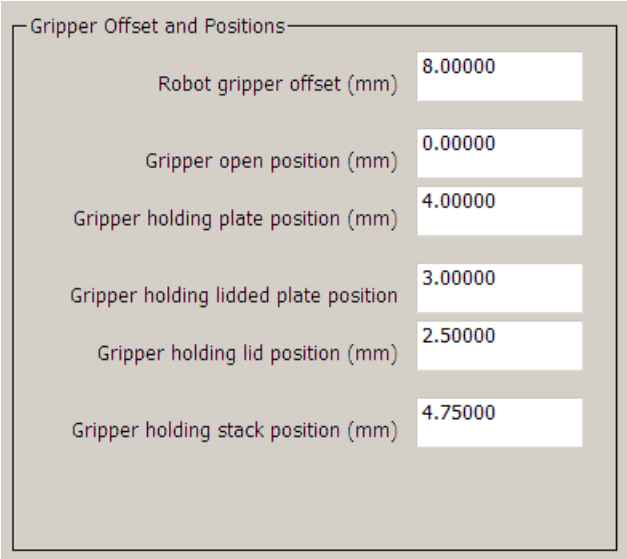
Read this section if you use a BenchCel.

Note: If you use a BenchCel, you must also define VStack properties because they apply to the built in stackers of the BenchCel.

For an overview of defining a plate type, see "Overview of Defining Plates" on page 16.

Properties

The properties on the BenchCel sub-page are described in the following screenshot and table. All of the properties on this sub-page only apply to the BenchCel.



Property	Description
Robot gripper offset	Distance above the bottom of the plate that the robot should grab the plate. Note: The robot gripper offset property on the Plate Properties sub-page performs an equivalent function for the BenchCel.
Gripper open position	Distance between the widest possible robot gripper position and the position at which the grippers are considered to be open.
Gripper holding plate position	Distance between the widest possible robot gripper position and the position at which the grippers hold a plate.
Gripper holding lidded plate position	This value is not currently used; if you enter a value it will have no effect.
Gripper holding lid position	Distance between the widest possible robot gripper position and the position at which the grippers close to hold a lid.
Gripper holding stack position	Distance between the widest possible robot gripper position and the position at which the grippers close to when they are holding a stack of plates.

Defining VStack Properties

Introduction

Read this section if you use a VStack or BenchCel.

Some VStack properties are used to make adjustments that avoid having to change teachpoints, which might otherwise cause problems.

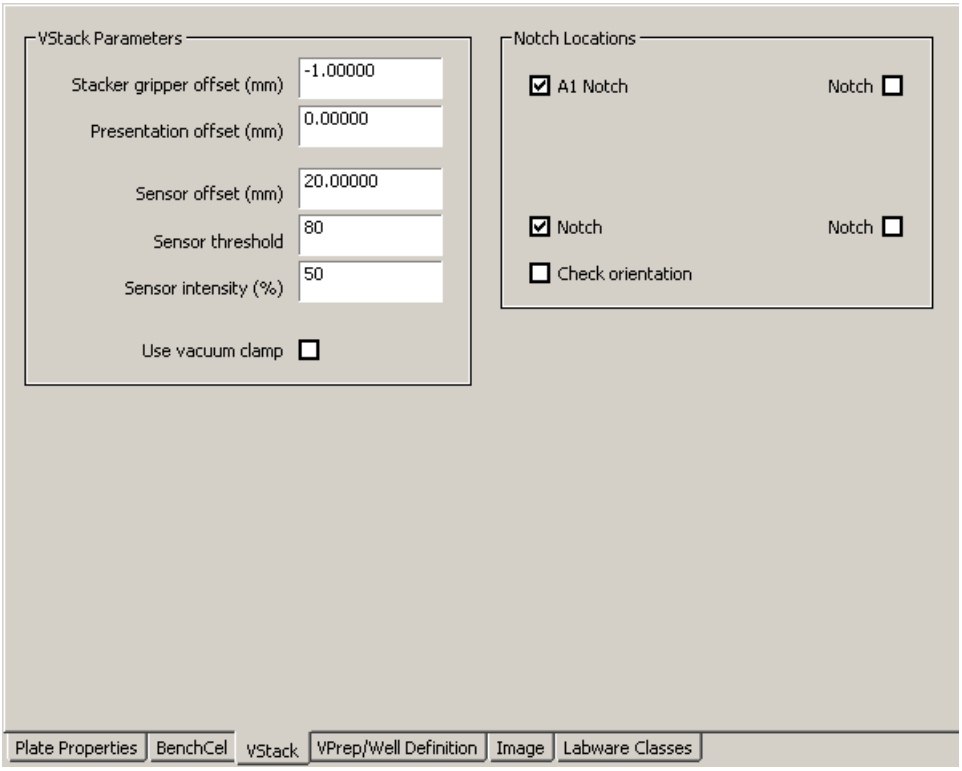
!! IMPORTANT !! Do not change the value of any teachpoint.

For more information about the VStack, see the *VStack User Guide*.

For an overview of defining a plate type, see "Overview of Defining Plates" on page 16.

Properties

The properties on the VStack sub-page are described in the following screenshot and table.



Property	Description	Applies To...
Stacker gripper offset	Adjusts the height at which the plate stage stops for the grippers to grip the plate, with respect to the: ❑ Grip teachpoint, in the case of the BioCel ❑ Bottom of the plate, in the case of the BenchCel Change this value only if the VStack or BenchCel stacker is not gripping the plates correctly. The VStackBioNet Diagnostics software's Plate specific grip offset property is a proxy of this Stacker gripper offset property. This means that if you change the value of the Stacker gripper offset in the labware editor, the same change is made in the Plate specific grip offset for that particular type of plate. The reverse is also true. It may be more convenient for you to always change this value in the labware editor instead of the VStackBioNet Diagnostics software. For more information about changing this value in the VStack, see the *VStack User Guide*.	VStack, BenchCel
Presentation offset	You should never need to change this value. Used by the BioCel VWorks software only. Adjusts the height of the VStack plate stage with respect to the presentation teachpoint associated with that VStack in VWorks.	VStack
Orientation sensor offset (named Sensor offset in earlier versions of the labware editor)	Adjusts the height at which the orientation checking sensors "view" the plate, with respect to the: ❑ Sensor teachpoint, in the case of the VStack ❑ Bottom of the plate, in the case of the BenchCel If the sensor offset is 0 mm, the bottom of the plate during orientation checking should be in the same plane as the sensors. The VStackBioNet Diagnostics software's Plate specific orientation sensor offset property is a proxy of this Orientation sensor offset property. This means that if you change the value of the Orientation sensor offset in the labware editor, the same change is made in the Plate specific orientation sensor offset for that particular type of plate. The reverse is also true. It may be more convenient for you to always change this value in the labware editor instead of the VStackBioNet Diagnostics software. Adjusting this value avoids having to adjust the actual Orientation Sensor teachpoint. For more information about changing this value in the VStack, see the *VStack User Guide*.	VStack, BenchCel

Property	Description	Applies To...
Orientation sensor threshold (named Sensor threshold in earlier versions of the labware editor)	Determines the intensity of the detected light at which the VStack senses a notch when the plate stage is in the Orientation sensor position. If the VStack does not sense a notch when it should, adjust the sensor threshold value. Instructions for testing this setting are given in the *VStack User Guide*.	VStack, BenchCel
Sensor intensity	Sets the percentage of maximum sensor lamp intensity for all sensors. If the sensor intensity is set too low, a plate will not be detected even though one is present. If it is set too high, the sensors may become saturated, causing failure to detect the orientation of a plate. This property adjusts for the fact that clear, black, and white plates reflect light differently. For example, white plates generally reflect more light so the sensor intensity should be set lower.	VStack, BenchCel
Use vacuum clamp	Not currently used.	Not applicable
Notch locations	With the A1 well of your plate positioned in the far, left corner as you face the BenchCel, or from the perspective of the robot in the case of the VStack, select the corresponding notch or notches for your plate in the **Notch Locations** group box.	VStack, BenchCel
Check orientation	When checked, turns on plate orientation checking for the BenchCel. Note: This value is ignored by VStacks. It is unrelated to the Orientation checking check box in the VStackBioNet Diagnostics software.	BenchCel

Adjusting the Sensor Intensity

Refer to the *VStack User Guide* or *BenchCel User Guide* for how this procedure fits into the overall process of configuring the VStack.

To adjust the sensor intensity:

1. Open the VStackBioNet Diagnostics software.

   For directions, see the *VStack User Guide*.
2. Make sure that there is a plate with a single notch on the plate stage.
3. Select the plate type that you are using from the **VStackBioNet Diagnostics** window.

   For directions, see the *VStack User Guide*.
4. In the **VStackBioNet Diagnostics** window, click **Move Here** for the Orientation Sensor teachpoint.
5. Open the labware editor.

   For directions, see the *VStack User Guide*, *BioCel User Guide* or *BenchCel User Guide*.
6. In the **Labware Entries** page, click the **VStack** tab.

7. In the **VStack Parameters** group box, adjust the **Sensor intensity** percentage.

   The goal is to maximize the difference between the sensor intensity where there is a notch and the sensor intensity where there is no notch.

8. Click **Save Changes**.

Adjusting the Orientation Sensor Threshold

Refer to the *VStack User Guide* or *BenchCel User Guide* for how this procedure fits into the overall process of configuring the VStack.

To adjust the Orientation sensor threshold:

1. Open the VStackBioNet Diagnostics software.

   For directions, see the *VStack User Guide*.

2. Make sure that there is a plate with a single notch on the plate stage.
3. Select the plate type that you are using from the **VStackBioNet Diagnostics** window.

   For directions, see the *VStack User Guide*.

4. In the **VStackBioNet Diagnostics** window, click **Move Here** for the Orientation Sensor teachpoint.
5. Open the labware editor.

   For directions, see the *VStack User Guide* and *BioCel User Guide*.

6. In the **Labware Entries** page, click the **VStack** tab.
7. In the **VStack Parameter**s group box, adjust the **Sensor Threshold** value.

   This number should typically be the average of the left and right notch sensor readings.

   For example: **Left=** 10, **Right**=110, **Sensor Threshold**=60.

8. Click **Save Changes**.

Defining VPrep/Well Properties

Introduction

This section is only relevant if you are working with a VPrep.

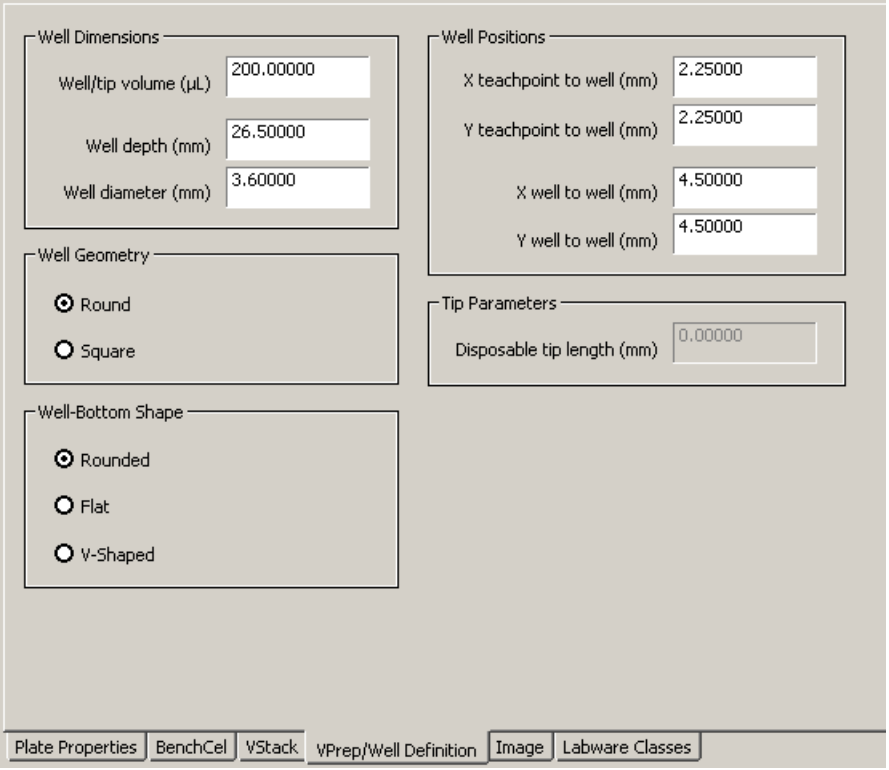
For more information about the pipetting station, see the *VPrep User Manual*.

For an overview of defining a plate type, see "Overview of Defining Plates" on page 16.

Measuring Wells

The properties on the VPrep/Well Definition sub-page are described in the following screenshot and table. Properties on this sub-page are only used for the VPrep.

Note: Use calipers to carefully measure the labware you are defining in the labware editor.



Property	Description
Well/tip Volume	Maximum volume of fluid for one tip or well, in microliters
Well depth	Distance from the top of the plate to the bottom of the well, in millimeters
Well diameter	Diameter of the well, in millimeters
Well geometry	Shape of the wells. Options are Round or Square.

Property	Description
Well-Bottom Shape	Shape of the well bottoms. Options are Rounded, Flat or V-Shaped.
X teachpoint to well	Distance from the teachpoint to the center of the A1 well along the *x* direction (number axis), in millimeters. This setting should be 0 mm for standard 96-well plates and 2.25 mm for standard 384-well plates.
Y teachpoint to well	Distance from the teachpoint to the center of the A1 well along the *y* direction (letter axis), in millimeters. This setting should be 0 mm for standard 96-well plates and 2.25 mm for standard 384-well plates.
X well to well	Distance from well-center to well-center in the *x* direction, in millimeters. This setting should be 9 mm for standard 96-well plates and 4.5 mm for standard 384-well plates.
Y well to well	Distance from well-center to well-center in the *y* direction, in millimeters. This setting should be 9 mm for standard 96-well plates and 4.5 mm for standard 384-well plates.
Disposable tip length	Length of the disposable tips being used, in millimeters.

Inserting an Image

Introduction

To make it easier for operators to identify a plate type, you can insert an image of each plate type in the labware editor.

Image files must be in the JPG, GIF or BMP format.

For an overview of defining a plate type, see "Overview of Defining Plates" on page 16.

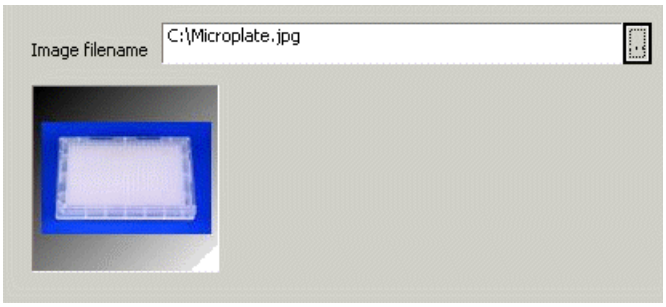
Procedure

To insert an image:

1. Click the ellipsis button (...), and browse to the folder location of the image file.

2. Click **Open** to insert the picture into the labware editor.

   The image appears below in the user interface.



Defining Labware Classes

Introduction

For an overview of defining a plate type, see "Overview of Defining Plates" on page 16.

Two Places To Define Classes

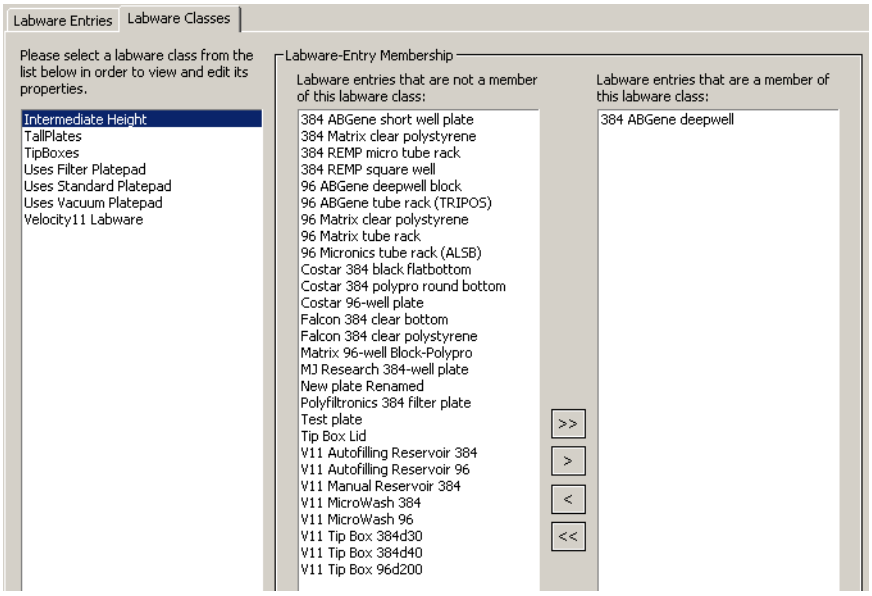
You can view and define which plate types are associated with which labware classes in two places:

- ❑ In the Labware Classes page
- ❑ In the Labware Classes sub-page of the Labware Entries page

These views present the same information in different ways.

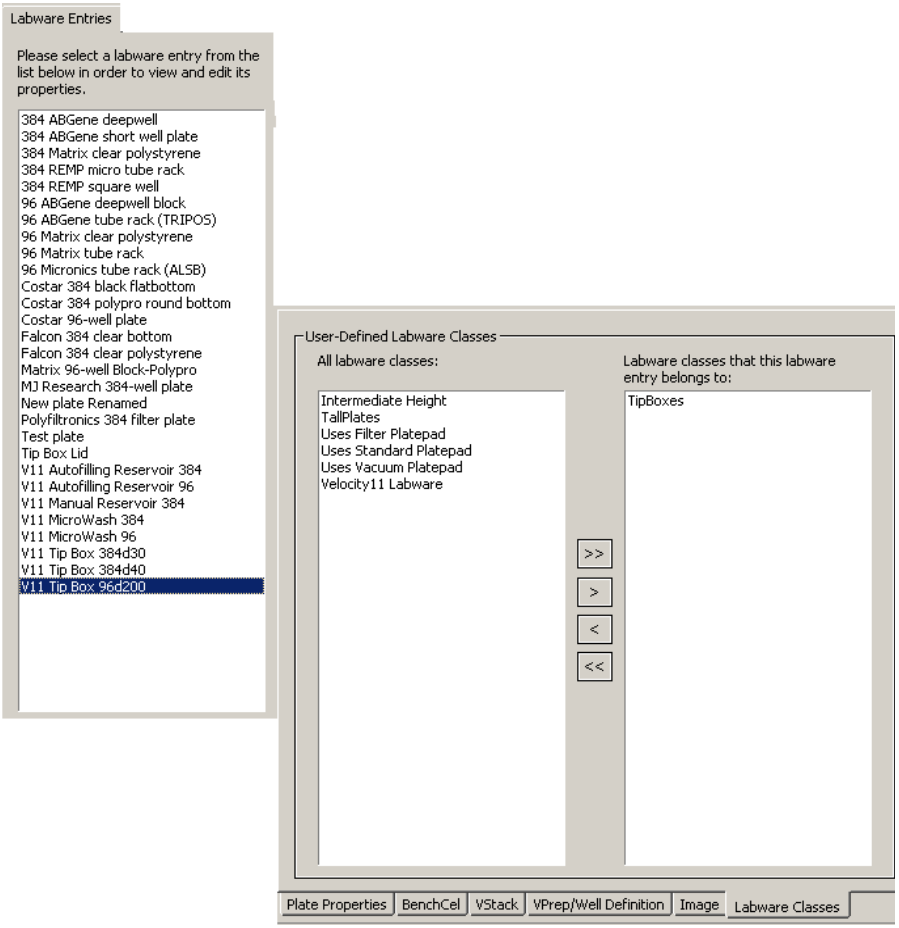
Labware Classes Page

In the Labware Classes page, if you select a class in the labware selection box on the left, the plate types that are members of that class are displayed in the right-hand column.



Labware Classes Sub-Page

In the Labware Classes sub-page, if you select a type of plate in the labware entry box on the left, the right-hand column displays the classes that it is a member of.



Procedure

To associate a type of plate with a labware class:

1. In the **Labware Classes** page or **Labware Classes** sub-page, select an item from the left list.

   To select more than one item, use SHIFT-click or CTRL + click. If you want to move all entries, do not select any entries and click > > .

2. Click > to move the labware entries or labware classes to the right-hand column.
3. Click **Save Changes** to save your changes or click **Save Changes As** to save them as a new labware class.
4. Click the close box to close the labware editor.

Liquid Library Database

4

Read this chapter if you operate the:

- ❑ BioCel® with a VPrep®
- ❑ BenchCel™ with a VPrep
- ❑ VPrep in stand-alone mode or with third-party automation software

If you are using the BioCel, BenchCel, or VPrep with PrepWorks™, you must have a user account with login privileges of Technician or higher to access this database.

This chapter describes the liquid library editor, which is used to set parameters that affect pipetting speed, accuracy and precision, and save the parameters as classes for convenient reuse. The liquid library editor is also used to calibrate the VPrep for pipetting accuracy.

About the Liquid Library Editor

Overview

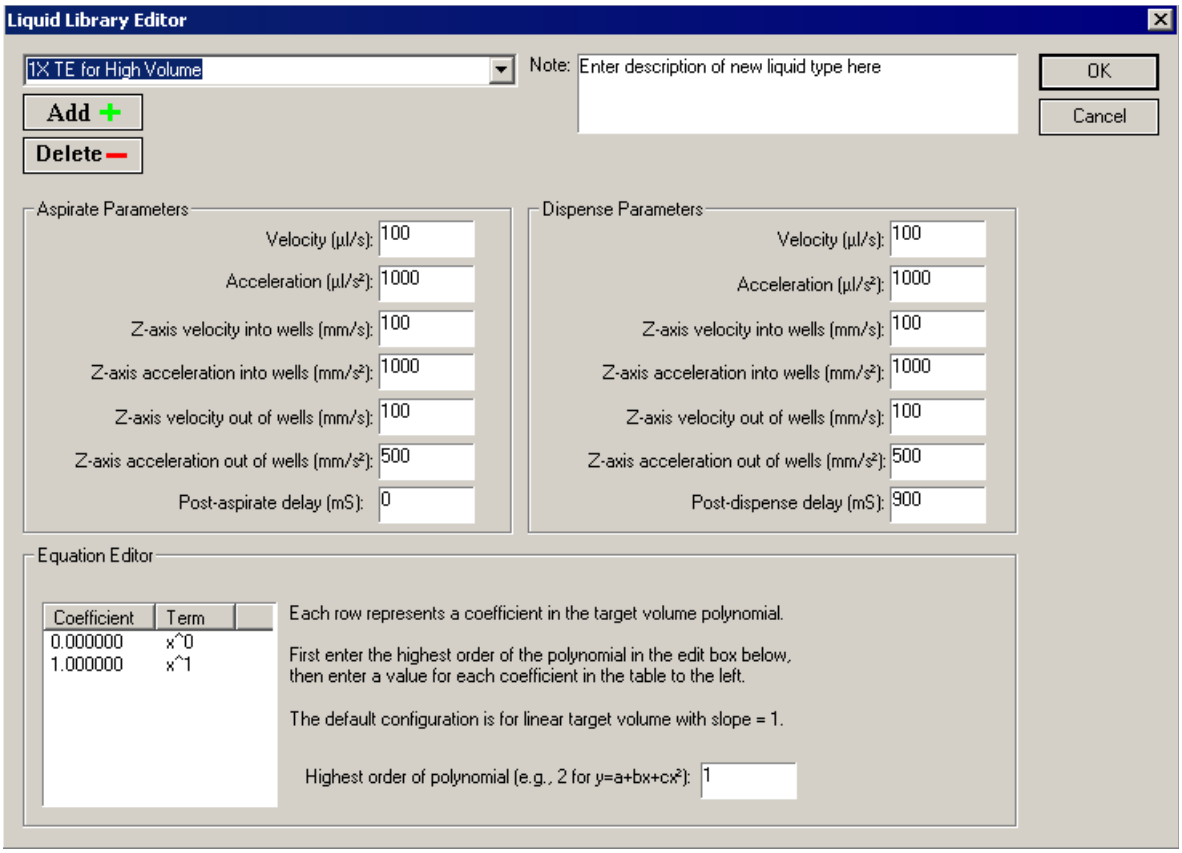
The liquid library editor is a user interface through which users with logon privileges of Technician or higher enter values for properties that affect pipetting speed, accuracy and precision. After you name (the liquid class name) the set of values you can save the data to Velocity11® liquid library database.

When preparing for a protocol run using a VPrep, BenchCel or BioCel, you select the liquid class that you want to use. Then, during the run, the liquid class values are referenced for pipetting operations.

The liquid library editor also has an equation editor that can be used to calibrate the VPrep.

Liquid Library Editor

The liquid library editor is a single window.



Setting Liquid Handling Properties

About Opening the Liquid Library Editor

Directions for opening the liquid library editor are different depending on the Velocity11 product you are using. For more information, consult the user guide for your product.

Adding and Configuring an Entry

!! INJURY HAZARD !! Velocity11 products are intended to be used with non-hazardous aqueous liquids. Please contact Velocity11 before using any non-aqueous solvents, or solvents generally considered to be hazardous.

To add an entry to the database:

1. Open the liquid library editor using the directions in the user guide for your product.

   You must have a Technician or Administrator user account.
2. Click **Add**.
3. In the list box at the top left, replace the text **New Liquid Type** with a name for the new liquid.

   This is the name of the liquid class.
4. In the **Note** text box at the top right, type a note describing the liquid library entry for your records.
5. Use the following table to enter values for the aspirate properties.

Aspirate Property	Definition
Velocity	Specifies the speed of the aspiration stroke, in microliters per second.
Acceleration	Specifies acceleration during the aspiration stroke, in microliters per second squared.
Z-axis velocity into wells	Specifies how fast the pipettor moves as the tips enter the wells, in millimeters per second.
Z-axis acceleration into wells	Specifies the acceleration of the pipettor as the tips move into the wells, in millimeters per second squared.
Z-axis velocity out of wells	Specifies how fast the tips leave the wells, in millimeters per second.
Z-axis acceleration out of wells	Specifies the acceleration of the pipettor as the tips move out of the wells, in millimeters per second squared.
Post-aspirate delay	Specifies the time the pipettor waits after aspiration is complete before moving the tips out of the wells, in milliseconds.

6. Use the following table to enter values for the dispense properties.

Dispense Property	Definition
Velocity	Specifies the maximum speed of the dispensing stroke, in microliters per second.
Acceleration	Specifies acceleration during the dispensing stroke, in microliters per second squared.
Z-axis velocity into wells	Specifies how fast the pipettor moves as the tips enter the wells, in millimeters per second.
Z-axis acceleration into wells	Specifies the acceleration of the pipettor as the tips enter the wells, in milliliters per second squared.
Z-axis velocity out of wells	Specifies how fast the pipettor moves as the tips leave the wells, in millimeters per second.
Z-axis acceleration out of wells	Specifies the acceleration of the pipettor as the tips leave the wells, in millimeters per second squared.
Post-dispense delay	Specifies the time the pipettor waits after the dispense stroke before moving the tips out of the wells, in milliseconds.

7. Click **OK**.

   The changes are now stored in the labware database.

Performing an Accuracy Calibration

Introduction

Pipetting accuracy is the ability to dispense an absolute volume of liquid. In practice, the volume that is actually dispensed by the VPrep may be different from the dispense volume that you select. This difference is the absolute error.

In some protocols, as long as you dispense an excess of liquid, the actual volume pipetted is not important. In other protocols pipetting accuracy can be a critical factor. You must remember, though, that every step of an experiment has error and there is no point taking the time to improve the accuracy of pipetting to four significant figures if another step in your protocol has error at the third significant figure.

If you are sure that the overall error of the experiment is limited by pipetting accuracy, and error at this number of significant figures makes a practical difference to your interpretation of the data, consider performing an accuracy calibration.

Method Overview

This section gives an overview of the method you can use to measure pipetting accuracy. It does not give a detailed procedure because that depends on exactly how you choose to conduct the experiment.

To calibrate the VPrep an independent method of measuring dispensed volume is required. One method would be to dispense a solution of fluorescein dye and measure the fluorescence emitted from each plate well.

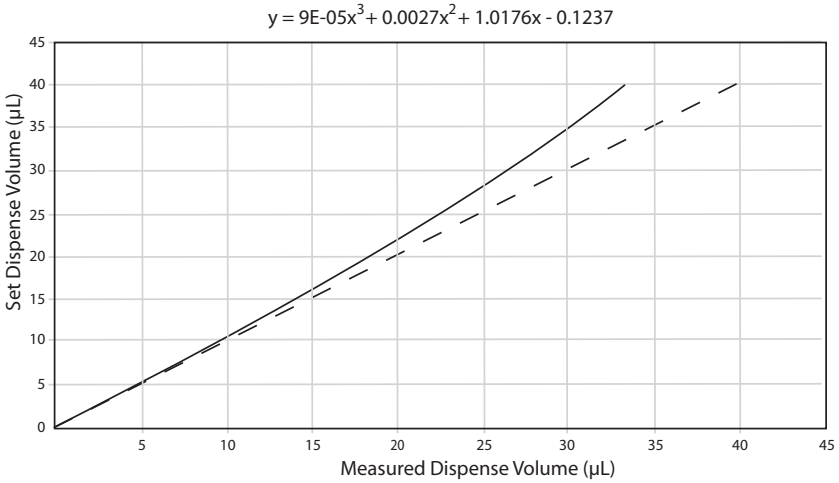
!! IMPORTANT !! Whichever method you use, verify that the error of the detection method is significantly smaller than the pipetting error. Otherwise, the error you detect may be due to the detection method and not the pipetting error.

The overall method is:

1. Perform a series of pipetting operations in which different volumes are pipetted.
2. Measure the volumes of dispensed liquid using the independent measuring method.
3. In a spreadsheet program, tabulate the dispense volumes that you set in the software against the measured volumes.
4. Plot a graph, with the set dispense volume on the y-axis and measured dispense volume on the x-axis.

   The plot will be a curve, reflecting the fact that absolute error is a function of the magnitude of the measurement.
5. Use the statistical functions of the spreadsheet program to fit a curve to the data.

   Your result may look like this:



The dashed line is a reference line, where the set dispense volume equals the measured dispense volume. The equation is the polynomial for the line, calculated by the spreadsheet program.

6. Enter the curve information into the equation editor of the liquid library editor.

If you repeat the experiment, you will find that the curve is much closer to a straight line. This is because the equation you entered adjusts the action of the servo motor that determines aspirate and dispense volumes, thereby calibrating the dispense.

Using the Equation Editor

The equation editor in the liquid library editor is where you enter the calibration curve data to correct for pipetting inaccuracy.

To enter a polynomial into the equation editor:

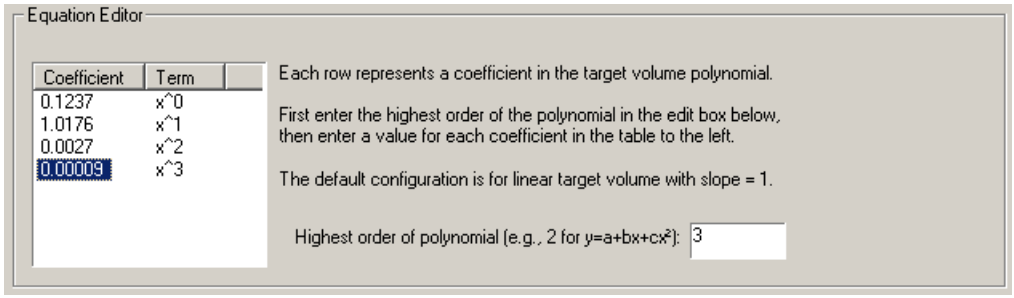
1. In the text box, enter the value for the highest order of the polynomial.

   This is the largest exponent in the equation and tells you how many terms are in the equation. For example, if the highest order of the polynomial is 3, the equation will have the general form: $y = a + bx + cx^2 + dx^3$, and four terms. With an exponent of three, four rows are added to the equation editor table.

2. In the equation editor table, in turn, enter the coefficient and exponent for each of the terms in the equation, starting with the zero order term.

   To enter a value, single-click the **Coefficient** table row twice. Note that the exponents are already entered for you and cannot be edited.

   The following example is for the curve displayed in the graph above.


Equation Editor
Coefficient
Term
0.1237
x^0
1.0176
x^1
0.0027
x^2
0.00009
x^3
Each row represents a coefficient in the target volume polynomial.
First enter the highest order of the polynomial in the edit box below, then enter a value for each coefficient in the table to the left.
The default configuration is for linear target volume with slope = 1.
Highest order of polynomial (e.g., 2 for y=a+bx+cx²):
3

3. Click **OK**.

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