BenchWorks Automation Control

User Guide

Agilent Technologies

Notices

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Letter to our Customers

Dear Customer,

The Agilent Technologies acquisition of Velocity11 resulted in the following changes:

- Creation of Agilent Technologies Automation Solutions, formerly Velocity11
- Renaming of some Velocity11 products
- New Customer Service and Technical Support contact information
- New website address for product information

Please make a note of the following changes as they impact this user guide.

Velocity11 product name changes

Velocity11 product name	Changes to ...
Access2 Automated Microplate Loader	Automated Centrifuge Loader
Element Automation System	BioCel 900 System
IWorks Device Driver Programming Interface	VWorks Device Driver Interface
PlatePierce Seal Piercing Station	Microplate Seal Piercer
VCode Barcode Print and Apply Station	Microplate Barcode Labeler
Velocity11 Robot	3-Axis Robot
VHooks Integration Interface	VWorks Hooks Interface
VPrep Pipetting System	Vertical Pipetting Station
VSpin Microplate Centrifuge	Microplate Centrifuge
VStack Labware Stacker	Labware Stacker

New contact information

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Contents

Preface

This chapter introduces the *BenchWorks Automation Control User Guide*.

To operate the BenchCel Workstation, become familiar with the procedures in this guide as well as the guides for the devices installed on your BenchCel Workstation. This chapter contains the following topics:

Who should read this guide

Job roles

This user guide is for people with the following job roles:

Job role	Responsibilities
Integrator	Someone who configures software and hardware to allow integration of the BenchCel Workstation into a larger lab automation system.
Installer	Someone who unpacks, puts together, and tests the BenchCel Workstation before it is used.
Lab manager, administrator, or technician	Someone who is responsible for: ❑ Managing the BenchCel Workstation ❑ Developing the applications that are run on it ❑ Solving the more challenging problems that might arise ❑ Developing training materials and standard operating procedures for operators
Operator	Someone who performs the daily production work on the BenchCel Workstation and solves routine problems. Your organization may choose to create its own procedures for operators including the procedures in this guide.

Related topics

For information about...	See...
Using Velocity11 user guides	“About Velocity11 user guides” on page vii
Finding firmware version	“Finding your software versions” on page xi
What this guide covers	“What this guide covers” on page ix
Starting BenchWorks software	“Starting BenchWorks software” on page 19

About Velocity11 user guides

About this topic

This topic describes the different formats of Velocity11 user information and explains how to access the user information.

Formats available

Velocity11 user information is provided to you as:

- Online help
- A PDF file
- A printed book

The information in each format is the same but each format has different benefits.

Where to find user information

Online help

The online help is added to your computer with the Velocity11 lab automation system software installation.

PDF file

The PDF file of the user guide is on the software CD that is supplied with the product.

Velocity11 website

You can search the online help or download the latest version of any PDF file from the Velocity11 website at www.velocity11.com.

Note: All Velocity11 user information can be searched from the website at www.velocity11.com.

Online help

The online help is the best format to use when you are working at the computer and when you want to perform fast or advanced searches for information.

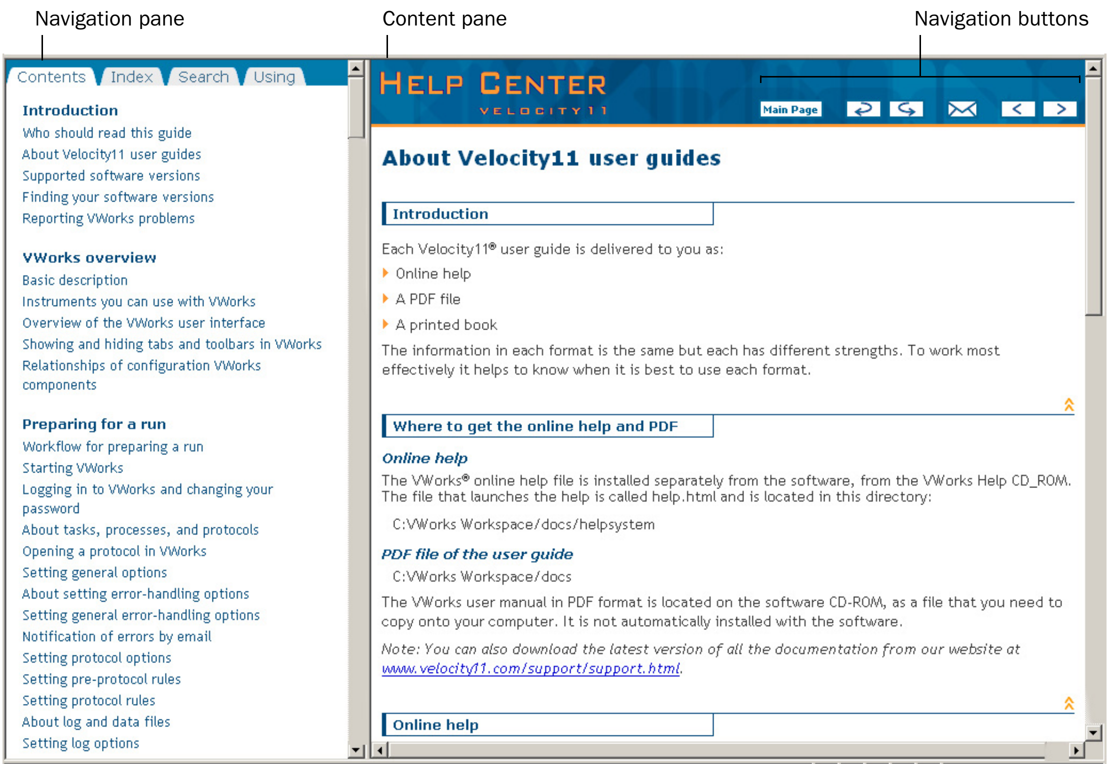
To open the online help:

1. In the Velocity11 lab automation software, press F1. The online help window opens.

Main features

The online help window contains the following:

- *Navigation pane*. Consists of four tabs. The Contents, Index, and Search tabs provide different ways to locate information. The Using tab contains information about using the help system.
- *Content pane*. Displays the online help topics.
- *Navigation buttons*. Enables you to navigate through the pages.The online help includes a navigation pane, content pane, and navigation buttons.



PDF user guides

Computer requirements

To open a user guide in PDF format, you need a PDF viewer. You can download a free PDF viewer from the internet.

Printing and searching

The user guides in PDF format are mainly for printing additional copies. You can perform simple searches in the PDF file, although these searches are much slower than online help searches.

More information

For more information about using PDF documents, see the user documentation for the PDF viewer.

Related topics

For information about...	See...
Who this guide is for	“Who should read this guide” on page vi
What this guide covers	“What this guide covers” on page ix
Finding firmware version	“Finding your software versions” on page xi
Starting BenchWorks software software	“Starting BenchWorks software” on page 19

What this guide covers

BenchWorks software version

This guide covers the operation of BenchWorks software. This version of the guide is only for use with BenchWorks software file version 37.

Supported firmware version

This guide covers firmware version 3.0. The firmware version can be determined from the General Settings page of the BenchWorks software Diagnostics dialog box.

What this guide does not cover

This guide does not cover the operation of the following:

- Velocity11 instruments, such as the PlateLoc Sealer, VCode Microplate Labeler, and VPrep Pipettor when used in stand-alone mode
- Other companies' devices, with the exception of the use of diagnostics software that is developed by Velocity11 for other companies' devices

For more information about these topics, see the user guides for the relevant instruments.

Related topics

For information about...	See...
Starting BenchWorks software	"Starting BenchWorks software" on page 19
Finding software and firmware versions	"Finding your software versions" on page xi

What is new in this version

About this topic

The following table describes the main new features of BenchWorks software (version 37) that have been added since version 24.

New features

Feature	Description	See...
Runset manager	Enables you to schedule a series of runs, using a different protocol for each run, if desired.	❑ “About starting runs automatically” on page 55 ❑ “Working with the run-set manager” on page 56
Spawn task	Enables you to conditionally start a new protocol process.	“Setting Spawn Process task parameters” on page 117
Inventory editor	Enables you to coordinate a plate storage system with a database.	“Using the BenchWorks software inventory” on page 167
Start and finish scripts	Enables you to create JavaScripts that are executed before and after a protocol is run.	❑ “Adding a start and finish script to the protocol” on page 37 ❑ “Where scripts are written” on page 210
New Run Progress toolbar	Enables you to view the current progress of a run.	“Monitoring a run” on page 61
Well volume visualization	Enables you to see volume of a plate in the inventory	“Auditing plate volumes in the inventory editor” on page 193
X-Series and R-Series BenchCel Workstations	Enables you to run protocols on both series of BenchCel Workstations.	“Defining labware properties for a BenchCel Workstation” on page 261

Related topics

For information about...	See...
Overview of the BenchCel Workstation	*BenchCel Microplate Handling Workstation User Guide*

Finding your software versions

About this topic

This topic shows you some ways to find out your version of:

- BenchWorks software
- Device driver plug-in
- Firmware

About software versions

There are several different software versions that describe the BenchWorks software. The most important are the following.

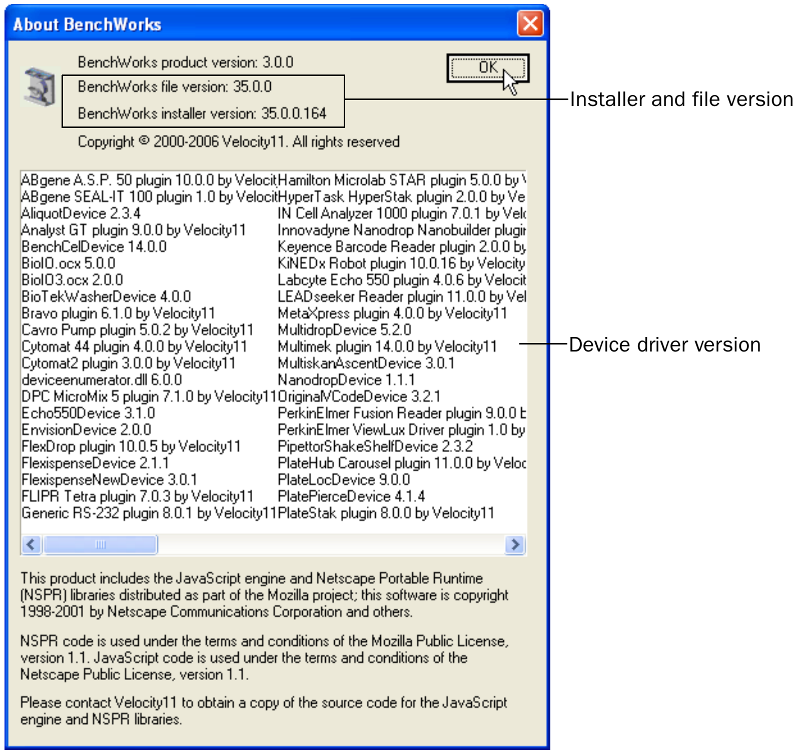
Version	This identifies the...
File version	Specific product version (follows the notation xx.x.x)
Installer version	Specific installer (follows the notation xx.x.x.xxx)
Driver version	Software version for the device driver plug-in or ActiveX
Firmware version	Version of firmware the device is using

Finding versions from the software

If you are asked to identify the software version, provide the installer version. If the software does not have an installer version, provide the file version.

To find the BenchWorks software installer version, file version, and device driver version number:

1. Start BenchWorks software.
2. Select **Help > About BenchWorks software**.



To find the firmware version number:

1. Start BenchWorks software.
2. Open a device file. Wait for the BenchCel Workstation to initialize.
3. Open **BenchCel Diagnostics**.

   Click the **General Settings** tab and observe the **Firmware version** in the **BenchCel** area at the top of the dialog box.

Finding versions from the files

You can find the BenchWorks software file version and device driver version information by looking at the executable files.

To find the BenchWorks software file version number:

1. Navigate to C:\Program Files\Velocity11\BenchWorks.
2. Right-click **BenchWorks software.exe**.
3. Select **Properties**.
4. Click the **Version** tab.

To find the device driver version number:

1. Navigate to C:\Program Files\Velocity11\BenchWorks\plugins.
2. Right-click .dll file for the device.
3. Select **Properties**.
4. Click the **Version** tab.

Related topics

For information about...	See...
Opening a device file	"Working with device files" on page 12
Getting help	"About Velocity11 user guides" on page vii
Opening Diagnostics	*BenchCel Microplate Handling Workstation User Guide*
Finding firmware version	*BenchCel Microplate Handling Workstation User Guide*
Starting BenchWorks software	"Starting BenchWorks software" on page 19

Reporting problems

About this topic

If you find a bug in the software or have a technical or hardware problem that you can't resolve, read the information in this topic for how to report problems.

Reporting software problems

If you find a problem in the Velocity11 software, let us know by:

- ❑ Sending a bug report from within BenchCel Workstation
- ❑ Sending an email to service@velocity11.com or euroservice@velocity11.com
- ❑ Calling Velocity11 Technical Support at 1-800-979-4811 or +1 650-846-6611 outside the US

Sending files and information

When resolving software bugs or other problems, please send the following files and information:

- ❑ Detailed, precise description of the problem you are experiencing
- ❑ Device file (if the issue occurs when a device file is open)
- ❑ Protocol file (if the issue occurs during a protocol run or simulation)
- ❑ Protocol log file (if the issue occurs during a protocol run or simulation)
- ❑ Velocity11 registry files from the Windows registry
- ❑ Error message text (or screen capture of the error message window)
- ❑ Screen capture of the About BenchWorks window

Reporting user guide problems

If you find a problem with this user guide or have suggestions for improvement, please take a minute or two to give us your feedback using the feedback button in the online help. Your comments will be reviewed promptly and used to write the next version of the guide.

You can also send an email directly to documentation@velocity11.com

Related topics

For information about...	See...
Sending a bug report	“Sending a bug report” on page xiv
Sending a registry file	“Moving or sending a registry file” on page 240

Sending a bug report

About this topic

This topic describes how to send a bug report to Velocity11 Technical Support from BenchWorks software.

Before you start

Before you can send a bug report:

- ❑ The system’s computer must be connected to a network with internet access.
- ❑ The outgoing email server must be set up on the system’s computer by a BenchCel Workstation or network administrator.

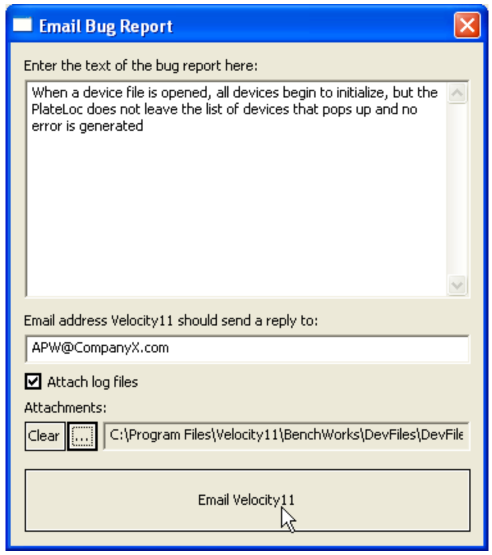
Sending a bug report

A bug report is an email that you create and send from within BenchWorks software.

To send a bug report:

1. Select **Help** > **Report a Bug**.

   The **Report a Bug** dialog box opens.



2. Type a description of the error in the text box.

   In your description, provide a summary of the error and, in the case of a software bug, a description of how we can reproduce it.

3. Click **Email Velocity11** and wait until a **Message Sent** message box opens.

Related topics

For information about...	See...
Reporting software problems	"Reporting problems" on page xiii
Sending a registry file	"Moving or sending a registry file" on page 240

BenchWorks software overview

1

This chapter introduces BenchWorks software and its user interface.

This chapter contains the following topics:

Description of BenchWorks software

About this topic

This topic gives an overview of BenchWorks software, the software that runs the BenchCel Workstation.

What BenchWorks software does

BenchWorks software controls the BenchCel Workstation and any associated devices. The BenchCel Workstation is a microplate-processing automation platform used to store microplates and move them to and from separate devices.

The control of the BenchCel Workstation occurs through the execution of protocols in BenchWorks software.

Example

A typical automation platform might consist of a BenchCel Workstation with two stacks, a VCode Plate Labeler, and a PlateLoc Plate Sealer. The BenchCel Workstation has access to the VCode Plate Labeler on one end and the PlateLoc Sealer on the other.

In one scenario, a BenchWorks software protocol might instruct the BenchCel Workstation to download the microplate from one of its stacks, place it on the VCode Plate Labeler, instruct the VCode Plate Labeler to label the plate, then move the plate to the PlateLoc Plate Sealer, instruct the PlateLoc Plate Sealer to seal the plate, and then upload it to the other stack.

About protocols

Protocols are sequences of tasks created by the user and run in BenchWorks software. Each task performs an activity, such as putting tips on a pipette head or sealing a plate.

BenchWorks software is a multiprocess application, enabling a single protocol to simultaneously run two or more sequence of tasks.

Before a protocol is run, a compiler checks it for logical errors that would otherwise prevent the protocol from completing. Users also have the option of running simulations of the protocol before committing expensive samples.

BenchWorks software is event-driven

BenchWorks software uses an event-driven controller to schedule the execution of the protocol. This means that protocols are run with no pre-set schedule and tasks are performed in a manner that uses devices simultaneously and most efficiently. This efficiency reduces the overall time of the run.

Real-time manipulation and troubleshooting

BenchWorks software can also manipulate each device in the system in real-time by sending individual commands using diagnostics software. This is useful for setting up and troubleshooting.

Comprehensive event logging allows the operator to analyze each run and troubleshoot problems.

Related topics

For more information about...	See...
Software installations	“Installing BenchWorks software” on page 14
BenchWorks software user interface	“Overview of the BenchWorks software user interface” on page 3
Device files	“Working with device files” on page 12
BenchWorks software components	“Relationships of BenchWorks software components” on page 9

Overview of the BenchWorks software user interface

About this topic

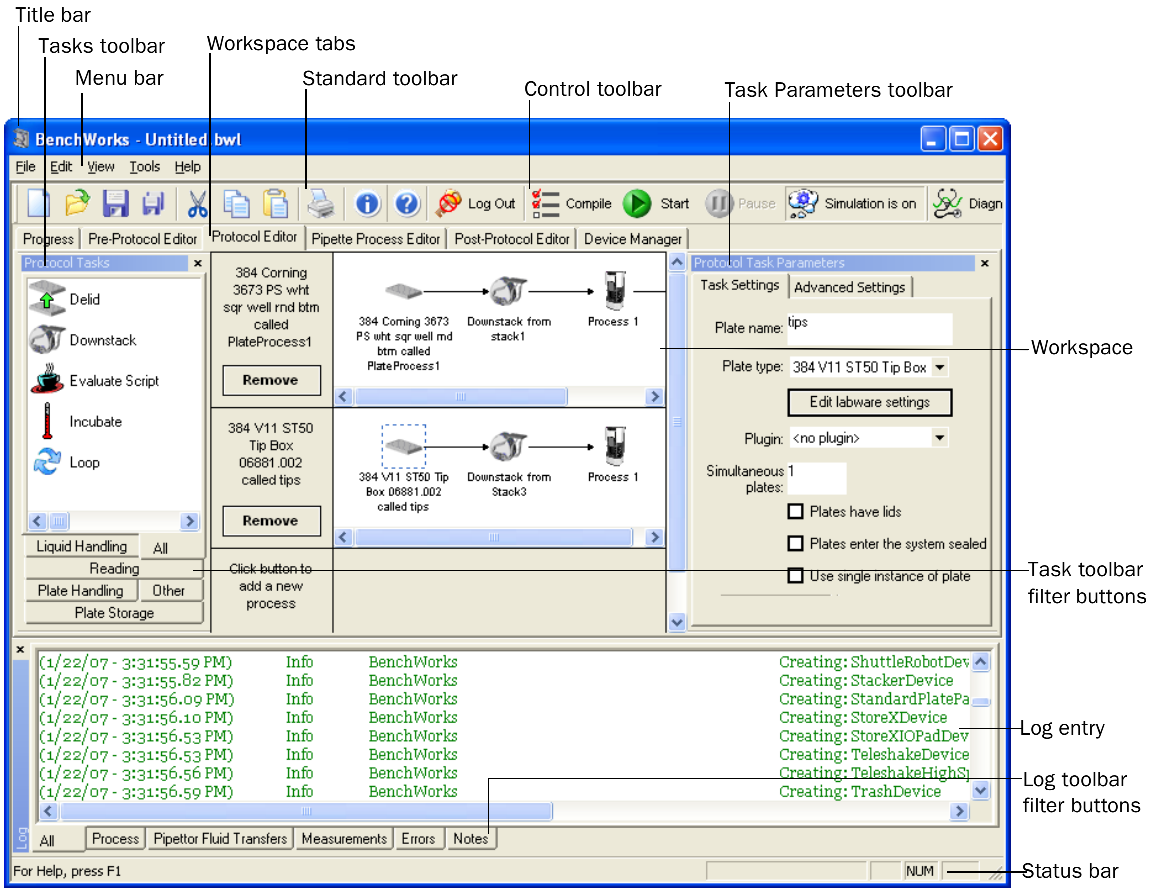
This topic introduces the pages, toolbars, and menus that make up the BenchWorks software user interface (UI).

About the BenchWorks software UI

The BenchWorks software UI is made up of a tabbed workspace, tabbed toolbars, a menu bar, and a status bar. The content of these items can change depending on whether you are viewing a device file, protocol file, or the progress of a protocol run.

UI terminology

The following diagram identifies the elements of the BenchWorks software UI.



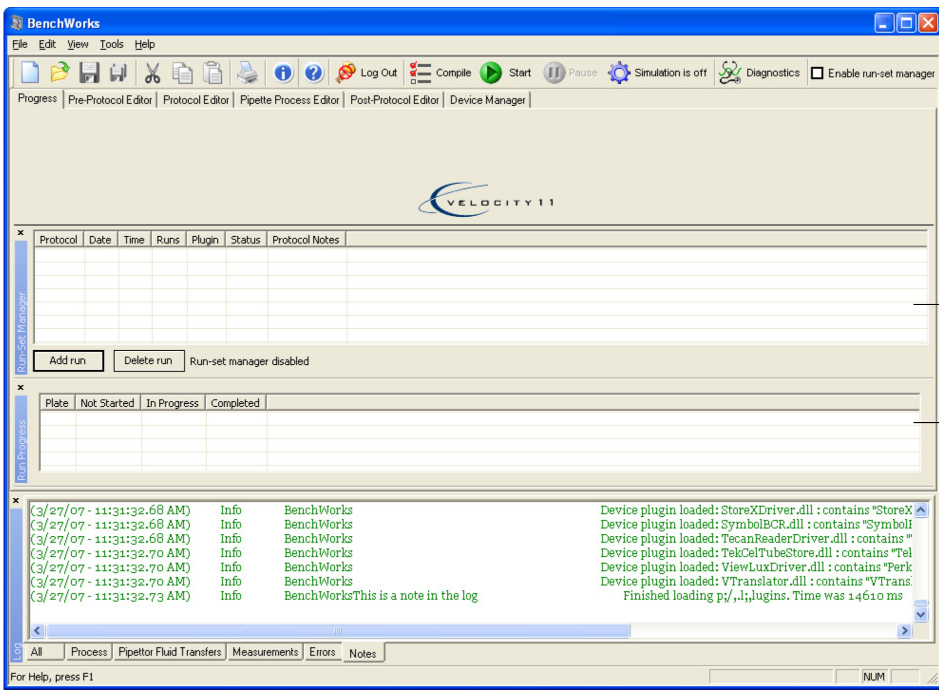
Workspace tabs

Run progress, protocol editors, and device manager are accessible by tabs.

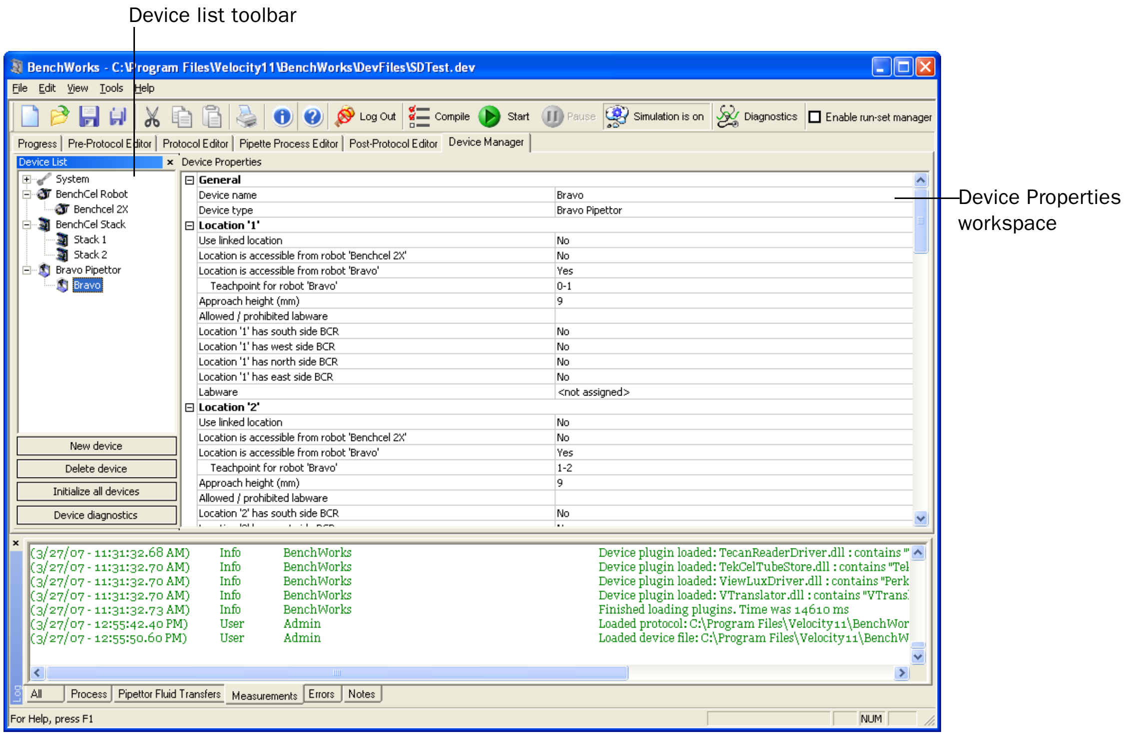
Tab	Use to...	See...
Progress	Display the status of the current protocol and manage run sets.	❑ "Monitoring overall progress" on page 61 ❑ "Working with the run-set manager" on page 56
Pre-Protocol Editor	Create a process to be executed before the protocol runs.	"Setting up a pre-protocol or post-protocol process" on page 74
Protocol Editor	Create and edit protocols and processes.	❑ "Creating a protocol basics" on page 67 ❑ "Creating a protocol: advanced topics" on page 201
Post-Protocol Editor	Create a process to be executed after the protocol run is completed.	"Setting up a pre-protocol or post-protocol process" on page 74

Tab	Use to...	See...
Pipette Process Editor	Create and edit pipette protocols and processes. *Note:* This is only used if a VPrep System or Bravo Platform is one of the configured peripheral devices.	"Adding and configuring a Pipette Process task" on page 130
Device Manager	Manage and configure devices. Every device that is added to the system must be added to the device file.	*Device Driver User Guide*

Progress tab



Device Manager tab



Toolbars

Control toolbar

There are six buttons on the Control toolbar.

Button	Use to...	See...
Log In	Log a user into BenchWorks software. This provides a level of security by controlling access to software security levels.	"Logging in to BenchWorks software" on page 20
Log Out	Log a user out of BenchWorks software.	"Logging out of BenchWorks software" on page 65
Compile	Check the protocol for errors.	"Compiling and saving protocols" on page 83
Start	Begin a protocol or run.	"Starting a run from BenchWorks software" on page 51
Pause	Interrupt a protocol or run after it has been started.	"Pausing or stopping a run" on page 59

Button	Use to...	See...
Simulate	❑ Find errors that you would encounter during an actual run ❑ Prevent BenchCel Workstation from trying to initialize devices while you are loading a device file.	❑ “Simulating a run” on page 84 ❑ “Working with device files” on page 12
Diagnostics	Displays the BenchCel System Device list providing access to diagnostics for all of the installed devices.	*BenchCel Microplate Handling Workstation User Guide*
Enable run-set manager	Enable/disable the run-set manager.	“Working with the run-set manager” on page 56

Log toolbar

The Log toolbar can display different subsets of log data or display all log data. You can also add a note to a log.

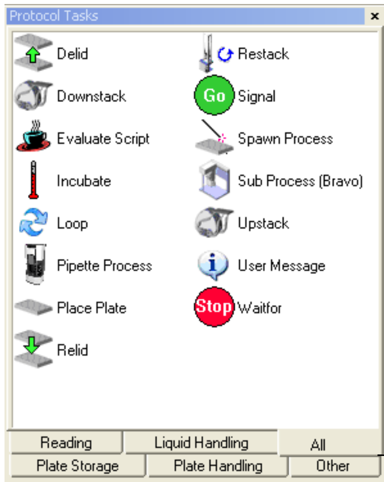
There are six tabs in the Log toolbar for displaying different data.

Page	Description
All	Displays all log entries
Process	Displays BenchCel Workstation process logs
Fluid Transfers	Displays VPrep System or Bravo Platform fluid transfer logs
Measurements	Displays
Errors	Displays run errors
Notes	Lets you enter a time stamped note into the log *Note:* Entries made directly into the log text fields do not get written to the log file.

Tasks toolbar

The Tasks toolbar provides access to all the available tasks that may be used in a protocol.

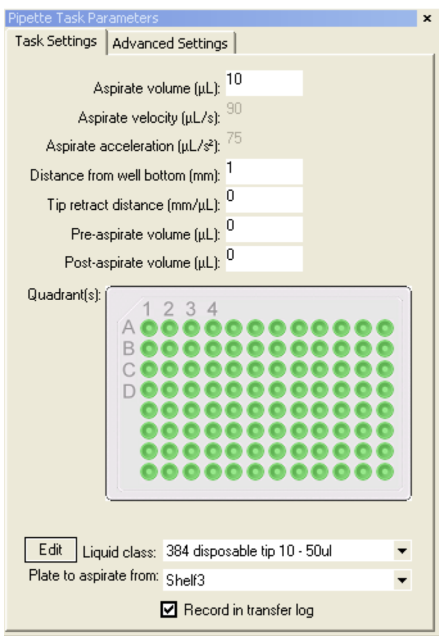
The display of available tasks can be filtered by clicking one of the category buttons on the bottom of the toolbar.



Task Parameters toolbar

The Task Parameters and Pipette Task Parameters toolbars enables you to set the parameters for each task in the protocol. There are two tabs:

- ❑ Task Settings for setting the task parameters
- ❑ Advanced Settings for adding a JavaScript to the task



Status bar

The Status bar is located on the bottom of the BenchWorks software UI. It displays short text messages describing the current state of the software, the current user, and tooltips.

Relationships of BenchWorks software components

About this topic

BenchWorks software uses different components (file types and databases) to run the application. What they are and how they work together to operate the BenchCel Workstation is described below.

What you should know

It is important to understand the way each of the components in BenchWorks software relate. Changing settings or options in one component will affect one or more of the other components.

Definitions

The table below provides some information about these BenchWorks software components:

Component	Definition	See...
Protocol file	A file that contains instructions for performing a run and a reference to the device file.	"About tasks, processes, and protocols" on page 68
Device file	The data entered into the device manager and saved as a device file that contains the configuration information for your devices and references to the profiles for each device.	*Device Driver User Guide*
Profile	A collection of settings, stored in the Windows registry, that manages how you connect to devices. It also stores device-specific information such as teachpoints	❑ *BenchCel Microplate Handling Workstation User Guide* ❑ *Device Driver User Guide*
Teachpoint File	A file that contains your teachpoint settings (referenced by the profile).	*BenchCel Microplate Handling Workstation User Guide*
Labware database	Labware definitions and classes stored in the Windows registry.	"Defining labware" on page 245
Liquid library database	Pipetting settings, setup for different liquid types, stored in the Windows registry.	"Setting liquid-handling definitions" on page 279
Pipette techniques	An xml file that contains pipette methods that can be applied to certain pipetting tasks.	*VWorks Software User Guide Addendum*
User database	List of user accounts, privileges, and passwords stored in the Windows registry.	"Administrator procedures" on page 235

Component file location

You choose the location for saving protocol, device, and teachpoint files. We recommend you create folders within the BenchWorks software folder for storing these files.

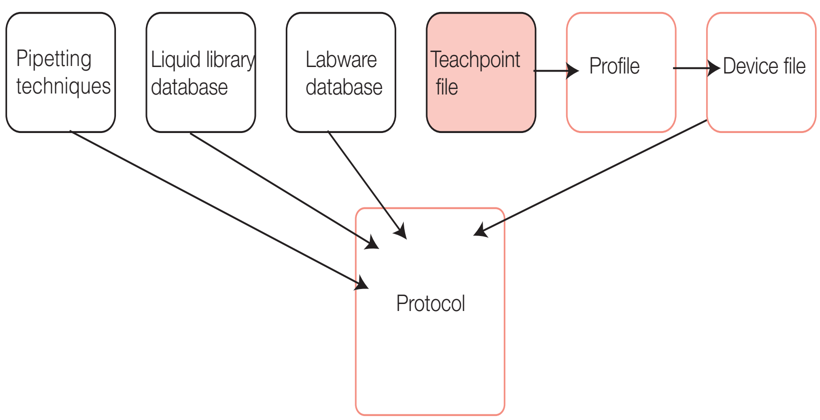
Component relationships

The table below lists the component, their file extension and what it loads when opened:

Component	Extension	Opening this file loads...
Protocol	.bwl	❑ BenchWorks software (if it is not already running) ❑ Labware database information ❑ Liquid library database information ❑ Device file (which loads the...) ◆ Profiles ◆ Teachpoint files
Device file	.dev	❑ Profile ❑ Teachpoint file
Profile	None	Teachpoint file
Teachpoint file	.xml	Teachpoint definitions

Component relationship diagram

The following diagram illustrates the most basic relationship between the BenchWorks software components.



The following table describes the consequences of making changes to one or more components.

If you...	Then...
Make a change to the teachpoint file	❑ All profiles that use that teachpoint file are affected ❑ All device files that use those profiles are affected ❑ All protocols that use those device files are affected
Create a new profile	You must specify the new profile in your device file
Want to use two different teachpoint files	You must: ❑ Create two teachpoint files ❑ Create two profiles ❑ Create two device files ❑ Create two protocol files
Want to copy a protocol to another system or computer	You must copy all components. This includes: ❑ Labware database ❑ Liquid library database ❑ Pipette techniques (if using) ❑ MySQL database (if using Plate or Location Groups) ❑ Device file ❑ Profile ❑ Teachpoint file *Note:* Labware, Liquid library, and profiles must be transferred by exporting and importing as a registry keys. See related topics for more information.

Related topics

For more information about...	See...
Registry keys	“Moving or sending a registry file” on page 240
Loading a device file	“Working with device files” on page 12

Working with device files

About this topic

This topic describes how to create, save, and load device files in BenchWorks software.

Device file defined

A device file is a .dev file containing the configuration information for your devices. The device configuration data is entered into the Device Manager and saved to a device file. In addition, the data in the device-specific profiles is stored as a reference to the profiles.

Device file location

Device files have the file name format *file name*.dev and are stored in the folder location that you specify when saving the file.

Creating device files

An empty device file is automatically created when you open BenchWorks software. If you add devices or make changes in the device manager, you need to save those changes, or they will be lost when you exit BenchWorks software (you will be prompted to do so).

For most users, one device file is sufficient. However, there may be circumstances when another device file is needed. There are multiple ways to create a new device file. Here are two methods.

Method 1: Create a new device file

To create a device file:

1. Make sure you are logged in as an administrator.
2. Select **File** > **Device File** > **New**.
3. Click **Yes** to the alert that existing devices will be erased. A new file opens.
4. Save the device file.

Method 2: Create a new device file from an existing one

To create a device file:

1. Select **File** > **Device File** > **Open**.
2. Select an existing device file and click **OK**.
3. Click **File** > **Device File** > **Save as**.
4. Enter a new name for the device file in the **Save as** dialog box.
5. Click **Save**.

Saving a device file

After you make changes in the device manager, you must save the device file for the changes to be available the next time the protocol using that device file is opened.

To save a device file:

1. Make sure you are logged in as an administrator.

2. Select **File** > **Device File** > **Save As**.
3. Navigate to the folder in which you want to save the file.

   If you want to save the file in the current folder, skip this step.
4. Click **Save**.

   The path of the device file specified in the protocol file and **Protocol Options** dialog box is changed to reflect the different location.

The next time you compile or run a protocol that references the device file, the new devices are registered with the Windows operating system.

Loading a device file

When you open a protocol file, the device file associated with it is automatically loaded for you.

If you need to load another device file, use one of the following method.

Note: Enabling simulation mode will prevent BenchWorks software from trying to initialize all devices when you load a device file. However, remember to disable simulation mode before starting a run.

To load a device file from within BenchWorks software:

1. Select **File** > **Device File** > **Open.**

   If you want to open a recently opened device file, select it from the list of device files at bottom of the menu, and the device file is loaded.
2. Navigate to the folder that contains the file to load.
3. Click **Open**.

   or,
4. Select **File** > **Protocol File** > **Open**.

   If you want to open a recently opened protocol file, select it from the list of protocol files at bottom of the menu, and the protocol file loads.
5. Navigate to the folder that contains the file to load.
6. Click **Open**. Opening the protocol, opens the associated device file.

To load a device file from protocol options:

If you load a device file using the following method, the device file will be saved with the protocol when you save the protocol.

1. Open a protocol.
2. Click **Tools** and select **Protocol Options**.
3. In the **Protocol Options** tab of the dialog box, click the device file ellipsis button.

4. Navigate to the folder that contains the file to load.

5. Click **Open**.

Related topics

For more information about...	See...
BenchWorks software components	"Relationships of BenchWorks software components" on page 9
BenchWorks software interface	"Overview of the BenchWorks software user interface" on page 3

Installing BenchWorks software

About this topic

This topic describes how to start the BenchWorks software installer.

Two procedures are given. If you are installing BenchWorks software:

- ❑ For the first time on the system, use Procedure 1
- ❑ On a system where a version of BenchWorks software is already installed, use Procedure 2

Procedure 1

To install BenchWorks software for the first time:

1. Insert the BenchWorks software CD-ROM into your CD-ROM drive.
2. Double-click the setup.exe file.
3. Follow the instructions in the wizard to complete your installation.

Procedure 2

If you are reinstalling BenchWorks software or installing a newer version of BenchWorks software use this procedure.

To install BenchWorks software if a version of BenchWorks software is already installed:

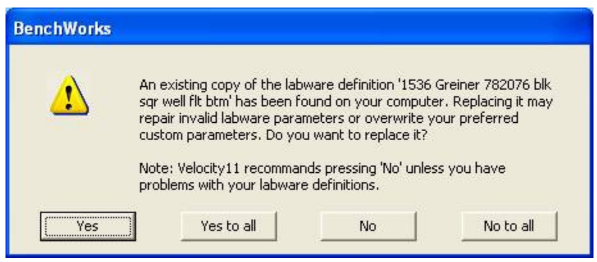
1. Exit the BenchWorks software application.
2. Insert the BenchWorks software CD-ROM into your CD-ROM drive.
3. Double-click the setup.exe file.

   You should be prompted to remove your old BenchWorks software application. If this does not happen, you need to uninstall BenchWorks software before continuing the new installation. See "Uninstalling BenchWorks software" on page 16. You do not need to delete the Velocity11 registry files.
4. Follow the instructions in the wizard to complete your installation.

Installing and overwriting labware definitions

The BenchWorks software installer checks for labware entries in the Windows registry, compares them to an approved list generated by Velocity11, and performs one or more actions according to the following:

- If the labware entry does not exist, the installer installs the definitions for that labware
- If a labware definition is missing one or more property values, the installer installs those values (without asking)
- If there is a labware definition within the approved list, if and only if the labware's parameter values are different from those in the installer, then a user prompt is displayed, asking whether to overwrite the labware's parameter value with the value considered to be correct by Velocity11



Note: The installer does not remove any labware not on the approved list

Related information

For information about...	See...
Starting BenchWorks software	"Logging in to BenchWorks software" on page 20
Uninstalling BenchWorks software	"Uninstalling BenchWorks software" on page 16

Uninstalling BenchWorks software

About this topic

This topic describes two ways to uninstall BenchWorks software.

When to remove Velocity11 registry files

In general, it is sufficient to uninstall the BenchWorks software program without removing the registry files. However, you can remove the Velocity11files from the registry if:

- ❑ You want to make a completely fresh start with BenchWorks software, removing all user accounts, teachpoints, device profiles, and liquid and labware definitions, or
- ❑ You do not intend to run BenchWorks software on your system again

Procedures

To remove BenchWorks software:

1. Use the Add / Remove Programs control panel.

   For more information, see the online help for your Windows operating system.

!! IMPORTANT !! The following procedure deletes the user accounts, labware definitions, liquid library data, device profiles, and teachpoints.

To remove the Velocity11 files from the registry:

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 select the following folder:

   HKEY_LOCAL_MACHINE\SOFTWARE\Velocity11
5. Make sure you have selected the Velocity11 folder.

   !! IMPORTANT !! Making a mistake and deleting the wrong registry folder may cause critical failures with your operating system.
6. Select **Edit** > **Delete**.

Related information

For information about...	See...
Exporting Velocity11 data from the registry files (for example, before clearing the registry)	“Moving or sending a registry file” on page 240

Preparing for a run 2

This chapter describes how to setup BenchWorks software to run an existing protocol. All of the procedures in this chapter can be performed by someone with operator privileges. This chapter contains the following topics:

Workflow for preparing for a run

About this topic

This topic gives the order of recommended tasks before performing a run and tells you where to look for information and procedures for each task.

Workflow

The general workflow for preparing for a run is listed in the following table:

Step	Topic
1	"Starting BenchWorks software" on page 19
2	"Logging in to BenchWorks software" on page 20
3	"Opening a protocol in BenchWorks software" on page 21
4	"Setting BenchWorks software options" on page 22
5	"Setting error-handling options in the Options dialog box" on page 25
6	"Setting up email error notification" on page 28
7	"Setting protocol error-handling options" on page 31
8	"Setting pre-protocol rules" on page 32
9	"Setting protocol rules" on page 33
10	"Adding an alarm" on page 35
11	"Adding a start and finish script to the protocol" on page 37
12	"Setting log options" on page 42
13	"What you should know before you start the protocol" on page 47

Related topics

For information about...	See...
Protocols	"About tasks, processes, and protocols" on page 68
BenchWorks software user interface	"Overview of the BenchWorks software user interface" on page 3
BenchWorks software components	"Relationships of BenchWorks software components" on page 9

Starting BenchWorks software

About this topic

This topic describes how to start BenchWorks software.

Before you start BenchWorks software

Start BenchWorks software after you have turned on the BenchCel Workstation and the controlling computer and logged in to the computer operating system.

Starting BenchWorks software

To start BenchWorks software:

1. Make sure that everyone is clear of the lab automation system and that there are no objects that could obstruct any moving parts.
2. Double-click the shortcut to BenchWorks software on the Windows desktop.

   Note: If the shortcut has been deleted, open the folderC:\Program Files\Velocity11\BenchWorks and create a new shortcut from the executable file BenchWorks.exe.

   The BenchWorks software splash screen opens.

Related topics

For information about...	See...
The workflow this procedure belongs to	“Workflow for preparing for a run” on page 18
The next step	“Logging in to BenchWorks software” on page 20

Logging in to BenchWorks software

About this topic

To log in to BenchWorks software you need a user account, created by an administrator. This topic describes how to log in and change your password once you have a user account.

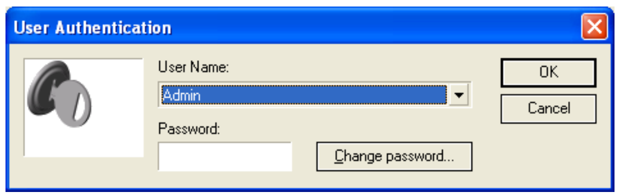
Logging in

To log in to BenchWorks software:

1. Click **Log in**.

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

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

   Note: If this is the first time anyone has logged in to this installation of BenchCel Workstation, there is one administrator account named Admin and it has no password.

4. To change your password, click **Change password**. The Change password dialog box opens.
5. Type your current password in the **Old** text box.
6. Type your new password in the **New** text box.
7. Retype your new password in the **Confirm New** text box.
8. Click **OK**.

   Note: You can also change your password by selecting **Tools** > **Manage Users**, after you have logged in.

Related topics

For information about...	See...
Workflow this procedure belongs to	“Workflow for preparing for a run” on page 18

For information about...	See...
The next step	"Opening a protocol in BenchWorks software" on page 21
Creating user accounts	"Adding and deleting a user account" on page 237
User permissions	"About user accounts and privileges" on page 236
Job roles and responsibilities	"Who should read this guide" on page vi

Opening a protocol in BenchWorks software

About this topic

All runs on the BenchCel Workstation require a protocol. This topic describes how to open a protocol that has already been created.

Procedure

To open a protocol:

!! INJURY HAZARD !! When BenchWorks software starts, device parts might unexpectedly move to their home positions.

Select **File** > **Open**.

Make sure you set the file type to Protocol (.bwl) when browsing for the file.

You can also open a protocol by navigating to the .bwl file in Windows and double-clicking it. This launches BenchWorks software and opens the protocol.

Related topics

For information about...	See...
The workflow this procedure belongs to	"Workflow for preparing for a run" on page 18
The next step	"Setting BenchWorks software options" on page 22

Setting BenchWorks software options

About this topic

This topic describes how to configure the settings on the Options tab in the BenchWorks software Options dialog box.

These include settings for the following:

- Bar-Code
- Robot
- Protocol Editor
- BenchCel
- Simulator

When to use

Review these options after you open a protocol but before starting a run.

!! IMPORTANT !! Protocols do not store Options dialog box settings as part of the protocol. This means that all protocols use the settings that are currently selected in the Options dialog box.

Note: You may decide to keep all or many of the options the same for every run.

Procedure

!! IMPORTANT !! If you use barcode data files, remember to select the correct file for every run.

To choose the settings in the Options tab of the Options dialog box:

1. Select **Tools** > **Options**.
2. Make sure that the **Options** page of the **BenchWorks software Options** dialog box is selected.
3. If you are using a barcode file, select its location:
   a. In the **BarCode Settings** area, click the ellipsis button (...) next to the appropriate type of barcode file.
   b. In the **Open** dialog box, navigate to the folder that contains the barcode file.
   c. Select the file (with a **.bar** filename extension for an input file and a **.dat** filename extension for a database file) and click **Open**.
4. In the **Robot Settings** area, select the desired maximum speed of the robot movement.

   If the plate-specific robot speed (set in the **Maximum Robot Handling Speed** area of the Labware Editor) is different from the general robot speed, the slower of the two speeds is used.

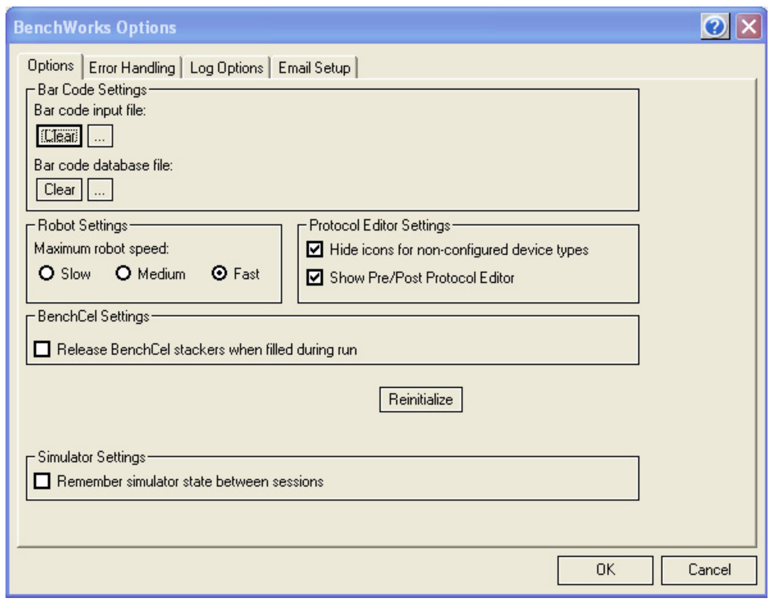
   !! DAMAGE HAZARD !! If you are testing a new protocol or learning to use the workstation, run the robot at a slow or medium speed to reduce the risk of damage in the event of a crash.

5. Select an option in the **Protocol Editor Settings** area, if desired.

   We strongly recommend that you select the **Hide icons for non-configured device types** check box. This option displays the available tasks based on the devices specified in the loaded device file instead of the tasks for all devices ever made compatible for the BenchCel Workstation. This is especially important where similar icons are used for different tasks.

6. In the **BenchCel Settings** area, select **Release BenchCel stackers when filled during run** to be able to remove the stackers after they have been filled.

7. In the **Simulator Settings** area, select **Remember simulator state between sessions** if you want BenchWorks software to remember the simulator state when the software was last opened and maintain that state when re-opened. This is useful when you are performing tasks when devices are not on and initiated.



8. Click **OK** to close the **BenchWorks software Options** dialog box.

Related topics

For information about...	See...
The workflow this procedure belongs to	"Workflow for preparing for a run" on page 18
The next step	"About setting error-handling options" on page 24

About setting error-handling options

About this topic

This topic provides an overview the types of error handling options available when running a protocol with BenchWorks software.

These options are located in the Options dialog box.

Review error options after you open a protocol, and before starting a run.

Note: You may not need to do this for every run.

What error handling options include

- ❑ Error options located on the Error Handling tab of the Options dialog box
  - ◆ *Error reporting*. Choose from a list of error types that you want reported.
  - ◆ *Error handling*. Direct the BenchWorks software on how to handle errors encountered during the run.
  - ◆ *Scheduler error behavior*. Direct the BenchWorks software scheduler on how to handle errors encountered during the run.
- ❑ *Error notification options*. Located on the Email Setup tab of the Options dialog box. Set up email notification in BenchWorks software to email or page you when a run error occurs.
- ❑ *Protocol error handling options*. Located on the Protocol Options tab of the Protocol Options dialog box. Specify how the BenchWorks software should behave if it encounters an error while executing your protocol.

Related topics

For information about…	See…
The workflow this procedure belongs to	"Workflow for preparing for a run" on page 18
The next step	"Setting error-handling options in the Options dialog box" on page 25
Protocol error-handling options	"Setting protocol error-handling options" on page 31
Error notification	"Setting up email error notification" on page 28

Setting error-handling options in the Options dialog box

About this topic

This topic describes the handling of error options found in the Error Handling tab of the Options dialog box (under Tools > Options).

See "Related topics" on page 27 for information about protocol error options and email error notification.

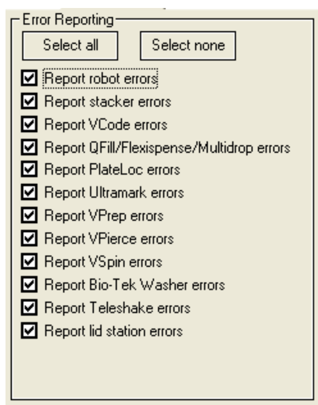
Procedure

To set error handling options found in the Options dialog box:

1. Select **Tools > Options**.
2. Click the **Error Handling** tab of the **BenchWorks software Options** dialog box.
3. In the **Error Reporting** area, select the devices for which you want errors reported.

   Typically, all of the devices are selected for a run. If you want to perform a test run without plates, clear the options for devices used in the protocol that would otherwise report errors.

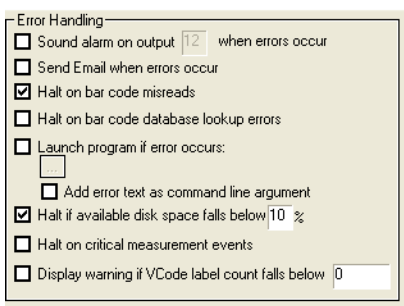
   !! INJURY HAZARD !! **Clearing error reporting results in all errors being ignored. This could result in damage to the equipment, microplates, or injury to the operator.**



4. Select from the following options in the **Error Handling** area:

Option	**When selected...**
Sound alarm on output...	Not used with the BenchCel Workstation.
Send Email when errors occur	The people listed in the **Email Setup** tab of the **BenchWorks software Options** dialog box will receive an email for every error notification.
Halt on barcode misreads	The robot will halt the run if it encounters a barcode misread.

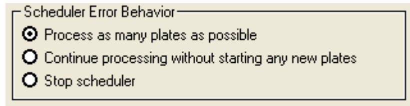
Option	When selected...
Halt on barcode database lookup errors	The robot will halt the run if the barcode found in the database does not match the plate barcode.
Launch program if error occurs...	A program that you specify is launched. You must specify the program by clicking the ellipsis button (...) and browsing to the program's executable. With the appropriate script, this function can be used to send a page or an email. If you want to pass the text of the error message to the program, select the **Add error text as command line argument** check box.
Halt if available disk space falls below...	The robot completes the currently scheduled step and then stops if the percentage of available hard disk space is less than the percentage specified in the text box.
Halt on critical measurement events	Halts the processing of plates if a critical measurement is detected. The critical measurement is defined in Alarm tab of the Protocol Options dialog box.
Display warning if VCode label count falls below	Displays a warning message when the VCode Microplate Labeler has fewer than the number of labels entered in the text box.



5. In the **Scheduler Error Behavior** area, select one of the following options:

Option	When selected, in the event of an error...
Process as many plates as possible	As many tasks as possible, given the error, are completed.
Continue processing without starting any new plates	Tasks involving plates that are currently in the system continue. Other tasks are not scheduled.

Option	When selected, in the event of an error…
Stop scheduler	The scheduler stops scheduling new tasks, even if plates are currently available to the robot. Current tasks continue to completion.



6. Click **OK** to close the **BenchWorks software Options** dialog box.

Related topics

For information about…	See…
The workflow this procedure belongs to	"Workflow for preparing for a run" on page 18
The next step	"Setting up email error notification" on page 28
Protocol error-handling options	"Setting protocol error-handling options" on page 31
Error options	"About setting error-handling options" on page 24

Setting up email error notification

About this topic

This topic describes how to add an email address to BenchWorks software so you can be notified by email or pager when there is a run error.

Email setup in BenchWorks software enables you to do the following tasks:

- ❑ Automatically be notified by email or pager when errors occur during a protocol run
- ❑ Send a bug report to Velocity11

Requirements for email setup

Before you can send an email from BenchWorks software, the controlling computer must:

- ❑ Be connected to a network with internet access
- ❑ Have network access to an outgoing mail server that supports one of the authentication methods available through BenchWorks software.

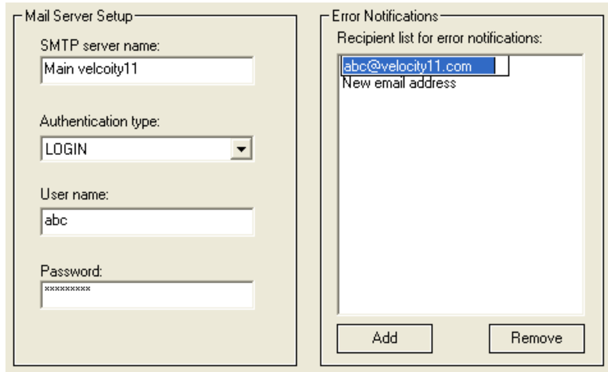
Setting up email

To set up the outgoing email server:

1. Select **Tools > Options**.
2. In the **Mail Server Setup** area, enter the name of your **SMTP server name** (outgoing email server).
3. If the server requires a user name and password:
   a. Select the **Authentication type** from the list.

!! IMPORTANT !! The authentication type is critical. Check with your network administrator to determine the best authentication network for your email server.

   b. Enter your User name and **Password** for the selected authentication type.
   c. Click **Add**. A new email address entry appears in the Recipient list for error notification.
   d. Click on the **New email address** entry and type in your email.
   e. Click **OK** in the **Options** dialog box, to save the email setup information and close the dialog box.



This information only needs to be set up once, provided the email account remains active. All email sent from BenchWorks software is authenticated using this account.

Related topics

For information about...	See...
The workflow that this procedure belongs to	"Workflow for preparing for a run" on page 18
The next step	"Setting protocol error-handling options" on page 31
How to setup the outgoing mail server	"Setting up email" on page 239
How to send a bug report using email	"Sending a bug report" on page xiv

About setting Protocol Options

Groups of protocol options

There are five groups of protocol options. See the table below for where to find out information for the different option groups.

Protocol Option	See...
Device File	“Working with device files” on page 12
Description/Notes	“Compiling and saving protocols” on page 83
Pre-Protocol Rules	“Setting pre-protocol rules” on page 32
Protocol Rules	“Setting protocol rules” on page 33
Error Handling	“Setting protocol error-handling options” on page 31

Related topics

For information about...	See...
The workflow this procedure belongs to	“Workflow for preparing for a run” on page 18
The next step	“Setting pre-protocol rules” on page 32

Setting protocol error-handling options

About this topic

This topic describes the error-handling options available in the Protocol Options dialog box.

Setting protocol error handling options

To set protocol error handling options:

1. Select **Tools > Protocol Options**.
2. In the **Error Handling** area, select one or both of the following options:

Option	If selected and...
Attempt to put plates away if deadlock occurs	A deadlock occurs, any lids are replaced and the plates are moved to the positions they would be in at the end of a successful protocol run.
Abort run if stacker runs out of plates	The stacker runs out of plates before the run is finished, the run is aborted. *Note:* Aborting a run permanently terminates the run.

Related topics

For information about...	See...
The workflow this procedure belongs to	“Workflow for preparing for a run” on page 18
The next step	“Setting pre-protocol rules” on page 32

Setting pre-protocol rules

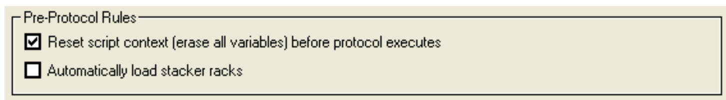
About this topic

This topic describes the pre-protocol rules available in the Protocol Options dialog box.

Pre-protocol rules include

There are two rules in the Pre-Protocol Rules area:

- ❑ Reset script context (erase all variables) before protocol executes
- ❑ Automatically load stacker racks



Reset script context

Select this option if you want all script variables to be cleared before the protocol is executed.

Automatically load stacker racks

Select this option if you want all racks on stacks to automatically load before the protocol is started.

Related topics

For information about...	See...
The workflow this procedure belongs to	"Workflow for preparing for a run" on page 18
The next step	"Setting protocol rules" on page 33
Using and resetting scripts	"Using JavaScript in BenchWorks software" on page 209
General options	"Setting BenchWorks software options" on page 22
Stackers	*BenchCel Microplate Handling Workstation User Guide*

Setting protocol rules

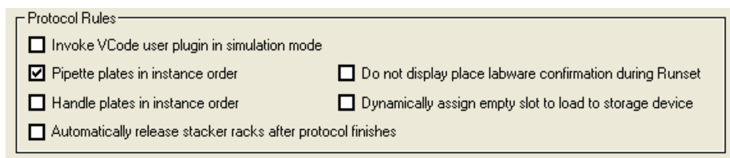
About this topic

This topic describes the protocol rules in the Protocol Options dialog box.

Protocol rules include

There are six rules in the Protocol Rules area:

- ❑ Invoke VCode user plugin in simulation mode
- ❑ Pipette plates in instance order
- ❑ Handle plates in instance order
- ❑ Automatically release stacker racks after protocol finishes
- ❑ Do not display place labware confirmation during Runset
- ❑ Dynamically assign empty slot to load in storage device



Invoke VCode user plugin in simulation mode

Select this option if you are using a Velocity11 lookup plug-in such as file reader and you want to check the communication from the VCode Microplate Labeler and the plug-in during simulation.

Pipette plates in instance order

Default setting

By default, the setting for the Pipette plates in instance order rule is checked, and it should be left checked for most protocols.

When to clear the rule

If your protocol has all of the following attributes, consider clearing this check box:

- ❑ The protocol has more than one pipette process that uses the same VPrep Pipettor or Bravo Platform
- ❑ The duration of one of the pipetting operations is much longer than another

Explanation

Consider an example in which a protocol has two processes and both have a pipetting operation that uses the same VPrep Pipettor. When selected, the pipetting operations for one process are completed before the pipetting operations begin for the other process.

Now consider what happens when the first pipetting operation takes significantly longer to complete than the second operation, and the protocol is run several times in succession. The overall time taken for the protocol to complete is much greater than it needs to be because during each cycle the system had to wait for the slower pipetting operations to complete for all the plates in the process before it could continue.

If the rule is turned off, a plate from the fast pipetting process can be delivered to the VPrep Pipettor after a plate from the slow pipetting process, followed by another plate from the slow pipette process, and so on. This reduces the bottleneck at the VPrep Pipettor because it allows the faster process to continue, and its second cycle in the series to start before the first cycle is complete.

Handle plates in instance order

Default setting

By default, the setting for the Handle plates in instance order rule is selected.

When to select the rule

Use this rule if you need the plates to be handled in the order in which they enter the system.

Explanation

Consider a situation in which you are using a BenchCel Workstation to seal plates using two PlateLoc Sealers and the first one runs out of seal, stopping on plate 5.

If this option is not selected, the second sealer continues sealing and upstacking plates but plate 5 would be omitted and thus out of order.

If this option is selected, the second sealer stops until you reload a new roll of seal and start the first sealer again and plate 5 is upstacked to its position in order.

Automatically release stacker racks after protocol finishes

Default setting

By default, the setting for the “Automatically release stacker racks after protocol finishes” setting is checked.

When to select the rule

Use this rule if you have two or more stackers and you want them all to release their racks at the end of the protocol.

Do not display place labware confirmation...

If you are using the Place Labware task in a pre-protocol process, the labware confirmation dialog box opens when you start the protocol and awaits your confirmation before allowing the protocol to continue.

Select this option if you are running a runset and do not want to pause the run between protocols.

Dynamically assign empty slot

Select this option if you want the software scheduler to assign slots in the storage device according to what is available at that moment.

Related topics

For information about...	See...
The workflow this procedure belongs to	"Workflow for preparing for a run" on page 18
The next step	"Setting log options" on page 42

Adding an alarm

About this topic

You can set an alarm, if your lab automation system is equipped with:

- ❑ A Weigh Pad
- ❑ A StoreX incubator with environmental control

For the Weigh Pad, you can set an alarm to inform you when the bottle on the Weigh Pad becomes too heavy or too light.

For the StoreX incubator, you can set an alarm to inform you when a particular temperature, humidity, or gas concentration level is reached.

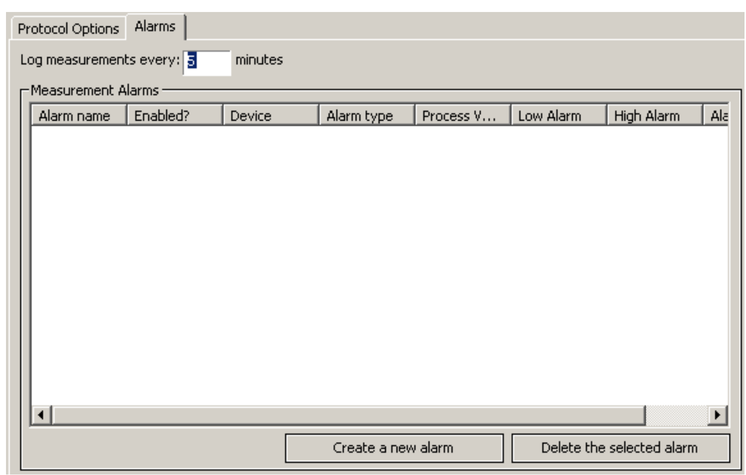
The alarm creates an error message when a measurement falls outside the range that you specify.

This topic describes how to set up such an alarm.

Procedure

To add an alarm:

1. Select **Tools** > **Options** > **Log Options**, and, in the **Screen settings** group box, select the **Log measurement readings** check box.
2. Select **Tools** > **Protocol Options** > **Alarms**.



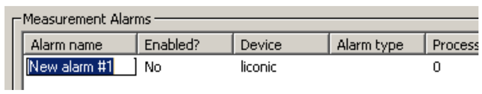
3. In the **Log measurements every** text box, type in the time interval between measurements taken by the device.

   If you change this value, the existing time interval instance expires before the change is implemented. If the existing time interval is long and you want to implement the change as soon as possible, you may need to restart BenchWorks software.

4. Click the **Create a new alarm** button.

   A row with default values is added to the Measurement Alarms table. Click to select the row and then click a value to edit it, using the following table as a guide.

   An example of a field ready to be edited is shown below.



Field	Comments
Alarm name	A name of your choice.
Enabled?	Yes turns the alarm on.
Device	The name of the device on which the alarm is set.
Alarm type	The parameter that is being measured. It could be temperature, relative humidity, mass, volume, and so on.
Process value	The current measurement, with units being dependent on the alarm type.
Low Alarm	The low value at which you want the alarm to be turned on.
High alarm	The high value at which you want the alarm to be turned on.
Alarm Timer [minutes]	Determines when a “critical” alarm is triggered. An initial alarm error message is triggered as soon as the alarm condition is met. A second “critical” alarm is triggered after this time interval. For example, if the temperature High Alarm is 40 °C and the Alarm Timer is 5 min, and a measurement is recorded at 40 °C, the critical alarm is triggered five minutes after remaining above 40 °C.

Related information

For information about...	See...
Workflow for preparing a run	“Workflow for preparing for a run” on page 18

For information about...	See...
Sending email when errors occur	“Setting up email error notification” on page 28
Monitoring environmental conditions during a run	“Monitoring a run” on page 61
The log file to which measurements are recorded	“Importing a log file to Excel” on page 45
StoreX environmental control	The operating manual for your StoreX incubator

Adding a start and finish script to the protocol

About this topic

Start and Finish scripts are typically used to initialize variables and define functions for all the scripts used throughout the protocol. Note that they are associated with the protocol rather than the task and therefore less susceptible to accidental deletion.

This topic describes how to add JavaScripts that will be executed before the pre-protocol or after the post-protocol is finished.

For more information on using scripts in protocols, see the Related topics section at the end of this topic.

Procedure

To add a start or finish JavaScript to a protocol:

1. Select **Tools > Protocol Options**.
2. Click **Start/Finish Scripts**.
3. To enter a script to run before the protocol, type the script into the **Start Script** text box or click **Browse** to open a file that contains a script.
4. To enter a script to run after the protocol, type the script into the **Finish Script** text box or click **Browse** to open a file that contains a script.
5. Click **OK**.

   Note: Entries entered on this page will be saved along with the protocol.

Related topics

For more information about...	See...
Using JavaScript in BenchWorks software	“Using JavaScript in BenchWorks software” on page 209

About log and data files

About this topic

This topic describes the different types of logs that BenchWorks software creates.

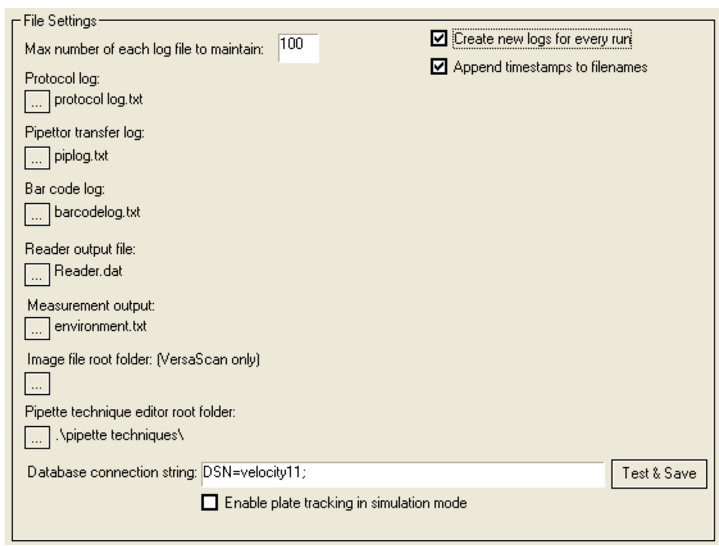
Types of log and data files

Log files record event and error information in text files that can be useful for troubleshooting. Data files record data collected by devices such as plate readers.

Velocity11 strongly recommends that you select Create new logs every run, Append timestamps to filenames, and set the Max number of each log file to maintain to 100.

The location of the three log files, a data file, environment text file, and two root folders are set in the Log Options page of the BenchWorks software Options dialog box.

Store the log files in a place that is easy for you to find them again. These files can be essential for verifying that plates were processed properly and can help troubleshoot any type of errors that you might encounter during the use of your system.



The various files are listed in the following table and described in more detail later in this topic:

File	Default file or folder name
Protocol log file	log.txt
Pipettor transfer log file	piplog.txt
Barcode log file	barcodelog.txt
Reader output file	Reader.dat
Measurement output file	Environment.txt

File	Default file or folder name
Image file root folder	A folder that you select
Pipette technique editor root folder	A folder that you select

Note: You can change the default filenames to suit your own needs, but they are referred to using their default names throughout this guide.

About opening log files

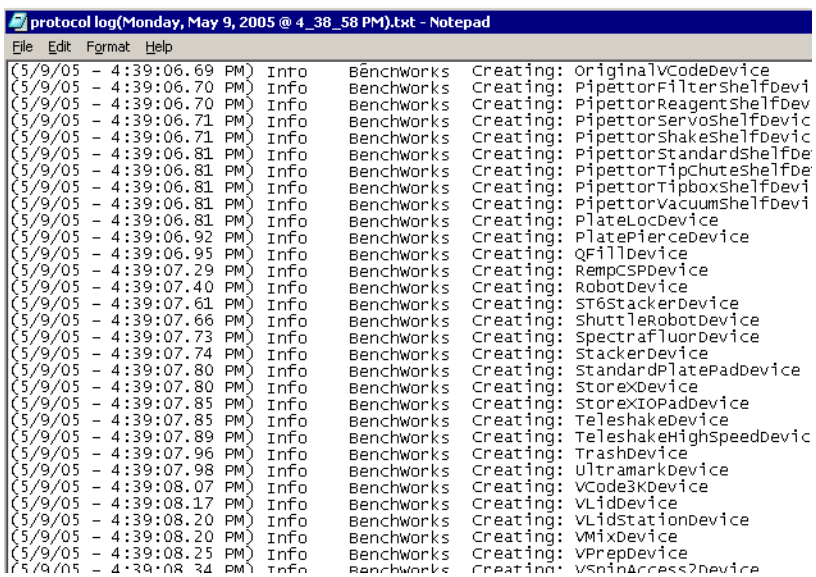
You can open a log file in any text editor, but we recommend that you use the Windows application Notepad because with Notepad you can open the file during a run as the file is being written.

Protocol log file

The protocol log file records all available event and error information. The information recorded in the protocol log file cannot be modified.

This is a tab-delimited text file that can be opened and manipulated in excel. Many customers use this feature to parse barcode information from the log and into their database.

Part of a protocol log file, opened in Notepad, is shown in the following diagram.



protocol log(Monday, May 9, 2005 @ 4_38_58 PM).txt - Notepad

File Edit Format Help

```
(5/9/05 - 4:39:06.69 PM) Info    BenchWorks  Creating: OriginalVCodeDevice
(5/9/05 - 4:39:06.70 PM) Info    BenchWorks  Creating: PipettorFilterShelfDevi
(5/9/05 - 4:39:06.70 PM) Info    BenchWorks  Creating: PipettorReagentShelfDev
(5/9/05 - 4:39:06.71 PM) Info    BenchWorks  Creating: PipettorServoShelfDevic
(5/9/05 - 4:39:06.71 PM) Info    BenchWorks  Creating: PipettorShakeShelfDevic
(5/9/05 - 4:39:06.81 PM) Info    BenchWorks  Creating: PipettorStandardShelfDe
(5/9/05 - 4:39:06.81 PM) Info    BenchWorks  Creating: PipettorTipChuteShelfDe
(5/9/05 - 4:39:06.81 PM) Info    BenchWorks  Creating: PipettorTipboxShelfDevi
(5/9/05 - 4:39:06.81 PM) Info    BenchWorks  Creating: PipettorVacuumShelfDevi
(5/9/05 - 4:39:06.81 PM) Info    BenchWorks  Creating: PlateLocDevice
(5/9/05 - 4:39:06.92 PM) Info    BenchWorks  Creating: PlatePierceDevice
(5/9/05 - 4:39:06.95 PM) Info    BenchWorks  Creating: QFillDevice
(5/9/05 - 4:39:07.29 PM) Info    BenchWorks  Creating: RempCSPDevice
(5/9/05 - 4:39:07.40 PM) Info    BenchWorks  Creating: RobotDevice
(5/9/05 - 4:39:07.61 PM) Info    BenchWorks  Creating: ST6StackerDevice
(5/9/05 - 4:39:07.66 PM) Info    BenchWorks  Creating: ShuttleRobotDevice
(5/9/05 - 4:39:07.73 PM) Info    BenchWorks  Creating: SpectrafluorDevice
(5/9/05 - 4:39:07.74 PM) Info    BenchWorks  Creating: StackerDevice
(5/9/05 - 4:39:07.80 PM) Info    BenchWorks  Creating: StandardPlatePadDevice
(5/9/05 - 4:39:07.80 PM) Info    BenchWorks  Creating: StoreXDevice
(5/9/05 - 4:39:07.85 PM) Info    BenchWorks  Creating: StoreXIOPadDevice
(5/9/05 - 4:39:07.85 PM) Info    BenchWorks  Creating: TeleshakeDevice
(5/9/05 - 4:39:07.89 PM) Info    BenchWorks  Creating: TeleshakeHighSpeedDevic
(5/9/05 - 4:39:07.96 PM) Info    BenchWorks  Creating: TrashDevice
(5/9/05 - 4:39:07.98 PM) Info    BenchWorks  Creating: UltramarkDevice
(5/9/05 - 4:39:08.07 PM) Info    BenchWorks  Creating: VCode3KDevice
(5/9/05 - 4:39:08.17 PM) Info    BenchWorks  Creating: VLidDevice
(5/9/05 - 4:39:08.20 PM) Info    BenchWorks  Creating: VLidStationDevice
(5/9/05 - 4:39:08.20 PM) Info    BenchWorks  Creating: VMixDevice
(5/9/05 - 4:39:08.25 PM) Info    BenchWorks  Creating: VPrepDevice
(5/9/05 - 4:39:08.34 PM) Info    BenchWorks  Creating: VSpinAccess2Device
```

During a run, you can type notes directly into the log and it will be saved to the log file. See related topics for more information.

Pipettor transfer log file

The pipettor transfer log file is a tab-delimited text file that records VPrep Pipettor or Bravo Platform pipetting information on a BenchCel Workstation that has a VPrep Pipettor or Bravo Platform.

Note: This log is not the same as the log generated by the VPrep Pipettor.

Part of a pipettor transfer log file, opened in Notepad is shown in the following diagram.

```
)3 - 12:53:56.60 PM)      VPrep 1 (96 channels)   Q1Source 1      MasterA0004     No bar code     No bar code     N
 1       (5/22/03 - 12:54:04.71 PM)      IntermediateA 1 IntA101 IntA001 No bar code     No bar code     1      1

)3 - 12:54:12.78 PM)      VPrep 1 (96 channels)   Q1Source 1      MasterA0004     No bar code     No bar code     N
 1       (5/22/03 - 12:54:20.60 PM)      IntermediateB 1 IntB101 IntB001 No bar code     No bar code     1      1

)3 - 12:54:27.40 PM)      VPrep 1 (96 channels)   Q1Source 1      MasterA0004     No bar code     No bar code     N
 1       (5/22/03 - 12:54:40.76 PM)      Q1Source 1      MasterA0004     No bar code     No bar code     No bar co
 0.0     OK
)3 - 12:54:27.40 PM)      VPrep 1 (96 channels)   Q1Source 1      MasterA0004     No bar code     No bar code     N
 1       (5/22/03 - 12:54:49.03 PM)      IntermediateC 1 IntC101 IntC001 No bar code     No bar code     1      1
```

The pipettor transfer log contains the following information, separated by tabs:

- ❑ Aspiration timestamp
- ❑ Pipettor name
- ❑ Name of the plate aspirated from
- ❑ North barcode (of plate aspirated from)
- ❑ East barcode (of plate aspirated from)
- ❑ South barcode (of plate aspirated from)
- ❑ West barcode (of plate aspirated from)
- ❑ Quadrant of the plate aspirated from (number 1–16)
- ❑ Dispense timestamp
- ❑ Name of the plate dispensed to
- ❑ North barcode (of plate dispensed to)
- ❑ East barcode (of plate dispensed to)
- ❑ South barcode (of plate dispensed to)
- ❑ West barcode (of plate dispensed to)
- ❑ Quadrant of the plate dispensed to (number 1–16)
- ❑ Volume of liquid dispensed in microliters
- ❑ Status of the dispense

  Values are ERROR or OK. These refer to the status of the barcode verification and not the dispense itself.

Note: One log entry is created for every aspirate/dispense task pair. For example, if 20 µL are aspirated and half is dispensed to one plate and half to another plate, two piplog entries are created. This example is treated as two dispense task pairs.

Barcode log file

The barcode log file contains the date and time at which each barcode is applied and the text of each field. Barcode fields are displayed in human readable form.

Reader output file

The reader output file defines the location of the data file (<*file name*>.dat) for a plate reader.

Measurements output log file

What is recorded

The measurements output log file records measurements made by StoreX and Weigh Pad devices.

Weigh Pad measuring units

The Weigh Pad records liquid volumes as percentage of the maximum.

StoreX measuring units

The measuring units recorded by a StoreX device are temperature, in degrees Celsius, humidity in relative humidity percentage, and gas concentrations in percent (by volume).

VersaScan image file root folder

The image root folder sets the folder in which images from a VersaScan are automatically stored.

Pipette technique editor root folder

The pipette technique editor root folder sets the folder in which pipette technique files are automatically stored.

Note: Currently, pipette techniques are available only for the Bravo Platform.

Related topics

For information about...	See...
The next step	"Setting log options" on page 42
Adding a note	"Working with the Log toolbar" on page 63
Barcode labeling	"Setting Apply Label task parameters" on page 91
Pipette techniques	*VWorks User Guide (addendum)*

Setting log options

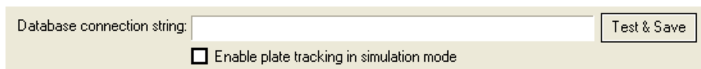
About this topic

This topic explains how to configure the log options page of the BenchWorks software Options dialog box. You may not need to configure these options for every run.

Available options

The following log options are available in BenchWorks software:

- ❑ The type of log information to show in the Log toolbar of BenchWorks software
- ❑ General settings that pertain to log and data file maintenance
- ❑ The folders in which to store log and data files
- ❑ Checking the database connection and enabling plate tracking



How messages displayed in the Log toolbar are controlled

Event and error messages are displayed in the log toolbar. With all message options turned on, a large number of messages are displayed. For simplicity, you can hide types of messages that are not important to you.

The messages that are displayed during a run are controlled by:

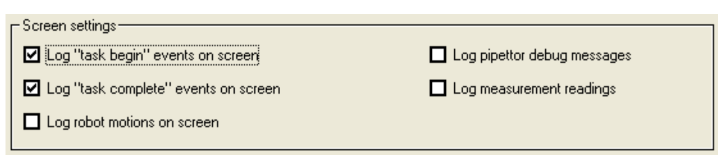
- ❑ Selecting screen settings options (in the Tools > Options dialog box) before a run
- ❑ Clicking tabs in the Log toolbar during a run

Note: Screen display settings do not affect the information saved in log files. All error and event information is always saved.

Procedure

To set log file options:

1. Select **Tools** > **Options**.
2. Click the **Log Options** tab.
3. In the **Screen settings** area, select one or more of the following options, as needed:



Log Option	**Writes to screen and file...**
Log “task begin” events on screen	Messages at the time that process tasks are scheduled (not at the time that they are performed). This applies only to the protocol log file.
Log “task complete” events on screen	Messages that confirm when process tasks are completed. This applies only to the protocol log file.
Log robot motions on screen	Robot motion events as they happen. This applies only to the protocol log file.
Log pipettor debug messages	Event messages that are generated by VPrep Pipettors and Bravo Platforms. This applies only to the protocol log file.
Log measurement readings	Environmental values as they are recorded in real time. This applies only to the protocol log file.

4. In the **File Settings** area:

   a. In the **Max number of each log file to maintain** text box, type the maximum number of log files that you want to store. We recommend you maintain at least 100 log files.

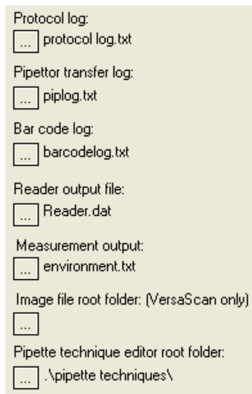
   !! IMPORTANT !! After this number has been reached, each new log file replaces the oldest existing log file.

   b. Select one or more of the following options, as needed:

Log options	**Description**
Create new logs for every run	A separate log file is created for every run. If the check box is cleared, each run appends data to the same log file and a new log file is created when BenchWorks software is started. This affects all log files.

Log options	Description
Append timestamps to log file names	The date and time of the run is appended to the name of the log file. This affects all log files.

5. Click the ellipsis button  for a log file or folder.



   a. Navigate to the folder to which you want to save the log file.
   b. Click **Save**.

6. In the **BenchWorks software Options** dialog box, click **OK**.

Related topics

For information about...	See
The workflow this procedure belongs to	"Workflow for preparing for a run" on page 18
The next step	"What you should know before you start the protocol" on page 47
Log and data files	❑ "Setting pre-protocol rules" on page 32 ❑ "Working with the Log toolbar" on page 63

Importing a log file to Excel

About this topic

This topic describes how to import a log file into Microsoft Excel.

Because comma-delimited and tab-delimited text files contain structured data, you can quickly import them into Microsoft Excel, automatically organizing their data into columns.

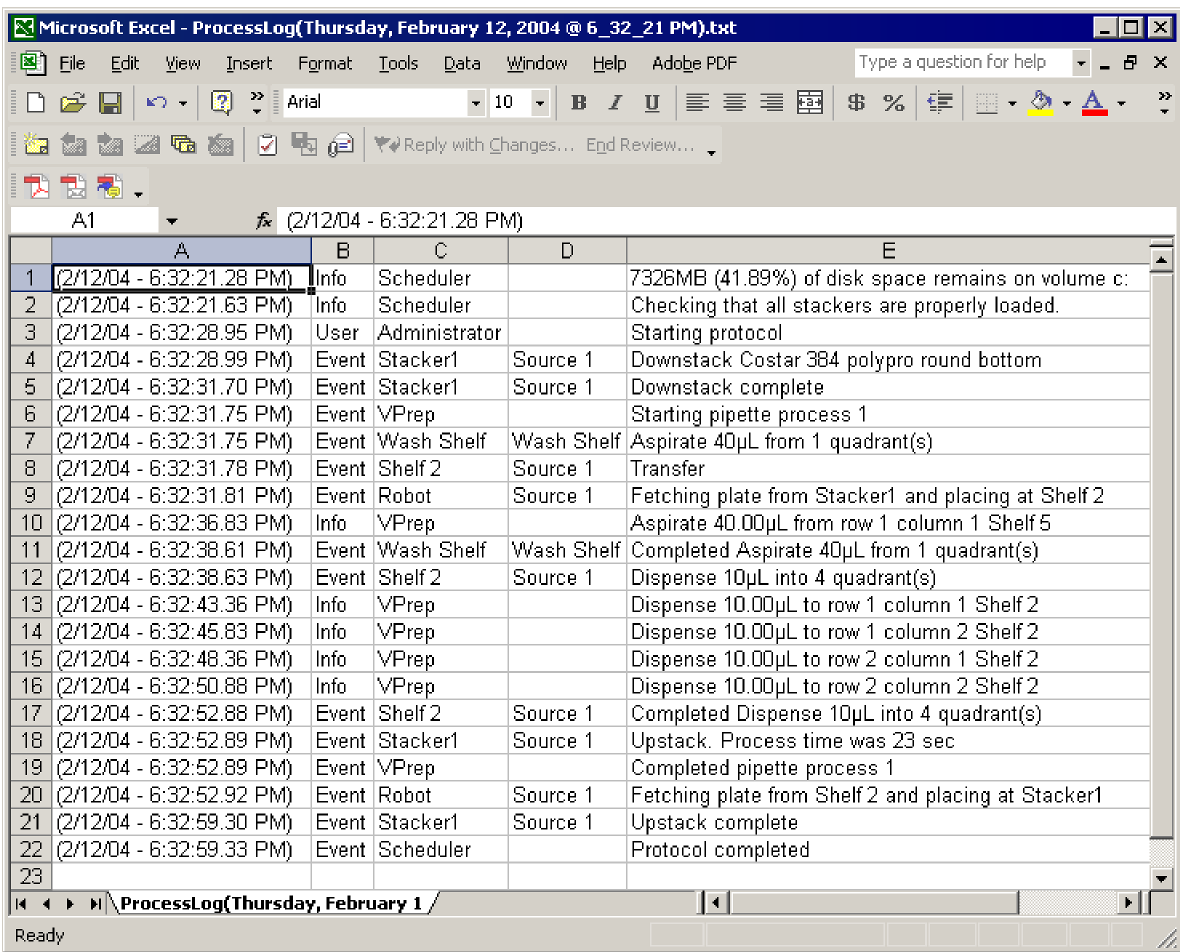
This feature is helpful for making it easier to analyze the data in log files.

Procedure

To import a log file to Excel:

1. Open Microsoft Excel.
2. Drag the file onto the Excel window.

   The data is imported.



	A	B	C	D	E
1	(2/12/04 - 6:32:21.28 PM)	Info	Scheduler		7326MB (41.89%) of disk space remains on volume c:
2	(2/12/04 - 6:32:21.63 PM)	Info	Scheduler		Checking that all stackers are properly loaded.
3	(2/12/04 - 6:32:28.95 PM)	User	Administrator		Starting protocol
4	(2/12/04 - 6:32:28.99 PM)	Event	Stacker1	Source 1	Downstack Costar 384 polypro round bottom
5	(2/12/04 - 6:32:31.70 PM)	Event	Stacker1	Source 1	Downstack complete
6	(2/12/04 - 6:32:31.75 PM)	Event	VPrep		Starting pipette process 1
7	(2/12/04 - 6:32:31.75 PM)	Event	Wash Shelf	Wash Shelf	Aspirate 40µL from 1 quadrant(s)
8	(2/12/04 - 6:32:31.78 PM)	Event	Shelf 2	Source 1	Transfer
9	(2/12/04 - 6:32:31.81 PM)	Event	Robot	Source 1	Fetching plate from Stacker1 and placing at Shelf 2
10	(2/12/04 - 6:32:36.83 PM)	Info	VPrep		Aspirate 40.00µL from row 1 column 1 Shelf 5
11	(2/12/04 - 6:32:38.61 PM)	Event	Wash Shelf	Wash Shelf	Completed Aspirate 40µL from 1 quadrant(s)
12	(2/12/04 - 6:32:38.63 PM)	Event	Shelf 2	Source 1	Dispense 10µL into 4 quadrant(s)
13	(2/12/04 - 6:32:43.36 PM)	Info	VPrep		Dispense 10.00µL to row 1 column 1 Shelf 2
14	(2/12/04 - 6:32:45.83 PM)	Info	VPrep		Dispense 10.00µL to row 1 column 2 Shelf 2
15	(2/12/04 - 6:32:48.36 PM)	Info	VPrep		Dispense 10.00µL to row 2 column 1 Shelf 2
16	(2/12/04 - 6:32:50.88 PM)	Info	VPrep		Dispense 10.00µL to row 2 column 2 Shelf 2
17	(2/12/04 - 6:32:52.88 PM)	Event	Shelf 2	Source 1	Completed Dispense 10µL into 4 quadrant(s)
18	(2/12/04 - 6:32:52.89 PM)	Event	Stacker1	Source 1	Upstack. Process time was 23 sec
19	(2/12/04 - 6:32:52.89 PM)	Event	VPrep		Completed pipette process 1
20	(2/12/04 - 6:32:52.92 PM)	Event	Robot	Source 1	Fetching plate from Shelf 2 and placing at Stacker1
21	(2/12/04 - 6:32:59.30 PM)	Event	Stacker1	Source 1	Upstack complete
22	(2/12/04 - 6:32:59.33 PM)	Event	Scheduler		Protocol completed
23					

Protocol log file information

The information given in a protocol log file is explained in the following table. Refer to the screenshot of the Excel file for the column letters.

Spreadsheet column	Information
A	Date and time that the entry was added
B	Type of information: ❑ Error ❑ Event ❑ Info ❑ Script ❑ User
C	Origin of the information
D	Either the: ❑ Name of the plate ❑ Name of the device, if it refers to a reagent
E	Description of the log entry

Related topics

For information about...	See
The workflow for preparing to do a run	"Workflow for preparing for a run" on page 18
The next step	"What you should know before you start the protocol" on page 47
Adding notes to the log file	"Working with the Log toolbar" on page 63
Log and data files	❑ "Setting pre-protocol rules" on page 32 ❑ "Working with the Log toolbar" on page 63
Setting log options	"Setting log options" on page 42

What you should know before you start the protocol

About this topic

This topic gives an overview of the information you should become familiar with when running a protocol.

What you should know

At a minimum, become familiar with the following:

- ❑ Which devices you need to prepare
- ❑ Where you need to position the plates before the run and where they are moved to during the run
- ❑ Whether User Message tasks prompt you to perform certain actions after you start the run or whether you need to perform the actions on your own initiative before you start the run
- ❑ Whether you need to replace fluids and empty waste during the run
- ❑ Whether you need to remove and add plates during the run
- ❑ Which liquids you need to prepare, where they should be placed, and in what kinds of reservoir

Related topics

For information about...	See
Where this topic fit into the workflow	“Workflow for preparing for a run” on page 18
Running a protocol	“Starting a run from BenchWorks software” on page 51
Printing a protocol	“Printing a protocol” on page 48

Printing a protocol

About this topic

You can print a description of a protocol, which will help you to analyze the sequence of tasks. This topic describes how to print a copy of the protocol.

Printing a protocol

It might help you to refer to a printout of the protocol steps as you analyze the protocol.

To set up the printer:

1. Select **File > Print Setup**.
2. Select the printer you want to print to and configure the print dialog box as required.

To print a protocol:

1. Navigate to **File > Print Preview**.
2. View the preview and, if it is satisfactory, click **Print**.

Note: If you try to print a protocol before a network printer driver is installed on the BenchCel Workstation computer, you will receive an error. If this happens, contact your network administrator for help.

An example of a printed process that includes a pipette process is shown here.

```
BenchWorks: (6/5/03 - 9:42:30.48 AM)

    384 ABGene deepwell called Test Plate:
    Pipet process 1
    Downstack from Stacker 2

    ******************************

    Pipet Process 1:
    Aspirate 10.0 µL from Test Plate quadrant 1
    Dispense 10.0 µL to VPrep 1 Shelf 3 quadrant 1 using 384 Disposable Tip 01ul - 05ul
    Mix 10.00 µL 3 times at VPrep 1 Shelf 5 quadrant 1
```

Related topics

For information about...	See...
Information you should know about protocols	"What you should know before you start the protocol" on page 47

Performing a run

3

A run is a single protocol that is performed one or more times in a series. This chapter describes how to run an existing protocol using BenchWorks software. All of the procedures in this chapter can be performed by someone with operator privileges. This chapter contains the following topics:

About performing a run

About this topic

This topic tells you where to find the information about starting a run and performing tasks associated with running a protocol.

Ways to set up a run

There are three ways to start a run.

Method	See...
Set up a single protocol run and manually start it by clicking the Start button in the BenchWorks software	"Starting a run from BenchWorks software" on page 51
Set up a single protocol in advance and manually start it from a command line	"Starting a run from a command line" on page 54
Set up a run set, which consists of one or more protocol runs that are started automatically, based on times that you set in advance	❑ "About starting runs automatically" on page 55 ❑ "Working with the run-set manager" on page 56

What you do next depends on whether you are going to run a single protocol or a run set.

If you are going to run a single protocol, at this point the protocol you plan to run has been created and opened in BenchWorks software. The next step is to start the run.

If you are going to run a run set, you first have to create it.

Tasks associated with a run

Whichever way you choose to start a run, you would typically perform a number of pre-run checks.

Task	See...
Perform pre-run checks	*BenchCel Microplate Handling Workstation User Guide*
Start a run	❑ "Starting a run from BenchWorks software" on page 51 ❑ "Starting a run from a command line" on page 54 ❑ "About starting runs automatically" on page 55 ❑ "Working with the run-set manager" on page 56

Task	**See...**
Monitor a run	❑ “Monitoring a run” on page 61 ❑ “Working with the Log toolbar” on page 63
Pause a run	“Pausing or stopping a run” on page 59
Clean up	*BenchCel Microplate Handling Workstation User Guide*
Exiting BenchWorks software	“Logging out of BenchWorks software” on page 65

Starting a run from BenchWorks software

About this topic

This topic describes how to start a run using the Start button in BenchWorks software. Start a run after performing pre-run checks and opening a protocol.

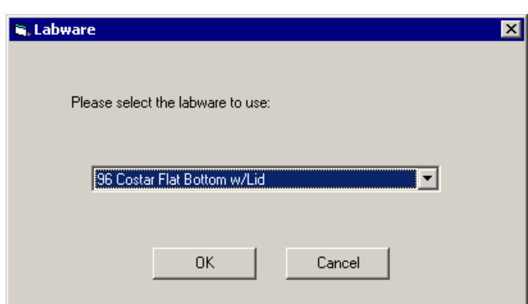
Procedure

To start a run:

1. Make sure all devices used in the protocol are in their home positions.

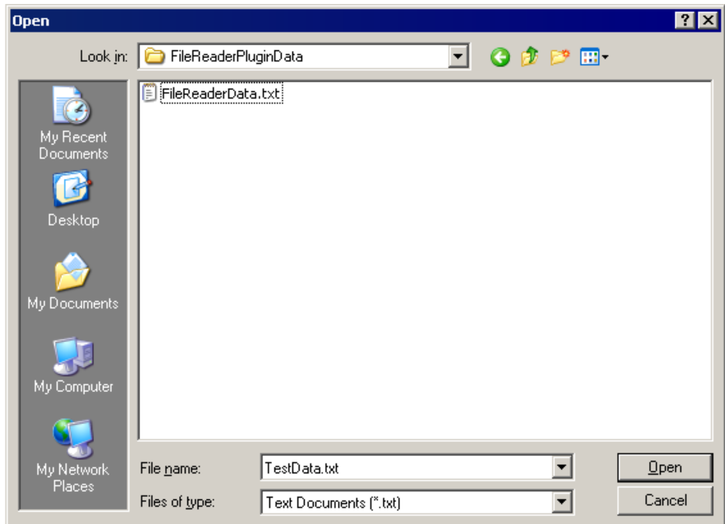
   Refer to the device user guides for more information about homing.
2. Make sure the areas around the devices are clear of labware (except for the labware used in the protocol).
3. In BenchWorks software, click **Start**.

   If this is the first run with this device file, BenchWorks software confirms communication with all devices and instructs the devices to home.
4. If you selected **from plug-in** as the plate type, the **Labware** dialog box opens asking you to select the labware type: select the appropriate labware type from the list.



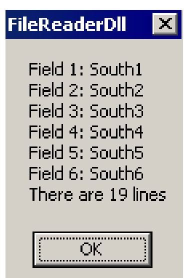
5. If you are running a VCode Labeler and are using the **FileReader** plug-in, the **Open** dialog box opens asking you to select the text file that contains the barcode label data.

   a. Select the plug-in text file that contains the data from the **Open** dialog box. and click **Open**.



   b. In the new dialog box that opens, inspect the list of names of the columns of the text file and the total number of rows in the file.

   In the following screenshot, the first six columns of the plug-in file are repeated for each side of the plate.

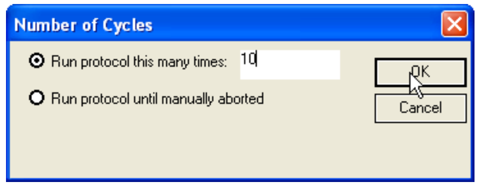


   c. Click **OK**.

   If the file is not the one you intend to use, you can cancel the run at the next step if needed.

6. Type the number of times that you want to execute the protocol during the run, or to run an indefinite number of plates, select **Run protocol until manually aborted**.

   When the downstack becomes empty, or the upstack becomes full, you will be prompted with the option of adding or removing plates. This feature saves you the time of having to restart the protocol when you are processing a large number of plates or when you are running plates intermittently.



7. Click **OK**.

What happens after a run starts

After you start the run:

- ❑ The Start button becomes unavailable and the Pause button becomes available.
- ❑ Log messages on the Log toolbar indicate the start of the run. Also, log files record events as they are performed on all plates in the run.
- ❑ The first instructions of the protocol are executed.
- ❑ If User Message tasks are included in the protocol, you are prompted to respond to them.

Related topics

For information about...	See...
Pausing a run	“Pausing or stopping a run” on page 59
Monitoring the log	“Working with the Log toolbar” on page 63

Starting a run from a command line

About this topic

This topic describes how to start BenchWorks software and initiate a run directly from a command line.

Procedure

To start BenchWorks software from a command line:

1. In Windows, select **Start** > **Run.**
2. In the **Run** text box, type `cmd` and click **OK**.

   The command prompt opens.
3. At the command prompt, change the current directory to BenchWorks software workspace that contains the protocol file by typing:

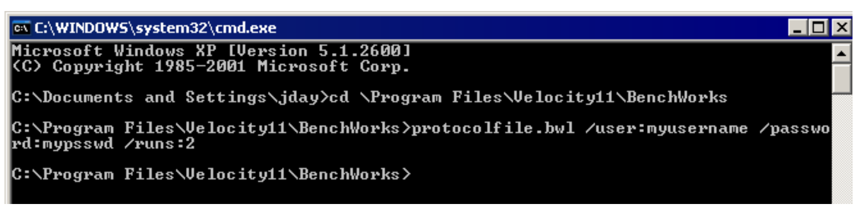
   `cd \Program Files\Velocity11\BenchWorks`
4. Press ENTER.
5. Type the name of the BenchWorks software protocol file followed by values for the switches that specify:

   - The protocol to run
   - Your user name
   - Your password
   - The number of cycles for which to run the protocol

   An example is:

   myprotocol.bwl /user:*your user name* /password:*your password* /runs:*number of run cycles*
6. Press **ENTER** to start the run.

   The following screenshot shows a generic example of the completed command prompt.



Related topics

For information about...	See...
Starting a run using the start button	"Starting a run from BenchWorks software" on page 51
Pausing a run	"Pausing or stopping a run" on page 59
Monitoring a run	"Monitoring a run" on page 61

About starting runs automatically

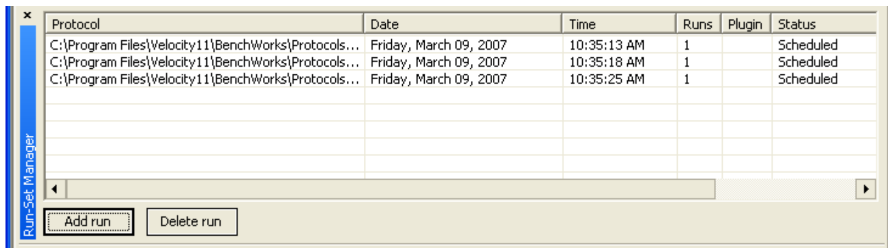
About this topic

If you want to schedule a series of runs, perhaps using a different protocol for each run, you need to create a run set. This topic provides some basic information about run sets.

Run set defined

A run set is a collection of runs that are scheduled in advance to run without operator intervention.

The run set is defined in the Run-Set Manager toolbar, which is displayed on the Progress page of BenchWorks software.



Typical use

Run sets are typically used with systems that are meant to be run for long stretches of time unattended.

Run-set file

The data displayed in the run-set manager is stored as an XML file with the file name extension .rst, in a location selected by your BenchCel Workstation administrator.

Run-set privileges

You can only save run-set files if you are logged on with an Administrator or Technician user account.

Run options

When setting up a run set, for each run you define:

- ❑ How many times the run should cycle
- ❑ The time that each run should start

Run scheduling logic

You can create a run set while another protocol is running.

If the time to start a run scheduled by the run-set manager arrives while another run is being performed, the start is delayed. Then, when the running protocol finishes, the earliest-scheduled run in the run set starts.

Related topics

For information about...	See...
Setting up runs (overview)	"About performing a run" on page 50
Using the run-set manager	"Working with the run-set manager" on page 56

Working with the run-set manager

About this topic

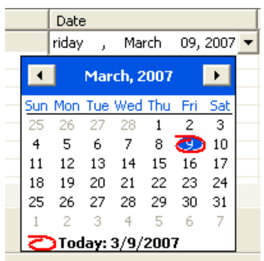
This topic describes how to create, edit, save, and open run sets.

Adding a run

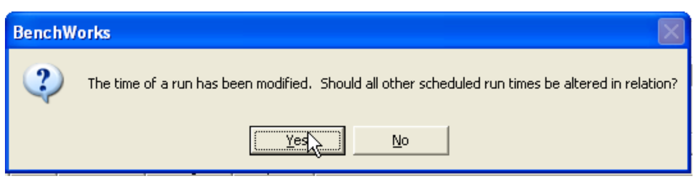
To add a run to the run set:

1. In the **Run-Set Manager** toolbar, click **Add run**.
2. In the **Select a protocol file to use for this scheduled run** browser box, navigate to, and select, the protocol file that you want to add.
3. Click **Open**.

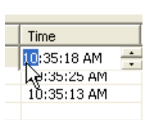
   A new row is added to the Run-Set Manager toolbar table, with a default time scheduled 5 minutes into the future.
4. If you want to schedule the run for a different day:
   a. Click in the **Date** column.
   b. Click a second time in the **Date** column to make the date editable.
   c. Click the drop-down arrow to open a calendar and select the date.



   d. If you want all other runs in a run set to be modified in relation to the changed day, click **Yes** in the BenchWorks software dialog box.



5. If you want to schedule the run for a different time:
   a. Click in the **Time** column.
   b. Click again in the **Time** column to make the time editable.
   c. Click the group of hours, minutes, or seconds to edit.
   d. In the following example, the minutes group is selected.



e. Click the up or down arrows to change the value or type the new value in the field.

6. In the **Runs** column, enter a number of cycles that you want the protocol to run.

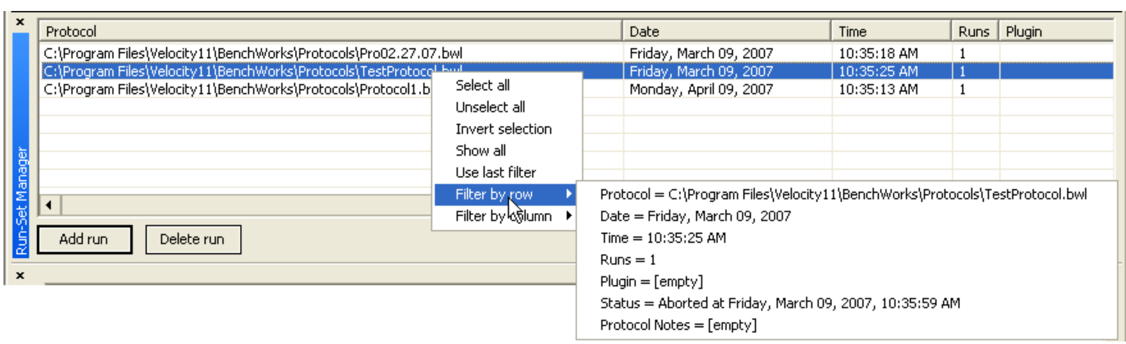
7. If you are using a plug-in (that Velocity11 has written or that you have created using the VHooks interface), double-click in the **Plugin** column and navigate to plug-in file.

Filtering runs

If you have a long list of runs in a run set, you can apply a filter to display a subset of the runs.

To filter displayed runs:

1. Right-click a cell in the **Run-Set Manager** toolbar that you would like to keep in the displayed selection.
2. Select **Filter by row** from the menu that appears.



3. Select the value that you would like to filter on.

   Runs that do not include this value are hidden.

After filtering a run set, you can display all runs again.

To display all runs:

1. Right-click a data-containing row in the **Run-Set Manager** toolbar.
2. Select **Show all** from the menu that appears.

   All runs are now displayed.

Deleting a run

To delete a run:

1. Select a row in the **Run-Set Manager** toolbar.
2. Click **Delete run**.

Saving run sets

To save a run set you must be logged on with an Administrator or Technician user account.

To save a run set:

1. Select **File** > **Runset File** > **Save**.

   To save the file in a different location, select **Save As**.

Opening a run set

If you open a previously created run set, it is likely that some or all of the runs are scheduled to start in the past. In this case, make sure that you set new start dates and times so that they are in the future.

The run-set manager allows you to set a new start time for one run and automatically reset the start times of the other runs by the same time increment.

!! IMPORTANT !! The runs that are scheduled in the past will not start automatically.

To open a run set:

1. Select **File** > **Runset File** > **Open**.
2. In the **Open** browser box, navigate to and select the run-set file that you want to open.
3. Click **Open**.
4. Change the scheduled date and time following the procedure in "Adding a run" on page 56.

Stopping a run set

The procedure for stopping a run set is the same as the procedure for stopping any run.

For more information about...	See...
Stopping a run set	"Pausing or stopping a run" on page 59
Setting up runs	"About performing a run" on page 50
Run sets	"About starting runs automatically" on page 55

Pausing or stopping a run

About this topic

This topic describes when and how to stop or pause a protocol that is running.

Use this procedure to:

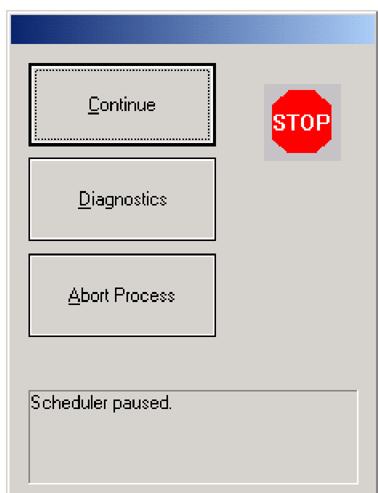
- ❑ Pause and continue a run, for example, when you want to:
  - ◆ Add or remove labware
  - ◆ Clean up a spill
  - ◆ Add buffer to a reservoir
  - ◆ Diagnose a problem that you notice
  - ◆ Perform an operation that is not part of the protocol
- ❑ Abort a run in a non-emergency situation

Procedure

To pause or stop a run using BenchWorks software:

1. In BenchWorks software, click **Pause**.

   The **Stop** dialog box opens and the currently scheduled task continues to completion. This may take a minute or more. After that, no more tasks are performed.

2. You now have three choices:

If you want to...	Then...
Continue with the run	Click **Continue**.

If you want to...	Then...
Troubleshoot a problem or perform a manual operation	Click **Diagnostics**, and select the module that caused the error. This opens the diagnostics software for that module, allowing you to troubleshoot the problem. For more information, see *BenchCel Microplate Handling Workstation User Guide*.
Abort the protocol	Click **Abort Process**.

!! IMPORTANT !! Before continuing with a run, make sure that the system is in a valid state for the protocol.

Make sure that you have not made changes that will cause an error, such as moving a plate to a position that should not have a plate or causing samples to be switched around.

Related topics

For information about...	See...
Starting a run	❑ "Starting a run from BenchWorks software" on page 51 ❑ "Starting a run from a command line" on page 54
Monitoring a run	"Monitoring a run" on page 61
Using the Log toolbar	"Working with the Log toolbar" on page 63

Monitoring a run

About this topic

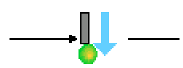
This topic describes what operations you need to monitor and how to view the progress of a run.

What to monitor

After starting a run, monitor the operation of the BenchWorks software. Exactly what you do to monitor a run depends on the protocol that you are using. For example, you might need to:

- ❑ Compare the motions of the robot to the protocol tasks being completed.

  You can identify the task that is currently being performed from the position of the green ball in the process panes. Because BenchWorks software can schedule more than one task at a time, there may be more than one green ball displayed.



- ❑ Add and remove labware.
- ❑ Empty liquid waste containers.
- ❑ Fill liquid reservoirs.
- ❑ Replace an empty roll of seal or barcode labels.

!! IMPORTANT !! No errors are reported when a liquid waste container becomes full or a liquid reservoir becomes empty. (Exceptions to this are reservoirs on a VPrep Pipettor Weigh Shelf.)

To guard against the problem of a full waste container or empty reservoir container, the protocol writer can incorporate User Message tasks into the protocol to remind the operator at the appropriate steps in the protocol. Alternatively, operators can set timer alarms to remind them to fill reservoirs and empty the waste container at the appropriate time.

Monitoring overall progress

You can monitor the overall progress of the run on the Progress page of BenchWorks software.

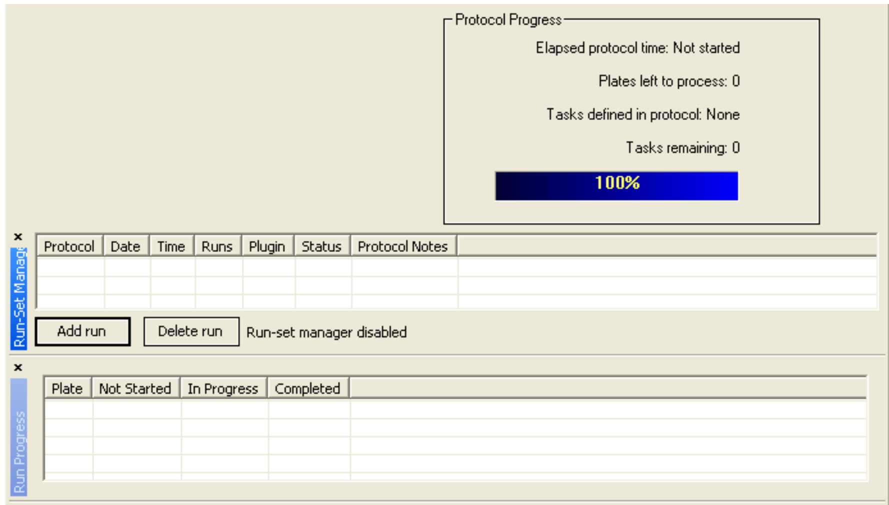
The Progress page has a:

- ❑ Protocol Progress area
- ❑ Run-Set Manager
- ❑ Run Progress area

Collectively, these display:

- ❑ The protocol that is running
- ❑ The number of tasks remaining
- ❑ The number of plates remaining to be run

- The status of each plate in the protocol



Closing unneeded toolbars

You can close unneeded toolbars to create more room on the screen for you to monitor a run by clicking the close box.

Related topics

For information about...	See...
Pausing a run	"Pausing or stopping a run" on page 59
Starting a run	❑ "Starting a run from BenchWorks software" on page 51 ❑ "Starting a run from a command line" on page 54
What to do when you get an error	*BenchCel Microplate Handling Workstation User Guide*

Working with the Log toolbar

About this topic

This topic gives an overview of what the Log toolbar does and how to use its features.

Event and error messages are displayed in the Log toolbar of the BenchWorks software window.

With all message options turned on, a large number of messages are displayed during a run. For ease of use, you can hide types of messages that are not important to you. The messages displayed during a run are controlled by:

- ❑ Selecting Screen Setting options in the Log Options dialog box before a run
- ❑ Clicking tabs at the bottom of the Log toolbar display during a run

Viewing the Log toolbar

To view the Log toolbar:

1. If the toolbar is not showing, from the **View** menu, select **Toolbars** > **Log**.

   The toolbar opens at the bottom of the screen.
2. Refer to the table below to view different kinds of log data.

Log toolbar options

The following options are available for displaying screen messages.

BenchWorks software log tab	Displays...
All	All event and error messages. This is the data that is recorded in the log.txt file.
Process	Event messages, including fluid transfer messages.
Pipettor Fluid Transfers	Event messages reported by a Velocity11 pipettor. This is the same data that is recorded in the pipettor transfer log file, but is presented in sentence rather than tab-delimited format. *Note:* Event messages can be disabled by clearing the Record in transfer log option in the aspirate and dispense pipette task parameters.
Errors	Error messages that appear as alert boxes on the screen. This data is not saved in a separate log, but is included in the log.txt file.
Notes	Notes that you add.

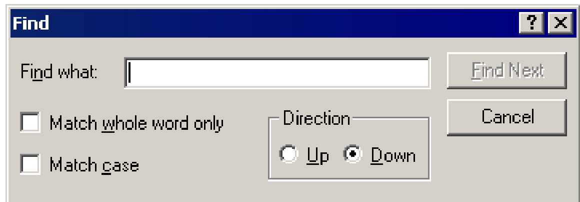
Searching the Log toolbar

You can search for specific text in the Log toolbar.

To perform a search in the Log toolbar:

1. Select the appropriate tab in the Log toolbar.
2. Click in the toolbar pane.
3. Click CTRL + F3 or CTRL + F.

   The **Find** dialog box opens.



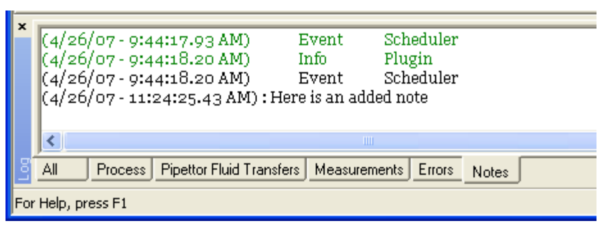
Adding a note

You can type notes into the message display pane during a run. Any notes that you type are also incorporated into the log.txt file.

To add a note to the Log toolbar and log.txt file:

1. At the bottom of the message display pane, click the **Notes** tab.
2. Click in the display pane wherever you want to add the note.
3. Type the note.
4. Press **ENTER** on the keyboard

   A timestamp is appended to the note.



Message color coding

The BenchWorks software log color-coding scheme is listed here.

Color	Meaning
Black	Standard events with a date stamp or user-added notes
Blue	Liquid transfer events
Red	Warnings
Lime green	General information

Related topics

For information about...	See...
Setting screen message options before a run	"About log and data files" on page 38
Importing a log file	"Importing a log file to Excel" on page 45

Logging out of BenchWorks software

About this topic

This topic describes how to log out of BenchWorks software.

Logging out of BenchWorks software ensures that unauthorized users do not use your account to control the BenchCel Workstation or its devices. For example, an administrator should log out after making changes in the plate editor.

Procedure

To log out:

1. Click **Log Out**.

Related topics

For information about...	See...
Managing users	"Adding and deleting a user account" on page 237
User privileges	"About user accounts and privileges" on page 236

Creating a protocol basics

4

This chapter is for people with technician and administrator privileges. It describes the process of creating a protocol and explains the parameters used to define each protocol task. Before reading this chapter you should be familiar with the concepts presented in "Performing a run" on page 49.

This chapter is not a tutorial on writing protocols—it provides the basic reference information you need to create protocols.

This chapter contains the following topics:

About tasks, processes, and protocols

About this topic

This topic defines some terms that you need to know before you can understand or create protocols.

Task defined

A task is an operation usually performed by a device, on one or more plates, and is represented by an icon in the protocol editor. It has associated parameters that are defined in the Task Parameters toolbar.

Some tasks can only be used in certain conditions, for example, only in a pre- or post-protocol process or only as part of a pipette sub-process.

Process defined

A process is a series of tasks to be performed on one or more pieces of labware, usually from a single source, such as plate stacker. Plate processes are created in the Protocol Editor. Each process starts with a plate process icon.

The following diagram shows a process in which a defined plate type is having four tasks performed on it.

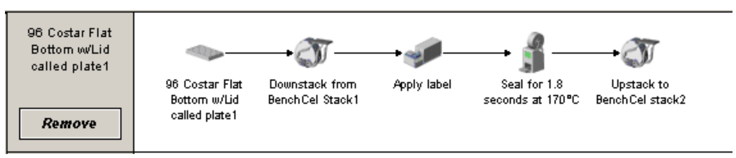
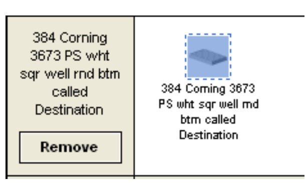


Plate process icon defined

A plate process icon represents the basic information about a plate or collection of plates. It has associated parameters that are defined in the Task Parameters toolbar.

The information it represents includes the type of labware used in the process, how many plates are available for processing at one time, whether the plates have lids, and plate name.

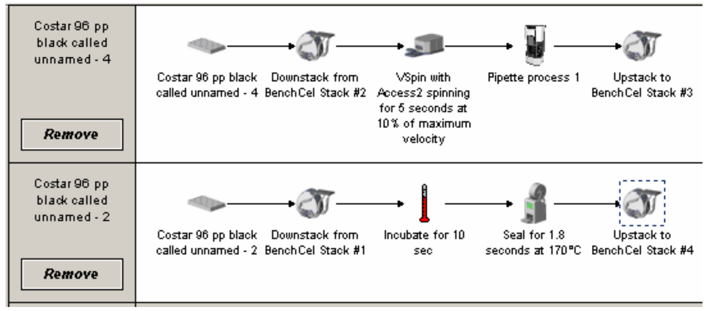
The following example icon represents a plate icon for a 384-well plate.



Protocol defined

A protocol is one or more processes that are run together.

The following example shows one protocol with two processes. The top process contains one pipette process. The pipette process is executed as a sub-routine of the main protocol process.



Pre-protocol defined

A pre-protocol is one or more processes that are executed once, before the protocol. The processes are created in the Pre-Protocol Editor which is accessed by clicking the Pre-Protocol Editor tab in BenchCel Workstation.

Priming reservoir pumps is an example of a startup-protocol task.

When you click Start, if there is a pre-protocol, it is executed first, followed by the protocol.

Note: If the Pre-Protocol tab is not visible, go to **Tools > Options** and select **Show Pre/Post Protocol Editor**.

Post-protocol defined

A post-protocol is one or more processes, which are executed once after the protocol. The processes are created in the Post-Protocol Editor which is accessed by clicking the Post-Protocol Editor tab in BenchCel Workstation.

A post-protocol is typically used to clean the system after a protocol run.

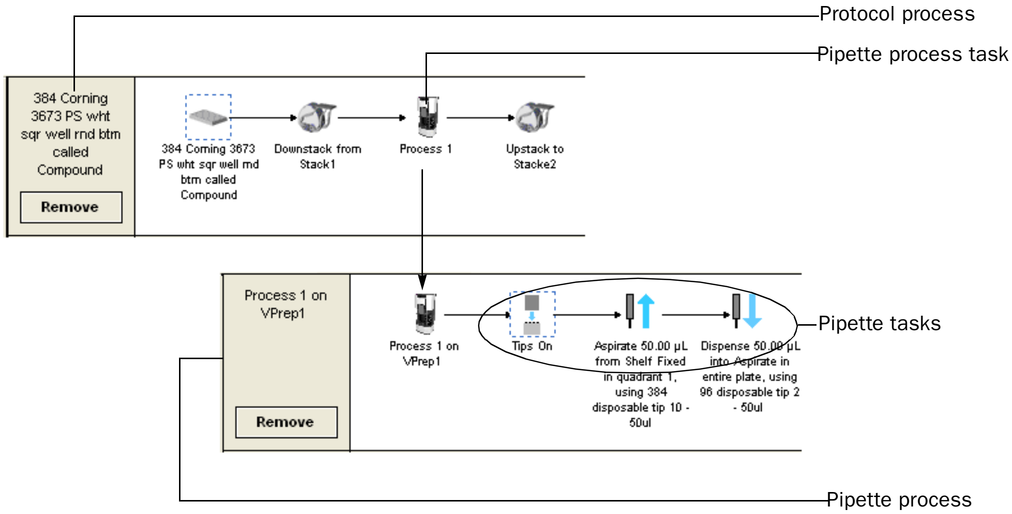
When you click Start, a pre-protocol might run first, followed by the protocol, and then any post-protocol processes.

Note: If the Pre-Protocol tab is not visible, go to **Tools > Options** and select **Show Pre/Post Protocol Editor**.

Pipette process defined

A pipette process is a sequence of pipette tasks that is performed on a specific plate, as defined in the process editor. It is a subroutine of a pipette process task.

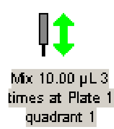
The following diagram describes the relationship between a task, pipette process task, and a pipette process.



Pipette task defined

A pipette task is an operation that is performed on one or more plates by a pipettor. It is represented by an icon in the pipette process editor.

The following diagram shows a pipette task.



Pipette process task defined

A pipette process task represents a sequence of pipette tasks known as a pipette process. Pipette processes are represented by an icon in the protocol.

Run defined

A run is a single protocol, which includes any pre-protocol and post-protocol processes, that is performed one or more times in a series.

When you start a run, you are prompted to enter the number of cycles that you want to run. The value that you enter represents the number of times the protocol executes before the run ends. For example, a value of four means that the protocol runs four times in the series. Note that when you run a protocol multiple times, the pre and post, if they exist, are only run once.

Related topics

For information about...	See...
Workflow for creating a protocol	"Workflow for creating a protocol" on page 73
The next step	"Setting up a pre-protocol or post-protocol process" on page 74

About the protocol file format

About protocol files

Protocols are sequences of tasks created by the user and run in BenchWorks software. Each task performs an activity, such as putting tips on a pipette head or sealing a plate.

Protocol files contain the information about which tasks to execute and what parameters each task uses. It does not contain information about device communications, teachpoint locations, and scheduling.

This topic provides an overview of the protocol file format.

File format

Protocols are created in the drag-and-drop protocol editor. When they are saved, the information is written to a file in XML format. In XML, the elements indicate the protocol's properties, and text within the markup tags gives the properties' values.

You can create and edit protocols in the protocol editor or directly in XML. The XML files can also be useful for troubleshooting because you can, for example, see which device file is associated with the protocol.

XML example

A protocol file viewed as XML is shown below. You can open a protocol file in any browser that contains an XML parser, for example, Mozilla Firefox.

```
  </Task>
- <Task Name="Bravo::secondary::Aspirate" Task_Type="0">
  - <Advanced_Settings>
      <Setting Name="Estimated time" Value="5.0"/>
      <Setting Name="Task has timing constraint" Value="0"/>
      <Setting Name="Minimum time" Value=""/>
      <Setting Name="Maximum time" Value=""/>
    </Advanced_Settings>
  - <Parameters>
      <Parameter Name="Location" Value="7"/>
      <Parameter Name="Volume" Value="10"/>
      <Parameter Name="Pre-aspirate volume" Value="0"/>
      <Parameter Name="Post-aspirate volume" Value="0"/>
      <Parameter Name="Liquid class" Value="< None >"/>
      <Parameter Name="Distance from well bottom" Value="2"/>
      <Parameter Name="Dynamic tip extension" Value="0"/>
      <Parameter Name="Number of sides to tip touch" Value="0"/>
      <Parameter Name="Tip touch retract distance" Value="0"/>
      <Parameter Name="Tip touch horizontal offset" Value="0"/>
      <Parameter Name="Well selection" Value="<?xml version='1.0' encoding='ASCII' ?> <Velocity11 file='M
      <Channels Value='0' /> <Quadrant Column='0' Row='0' /> </Velocity11>"/>
    </Parameters>
    <PipetteHead Channels="0" Disposable="1" MaxRange="245" MinRange="-40" Name="96LT, 200 �l
  </Task>
- <Devices>
    <Device Device_Name="Bravo - 1" Location_Name="1"/>
  </Devices>
```


XML schema

To create and edit protocols directly in XML, you need to have the XML schema that defines the logical rules of a BenchWorks software protocol. If you want the schema, please contact Velocity11 Technical Support.

Related topics

For information about...	See...
Workflow for creating a protocol	“Workflow for creating a protocol” on page 73
Using JavaScript in protocols	“Using JavaScript in BenchWorks software” on page 209

Workflow for creating a protocol

About this topic

This topic gives the steps used to make a protocol and a cross-reference to the topic that describes each step.

Who creates protocols?

People who have technician and administrator level user accounts have the necessary privileges to create protocols.

Workflow

Step	Topic	See...
1	*Optional*. Preparing back-end barcode label data to use with a plug-in.	❑ "About the FileReader plug-in" on page 203 ❑ "Using the FileReader plug-in in a protocol" on page 206 ❑ "About barcode reading and tracking" on page 229 ❑ "Using barcode input files" on page 230 ❑ "Using barcode data files" on page 233
2	*Optional*. Creating a pre-protocol process.	"Setting up a pre-protocol or post-protocol process" on page 74
3	Creating a protocol process which includes:	
	Setting up a process.	"Setting up a protocol process" on page 76
	Adding tasks.	"Adding and deleting tasks" on page 78
	Setting task parameters.	❑ "Simulating a run" on page 84 ❑ "Simulating a run" on page 84
4	*Optional*. Enter JavaScript scripts to dynamically set task parameters. and control devices.	❑ "Using JavaScript in BenchWorks software" on page 209 ❑ "The JavaScript task object and properties" on page 216
5	*Optional*. Creating a pipette process, which includes:	
	Adding pipette tasks.	"Configuring a pipette process: example" on page 126
	Setting pipette process task parameters.	"Setting pipette task parameters" on page 125
6	Creating additional processes and pipette processes.	This table, step 3 and step 5
7	*Optional*. Creating a post-protocol process.	"Setting up a pre-protocol or post-protocol process" on page 74

Step	Topic	See...
8	Adding user message tasks where needed.	“Setting User Message task parameters” on page 118
9	Compiling and saving the protocol.	“Compiling and saving protocols” on page 83
10	Testing the protocol with the simulator.	“Simulating a run” on page 84
11	Deciding the number of simultaneous plates to set.	“Compiling and saving protocols” on page 83
12	Running the protocol.	“Performing a run” on page 49

Related topics

For information about...	See...
Protocols, including definitions of terms	“Opening a protocol in BenchWorks software” on page 21
Privileges	“About user accounts and privileges” on page 236

Setting up a pre-protocol or post-protocol process

About this topic

This topic describes how to set up a pre-protocol and post-protocol process.

Pre-protocols and post-protocols are processes that are carried out before and after the protocol is executed.

Use the pre-protocol editor when you want a task performed, before the protocol runs. For example, if you are dispensing reagents, you may want to prime a pump with fluid.

Use the post-protocol editor when you want to perform a task, after the protocol runs. For example, you may want to flush lines with a buffer or cleaning agent.

Procedure

To set up a pre-protocol or post-protocol process:

1. Click the **Pre-Protocol** or **Post-Protocol Editor** tab.

   If the tab is not available:

   a. Select **Tools > Options**.

   b. Select **Show Pre/Post Protocol Editor**.

   c. Click **OK**.

2. Click **Add**.

   A pre-protocol process icon appears in the **Pre-Protocol** or **Post-Protocol Editor** window.

3. If the **Task Parameters** toolbar is not showing, select **View > Toolbars > Protocol Parameters**.
4. Type in a name for the process in the **Process name** field.
5. Create the pre-protocol process as you would a protocol process, by adding tasks and then setting the task parameters.
6. When you are finished, compile and check your pre-protocol.

Related topics

For information about...	See...
Creating a protocol process	❑ “Setting up a protocol process” on page 76 ❑ “Compiling and saving protocols” on page 83 ❑ “Adding and deleting tasks” on page 78
Compiling a protocol	“Compiling and saving protocols” on page 83
Running a protocol in simulation mode	“Simulating a run” on page 84
The workflow that this procedure belongs to	“Workflow for creating a protocol” on page 73

Setting up a protocol process

About this topic

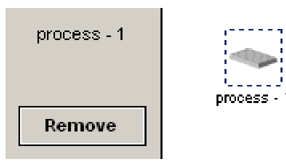
This topic describes how to set up a protocol process when creating a protocol. See Related topics at the end of this topic for where to find a definition of plate instance.

Procedure

To set the plate properties for a protocol process:

1. In the protocol editor, click **Add.**

A plate process icon appears in the protocol editor window.



2. In the **Task Parameters** toolbar:

   a. Type a name for the plate in the **Plate name** text box.

   b. In the **Plate type** list box, select the type of plate you want to use.

   c. If you want to add or modify a plate definition, click **Edit labware settings** to open the labware editor.

   d. If you are using a plug-in, select it from the **Plug-in** list box.

   If the plug-in is not available for selection, it may be because the *file_name*.dll file is not in the plug-ins folder in the same folder as the BenchWorks software executable.

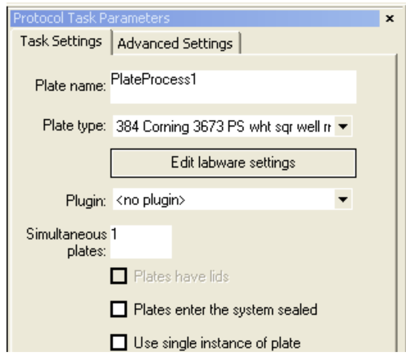
   e. In the **Simultaneous plates** text box, type the maximum number of plates of this type that the system is allowed to operate on at any given time.

   f. If the plates entering the system have lids, select the **Plates have lids** check box.

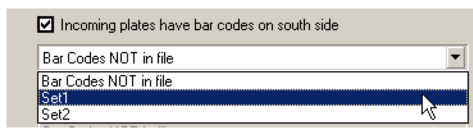
   Note: This option is only available if the plate you selected is capable of using a lid, as defined in the labware editor.

   g. If the sample plates in the protocol have seals when they are loaded onto the BenchCel Workstation, select the **Plates enter the system sealed** check box.

   h. If you have only one instance of a plate type and want it to be used repeatedly, select the **Use single instance of plate** check box. For example, you may have one source plate from which you want to repeatedly aspirate a given volume and dispense it into a different receiving plates.



3. In the **Barcode control** sub-page:
    a. If the incoming plates have barcodes, select the appropriate **Incoming plates have barcodes...** check box.
    b. If you want to check the barcodes on the incoming plates against a series of barcodes in a barcode input file, select the name of the barcode series you want to use.



For more information about barcodes input from file, see Related topics at the end of this topic.

4. In the **Special error handling** sub-page:
    a. Select one or more devices that you want to use as quarantine stations and click **Add**.

    The device names are moved to the bottom quarantine list.

    A quarantine station is a place that plates will be placed if the plate has a barcode mismatch error.

    b. Check or leave clear **Quarantine plate after process completed**, based on the following descriptions.

    If left clear, a plate that gives a barcode misread error is immediately moved to a quarantine station and a new plate takes the place of the quarantined plate in the processing sequence.

    If selected, plates that give a barcode misread are processed as normal, but are then moved to quarantine instead of moving to the final destination specified in the protocol.

Related topics

For information about...	See...
Using plug-ins	"About the FileReader plug-in" on page 203

For information about...	See...
Definition of a protocol process	"About tasks, processes, and protocols" on page 68
Setting the number of simultaneous plates	"Compiling and saving protocols" on page 83
Using barcodes	"About barcode reading and tracking" on page 229
The workflow that this procedure belongs to	"Workflow for creating a protocol" on page 73

Adding and deleting tasks

About this topic

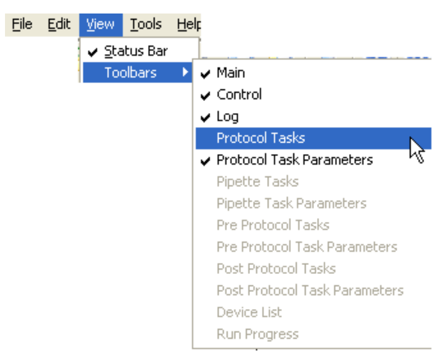
This topic describes how to add and delete tasks.

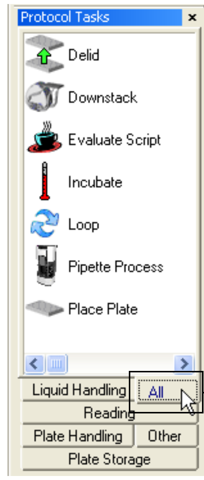
After you have set up a protocol process, you can start adding tasks and pipette tasks.

Adding a task

To add a task to a process:

1. If the Protocol Tasks are not visible, make sure that:
   a. **View > Toolbars > Protocol Tasks** is selected.
   b. The **All** tab is selected.





2. To add tasks to the protocol, do one of the following:
   - Click a task icon and drag it from the task list to the protocol editor window until a vertical, dashed line appears.
   - Double-click the icon.
   - Copy (or cut) and paste task icons in the protocol.

Deleting a task

To delete a task from a process:

1. In a protocol editor, select a task that is in a protocol process.
2. Press the DELETE key on the keyboard.
3. Click **Yes** in the **Delete Task** dialog box to delete the task.

Moving tasks

To move tasks in a protocol:

1. In a protocol editor, select a task or a group of tasks in a protocol process.
2. Do one of the following:
   - Drag and drop the tasks to a new location in the protocol.
   - Use the **Cut**, or **Copy** and **Paste** commands on the **Edit** menu to move the tasks. To paste between two tasks, click the first task before pasting the copied task.

Related topics

For information about...	See...
The workflow that this procedure belongs to	"Workflow for creating a protocol" on page 73
Setting up a plate instance	"Setting up a protocol process" on page 76

For information about...	See...
Setting the number of simultaneous plates	"Compiling and saving protocols" on page 83

About setting task parameters

About this topic

This topic describes what task parameters are and what they do.

Task parameters defined

After you have added a task, you can set parameters for it. Most tasks require you to set parameters. The parameters specify the details of the task. As you set the parameters, the text underneath the task icons change to reflect the new parameters.

Related topics

For information about the specific types of tasks, see the following topics:

For information about...	See
Pipette task parameters	"Simulating a run" on page 84
Apply Label task parameters	"About setting Apply Label task parameters" on page 90
Delid/Relid task parameters	"Setting Delid/Relid task parameters" on page 97
Downstack and Upstack task parameters	"Setting Downstack and Upstack task parameters" on page 98
Evaluate Script task parameters	"Using the Evaluate Script task" on page 102
Incubate task parameters	"Setting Incubation task parameters" on page 103
Inoculate task parameters	"Setting Inoculate task parameters" on page 105
Loop task parameters	"Setting Loop task parameters" on page 107
Mount/dismount task parameters	"Setting Mount/Dismount task parameters" on page 108
Multidrop task parameters	*Device Driver User Guide*
Nanodrop task parameters	*Device Driver User Guide*
Pierce task parameters	"Setting Pierce task parameters" on page 110

For information about...	See
Place Plate task parameters	"Setting Place Plate task parameters" on page 113
QFill2 task parameters	*Device Driver User Guide*
Restack task parameters	"Setting Restack task parameters" on page 114
Seal task parameters	"Setting Seal task parameters" on page 116
User Message task parameters	"Setting User Message task parameters" on page 118
Waitfor and Signal task parameters	"Setting Waitfor task and Signal task parameters" on page 120
WellMate task parameters	"Setting VSpin Access2 Centrifuge task parameters" on page 121
VSpin with Access2 task parameters	"Setting VSpin Access2 Centrifuge task parameters" on page 121
Setting the order of tasks	"Specifying task order across processes" on page 122
Checking for protocol errors	"Simulating a run" on page 84
Individual modules that perform tasks	"Overview of the BenchWorks software user interface" on page 3

About setting pipette task parameters

About this topic

This topic describes the differences between tasks and pipette tasks and provides cross references to topics about specific pipette tasks.

Pipette tasks versus tasks

Pipette tasks differ from tasks in the following ways:

- ❑ Pipette tasks are added in the pipette process editor and not the protocol editor
- ❑ Pipette tasks refer to settings in the liquid library editor
- ❑ Pipette tasks may require you to configure a VPrep Pipettor shelf in the device manager

Specific pipette tasks

For information about the specific types of pipette tasks, see the following topics:

For information about...	See...
Aspirate task parameters	❑ "Setting Aspirate task parameters for a VPrep Pipettor" on page 135 ❑ "Setting Aspirate task parameters for a Bravo Platform" on page 137
Change instance task parameters	"Setting Change Instance task parameters" on page 140
Change tips task parameters	❑ "Setting Change Tips task parameters for a VPrep Pipettor" on page 142 ❑ "Setting Tips On task parameters for the Bravo Platform" on page 158 ❑ "Setting Tips Off task parameters for the Bravo Platform" on page 159
Dispense task parameters	❑ "Setting Dispense task parameters for a VPrep Pipettor" on page 144 ❑ "Setting Dispense task parameters for a Bravo Platform" on page 147
Dry tips task parameters	"Setting Dry Tips task parameters" on page 150
Loop task parameters	"Setting Loop task parameters" on page 107
Mix task parameters	❑ "Setting Mix task parameters for a VPrep Pipettor" on page 150 ❑ "Setting Mix task parameters for a Bravo Platform" on page 152
Pump reagent task parameters	❑ "Setting Pump Reagent task parameters for a VPrep Pipettor" on page 155 ❑ "Setting Pump Reagent task parameters for a Bravo Platform" on page 156
Wash tips task parameters	"Setting Wash Tips task parameters for a VPrep Pipettor" on page 160

Compiling and saving protocols

About this topic

This topic describes how to compile and save a protocol.

When you compile a protocol, BenchWorks software checks to make sure that your protocol makes logical sense.

Compiling a protocol

To compile a protocol:

1. Click **Compile**.

   Errors are reported in the Log toolbar.

   Note: Whenever you start a protocol, BenchWorks software automatically compiles it and checks for errors.

Saving a protocol

To save a protocol you must be logged in with an administrator or technician user account.

!! IMPORTANT !! When you edit a protocol, the changes take effect immediately. However, unless you explicitly save the protocol, the changes are lost when you exit BenchWorks software.

To save a protocol:

1. Select **File > Save As**.
2. In the **Save As** dialog box, navigate to the folder in which you want to save the protocol.
3. In the **File name** text box, replace the selected file name with a name of your choice.

   You can save your protocol files anywhere, but it is good practice to create a directory in your BenchWorks software directory to contain your protocol files.

Related topics

For information about...	See...
The workflow that this procedure belongs to	"Workflow for creating a protocol" on page 73
Setting up a plate instance	"Setting up a protocol process" on page 76
Resolving protocol compilation errors	*BenchCel Microplate Handling Workstation User Guide*
Setting the number of simultaneous plates	"Compiling and saving protocols" on page 83

Simulating a run

About this topic

This topic provides suggestions on how to check for errors in a protocol after it is compiled.

Simulating the run

After making sure there are no compiler errors in the protocol, you can check for other types of problems by running the protocol through the simulator. The simulator allows you to confirm that steps are completed and sequenced correctly. and to find problems such as:

- Deadlocks
- Periods of inefficiency, such as when the robot is not being used
- Plates spending different times at critical steps when they should be run under identical conditions
- A number of simultaneous plates that is too high or too low

The simulator does not move plates. It performs a virtual run based on the estimated execution times displayed for each task. You can change the execution times for tasks to make the simulation more accurate for your protocol.

One approach you can use for testing is the following:

1. Run the simulator with the default task execution times and the same number of plates expected for a run to identify deadlocks and rate-limiting tasks.
2. Resolve any major problems with the protocol.
3. Perform a real dry run with a plate.
4. Use the times recorded in the log to edit the task execution times for each task.
5. Run the simulator with the more accurate task execution times.
6. Make adjustments to the protocol based on the results of the simulation.

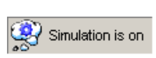
Running the simulator

To run the simulator:

1. Click **Simulation is off** on the toolbar.

   The button changes to **Simulation is on**.

2. Click **Start** to run the protocol in simulation mode.

Related topics

For information about...	See
Compiling and saving a protocol	"Compiling and saving protocols" on page 83
Resolving errors	*BenchCel Microplate Handling Workstation User Guide*
The workflow that this procedure belongs to	"Workflow for creating a protocol" on page 73

Setting the number of simultaneous plates

About this topic

This topic describes the concept of simultaneous plates and how to set the simultaneous plate number.

The number of simultaneous plates is the maximum number of plates belonging to a single process that are in the system at one time.

Plates that are in the system could be in the robot gripper, on platepads, pipettor location, plate hotels, and so on. Simultaneous plates do not include counterweight plates.

Setting the number of simultaneous plates is part of the process of setting up a process in the Protocol Editor.

Selecting the number

The default number of simultaneous plates is set to one for each protocol process. If your protocol process uses multiple devices, you can increase the throughput of the system by increasing the number of plates to be processed simultaneously. The challenge is to determine the balance between highest throughput and avoiding deadlock.

The number of simultaneous plates to select for a plate instance depends on how many:

❑ Positions available during a protocol process

  In general, one simultaneous plate can be used for every task in the protocol. This is because, in general, each task uses one plate position. For example, if your protocol downstackes a plate, seals the plate, labels the plate, and then upstacks the plate, you have three positions available; one in the robot grippers, one on the plate sealer, and one on the microplate labeler. There are exceptions to this, though, such as cases where the same plate position is used for more than one of the tasks and when a VPrep Pipettor is used. Several plates can be positioned on a VPrep Pipettor at the same time.

- ❑ Positions there are in the system that will incubate plates.

  For example, if your protocol downstacks a plate, dispenses liquid, incubates the plate at a 10-position plate hotel, and then dispenses more of the same liquid, you have 12 positions available; one in the robot grippers, one on the dispenser, and 10 in the plate hotel.

- ❑ Plates there are in a restack task.

  If the protocol includes a restack task, the number of simultaneous plates must be equal to, or greater than, the number of plates in the restack task.

If the number of simultaneous plates is set too high, the protocol might be slowed down because the robot will move around to avoid a deadlock. A deadlock occurs when too many plates are in the system and there is no way to move the plates around further, at which point the protocol stops.

If the number of simultaneous plates is set too low, the time for the protocol run could be extended. Optimizing the number of simultaneous plates is therefore critical for maximizing efficiency.

Run the protocol in simulation, noting the protocol process time in the log, then increase the number of simultaneous plates and simulate again. When the simulated time no longer decrease, you have found the optimal number of simultaneous plates. If you see messages in the log that say “Attempting to avoid deadlock by...”, then your protocol might have too many simultaneous plates. Decreasing the number of simultaneous plates will decrease the likelihood of a deadlock during the protocol run.

Determining the correct release rate

Another aspect to optimizing your protocol is the rate at which plates enter the system, particularly if you have a precisely timed incubation for one of the tasks.

Consider the following:

A plate will be downstacked when the first required device is available to process plates, and the number of plates currently being processed is less than the number of simultaneous plates. If a task in the protocol process takes longer to perform than it takes for the BenchCel Workstation to introduce new plates, this task will become a bottleneck. Plates will be introduced into the system faster than they can be removed from the system and if your protocol requires precise incubation times, this can cause a problem.

For example, if you have a protocol that downstacks, dispenses liquid, incubates for one hour, reads the plate, and then upstacks and the read takes 1 minute, but the dispense task only takes 10 seconds, the software will introduce new plates at a rate of 1 plate every 10 seconds until the number of simultaneous plates is reached. These plates will then sit in the incubation step for 1 hour, at which point the first plate will move to the reader. The second plate should leave the incubation step 10 seconds behind the first plate, but it cannot because the first plate is still occupying the reader. The result is the second plate incubating for 50 seconds longer than the first plate. The third plate will incubate 50 seconds longer than the second, and 100 seconds longer than the first.

To prevent this from happening, limit the input rate of your plates to match the output rate. Run the protocol dry once to determine where your bottleneck is and how quickly plates can be moved through the bottleneck. Set your input rate about 10% slower than the output rate to account for variance in the speed of the bottle-neck task.

Related topics

For information about...	See...
Recovering from deadlock	*BenchCel Microplate Handling Workstation User Guide*
Definition of a plate instance	"Opening a protocol in BenchWorks software" on page 21
Setting up a plate instance	"Setting up a protocol process" on page 76
The workflow that this procedure belongs to	"Workflow for creating a protocol" on page 73

Setting task parameters

5

This chapter gives the procedures for configuring the parameters for individual tasks in a protocol. This chapter contains the following topics:

About setting Apply Label task parameters

About this topic

This topic provides some information about the Apply Label task to help you make choices about barcode labeling.

Apply Label task defined

The Apply Label task uses a VCode Microplate Labeler to print a barcode label and apply it to a plate.

Barcode labelling decisions

Before you add an Apply Label task to a protocol, consider your record-keeping and automation needs. For example:

- ❑ Do you need each barcode label to be unique within a run, but not from run to run?
- ❑ Do you need each barcode label to be unique across all runs?
- ❑ Will you be using a Laboratory Information Management System (LIMS) for barcoding information and record-keeping?
- ❑ What human-readable fields do you want to include on the label?
- ❑ Do you want to use a barcode input file?
- ❑ Do you want to use a barcode data file?

Barcode format

When setting Apply Label task parameters, you need to select a barcode format, which specifies the type, number, properties, and location of fields that are printed on barcode labels.

Some formats are provided with the VCode Microplate Labeler, but you can define others according to your needs. Each format is identified by a number, which you enter when setting up an Apply Label task.

Related topics

For information about...	See...
Using barcode modifiers	"About combining barcode modifiers" on page 95
Creating a barcode input file	"Using barcode input files" on page 230
Using barcode data files	"Using barcode data files" on page 233
General options	"Setting BenchWorks software options" on page 22
Creating a plate instance	"Setting up a protocol process" on page 76
Using plug-ins	"About the FileReader plug-in" on page 203

For information about...	See...
Log files	"About log and data files" on page 38

Setting Apply Label task parameters

About this topic

This topic describes how to set the parameters for the Apply Label task.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols that uses a VCode Microplate Labeler
- ❑ An operator who needs to specify parameters for one or more of the apply label tasks

Before you start

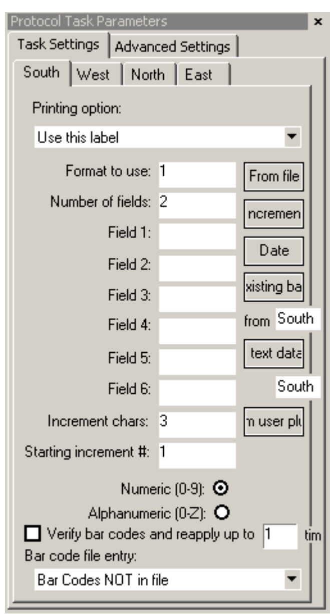
Before working with Apply Label tasks, read the *VCode Barcode Print and Apply Station User Guide* to learn about barcodes and label formats.

Procedure

To set Apply Label task parameters:

1. Add the **Apply Label** task to a protocol process.
2. In the **Protocol Task Parameters** toolbar, click a tab corresponding to a side of the plate.

   The options are **South**, **West**, **North**, and **East**.

3. Select one of the options in the **Printing Option** list.

If...	Then...
You do not want to place a label on this side of the plate	Select **No Label** and return to step 2.
You want to define a barcode label and place it on this side of the plate	Select **Use this label** and continue with step 4.
You want to print a label that is the same as a label already set up for another side of the plate	Select **Use *side* label** and continue with step 4. All other parameters on the page are ignored.

4. In the **Format to use** text box, type a number that corresponds to the barcode format that you want.
5. In the **Number of Fields** text box, type the number of fields that you want to print on the barcode.

   The maximum number of fields you can print is limited by the number of fields in the format you selected. For example, if the format specifies three fields, you cannot print a barcode with four fields. In this example, if you do enter the number four into the text box, the last field is ignored.
6. Click in the **Field** text box for the first field that you want to use and enter one or more of the following types of information that you want to print in that position on the label:

If you want to print...	Then...
Text field that does not increment	Type the text in the text box.
A field that is identical to a barcode field on another side of the plate	To use this option, your VCode Microplate Labeler must have an attached barcode reader. a. Select the side of the plate from the **from *side* side** list, below the **Use existing barcode button**. b. Click **Use existing barcode**. This places the code [BC] in the text box. *Note:* This option copies a single field from another side of the plate. The similar option selected in the **Printing Options** list copies an entire barcode from another side of the plate.

If you want to print...	Then...
A series of barcodes from a barcode input file	a. Make sure that you have set up a barcode input file and selected it in BenchWorks software general options. b. Make sure that the number of barcodes specified in the series of the barcode input file that you want to use is equal to or greater than the number of labels that you want to print. c. Select the series in the **Barcode file entry** list at the bottom of the toolbar. *Note:* If there are no entries in the **Barcode file entry** list other than the default text, you need to set the location of the barcode input file. d. Click **From File**. This places the code [FILE] in the text box. **!! IMPORTANT !! If you use this option in two fields, the same data will be printed in both fields. You cannot enter different data into fields using this method.**
A series of barcodes by referencing barcodes on another side of the plate, using a barcode data file	a. Make sure that you have created a barcode database file and selected it in BenchWorks software general options. b. Make sure that the incoming plates have barcode labels on the south or west side, or a previous Apply Label task is set up to print labels on the south or west side. c. If the incoming plates are labelled, make sure that the system verifies the labels by setting up barcode control on the plate icon. d. Click **From text database**. This places the code [DB] in the text box. e. In the **use *side* side** list under the **From text database** button, select the side of the plate that has the barcodes you want to use as a reference. **!! IMPORTANT !! Although you can select any side, only the south and west sides can currently be used.**

If you want to print…	Then…
A series of barcodes that increment, but which are *not* specified by a barcode input file	a. Type the root data that you want in the **Field 1** text box. b. Click **Increment**. This adds the code [INC] to the root data. c. In the **Increment chars** text box, type the number of alphanumeric characters that you want to be appended to the root data. For example, if you want the series to increment from 01 enter 2. If you want it to increment from 001, enter 3. d. In the **Starting increment #** text box, type the number that you want to be printed on the first label, for example, 100. e. Select either **Numeric** or **Alphanumeric** depending on the increment style you prefer. Alphanumeric increments use 0–9, A–Z, whereas numeric increments use 0–9.
From a plug-in that you have developed	Select **From user plug-in**.

7. Return to step 6 and fill out another field until all required fields are completed.

   Note: If you enter information in a field that does not exist in the format you have chosen, the information is ignored.

8. Return to step 3 and define labels to put on other sides of the plate.

Related topics

For information about…	See…
Using barcode modifiers	"About combining barcode modifiers" on page 95
Creating a barcode input file	"Using barcode input files" on page 230
Using barcode data files	"Using barcode data files" on page 233
General options	"Setting BenchWorks software options" on page 22
Creating a plate instance	"Setting up a protocol process" on page 76
Using plug-ins	"About the FileReader plug-in" on page 203
Log files	"About log and data files" on page 38

About combining barcode modifiers

About this topic

This topic describes how to combine barcode modifiers for the Apply Label task.

Barcode modifiers are text/numerical strings that are appended to the barcode. Typically they are used to add a readable text/numerical string to a barcode, which increments for each plate, giving each plate a unique label.

Read this topic if you are:

- An administrator or technician who writes protocols that uses a VCode Microplate Labeler
- An operator who needs to specify parameters for one or more of the Apply Label tasks

Before you start

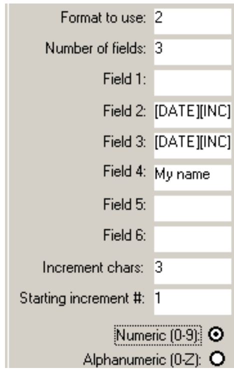
Before you modify the barcodes, read the *VCode Barcode Print and Apply Station User Guide* to become familiar with barcodes and label formats.

Combining barcode modifiers

You can combine barcode modifiers with text in a single field. This section shows how to do this by using an example. The example has five fields and for each field the symbology or font used has been defined as follows in the VCode Microplate Labeler.

Format field (valid for pre-2003 VCode Microplate Labeler)	BenchCel Workstation/VCode Microplate Labeler field	Symbology/Font
Field 0	Field 1	Swiss Mono 721 Bold
Field 1	Field 2	Code 39
Field 2	Field 3	Dutch Roman 801 prop
Field 3	Field 4	Dutch Roman 801 prop
Field 4	Field 5	Dutch Roman 801 prop

In the screenshot below, you can see that three of the BenchWorks software fields are used: Field 2, Field 3, and Field 4.



Field 2 prints a Code 39 symbology barcode that is incremented for each printing. Field 3 prints the same barcode in the human readable Dutch Roman font. The text entered into Field 3 is the same as that entered into Field 2.

The information entered in Field 3, combined with the information entered into the Increment chars and Starting increment # fields, creates the following human readable barcode sequence:

*Date*001

*Date*002

*Date*003

*Date*004

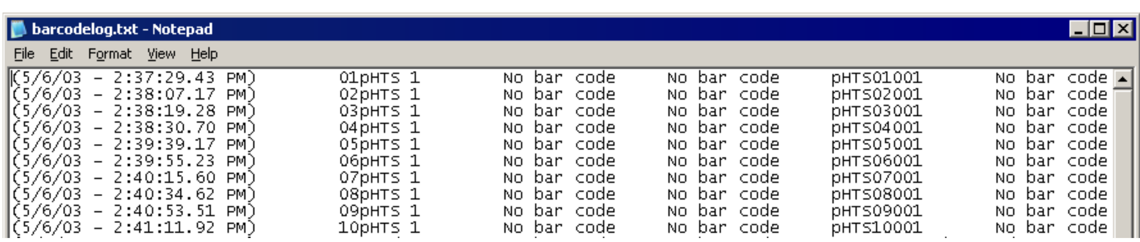
*Date*005

*Date*006

*Date*007...

The barcode log file

Information about the barcodes that are applied during a run is saved in a barcode log file. Because this is a tab-delimited text file, the data can easily be imported into a spreadsheet program.



Related topics

For information about...	See...
Creating a barcode input file	“Using barcode input files” on page 230
Using barcode data files	“Using barcode data files” on page 233

For information about...	See...
General options	"Setting BenchWorks software options" on page 22
Creating a plate instance	"Setting up a protocol process" on page 76
Using plug-ins	"About the FileReader plug-in" on page 203
Log files	"About log and data files" on page 38

Setting Delid/Relid task parameters

About this topic

This topic describes how to set the Delid/Relid task parameters. These tasks are used by the BenchWorks software to remove and replace labware lids.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols that uses this task
- ❑ An operator who needs to specify parameters for the Delid/Relid tasks

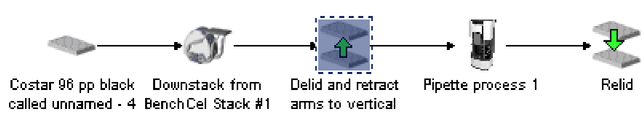
Delid/Relid task defined

The Delid task removes a plate's lid using a device such as a plate hotel or vacuum delidding station. The Relid task replaces the lid.

Neither the Delid nor Relid tasks have configurable parameters.

Example

The Delid/Relid tasks are used to remove and replace a plate lid. A typical use for this task is shown below:



In the example, a plate is downstacked and the lid is removed. The plate is pipetted at the VPrep Pipettor and the lid is replaced. If your system has a trash chute and you want to remove a plate's lid and put the lid in the trash, use the Delid task and do not add a subsequent Relid task.

Procedure

Setting Delid/Relid task parameters

There are no task parameters for these processes.

Related topics

For information about...	See...
Defining lidded plates	“Defining labware” on page 245
Adding and deleting tasks	“Adding and deleting tasks” on page 78
Creating a protocol process	“Setting up a protocol process” on page 76
Specifying task order	“Specifying task order across processes” on page 122

Setting Downstack and Upstack task parameters

About this topic

This topic describes how to set the Downstack and Upstack task parameters.

Read this topic if you are:

❑ An administrator or technician who writes protocols using the Downstack and Upstack tasks

❑ An operator who needs to specify parameters for these tasks

Stacker task defined

The Downstack and Upstack tasks move plates into or out ofBenchCel Workstation stacks.

The process of moving a plate out of a stacker is called downstacking. The process of moving a plate into a stacker is called upstacking.

Plates may be returned to the same or different stackers.

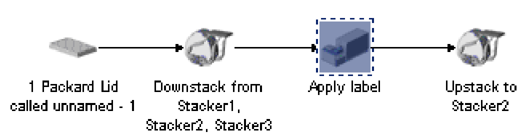
You can make a single task upstack to, or downstack from, more than one stacker. For example, in a downstacking task, when all of the plates are removed from one stacker, the robot will begin to pick plates from a second stacker. The two stackers are referred to as pooled downstackers.

You can also perform mixed upstacking where plates downstacked from two different stackers can be upstacked to one stack.

Procedure

To set Downstack and Upstack task parameters:

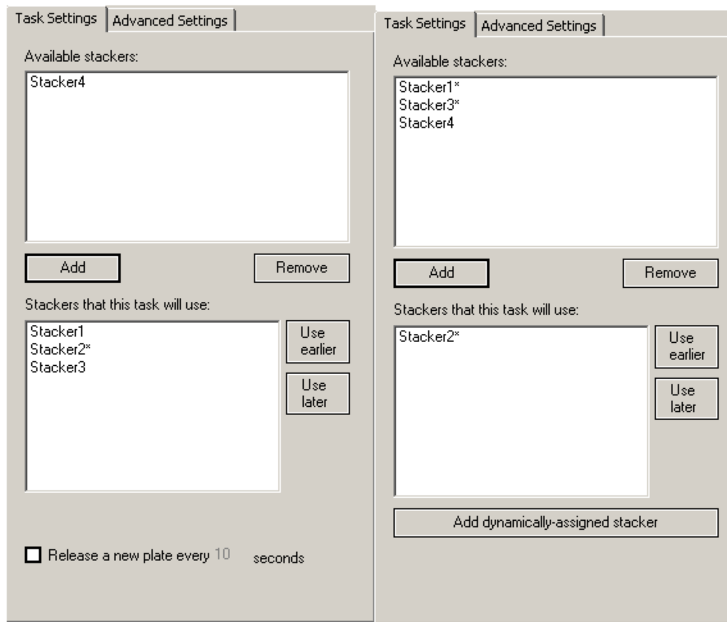
1. Add the **Downstack** or **Upstack** task to a protocol process.



2. In the list of available stackers in the **Protocol Task Parameters** toolbar, select a stacker to downstack from or upstack to and click **Add**.

   To select more than one stacker, SHIFT-click or CTRL-click before clicking **Add**.

   An asterisk next to a stacker in the list means that the stacker is currently assigned to a task that uses the same labware.



3. To remove a stacker from your list of available stacker devices, select it and click **Remove**.
4. If you have added more than one stacker, you can change the order in which particular stackers are used:
   a. Select a stacker.
   b. Click **Use earlier** to increase the priority of the stacker or **Use later** to decrease the priority of it.
5. To specify a time interval for when plates are made available to the system, select the **Release a new plate** check box and type in an interval time.

   You can use this feature to avoid a plate processing bottleneck that results in plates having different incubation times.

   Consider a simplified example process in which plates are downstacked, labels applied, liquid dispensed into, and then incubated for 10 minutes.

   Applying the label only takes a few seconds while subsequent tasks take longer. This creates a processing bottleneck.

   If the dispense task takes 2 minutes, plates that are ready for the pipetting step would have to wait. In this example, the first plate would incubate for approximately 5 minutes, the second plate for approximately 7 minutes, the third plate for approximately 9 minutes, and so on. To avoid these different incubation times, you could downstack one plate every 2 minutes. The plates are then incubated sequentially and not simultaneously.

6. If you want to dynamically assign an upstacking stackers, click **Add dynamically-assigned stacker.**

   Note: This option is only available for upstacking tasks.

   With dynamic assignment you do not have to specifically assign every stacker that will receive plates because assignments are made automatically.

   When stackers are dynamically assigned, the text "TBD," meaning "To Be Determined", is added to the stacker task icon.

   Note: When using dynamically assigned stackers, you need to have a dynamic stacker in the Device Manager for each stack you expect to require.

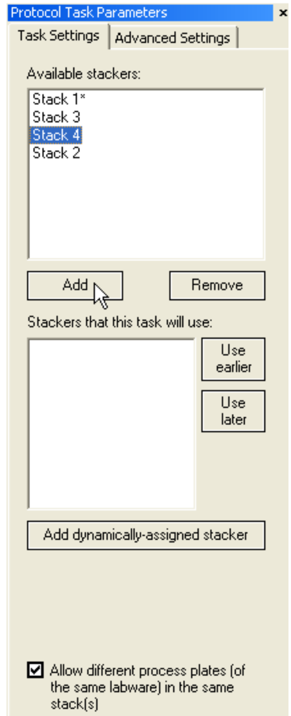
   You can determine which stackers contain which plates at the end of the run by consulting the run log.

Using mixed upstacking

This procedure describes how to downstack from two different stacks and upstack both to a single stack.

To use the mixed upstacking option:

1. Add the **Upstack** task to the first protocol process (downstacking from the first stack).
2. In the **Task Parameters** toolbar, select **Allow different process plates...**.
3. Add the stack.
4. Add the **Upstack** task to the second protocol process (downstacking from the second stack).
5. In the **Task Parameters** toolbar, select **Allow different process plates...**.
6. Add the stack.



Related topics

For information about…	See…
Adding and deleting tasks	"Adding and deleting tasks" on page 78
Creating a protocol process	"Setting up a protocol process" on page 76
Specifying task order	"Specifying task order across processes" on page 122
Restacking	"Setting Restack task parameters" on page 114

Using the Evaluate Script task

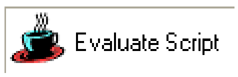
About this topic

This topic describes how to use the Evaluate Script task in BenchWorks software.

About the Evaluate Script task

The Evaluate Script task can be added to any protocol process to execute a JavaScript. Used in this way, the JavaScript does not have to be linked with a particular task.

The Evaluate Script task is represented by this icon in the Protocol Task toolbar:



This task is available in the pre-, post-, pipette-, and protocol editors

Procedure

To use the Evaluate Script task:

1. Add the Evaluate Script task to a protocol process.
2. Click **Advanced Settings** in the **Protocol Task Parameters** toolbar (there are no task settings for this task).
3. Do one of the following to attach a script:
   - ◆ Enter a script in the text field
   - ◆ Click **Browse** and navigate to an external .txt file that contains the script

Related topics

For information about...	See...
Using JavaScript	"Using JavaScript in BenchWorks software" on page 209
Creating a protocol process	"Setting up a protocol process" on page 76
Specifying task order	"Specifying task order across processes" on page 122

Setting Incubation task parameters

About this topic

This topic describes how to set the Incubation task parameters.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Incubation task
- ❑ An operator who needs to specify parameters for this task

Incubate task defined

The Incubate task performs a timed incubation of a plate. It is typically used for short incubations.

The number of plates that can be incubated simultaneously is limited by the number of platepads that are available for holding plates.

Process overview

The overall process for a typical incubation is as follows:

1. Incubation of the plate starts with the addition of an initiating reagent.

   This would be performed by a liquid-handling task, such as a Pipette Process task.
2. The plate is moved to a platepad.

   When the plate arrives at the platepad, the incubation time parameter that you specify starts timing.
3. The plate is moved from the platepad to a reader.

   The plate is moved when the incubation time parameter that you specify ends.

Incubation time error

The time parameter that you set for the incubation period is not the actual time of incubation. It represents the minimum time that the plate sits on the platepad where the incubation task is carried out.

The actual incubation period starts when the initiating reagent is added and continues until the plate is transferred to the next step in the process. This means that the actual incubation is longer than the time parameter that you set, by an amount that depends on the scheduling and operating speed of the robot.

If your assays require greater precision in plate incubation times than this method supports, you can adjust the rate at which plates enter the system.

Procedure

To set incubation parameters:

1. Add the **Incubate** task to a protocol process window.
2. In the **Task Settings** page of the **Protocol Task Parameter** toolbar, type the length of time for which you want the plate to incubate on the platepad.

3. If you need to control the rate at which plates are delivered to a particular device, incubate the plates on a plate hotel or similar short-term storage device and select **Start timer when previous plate finishes incubating**.

   A situation can arise in which plates move through a protocol too fast for one of the steps. An example is a pipetting step in which a reagent that starts a timed reaction is added to the plate. The result is that plates queue up at the pipettor.

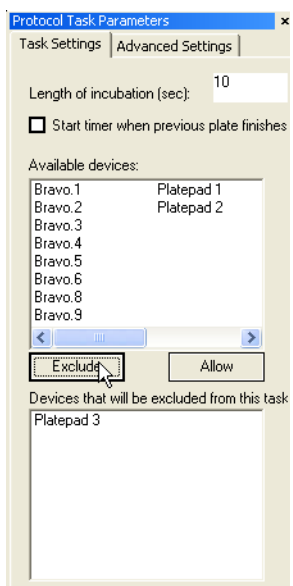
   Without selecting the **Start timer when previous plate finishes incubating** check box, plates are delivered to the plate hotel as fast as the robot can deliver them, are incubated for the time specified in the **Length of incubation text box**, and then leave as fast as the robot can remove them. The robot might remove the plates as frequently as every 10 seconds.

   With the **Start timer when previous plate finishes incubating** check box selected, the time separation between each plate being picked up is specified by the value in the **Length of incubation text box**. Using this function, plates can leave the plate hotel and delivered to the pipettor every minute instead of every 10 seconds.

   An alternative way to control the time at which plates are delivered to a device is to use the **Release a new plate every *x* seconds** parameter for the Downstack task.

4. If you want to restrict a device so it is not used as the place where the incubation takes place, in the **Available devices** box, select the device and click **Exclude**.

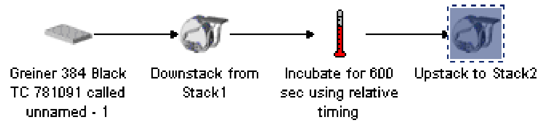
   This might be useful if a particular platepad is used during multiple steps of the protocol.



   The name of the platepad moves to the lower box.

Example

In the following example, a plate is downstacked, moved to an incubator, and then upstacked.



Related topics

For information about...	See...
Adding tasks to protocols	"Adding and deleting tasks" on page 78
Pipette tasks	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting Inoculate task parameters

About this topic

This topic describes how to set the Inoculate task parameters.

Inoculate task defined

The Inoculate task performs a transfer of material from a source plate to a destination plate using a pin tool.

Procedure

The Inoculate task was developed for the transfer of DNA from a source plate to a destination plate.

If you need to perform this task for this or another application, please contact the Velocity11 Technical Support for a procedure on how to set this task up in a protocol.

Related information

For information about...	See...
Dispensing liquids	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting Load, Unload, and Incubate at plate storage device task parameters

About this topic

This topic describes how to set the parameters for the Load, Unload, and Incubate at plate storage device tasks.

Load, Unload, and Incubate at storage device defined

The Load task instructs a robot to move a defined set of plates into a storage device.

The Unload task instructs a robot to remove a defined set of plates from a storage device.

Using the Unload task and Load task in sequence instructs the robot to move a defined set of plates from one storage device to another.

The Incubate at storage device task moves a defined set of plates into a storage device, leaves them there for a specified time period and then removes them from the storage device.

These tasks are available for the following devices:

- ❑ PlateHub Carousel
- ❑ StoreX incubator

Procedures

To set the Unload task parameters:

1. Confirm that the plates you want to move are in the system.
2. Add the Unload task to a protocol process.
3. In the **Protocol Task Parameters** toolbar, drag the groups or locations you want to unload from the **Available groups/locations** list to the **Assigned groups/locations** list.

To set the Load task parameters:

1. Add the Load task to a protocol process.
2. In the **Protocol Task Parameters** toolbar, drag the groups or locations you want to load into from the **Available groups/locations** list to the **Assigned groups/locations** list.

To set the incubate at storage device task parameters:

1. Add the **Incubate at plate storage device** task to a protocol process.

   Note: The **Incubate at plate storage device** task cannot be the last task in a process.
2. In the **Task Settings** page of the **Protocol Task Parameters** toolbar, select the devices that you don’t want to use for the incubation from the **Available devices** list and click **Exclude**.

   The devices that you exclude appear in the **Devices that will be excluded from this task** list.
3. Enter the length of time to incubate in the **Length of incubation (sec)** field.

Related topics

For information about...	See...
Configuring a Liconic StoreX	*Device Driver User Guide*
Configuring a PlateHub Carousel	*Device Driver User Guide*
Setting up plates in the inventory editor	“Setting up the inventory management database” on page 171
Moving plates to and from storage devices	“Moving stored plates out of the system” on page 182
Using the inventory editor	“BenchWorks software inventory overview” on page 168

Setting Loop task parameters

About this topic

This topic describes how to set the Loop task parameters. This task is available for all protocol processes and is illustrated with an example in which an Aspirate/Dispense pair of tasks is looped four times.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Loop task

Loop task defined

The Loop pipette task allows you to repeat a set of tasks within a process.

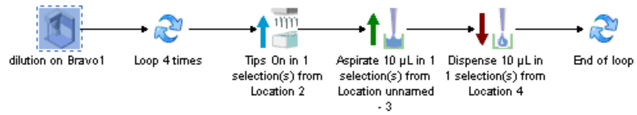
Procedure

To set Loop task parameters:

1. Add the **Loop** task to the protocol process or sub-process, where you want the loop to begin. After adding the task, a second icon labeled **End of Loop** is also added.
2. Drag the **End of Loop** task where you want the loop to end.
3. Click the **Protocol Task Parameters** tab. Set the **Loop properties**.

Property	Description
Number of times to loop	Enter the number of times you want the tasks inside the loop to run. (Setting this to 1 is equivalent to not using the loop tasks.)

An example is shown below.



Related topics

For information about...	See...
The loop task in an example	"Setting Loop task parameters" on page 107
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Mount/Dismount task parameters

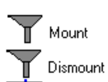
Introduction

This topic describes how to set the Mount and Dismount task parameters.

About the Mount/ Dismount task

The Mount task places one plate on top of another plate and works in collaboration with the Waitfor task. The Dismount task removes a plate from the top of another plate.

The Mount and Dismount tasks are represented by the following icons in the Protocol Tasks toolbar:



When to use

These tasks are associated with a platepad device and are typically used to mount a filter plate onto another plate or reservoir.

Before you start

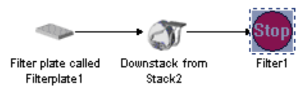
Before you start make sure that your labware is properly configured.

- ❑ The plate or reservoir you want to be on the bottom is set to Can be mounted in the Labware Editor
- ❑ The plate you want to be on the top is set to Can mount in the Labware Editor

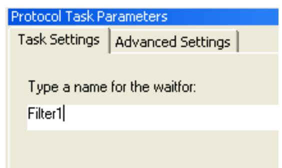
Procedure

To set Mount task parameters:

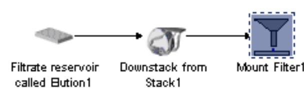
1. In the protocol process that is downstacking the upper plate (for example, a filter plate), add a **Waitfor** task at the position you want to mount the plate.



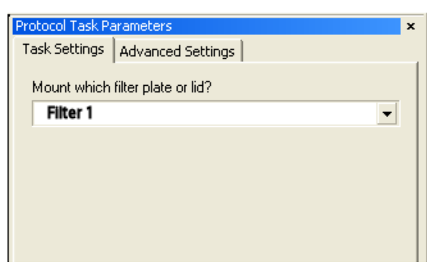
2. Select the **Waitfor** task.
3. In the **Protocol Task Parameters** toolbar, enter a name for the **Waitfor** task.



4. In the protocol process that is downstacking the lower plate (for example an elution plate), add the **Mount** task at the position you want to mount the plate.



5. Select the **Mount** task.
6. In the **Protocol Task Parameters** toolbar, select the labware you want to mount from the list box.

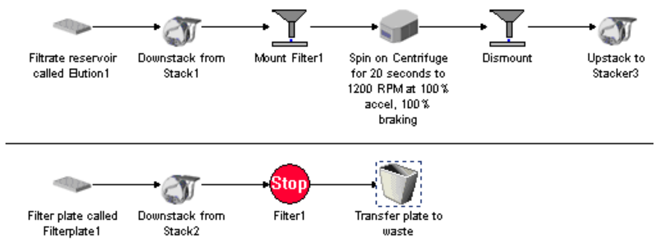


To set the Dismount task parameters:

1. Add the **Dismount** task to the protocol process to which you've added the **Mount** task.

   There are no task parameters for the **Dismount** task.

   In the following example, the mounted filter plate (sandwiched with the lower plate) was centrifuged, and then the filter plate was dismounted and discarded to waste. The lower or elution plate was then upstacked.



Related topics

For information about...	See...
Adding tasks to protocols	"Adding and deleting tasks" on page 78
Pipette tasks	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting Pierce task parameters

About this topic

This topic describes how to set the Pierce task parameters for BenchWorks software.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Pierce task
- ❑ An operator who needs to specify parameters for the Pierce task

Pierce task defined

The Pierce task pierces a plate seal using a PlatePierce.

Procedure

To set the Pierce task parameters:

1. Add the **Pierce** task to a protocol process.
2. In the **Task Settings** page of the **Protocol Task Parameter** toolbar, enter a value in the **Pierce Pressure** text box.

   If you are unsure of the best piercing pressure to use for your application, contact Velocity11 Technical Support.

Related topics

For information about...	See...
Adding tasks to protocols	"Adding and deleting tasks" on page 78

For information about...	See...
Pipette tasks	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting Place Labware task parameters

About this topic

This topic describes how to set the Place Labware task parameters.

When to use

The Place Labware task is designed for labs that use multiple types of labware for a protocol. It is useful if you have devices where you want to use one type of labware on the device for some runs and another type for other runs of the same protocol. This saves you from having to create a device file for each protocol that uses a different type of labware.

If you are always using the same labware, you might not want to use this task.

The Place Labware task is only used in pre- or startup-protocol processes.

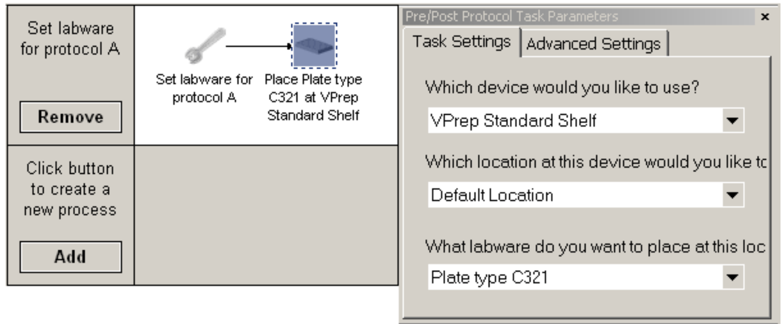
The Place Labware task can only be used with labware that is stationary throughout the running of the protocol.

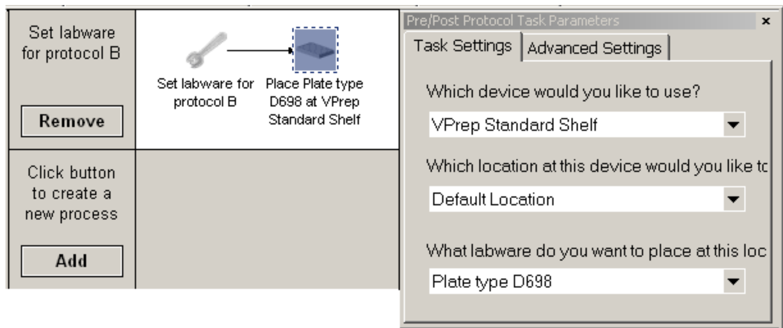
The Place Labware task allows you to associate a specific type of labware with a device just before starting a run instead of in the device file.

Usage example

For example, if in one protocol you restrict use of a device to *labware1* only, and in another protocol you restrict use of the same *device* to *labware2* only, there are two ways to handle this:

1. Create two device files, one called *device* for *labware1* and another called device for *labware2*, where the labware type is specified in the "Allowed / prohibited labware" device property.
2. Create one device file where labware type is not specified, then create a startup-protocol for each protocol where the Place Labware task specifies the labware that must be used for the protocol.





Procedure

To set task parameters for the Place Labware startup-protocol task:

1. Add the **Place Labware** task to the protocol process.
2. In the **Task Settings** page of the **Pre/Post Protocol Task Parameters** toolbar select items from appropriate boxes:
   - ◆ The device you want to use with this task
   - ◆ The location of the labware on the device you are using
   - ◆ Labware you are using in this protocol

Related topics

For information about...	See...
Working with device files	"About barcode reading and tracking" on page 229
Pre-protocol and post-protocol processes	"Setting up a pre-protocol or post-protocol process" on page 74
Creating protocols	"Workflow for creating a protocol" on page 73

Setting Place Plate task parameters

About this topic

This topic describes how to set the Place Plate task parameters for BenchWorks software.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Place Plate task
- ❑ An operator who needs to specify parameters for the Place Plate task

Place Plate task defined

The Place Plate task moves a plate to any location. This task has many uses.

The next task in the process after a Place Plate task moves the plate to another location.

Place Plate task and barcodes

The Place Plate task can be used in combination with a platepad barcode reader to read a barcode. The requirements for this are as follows:

- ❑ The platepad must be set up in the device manager as a barcode reader for the platepad.
- ❑ The protocol process for the plate must indicate that the plate has a barcode on the side that the barcode reader reads. See Related topics at the end of this topic for how to do this.

Whenever a plate is placed on this platepad, the BenchWorks software scheduler tells the barcode reader to read the plate's barcode.

Procedure

To set the Place Plate task parameters:

1. Add the **Place Plate** task to the protocol process.
2. In the **Task Settings** page of the **Protocol Task Parameter** toolbar, select the device to which you want to move the plate.
3. If the **Place Plate** task is the first task in the protocol and you want to require that the operator confirms the barcode on the plate that is placed, check the **Manually confirm barcode** check box.

   This can prevent the wrong plate from being used in the protocol.

   To confirm the barcode, when the plate is picked up, the operator is prompted to enter the barcode of the plate that should be in the placed position. If the two codes do not match, an error is generated.

Related topics

For information about...	See...
Indicating barcodes on a protocol process	"Setting up a protocol process" on page 76

For information about...	See...
Adding tasks to protocols	"Adding and deleting tasks" on page 78
Pipette tasks	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting Restack task parameters

About this topic

This topic describes how to set the Restack task parameters in BenchWorks software.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Restack task
- ❑ An operator who needs to specify parameters for the Restack task

Restack task defined

The Restack task collects plates in a stack, moves them to another stack in a definable time and in a way that maintains the proper order of the plates, so that they are ready to be passed to another task.

The Restack task can be used as part of a larger process that carries out simultaneous, timed incubations of more than one plate, where the goals are the following:

- ❑ Time between the start of the incubation and the reading of the plate to be approximately the same for each plate
- ❑ Evaporation from the plates is to be minimized

Note: Two or more stacks are required to use the Restack task.

Procedure

To set Restack task parameters:

1. Add the **Restack** task to a protocol process.
2. In the **Protocol Task Parameters** toolbar either:
   - ◆ Select the empty racks that you want to use for the task and click **Add.**
   - ◆ Click **Add dynamically-assigned stacker**.

     With this option, the scheduler automatically assigns racks during a run, and there must be at least two racks available for this operation.
3. If you have added more than one rack, you can change the order in which particular racks are used:

a. Select a rack.

b. Click **Use earlier** to increase the priority of the rack or **Use later** to decrease the priority of it.

4. In the **Store up to** text box, type a number equal to the number of plates you intend to incubate.

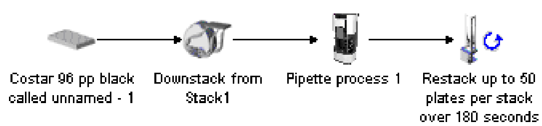
   This value is important because it can affect the timing of the incubation. For example, if the time taken to move all plates to the first restack rack is greater than the time specified for the incubation, the first plate cannot be moved to the next task in time. This problem can be resolved by lowering the number of plates in a restack operation and adding more racks.

5. In the **Incubate plate for** text box, type the time interval between when a plate enters the first restack rack and leaves the second restack rack.

!! IMPORTANT !! When you start a run that includes a Restack task, you must type in a number that is equal to the total number of plates you want to restack in the Number of Runs dialog box.

Usage example

The following screen shot shows one example of how to use the Restack task. The plates are first downstacked and delivered to a VPrep pipettor for a pipette process. After the pipette process is completed, the plates are restacked to their original order, ready for the next step in the assay protocol.



Related topics

For information about...	See...
Adding tasks to protocols	"Adding and deleting tasks" on page 78
Pipette tasks	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting Seal task parameters

About this topic

This topic describes how to set the Seal task parameters for BenchWorks software.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Seal task
- ❑ An operator who needs to specify parameters for the Seal task

Seal task defined

The Seal task places a seal on a plate using a PlateLoc Sealer.

If you are sealing more than one type of plate that requires different sealing temperatures, we recommend that you use a separate PlateLoc Sealer for each temperature. This avoids time delays as the PlateLoc Sealer heats and cools between different plate types.

When you open a protocol containing one or more Seal tasks, the PlateLoc Sealer immediately starts adjusting to the temperatures defined in the task parameters.

Procedure

To set Seal task parameters:

1. Add the **Seal** task to a protocol process.
2. In the **Protocol Task Parameters** toolbar, enter a seal time and seal temperature.

   When you enter a seal temperature, the PlateLoc Sealer immediately starts adjusting to that temperature.
3. Select the PlateLoc Sealer to use for the sealing operation from the **Select PlateLoc to use** list.

   If you are using more than one PlateLoc Sealer, make sure that you select the device with the correct seal type temperature and time for the plate.

Related topics

For information about...	See...
Adding tasks to protocols	"Adding and deleting tasks" on page 78
Pipette tasks	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting Spawn Process task parameters

About this topic

This topic describes how to configure the Spawn Process task in BenchWorks software.

About the Spawn Process task

The Spawn Process task instructs BenchWorks software to initiate another protocol process.

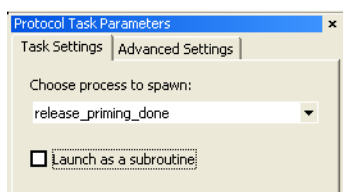
Typically, this task is used in conjunction with a script initiating another process when a certain condition is met. For example, plates entering the system could be funneled into different processes depending on their barcode.

The Spawn Process task is represented by this icon in the Protocol Tasks toolbar:

Setting the Spawn Process task parameters

To set the Spawn Process task parameters:

1. Add the Spawn Process task to the protocol process.
2. In the **Protocol Task Parameters** toolbar, make sure that the **Task Setting** tab is displayed.
3. Select the process you want to initiate with the Spawn Process task.
4. Select **Launch as a subroutine** if you want to continue with the current process after the Spawn Process task is executed.



Related topics

For information about...	See...
Adding tasks to protocols	"Adding and deleting tasks" on page 78
Using JavaScript	"Using JavaScript in BenchWorks software" on page 209
Pipette tasks	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting User Message task parameters

About this topic

This topic describes the parameters for the User Message task.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols for the BenchCel Workstation
- ❑ An operator who runs protocols and may need to set the parameters for this task

User Message task defined

The administrator or technician who creates a protocol can add User Message tasks to provide reminders to the operator. The reminders are in the form of messages that appear on the screen at the appropriate time and pause the protocol until acknowledged by the operator.

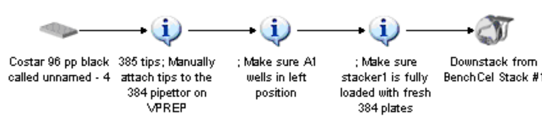
User message tasks can, for example, be used to remind the operator to empty the waste container, fill a reservoir, or remove plates.

Note: User messages do not appear when running a protocol in simulation mode.

!! IMPORTANT !! Remember to remove all user messages from protocols that you intend to run unattended.

Example

In the example shown below, the protocol has three user messages that remind the operator to perform final run-preparation tasks. The user messages appear before the plates are downstacked.The intended sequencing of the User Messages tasks can be ensured by the addition of Signal tasks to the other processes in the protocol.



Procedure

To set User Message task parameters:

1. Add the **User Message** task to a protocol process.
2. Set the **User Message properties**.

Property	Description
Title	Name of the user message, such as fill reservoir.
Body	Details about the task, such as which locations to fill.
First plate of the series only	Displays the message the first time it is encountered for that process during the run.

Property	Description
Every *x* plates	Displays the message the first time it is encountered for that process, and then every *x* number of times it is encountered for that process during the run. For example, if the value of *x* is 3, the first plate and the fourth plates in the protocol will trigger the message.
Last plate of the series only	Displays the message the last time it is encountered for that process during the run.
User data entry into variable named	Displays a message that asks for input from the user. The message is generated from a script that is added to one of the tasks.

Related topics

For information about...	See...
The workflow that this procedure belongs to	"Workflow for creating a protocol" on page 73
Adding tasks to protocols	"Adding and deleting tasks" on page 78
Using JavaScript with BenchWorks software	"Using JavaScript in BenchWorks software" on page 209
Signal tasks	"Setting Waitfor task and Signal task parameters" on page 120
Pipette tasks	"About setting pipette task parameters" on page 81
Other tasks	"About setting task parameters" on page 80

Setting Waitfor task and Signal task parameters

About this topic

This topic describes how to set the Waitfor and Signal task parameters for BenchWorks software.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols for the BenchCel Workstation
- ❑ An operator who runs protocols and may need to set the parameters for this task

Waitfor and Signal tasks defined

The Waitfor task and a Signal task work together to specify the order in which tasks are performed across processes.

You must first set the Waitfor task and then set the Signal task.

Procedure

To set Waitfor task parameters:

1. Add a **Waitfor** task to a protocol process.
2. In the **Protocol Task Parameters** toolbar, type a name for the task.

To set Signal task parameters:

1. Add a **Signal** task to a protocol process.
2. In the **Available waitfors** text box of the **Protocol Task Parameters** toolbar, select the **Waitfor** task that you want to reference.
3. Click **Add**.

   The task moves to the lower box.

Related topics

For information about...	See...
Example usage of Waitfor and Signal tasks	"Specifying task order across processes" on page 122
Adding tasks to protocols	"Adding and deleting tasks" on page 78
Specifying task order	"Specifying task order across processes" on page 122
User message tasks	"Setting User Message task parameters" on page 118

Setting VSpin Access2 Centrifuge task parameters

About this topic

This topic describes how to set the Access2 Microplate Loader task parameters.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who may need to change the Access2 Microplate Loader task parameters

VSpin Access2 Centrifuge task defined

This task moves a plate to an VSpin Access2 Centrifuge and centrifuges it.

Setting VSpin Access2 Centrifuge task parameters

To set VSpin Access2 Centrifuge task parameters:

1. Add the **VSpin with Access2** task to a protocol process.
2. In the **Task Settings** page of the **Protocol Task Parameter** toolbar, select a VSpin from the **Select a VSpin with Access2 to use** list.
3. Set the desired options in the **Load Plate** area:
   a. Enter the **Gripper Z offset (mm)** for the plate you are using. This value is the distance from the bottom of the plate to where the Access2 Microplate Loader grippers will grab the plate. Typically, this value is the same as the robot gripper offset.
   b. If you don't want to use the plate sensor on the Access2 Microplate Loader, select the **Ignore optical plate sensor** check box.
   c. If you are using flexible plates, such as PCR plates, select the **Grip gently** check box.
4. Set the spinning parameters in the **Spin Plate** area. Enter a value for the **Velocity (%)**, **Acceleration (%)** and **Deceleration (%)**.

   These parameters are calculated as a percentage of the maximum value possible. Maximum speed is 3000 rpm. For more information, see the *VSpin Microplate Centrifuge User Guide*.
5. Set the spin duration.
   a. Choose a **Timer mode** option.

      Total time includes the time it takes the VSpin Centrifuge to accelerate to the target speed and decelerate to a stop.

      Time at speed only includes the time that the rotor is at the target speed.
   b. Enter the spin duration.

      The format for the timer is hours:minutes:seconds.

Related topics

For information about...	See...
Setting up counterweights	*BenchCel Microplate Handling Workstation User Guide*
Adding tasks to protocols	“Adding and deleting tasks” on page 78
Pipette tasks	“About setting pipette task parameters” on page 81
Other tasks	“About setting task parameters” on page 80

Specifying task order across processes

About this topic

If you are running more than one process in a protocol, you may want to specify that a particular task in one process is performed before a particular task in another process. You do this when creating a protocol by using the combination of Waitfor and Signal tasks.

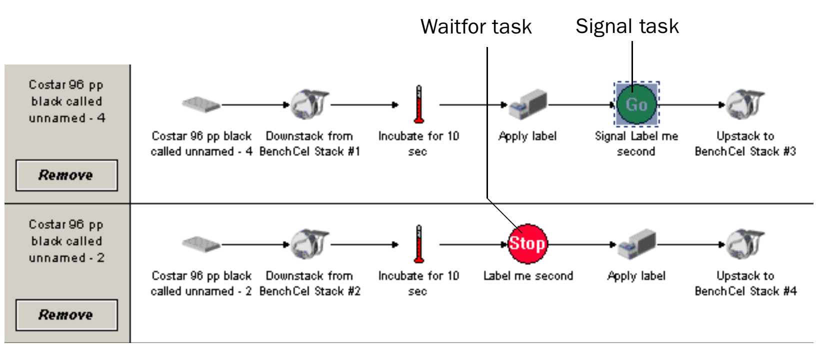
This topic describes how to use this task by providing an example. Read this topic if you are:

- ❑ An administrator or technician who writes protocols for the BenchCel Workstation
- ❑ An operator who runs BenchWorks software protocols

Example

In this example, the administrator or technician creating the protocol wants to make sure that a barcode is applied to plate 1 before plate 2.

The operator creates the protocol shown in the following diagram.



The order in which plate 1 and plate 2 are processed is selected by the scheduler program. Without the Waitfor and Signal tasks, this would also be the case for the bar coding operation. However, in this protocol, the Waitfor task, called “Label Me Second”, is included for Plate 2, and this causes the process to wait until it receives an instruction to continue. Meanwhile, the barcode is applied to Plate 1.

After the barcode has been applied to Plate 1, the Signal task called “Label Me Second” releases the wait condition on Plate 2 and the barcode is applied.

Related topics

For information about...	See...
Workflow for creating protocols	“Workflow for creating a protocol” on page 73
Adding tasks to protocols	“Adding and deleting tasks” on page 78
Pipette tasks	“About setting pipette task parameters” on page 81
Other tasks	“About setting task parameters” on page 80

Setting pipette task parameters

6

This chapter gives the procedures for configuring the parameters for individual pipette tasks in a protocol. This chapter contains the following topics:

Configuring a pipette process: example

About this topic

This topic gives an example of how to construct a pipette process as a sub-process that performs a simple pipetting operation. See Related topics at the end of this topic for more information about creating a pipette process.

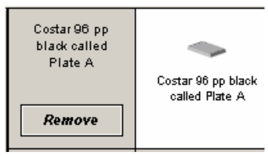
The example

The goal of the pipetting operation in this example is to pipette 20 µL of 1X TE buffer from a reservoir on a particular VPrep Pipettor into a Costar 96-well plate.

Creating a protocol

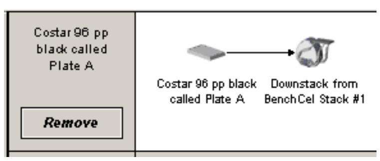
The first step is to create a new protocol by setting up a protocol process for the plate you want to pipette into.

Name the process "Plate A" and select the "Costar 96-well plate" as the plate type.



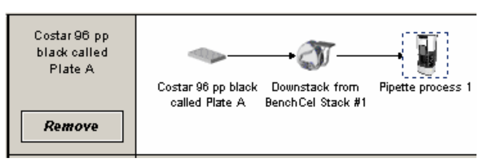
Downstacking a plate

The next step is to add a Downstack task that downstacks a plate from an appropriate stacker.



Adding a Pipette Process task

Next, you add a Pipette Process task.

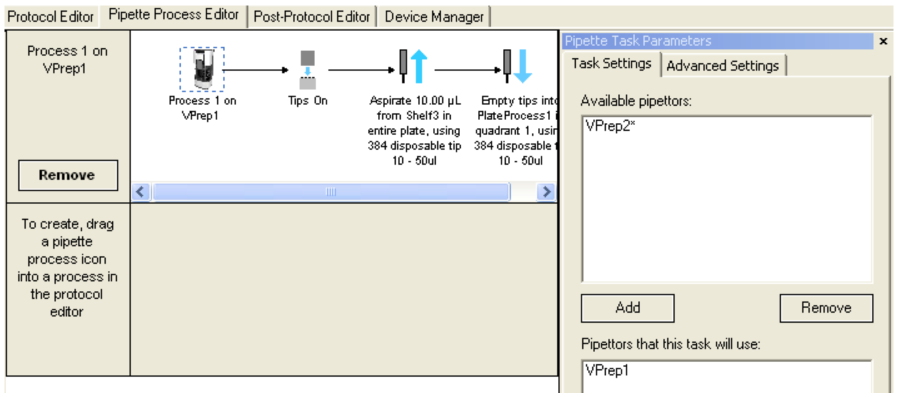


Because there can be a number of Pipette Process tasks in a protocol, this particular pipetting operation is identified by the name selected from the list in the Pipette Task Parameters toolbar. In this simple case there is only one name to select, which is "Process1." (You can rename the process, if desired.)

Selecting a VPrep Pipettor

In this example, there are two VPrep Pipettors configured so you need to associate the one you want to use with the pipette process.

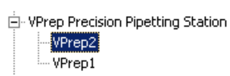
You do this in the Pipette Process Editor page. In the following example, the task will use VPrep1. VPrep2 remains available but is not used for this process.



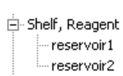
Configuring the VPrep Pipettor shelf

You want to aspirate 20 µL of 1X TE buffer from a reservoir. This means that you have to configure a shelf of the VPrep Pipettor to hold the reservoir that will contain the buffer. You decide to use a 384 V11 Reservoir (manual fill) 21.5 deep plate type for the reservoir.

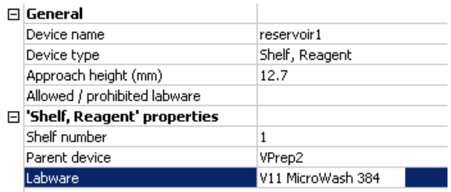
We know that the VPrep Pipettor itself has already been configured in BenchWorks software as a device because you were able to select it in the previous step. We can also see it listed as a device in the device manager. To open the device manager you click the Device Manager tab.



Each shelf that you want to use on the VPrep Pipettor must also be configured as a device. The shelves are already set up as devices, but you need to make sure that shelf 1, where you want to place the buffer reservoir, is configured correctly. Again looking at the device manager you see that there are two shelves configured as reagent shelves, which can hold reservoirs.



On selecting reservoir 1 you see that it is assigned to shelf 1 of VPrep 2, which is what you want. However, the labware associated with the shelf is the wrong type.



If you leave it as V11 MicroWash 384, the pipette tips might crash into the reservoir because the task will be performed on the assumption that the tips are moving into a Microwash tray rather than a 384 V11 Reservoir (manual fill) 21.5 deep reservoir.

So, you change the labware association to 384 V11 Reservoir (manual fill) 21.5 deep.

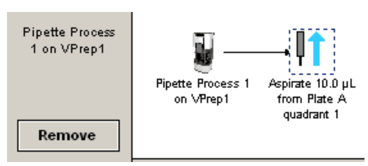
Note: To save the changes in the device manager you need to have administrator login privileges.

Note that when you associate a type of labware with the VPrep Pipettor shelf, you are also associating all of the parameters for that type of labware stored in the labware database. The VPrep Pipettor references the labware database parameters so that the pipette tips move to the right depth, position, and so on, as they enter the reservoir.

After configuring a VPrep Pipettor shelf, you compile the current protocol to check for errors.

Adding the Aspirate task

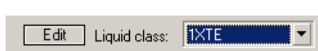
The next step is to add the Aspirate task.



Associating the task with a liquid class

In the Pipette Task Parameters toolbar of the Aspirate task, you need to tell the system what class of liquid it is aspirating. The system then uses the parameters stored in the liquid library database for that class during the aspiration operation.

In this case, you select the class 1XTE.

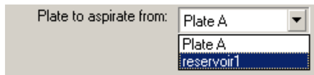


You can see the parameters used for the class by clicking the Edit button, which opens the liquid library editor.

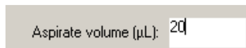
Associating the task with the VPrep Pipettor shelf

In the Pipette Task Parameters toolbar of the Aspirate task, you need to tell the system from what type of labware to aspirate.

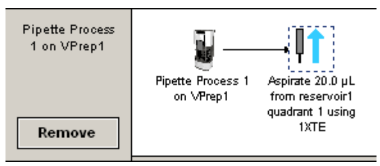
In this case there are two choices. If you select Plate A, the Costar 96-well plate you downstacked will be moved to the VPrep Pipettor and the volume aspirated from it. Instead, you select reservoir1, which is the name of the device that holds the buffer reservoir.



Finally, you want to specify a 20 µL aspiration.



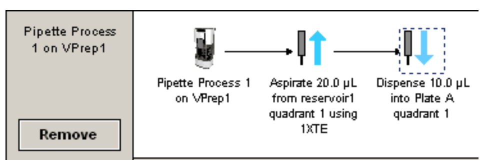
The modified task is shown in the following diagram:



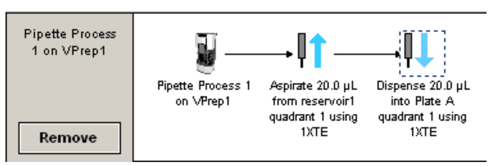
Adding a Dispense task

To complete the pipetting operation we have to add a Dispense task and set the parameters.

Drag the Dispense task into the pipette process pane.



The task defaults to the first plate in the list, which in this case is Plate A, but the dispense volume is incorrect and there is no associated liquid class. After editing the task parameters, the task is shown in the following diagram:



The pipette process is now complete.

Related topics

For information about...	See...
Setting up a protocol process for a plate	"Setting up a protocol process" on page 76
Liquid library editor	"About the liquid library editor" on page 280

For information about...	See...
Creating a pipette process task	"Adding and configuring a Pipette Process task" on page 130

Adding and configuring a Pipette Process task

About this topic

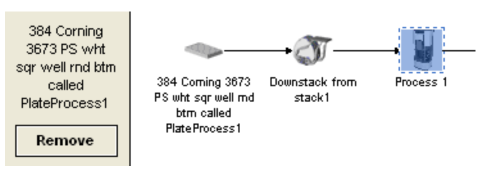
This topic describes how to configure a Pipette Process task. This task is used when creating a BenchWorks software protocol that uses a Velocity11 VPrep Pipettor or Bravo Platform.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who may need to change Pipette Process task parameters

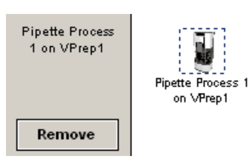
Adding a Pipette Process task

The first step in creating a pipette process is to add a Pipette Process task to the protocol editor. Drag the Pipette process icon into the protocol process.



Setting Pipette Process parameters

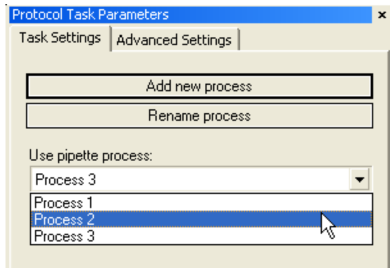
When you add the Pipette Process task, a new process is started in the Pipette Process Editor. The pipette process is represented by the Pipette Process icon in the Protocol Editor.



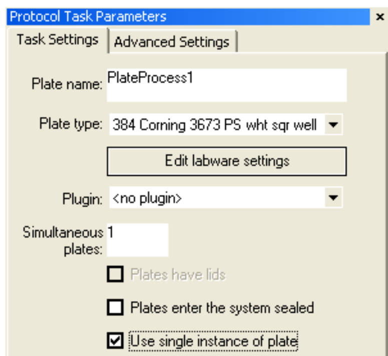
Because you can have more than one pipette process in a protocol, you must link the Pipette Process task to the pipette process by setting the Pipette Process parameters.

To set the Pipette Process task parameters:

1. In the **Protocol Editor** window, add a **Pipette Process** task to the protocol and then select it in the protocol sequence.
2. In the **Pipette Task Parameters** toolbar, select the pipette process that you want to use for this pipetting task.



3. If the pipette process is for a replicate pipetting series, so that the same plate can be used over and over again, select the **Use single instance of plates** check box in the **Task Setting** page of the protocol process for the plate.



Note: If the plate is a tip box, the tips will be picked up and the tip box will be moved from the VPrep Pipettor or Bravo Platform. At the end of the pipetting series, the tip box will be returned to the VPrep Pipettor or Bravo Platform and the tips replaced in it.

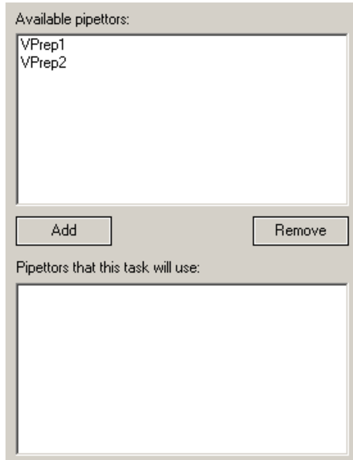
Associating the Pipette Process task

Because you can have more than one VPrep Pipettor or Bravo Platform on a lab automation system, you must link each pipette process with one or more devices that you want the task to be able to use. You do this by setting the parameter for the pipette process task.

To link a Pipette Process task to a pipette process:

1. In the **Pipette Process Editor**, select the **Pipette process** icon.

2. In the **Available pipettors** list of the **Pipette Task Parameters** toolbar, select one or more pipettors to link to and click **Add**.



The selected pipettors move to the lower box and become available for the task to use.

Related topics

For information about...	See...
Creating a pipette process	"Configuring a pipette process: example" on page 126
The workflow that this procedure belongs to	"Workflow for creating a protocol" on page 73
Configuring VPrep Pipettor shelves	"Configuring a VPrep Pipettor shelf as a device" on page 133

Configuring a VPrep Pipettor shelf as a device

About this topic

All VPrep Pipettor shelves have to be configured in BenchWorks software as devices before they can be used in a protocol. All shelves on your VPrep Pipettor were set up as devices at the factory. This topic shows you how to modify the existing settings for a shelf.

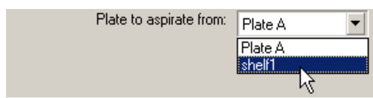
Read this topic if you are an administrator or technician who writes protocols that uses a VPrep Pipettor.

When to use this procedure

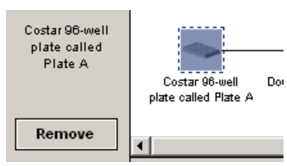
Use this procedure when creating a protocol that uses a type of reservoir on the VPrep Pipettor that is not currently set up or when a new type of shelf device is used in a protocol for the first time.

About associating a VPrep Pipettor shelf with a task

When you set parameters for some tasks, you have to select the type of labware or device used in the task. The following screenshot shows both a plate and a device in the list box of an Aspirate task.



The plate in the list box refers to Plate A in the associated process.



With Plate A selected, the robot will move the plate to the VPrep Pipettor and liquid will be aspirated from it.

Note: This does not specify which shelf the robot will deliver the plate to. If you would like to ensure that particular plate types go to particular shelves you should use labware classes in combination with allowed/ prohibited labware to force plates to go to specific shelves.

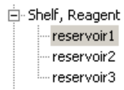
The device in the list box refers to a reagent shelf on the associated VPrep Pipettor. With shelf 1 selected, the VPrep Pipettor head will move to shelf 1 and the VPrep Pipettor will aspirate from whatever type of labware sits on the shelf.

Before you can run the protocol, you have to associate a type of labware with the VPrep Pipettor shelf. You do this in the device manager.

Procedure

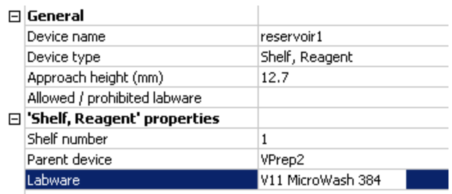
To configure a VPrep Pipettor reagent shelf as a device:

1. Click the **Device Manager** tab.
2. Select a reagent shelf in the **Device List**.



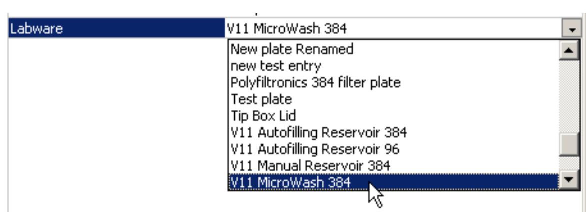
3. Make sure that:
   - The **Parent device** is the VPrep Pipettor you intend to use.
   - The **Shelf number** is the shelf you intend to use.

   Note: For most BenchCel Workstation configurations, reagent shelves have odd numbers, with shelf 1 being at the top left.



   If these are not correct, select another reagent shelf in the **Device List**.

4. *Optional*. Change the **Device name** to one that describes the type of liquid being used by typing over the existing name.
5. Select the type of labware that will contain the reagent from the **Labware** list box.



6. Click the blank column to the right of **Allowed/prohibited labware**.
7. Click the ellipsis button.

   The **Labware Classes** dialog box opens.

8. Make sure that the labware you intend to use on this VPrep Pipettor shelf is in the **Labware classes allowed to use this device** column and not in the prohibited column.
9. Select **File** > **Device File** > **Save** to save the device file.

   !! IMPORTANT !! Making a change to the device file could break other protocols that are using that device file. For example, if two protocols use the same device file, but one protocol calls for a manual fill reservoir on shelf 5 and the other calls for a microwash station you'll have to change the device file each time you switch protocols. In this case, create a separate device file for each protocol.

Related topics

For information about...	See...
Working with Device files	“About barcode reading and tracking” on page 229
Labware editor	“About the labware editor” on page 248

Setting Aspirate task parameters for a VPrep Pipettor

About this topic

This topic describes how to set the Aspirate task parameters when creating a BenchWorks software protocol that use a VPrep Pipettor.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Aspirate task

Aspirate task defined

An Aspirate task is used with a VPrep Pipettor to draw up liquid from a plate or reservoir.

Before you start

Before you start setting the Aspirate task parameters, you need to associate a VPrep Pipettor shelf with the labware type that will be used for the aspirating.

Procedure

To set Aspirate task parameters:

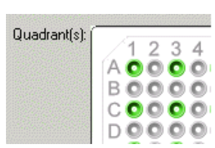
1. Add an **Aspirate** task to the pipette process.
2. If you have defined a liquid class for the liquid you intend to aspirate, select it from the **Liquid class** list at the bottom of the **Pipette Task Parameters** toolbar.
3. Complete the following fields:

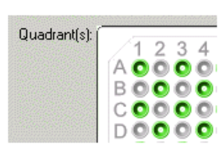
Field	Description
Aspirate volume	The volume of liquid to be drawn up into each pipette tip.
Aspirate velocity	The rate at which to draw up liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.

Field	Description
Aspirate acceleration	The rate of increase in velocity before the maximum aspirate velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Distance from well bottom	The distance between the bottom of the pipette tips and the bottoms of the plate wells or MicroWash tray chimneys. If you are using dynamic tip retraction this value sets the lowest point to which the tips will travel.
Tip retract distance	The distance that the tips should move downwards per unit volume of liquid being aspirated. This value allows the tips to move downwards during aspiration to maintain a certain height below the surface of the liquid. Determine an appropriate value by trial-and-error for each type of plate you use. *Note:* You might want this value to be the same as the Tip Retract Distance for the Dispense task if both tasks are using the same labware type.
Pre-aspirate volume	The volume of air to be drawn up before the pipette tips enter the liquid.
Post-aspirate volume	The volume of air to be drawn up after the liquid is drawn up.

4. If the VPrep Pipettor head has fewer tips than the plate has wells, select a quadrant configuration from the **Quadrant(s)** diagram to indicate which well quadrant of the plate you want to aspirate from.

   To select a quadrant, click a representative well. Two possible examples are shown below.





5. In the **Plate to Aspirate from** list, select the type of labware or device from which to aspirate.

6. If you do not want to record this dispense in the transfer log, clear the **Record in transfer log** check box.

   You might do this, for example, if you are running a casual test protocol.

Related topics

For information about...	See...
Configuring VPrep Pipettor shelves	"Configuring a VPrep Pipettor shelf as a device" on page 133
Defining liquid handling parameters	"About the liquid library editor" on page 280
Labware editor	"About the labware editor" on page 248
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Aspirate task parameters for a Bravo Platform

About this topic

This topic describes how to set the Aspirate task parameters when creating a BenchWorks software protocol that uses a Bravo Platform.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Aspirate task

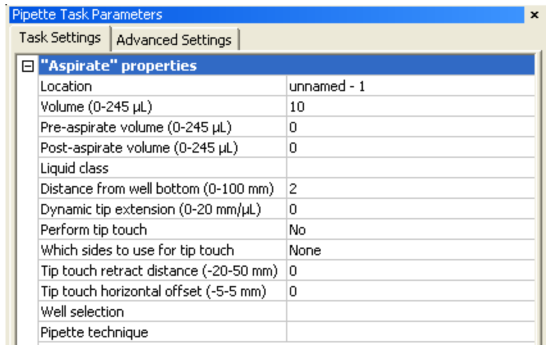
Aspirate task defined

An Aspirate task is used to draw up liquid from a plate or reservoir.

Procedure

To set Aspirate task parameters:

1. Add an **Aspirate** task to a pipette process.
2. Use the table below as a guide to complete the **Aspirate Properties** located in the **Task Settings** tab of the **Task Parameters** toolbar.



Field	Description
Location	Identifies the location at which the aspiration will occur.
Volume (0–245 µL)	Specifies the volume of liquid to be drawn up into each pipette tip.
Pre-aspirate volume (0–245 µL)	Specifies the volume of air to be drawn before the pipette tips enter the plate.
Post-aspirate volume (0–245 µL)	Specifies the volume of air to be drawn after the liquid is drawn up.
Liquid class	Specifies a defined a liquid class for this liquid. Click the adjacent blank field to display an arrow and select the liquid from the list.
Distance from well bottom (0–100 mm)	Specifies the starting or maximum distance from the well bottoms that the tips will be during the aspirate cycle. If you are using dynamic tip retraction this value sets the lowest point to which the tips will travel.
Dynamic tip extension (0–20 mm/µL)	Specifies the distance (in millimeters) to lower the head for each microliter aspirated.
Perform tip touch	Specifies whether a tip touch is performed after each selection of the plate.
Which sides to use for tip touch	Specifies which sides and in what order to use for the tip touch.
Tip touch retract distance (–20–50 mm)	Specifies the height that the tips move up before touching the sides of the wells.

Field	Description
Tip touch horizontal offset (–5–5 mm)	When the value for this parameter is 0, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.
Well selection	Identifies the wells for aspiration. Applies only if the Bravo Platform head has fewer tips than the plate has wells or if you are in single row/ column mode. Click the ellipsis button, and, in the Well Selection dialog box, select the well quadrant(s) of the plate from which you want to aspirate.
Pipette technique	Specifies a pipetting method to use for the aspiration. Click in the adjacent blank field to display an arrow and select the method from the list. See the *VWorks4 User Guide Addendum* for more information about pipette techniques

Related topics

For information about...	See...
Pipette techniques	*VWorks4 User Guide Addendum*
Defining liquid handling parameters	"About the liquid library editor" on page 280
Labware editor	"About the labware editor" on page 248
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Change Instance task parameters

About this topic

This topic describes how to set the Change Instance task parameters. This task is used when creating a BenchWorks software protocol that uses a Velocity11 VPrep Pipettor or Bravo Platform.

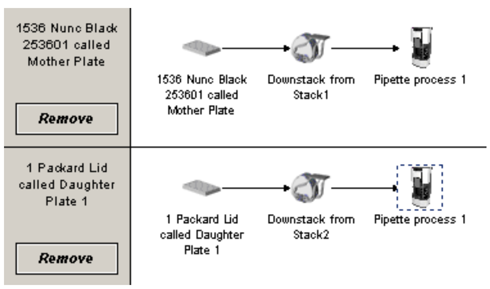
Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Change Instance task

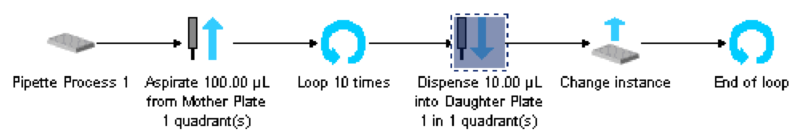
Change Instance task defined

The Change Instance task is used in combination with a pipette loop to perform replicate dispense operations from a mother plate into a series of daughter plates.

Part of an example protocol, which contains a mother plate and the first of 10 daughter plates, is shown below.



An example pipette process for the mother plate is shown below.



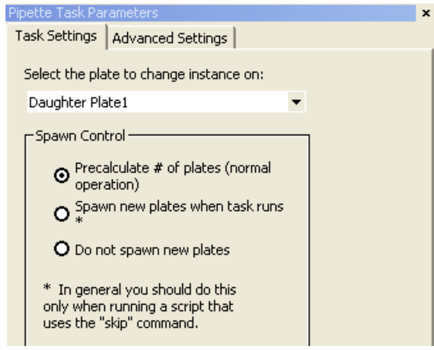
When the protocol runs, 100 µl from each well of the mother plate are aspirated and 10 µl are dispensed into the first daughter plate (Daughter Plate 1). When the Change Instance task is reached, Daughter Plate 2 is moved into the system and 10 µl are dispensed into it from the mother plate. This loop repeats until all 10 daughter plates have been dispensed into.

Procedure

To set Change Instance task parameters:

1. Set up a protocol and pipette processes following the example shown above.
2. In the **Pipette Task Parameters** toolbar, from the list, select the first daughter plate for the plate icon to change instance on.

   !! IMPORTANT !! Only use Change Instance within a loop.



3. Select a **Spawn Option**:
   - **Precalculate...** Select this option if you know the number of plates to use before the run starts. If the number of times to loop or the Change Instance task is scripted, you cannot use this option.
   - **Spawn new plates...** Select this option if you are scripting the number of times to loop or the Change Instance task. The scheduler will not precalculate the number of plates to use in the Change Instance task. Instead, every time this task executes, a new plate is brought into the system.
   - **Do not spawn...** Select this option to get a combination of the other two options. The scheduler will not precalculate nor will it bring in new plates when the Change Instance task executes. This option enables you to script the number of plates in the run and not have to wait for the Change Instance task to execute to bring in new plates.

     An example of this is as follows:

     Process ->Loop x times ->Spawn process y ->End loop

Related topics

For information about...	See...
Setting up a plate instance	"Setting up a protocol process" on page 76
Setting Loop task parameters	"Setting Mix task parameters for a VPrep Pipettor" on page 150
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Change Tips task parameters for a VPrep Pipettor

About this topic

This topic describes how to set the Change Tips task parameters. This task is used when creating a BenchWorks software protocol that uses a Velocity11 VPrep Pipettor.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Change Tips task

Change Tips task defined

The Change Tips task uses the robot to apply or remove VPrep Pipettor pipette tips.

Pairs of Change Tips tasks are usually used together. For example, if the protocol starts with tips already on the VPrep Pipettor, the first Change Tips task would remove the tips and the second Change Tips task would install new tips.

Change Tips tasks are always entered in a process created solely for changing tips; an example is described in this topic.

Before you start

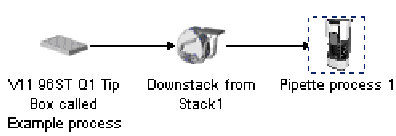
Before you start, you need to configure a shelf on the VPrep Pipettor to use tip boxes and have ready a tip box, containing tips, with the tip box lid removed and placed in a robot-accessible position.

Also, if you are removing tips first, you need an empty tip box on the tip box shelf of the VPrep Pipettor that you intend to use for the operation.

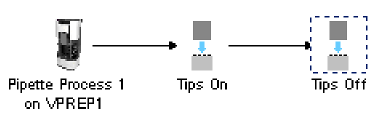
Overall process

One method to change tips with a VPrep Pipettor requires you to create the following processes:

1. In the protocol editor, create a process for the tip box, such as in the following example.



2. In the pipette process editor, create a pipette process to change tips, such as in the following simple example.



Creating the process for the tip box

Before you can add a Change Tips task, you must create a process for the tip box that will contain the tips.

Creating a process for the tip box:

1. Click the **Protocol Editor** tab.
2. Click **Add**.

   A plate definition icon appears in the **Protocol Editor** window.
3. In the **Protocol Task Parameters** toolbar:
   a. Type a name for the tip box in the **Plate name** text box.
   b. In the **Plate type** list, select the tip box that has already been configured for use on the shelf of the VPrep Pipettor that you intend to use.

      Note: Make sure that you select and use a tip box without lids. If the correct tip box is selected, the **Plates have lids** check box is unavailable.
   c. In the **Simultaneous Plates** text box, type the maximum number of tip boxes of this type that you want to be available to the system at one time.
   d. If the tip boxes have a barcode on the south side or west side, select the appropriate **Incoming plates have a barcode**... check box and list box option.
4. Add the **Downstack** task to the protocol process.
5. Set the **Downstack** task parameters.
6. Add the **Pipette Process** task to the protocol process.
7. Set the **Pipette Process** task parameters.
8. Add any other tasks that you want to for the tip box.

   For example, you could add an **Apply Label** task to place a barcode on the tip box.

Creating the pipette process for changing tips

After you have created a process for the tip box, create a pipette process for the Change Tips task.

To create a pipette process for changing tips:

1. Click the **Pipette Process Editor** tab.
2. Add a **Change Tips** task to the pipette process.
3. In the **Pipette Task Parameters** toolbar, select either:

Option	With this option, during the protocol...
❑ Press On New Tips	Puts tips on to a VPrep Pipettor head.
❑ Tips Off	Removes tips from a VPrep Pipettor head.

4. From the **Select the tip box to use** list, select the name of the tip box that you have assigned to the tip box process.
5. Add other tasks, including a second **Change Tips** task, as required.

Note: If you would like to use one box of tips, not delivered by the robot you can do so, but you must configure shelf 7 or 8 as a tipbox shelf with the appropriate labware definition.

Related topics

For information about...	See...
How to set the number of simultaneous plates	"Compiling and saving protocols" on page 83
Configuring VPrep Pipettor shelves	"Configuring a VPrep Pipettor shelf as a device" on page 133
Labware editor	"About the labware editor" on page 248
Applying labels	"Setting Apply Label task parameters" on page 91
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Dispense task parameters for a VPrep Pipettor

About this topic

This topic describes how to set the Dispense task parameters. This task is used when creating a BenchWorks software protocol that uses a VPrep Pipettor.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Dispense task

Dispense task defined

A Dispense task is used with a VPrep Pipettor to dispense liquid into a plate.

Dispense value limits

You cannot dispense more volume than you aspirated.

If you enter a total dispense volume that is greater than the total aspirate volume you will get an error message when you compile the protocol. More specifically, the Aspirate Volume + Pre-Aspirate Volume + Post-Aspirate Volume must be greater than or equal to the Dispense Volume + Blowout Volume + Post Dispense Volume.

Before you start

Before you can set the Dispense task parameters, you need to associate a VPrep Pipettor shelf with the labware type from which you will aspirate.

Procedure

To set Dispense task parameters:

1. In the pipette process window add the **Dispense** task to a pipette process.
2. If you have defined a liquid class for the liquid you intend to dispense, select it from the **Liquid class** list at the bottom of the **Pipette Task Parameters** toolbar.
3. Either:
   - Type the volume that you want to move out of each pipette tip in the **Dispense Volume** text box.
   - Select the **Empty tips** check box. Select this option if you want to empty the tips rather than deliver a specific volume of liquid.

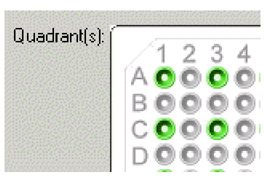
     Note: You might need to drag the toolbar to widen it so you can see the check box.
4. Complete the remaining fields:

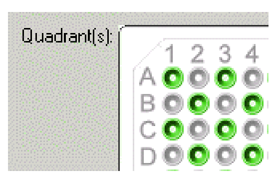
Field	Description
Dispense velocity	The rate at which to dispense the liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Dispense acceleration	The rate of increase in velocity before the dispense velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Distance from well bottom	The distance between the bottom of the pipette tips and the bottoms of the plate wells or MicroWash tray chimneys. If you are using dynamic tip retraction this value sets the lowest point to which the tips will travel.

Field	Description
Retract distance	The distance that the tips should move upwards per unit volume of liquid being dispensed. This value allows the tips to move upwards during dispensing to maintain a certain height above the surface of the liquid. Determine an appropriate value by trial-and-error for each type of plate you use. You might want this value to be the same as the Tip Retract Distance for the Aspirate task.
Blowout volume	The volume of air to blow out when the tips are in the liquid. This is typically the same as the pre-aspirate volume. *Note:* Blowout only occurs in the last quadrant dispensed into for a given Dispense task.
Post-dispense volume	The volume of air to blow out when the tips are out of the liquid.

5. If the VPrep Pipettor head has fewer tips than the plate has wells, select a quadrant configuration from the **Quadrant(s)** diagram to indicate which well quadrant of the plate to which you want to dispense.

   To select a quadrant, click a representative well. Two possible examples are shown below.





6. If you want the tips to touch one or more sides of the plate wells:

   a. Select the **Enable tip touch** check box.

   b. Type a value for the **tip touch rise height**.

      This is the height that the tips should move upwards before touching the side of the wells.

   c. Type a value for the **Tip touch horiz distance**.

      When the value for this parameter is zero, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.

d. In the **Number of sides to touch** text box, type a value for number of sides of the wells that you want the tips to touch.

7. In the **Plate to dispense to** list, select the plate or device to which to dispense.
8. If you do not want to record this dispense in the transfer log, clear the **Record in transfer log** check box.

   You might do this, for example, if you are running a casual test protocol.

Related topics

For information about...	See...
Configuring VPrep Pipettor shelves	"Configuring a VPrep Pipettor shelf as a device" on page 133
Defining liquid handling parameters	"About the liquid library editor" on page 280
Labware editor	"About the labware editor" on page 248
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Dispense task parameters for a Bravo Platform

About this topic

This topic describes how to set the Dispense task parameters when creating a BenchWorks software protocol that uses a Bravo Platform.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Aspirate task

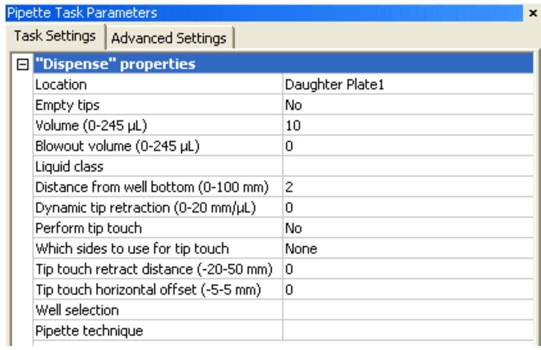
Dispense task defined

A Dispense task is used to dispense liquid to a plate.

Procedure

To set Dispense task parameters:

1. Add a Dispense task to a pipette process.
2. Use the table below as a guide to complete the **Dispense Properties** located in the **Task Settings** tab of the **Task Parameters** toolbar.



Field	**Description**
Location	Identifies the location at which the dispense will occur.
Empty tips	Indicates whether to empty entire contents of tips, including fluid and air. Volume parameter is ignored if this option is yes.
Volume (0–245 µL)	Specifies the volume of liquid to be dispensed from each pipette tip.
Blowout volume (0–245 µL)	Specifies the volume of air to dispense after the main volume has been dispensed. Typically, the blowout volume is the same as the pre-aspirate volume. *Note:* Blowout only occurs in the last quadrant dispensed for a given Dispense task.
Liquid class	Specifies a defined a liquid class for this liquid. Click the adjacent blank field to display an arrow and select the liquid from the list.
Distance from well bottom (0–100 mm)	Specifies the starting or maximum distance from the well bottoms that the tips will be during the dispense cycle. If you are using dynamic tip retraction, this value sets the lowest point to which the tips will travel.
Dynamic tip retraction (0–20 mm/µL)	Specifies the distance to lower the head for each microliter dispensed.
Perform tip touch	Specifies whether a tip touch is performed after each selection of the plate.
Which sides to use for tip touch	Specifies which sides and in what order to use for the tip touch.

Field	Description
Tip touch retract distance (–20–50 mm)	Specifies the height that the tips move up before touching the sides of the wells.
Tip touch horizontal offset (–5–5 mm)	When the value for this parameter is 0, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.
Well selection	Identifies the wells for dispensing. Applies only if the Bravo Platform head has fewer tips than the plate has wells or if you are in single row/ column mode. Click the ellipsis button, and, in the Well Selection dialog box, select the well quadrant(s) of the plate to which you want to dispense.
Pipette technique	Specifies a pipetting method to use for the dispense. Click in the adjacent blank field to display an arrow and select the method from the list. See the *VWorks4 User Guide Addendum* for more information about pipette techniques

Related topics

For information about...	See...
Pipette techniques	*VWorks4 User Guide Addendum*
Defining liquid handling parameters	"About the liquid library editor" on page 280
Labware editor	"About the labware editor" on page 248
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Dry Tips task parameters

Special note

The Dry Tips task is associated with the VPrep Pipettor tip dryer. This tip dryer hardware is no longer available. If you have a tip dryer, contact Velocity11 Technical Support before using the Dry Tips task.

Setting Mix task parameters for a VPrep Pipettor

About this topic

This topic describes how to set the Mix task parameters. This task is used when creating a BenchWorks software protocol that uses a VPrep Pipettor.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Mix task

Mix task defined

The Mix task is used with a VPrep Pipettor to mix reagents by aspirating and then dispensing.

Before you start

Before you start, you must associate a VPrep Pipettor shelf with the labware you will be using for the aspiration step of the mixing.

Procedure

To set Mix task parameters:

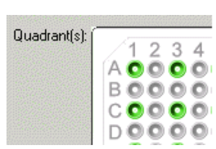
1. Add the **Mix** task to the pipette process.
2. If you have defined a liquid class for the liquid you intend to mix, select it from the **Liquid class** list at the bottom of the **Pipette Task Parameters** toolbar.
3. Complete the following properties:

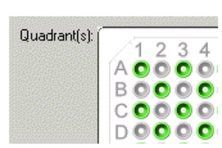
Property	Description
Mixing volume	The volume of liquid to be aspirated and dispensed to each plate well.
Number of mixing cycles	The number of aspirate/dispense operations.
Aspirate velocity	The rate at which to draw up liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Aspirate acceleration	The rate of increase in velocity before the maximum aspirate velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.

Property	Description
Dispense velocity	The rate at which to dispense the liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Dispense acceleration	The rate of increase in velocity before the dispense velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Distance from well bottom	The distance between the bottom of the pipette tips and the bottoms of the plate wells or MicroWash tray chimneys. If you are using dynamic tip retraction this value sets the lowest point to which the tips will travel.
Retract distance	The distance that the tips should move upwards or downwards per unit volume of liquid being dispensed or aspirated. This value allows the tips to move upwards or downwards during dispensing or aspirating to maintain a certain height below or above the surface of the liquid. You will need to determine an appropriate value by trial-and-error for each type of plate you use.
Pre-aspirate volume	The volume of air to be drawn up before the pipette tips enter the liquid, and before mixing begins.
Last-cycle blowout volume	The volume of air to blow out when the tips are in the liquid once the mixing is complete. This is typically the same as the pre-aspirate volume.

4. If the VPrep Pipettor head has fewer tips than the plate has wells, select a quadrant configuration from the **Quadrant(s)** diagram to indicate in which well quadrant of the plate you want to mix.

   To select a quadrant, click a representative well. Two possible examples are shown below.





5. If you want the tips to touch one or more sides of the plate wells:
   a. Select the **Enable tip touch** check box.
   b. Type a value for the **Tip touch rise height**.

This is the height that the tips should move upwards before touching the side of the wells.

c. Type a value for the **Tip touch horizontal distance**.

When the value for this parameter is zero, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.

d. In the **Number of sides to touch** text box, type a value for the number of sides of the wells that you want the tips to touch.

6. In the **Plate to mix** list, select the type of labware or device in which to mix.

Related topics

For information about...	See...
Defining labware	"About the labware editor" on page 248
Configuring VPrep shelves	"Configuring a VPrep Pipettor shelf as a device" on page 133
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130
Defining liquid handling parameters	"About the liquid library editor" on page 280

Setting Mix task parameters for a Bravo Platform

About this topic

This topic describes how to set the MIx task parameters when creating a BenchWorks software protocol that uses a Bravo Platform.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Aspirate task

Mix task defined

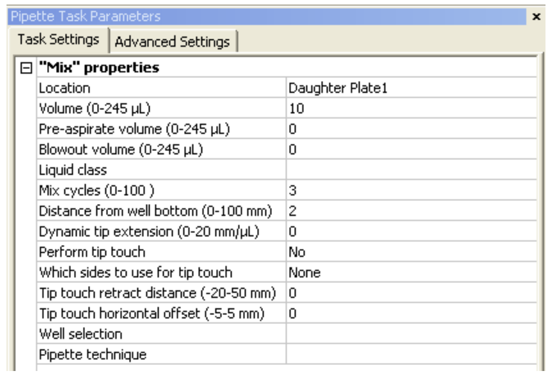
A Mix task is used to dispense liquid to a plate.

Procedure

To set Mix task parameters:

1. Add a **Mix** task to a pipette process.

2. Use the table below as a guide to complete the **“Mix” Properties** located in the **Task Settings** tab of the **Task Parameters** toolbar.



Field	**Description**
Location	Identifies the location at which the mix will occur.
Volume (0–245 µL)	Specifies the volume of liquid to be mixed for each plate well.
Pre-aspirate volume (0–245 µL)	Specifies the volume of air to be drawn before the pipette tips enter the plate.
Blowout volume (0–245 µL)	Specifies the volume of air to dispense when the tips are in the liquid of the last quadrant after the last cycle. *Note:* Typically the same as the pre-aspirate volume.
Liquid class	Specifies a defined a liquid class for this liquid. Click the adjacent blank field to display an arrow and select the liquid from the list.
Mix cycles (0–100)	Specifies the number of aspirate/ dispense operations.
Distance from well bottom (0–100 mm)	Specifies the starting or maximum distance from the well bottoms that the tips will be during the dispense cycle. If you are using dynamic tip retraction, this value sets the lowest point to which the tips will travel.
Dynamic tip extension (0–20 mm/µL)	Specifies the distance that the tips will move downwards and upwards per unit volume of liquid being dispensed or aspirated. For an approximation, use well volume/well depth.

Field	Description
Perform tip touch	Specifies whether a tip touch is performed after each selection of the plate.
Which sides to use for tip touch	Specifies which sides and in what order to use for the tip touch.
Tip touch retract distance (–20–50 mm)	Specifies the height that the tips move up before touching the sides of the wells.
Tip touch horizontal offset (–5–5 mm)	When the value for this parameter is 0, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.
Well selection	Identifies the wells for dispensing. Applies only if the Bravo Platform head has fewer tips than the plate has wells or if you are in single row/column mode. Click the ellipsis button, and, in the Well Selection dialog box, select the well quadrant(s) of the plate to which you want to mix.
Pipette technique	Specifies a pipetting method to use for the mix. Click in the adjacent blank field to display an arrow and select the method from the list. See the *VWorks4 User Guide Addendum* for more information about pipette techniques

Related topics

For information about...	See...
Pipette techniques	*VWorks4 User Guide Addendum*
Defining liquid handling parameters	"About the liquid library editor" on page 280
Labware editor	"About the labware editor" on page 248
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Pump Reagent task parameters for a VPrep Pipettor

About this topic

This topic describes how to set the Pump Reagent task parameters. This task is used when creating a BenchWorks software protocol that uses a VPrep Pipettor.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Pump Reagent task

Pump Reagent task defined

The Pump Reagent task is used on a VPrep Pipettor (or Bravo Platform) to pump liquid into an installed autofilling reservoir. Reservoirs are typically filled with washing buffer or water, and drained through the gravity drain.

!! IMPORTANT !! If you run an empty reservoir step and a fill reservoir step in the same protocol, check the protocol to make sure that it will not lead to an overflow.

Procedure

To fill a VPrep Pipettor reservoir:

1. Add the **Pump Reagent** task to the pipette process.
2. In the **Pipette Task Parameters** toolbar, select **Fill reservoir**.

   The **Fill reservoir** and **Empty reservoir** values determine whether the pumps will fill or empty the reservoir.

   To empty the reservoir you must complete the **Autofill Configuration** information on the **Shelves** tab of the **VPrep Diagnostics**.
3. In the list, select the shelf on which the reservoir is located.
4. In the **for** text box, type the pumping duration. This is the time in seconds that the pumps pump.
5. In the **at** text box, type the percentage of maximum pumping rate. This, combined with the pumping duration, determines the volume of fluid moved.
6. In the **every** text box, type a number that controls how frequently the liquid is pumped. For example, if you type `3`, the pump will run every third time the task runs.
7. If you are using a Weigh Shelf, in the **If liquid is below this level** text box, enter the minimum percentage of liquid that you want the reservoir to contain. A typical value is 45%.
8. If you are using a Weigh Shelf, in the **then fill reservoir to this level** text box, enter the maximum percentage of liquid that you want the reservoir to contain. A typical value is 60%.

Related topics

For information about...	See...
Defining labware	"About the labware editor" on page 248
Configuring VPrep Pipettor shelves	"Configuring a VPrep Pipettor shelf as a device" on page 133
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130
Defining liquid handling parameters	"About the liquid library editor" on page 280

Setting Pump Reagent task parameters for a Bravo Platform

About this topic

This topic describes how to set the Pump Reagent task parameters when creating a BenchWorks software protocol that uses a Bravo Platform.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Pump Reagent task

Pump reagent task defined

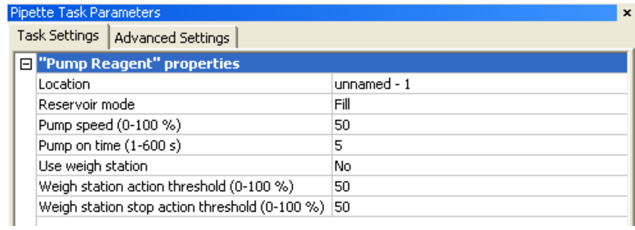
The Pump Reagent task is used on a Bravo Platform (or VPrep Pipettor) to pump liquid into an installed autofilling reservoir. Reservoirs are typically filled with washing buffer or water, and drained through the gravity drain.

!! IMPORTANT !! If you run an empty reservoir step and a fill reservoir step in the same protocol, check the protocol to make sure that it will not lead to an overflow.

Procedure

To set Pump Reagent task parameters:

1. Add a **Pump Reagent** task to a pipette process.
2. Use the table below as a guide to complete the **"Pump Reagent" Properties** located in the **Task Settings** tab of the **Task Parameters** toolbar.



Field	Description
Location	Identifies the location at which the filling or emptying will occur.
Reservoir mode	Specifies whether you want to fill or empty the reservoir.
Pump speed (0–100%)	Specifies the percentage maximum speed.
Pump on time (0–600s)	Specifies the pump time in seconds.
Use weigh station	Indicates whether you are using a weigh station
Weigh station action threshold (0–100%)	Specifies the percentage of maximum weight for activating the Pump Module.
Weight station stop action threshold (0–100%)	Specifies the percentage of maximum weight for de-activating the Pump Module.

Related topics

For information about...	See...
Configuring accessories for the Bravo Platform	*Bravo User Guide*
Pump Module	*Bravo User Guide*
Labware editor	"About the labware editor" on page 248
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Tips On task parameters for the Bravo Platform

About this topic

This topic describes how to set the parameters for the Tips On task when creating a BenchWorks software protocol that uses a Bravo Platform. Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to edit the Tips On task in a protocol

Tips On task defined

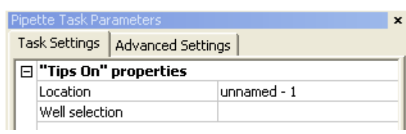
A Tips On (Bravo) task puts fresh tips on the pipette head.

This task is available in Bravo Platform pipette and sub-processes and only with a pipette head that uses disposable tips (not fixed tips).

Procedure

To set the Tips On task parameters:

1. Add the Tips On (Bravo) task to a pipette process.
2. Use the table below as a guide to complete the **"Tips On" properties** located in the **Task Settings** tab of the **Task Parameters** toolbar.



Property	Description
Location	Identifies the location at which the tips on task will occur.
Well selection	Identifies the wells for dispensing. Applies only if the Bravo Platform head has fewer tips than the plate has wells or if you are in single row/column mode. Click the ellipsis button, and, in the Well Selection dialog box, select the well quadrant(s) of the plate to which you want the tips on task to correspond.

Related topics

For information about…	See…
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Tips Off task parameters for the Bravo Platform

About this topic

This topic describes how to set the parameters for the Tips Off task when creating a BenchWorks software protocol that uses a Bravo Platform. Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to edit the Tips Off task in a protocol

Tips Off task defined

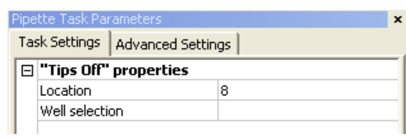
A Tips Off (Bravo) task removes the pipette tips from the pipette head.

This task is available in Bravo Platform pipette processes and only with a pipette head that uses disposable tips (not fixed tips).

Procedure

To set the Tips Off task parameters:

1. Add the Tips Off (Bravo) task to a pipette process.
2. Use the table below as a guide to complete the **"Tips Off" properties** located in the **Task Settings** tab of the **Task Parameters** toolbar.



Property	Description
Location	Identifies the location at which the tips will be removed.
Well selection	Specifies the tips to be removed. Applies only if the Bravo head has fewer tips than the plate has wells or if you are in serial dilution mode. Click the ellipsis button, and, in the Well Selection dialog box, click wells, rows, or columns to highlight where in the tip box or tip trash the removed tips will be placed.

Related topics

For information about...	See...
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Setting Wash Tips task parameters for a VPrep Pipettor

About this topic

This topic describes how to set the Wash Tips task parameters. This task is used when creating a BenchWorks software protocol that uses a VPrep Pipettor.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Wash Tips task

Wash Tips task defined

A Wash Tips task is used with a VPrep Pipettor to wash pipette tips.

Before you start

Before you start, you need to have a VPrep Pipettor shelf associated with the labware type with which you want to wash.

Procedure

To wash pipette tips:

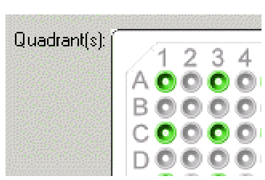
1. Add the Wash Tips task to the pipette process.
2. If you have defined a liquid class for the liquid you intend to use for washing, select it from the **Liquid class** list at the bottom of the **Task Parameters** toolbar.
3. Complete the following properties:

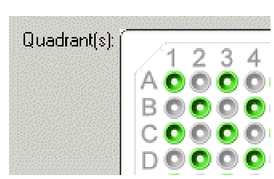
Property	Description
Wash volume	The volume of liquid to be aspirated and dispensed to each plate well.
Dispense only	Select this if you want to dispense the wash liquid to waste instead of dispensing it back into the reservoir of washing liquid. *Note:* The **Dispense to waste at height of** check box must be selected for this option to be available. Enter the amount to dispense in the **Wash Volume** field.
Empty tips	This option is only available if you select **Dispense only**. Select this if you want to empty the tips, regardless of the volume.
Number of wash cycles	The number of aspirate/dispense operations.
Aspirate velocity	The rate at which to draw up the liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.

Property	Description
Aspirate acceleration	The rate of increase in velocity before the aspirate velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Dispense velocity	The rate at which to dispense the liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Dispense acceleration	The rate of increase in velocity before the dispense velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor and cannot be edited here.
Distance from well bottom	The distance between the bottom of the pipette tips and the bottoms of the MicroWash tray chimneys.
Retract Distance	The distance that the tips should move upwards or downwards per unit volume of liquid being dispensed or aspirated. This value allows the tips to move upwards or downwards during dispensing or aspirating to maintain a certain height below or above the surface of the liquid. You will need to determine an appropriate value by trial-and-error.
Pre-aspirate volume	The volume of air to be drawn up before the pipette tips enter the liquid, and before mixing begins.
Last-cycle blowout volume	The volume of air to blow out when the tips are in the liquid once the mixing is complete. This is typically the same as the pre-aspirate volume.

4. If the VPrep Pipettor head has fewer tips than the plate has wells, select a quadrant configuration from the **Quadrant(s)** diagram to indicate which well quadrant of the plate you want to dispense to.

   To select a quadrant, click a representative well. Two possible examples are shown below.





5. Type a value for the **Inflow pump**, which is the relative rate of liquid flow into the MicroWash tray manifold.

   This value should be high enough for the washing liquid to just bubble over the tops of the chimneys.

6. Type a value for the **Outflow pump**, which is the relative rate of liquid flow out of the MicroWash tray manifold.

   This value should be zero.

7. If you want to dispense the wash liquid to waste instead of dispensing it back into the reservoir of washing liquid:

   a. Select the **Dispense to waste at height of** check box.

   b. Type a value into the associated text box for the height above the chimney from which you want the liquid to be dispensed.

      The value can be a positive or negative number.

      The pipette tips move up and sideways to dispense the wash liquid between the chimneys into waste.

8. If you want the tips to touch the outside tops of the chimneys to remove drops from the tips, select the **Enable tip touching** check box:

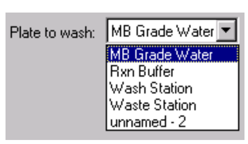
   a. Type a value for the **Tip touch rise height**.

      This is the height that the tips should move upwards before touching the side of the wells.

   b. Type a value for the **Tip touch horizontal distance**.

      When the value for this parameter is zero, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.

9. In the **Plate to wash** list, select the VPrep Pipettor and shelf position of the MicroWash tray.

   If the name that you chose does not appear in this list, you probably associated the VPrep Pipettor shelf with the labware type *after* adding the Wash tips task to the pipette process. Remove the task and add it again for the choice to appear.

Washing the MicroWash tray manifold

To wash the MicroWash tray manifold:

1. Create a protocol process that contains only a pipette process.
2. Add a **Wash Tips** task to the pipette process.
3. Enter the following values for the task:

Property	**Value**
Wash volume	0
Number of wash cycles	0
Inflow pump	Typically set below 100%. The actual rate of inflow depends on the viscosity of the liquid and the height of the reservoir above the Microwash tray. It is best to observe the height of the fluid in the tray and set the inflow pump value so that there is an even flow of liquid and the height does not rise to cause an overflow.
Outflow pump	Typically set to 100%

4. Run the process.

Related topics

For information about...	**See...**
Defining labware	"About the labware editor" on page 248
Configuring VPrep Pipettor shelves	"Configuring a VPrep Pipettor shelf as a device" on page 133
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130
Defining liquid handling parameters	"About the liquid library editor" on page 280

Setting Wash Tips task parameters for a Bravo Platform

About this topic

This topic describes how to set the Wash Tips task parameters when creating a BenchWorks software protocol that uses a Bravo Platform.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols
- ❑ An operator who needs to specify parameters for the Aspirate task

Wash Tips task defined

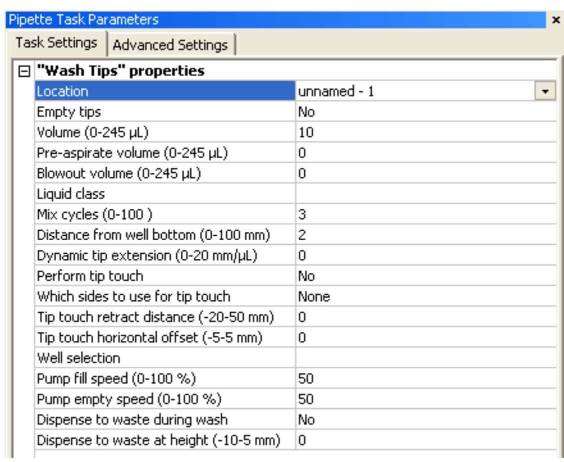
A Wash Tips task is used with a Bravo Platform to wash pipette tips and prime the Microwash Reservoir manifolds.

This task is available in pipette processes and sub-processes and only if a Microwash Reservoir is installed.

Procedure

To set Wash Tips task parameters:

1. Add a **Wash Tips** task to a pipette process.
2. Use the table below as a guide to complete the **"Wash Tips" Properties** located in the **Task Settings** tab of the **Task Parameters** toolbar.



Field	Description
Location	Identifies the location at which the mix will occur.
Empty tips	Indicates you want to empty the tips, regardless of the volume.
Volume (0–245 µL)	Specifies the volume of liquid to be aspirated and dispensed to each plate well.
Pre-aspirate volume (0–245 µL)	Specifies the volume of air to be drawn before the pipette tips enter the liquid.

Field	Description
Blowout volume (0–245 µL)	Specifies the volume of air to dispense when the tips are in the liquid of the last quadrant after the last cycle. *Note:* Typically the same as the pre-aspirate volume.
Liquid class	Specifies a defined a liquid class for this liquid. Click the adjacent blank field to display an arrow and select the liquid from the list.
Mix cycles (0–100)	Specifies the number of aspirate/dispense operations.
Distance from well bottom (0–100 mm)	Specifies the minimum distance from the bottoms of the plate wells or MicroWash chimneys that the tips will be during a wash cycle.
Dynamic tip extension (0–20 mm/µL)	Specifies the distance that the tips should move upwards or downwards per unit volume of liquid being dispensed or aspirated. Determine an appropriate value by trial-and-error.
Perform tip touch	Specifies whether a tip touch is performed after each selection of the plate.
Which sides to use for tip touch	Specifies which sides and in what order to use for the tip touch.
Tip touch retract distance (–20–50 mm)	Specifies the height that the tips move up before touching the sides of the wells.
Tip touch horizontal offset (–5–5 mm)	When the value for this parameter is 0, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.
Well selection	Specifies the tips to be washed. Applies only if the Bravo Platform head has fewer tips than the plate has wells. Click the ellipsis button, and, in the Well Selection dialog box, click wells to highlight which MicroWash chimneys the tips will be washed in.

Field	Description
Pump fill speed (0–100%)	Specifies the relative rate of liquid flow into the MicroWash manifold. This value should be high enough for the washing liquid to just bubble over the tops of the chimneys.
Pump empty speed (0–100%)	Specifies the relative rate of liquid flow out of the MicroWash manifold. This value should be slightly higher than that of the inflow pump to prevent an overflow.
Dispense to waste during wash	Specifies the dispense step of the wash cycle will take place outside of the MicroWash chimneys. Dispensing to waste provides a more efficient wash than dispensing the waste into the chimneys. However, dispensing to waste takes longer because the pipette head must move more.
Dispense to waste at height (–10–5 mm)	Specifies the height at which the dispense takes place. For example, if –10 mm, the tip dispenses 10 mm below the top of the chimneys.

Related topics

For information about...	See...
Defining liquid handling parameters	"About the liquid library editor" on page 280
Labware editor	"About the labware editor" on page 248
Configuring a pipette process	❑ "Configuring a pipette process: example" on page 126 ❑ "Adding and configuring a Pipette Process task" on page 130

Using the BenchWorks software inventory

7

This chapter describes how to use the inventory to track plates that move in and out of long-term plate storage devices. This chapter contains the following topics:

BenchWorks software inventory overview

About this topic

This topic provides the background information you need to understand how to use the inventory manager to track groups of plates moving into and out of a plate storage device.

Who should read this

Read this topic if your lab automation system has a Liconic StoreX, Heraeus Cytomat PLC, or a Velocity11 PlateHub Carousel and you are using, or want to set up, inventory management with a database.

Before you start

Before starting to create protocols that use a StoreX also read:

- ❑ The StoreX information in the *Device Driver User Guide*
- ❑ "Resolving plate inventory problems" on page 197

Before starting to create protocols that use a PlateHub Carousel also read:

- ❑ The PlateHub Carousel information in the *Device Driver User Guide*
- ❑ "Resolving plate inventory problems" on page 197

Barcode tracking versus inventory management

Barcode tracking

Barcode tracking without an inventory system is limited because the plate locations are stored in memory and are lost when you exit BenchWorks software.

Inventory management

The inventory management system allows long-term tracking of plates as barcode data is permanently stored in a database. This is useful for lab automation systems with devices that store plates for a long time, such as a Heraeus Cytomat PLC and Liconic StoreX.

Required database

To use inventory management you must have a SQL database set up, either on the computer that runs BenchWorks software or a computer that is on the same local area network.

How plates are stored

The long-term storage devices supported by BenchWorks software store plates in cassettes and slots. A cassette is a vertical rack of plates that has many slots, with each holding one plate.

Information that is stored

The inventory maintains a list of plates in every long-term plate storage device.

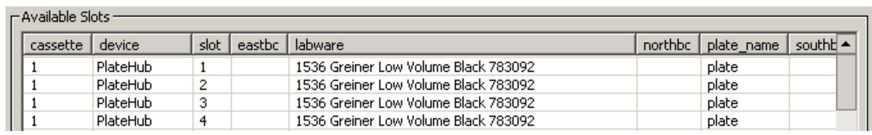
The information contained about each plate in the inventory includes:

- ❑ Device in which the plate is located
- ❑ Cassette and slot location of the plate
- ❑ Name of the group or location to which it belongs

- ❑ Labware type
- ❑ Any north-side, south- side, east-side, and west-side barcodes.

  West side barcodes are tracked only if an optional barcode reader is used.
- ❑ Volume of the wells in the plate

The list of plates in the inventory is displayed in the Inventory Plate Group Editor Preview dialog box. An example view is shown below.



The list of plates in the inventory is updated every time a plate is moved with a robot in to or out of a storage device so that at all times, the list is current.

Inventory manager

The Inventory Editor dialog box is where you manage the inventory. From here you can:

- ❑ Create plate groups
- ❑ Create location groups
- ❑ Review information about plates in a group
- ❑ Import groups from a barcode file
- ❑ Change the plate type associated with plates in the database
- ❑ Delete plates from the database
- ❑ Inventory the plates in a plate storage device

Plate groups and Location groups

With long-term storage devices, typically only a sub-set of the plates stored in the device is used in one protocol. You can set up two different types of plate sub-sets, called plate groups and location groups. Which you choose for a particular protocol depends on what you are planning to do.

Plate groups are a group of plates based on the unique database identifier for that plate.

Location groups are a group of slots that are not based on information in the plate database.

Inventory management tasks

The following tasks are used with the inventory management system. These are the tasks that move plates in to and out of a long-term storage device:

- ❑ Load
- ❑ Unload
- ❑ Incubate at plate storage device

About manually moving plates

Keeping the database synchronized

It is important to note that the database cannot track plates that you manually add, remove, or move. To keep the database synchronized with the long-term storage device, load and unload the plate storage device robotically, or periodically reinventory the storage device.

Instead of manually adding plates to the storage device, write a protocol to downstack the plates and load them. Instead of manually removing plates from the storage device, write a protocol to unload the plates and upstack them.

If you must manually load and unload plates

If you must manually load and unload plates you will need to create a protocol to load or unload the exact plates that you are manually adding or removing and then run the simulator.

With an appropriate protocol, the simulated run accurately changes the plates listed in the database without actually moving any plates.

Terminology

When describing the movement of plates, it is important to use terms correctly. The terms *load* and *unload* are used from the storage device's perspective.

Term	Definition
Unload	The act of moving a plate from a storage device into the system.
Load	The act of moving a plate from the system into a storage device.
System	Plates that are being processed by the current protocol are considered to be in the system. For example: ❑ A plate on a platepad is in the system. ❑ A plate in a plate hotel is in the system. ❑ A plate being incubated in an incubator is in the system. ❑ A plate half-way up a VStack rack is not in the system, unless it will be moved during the current protocol. ❑ A plate being stored in a PlateHub is not in the system unless it will be moved during the current protocol.

Database backup

The inventory management database can be backed up onto another computer using a software utility. If you want to do this, contact the Velocity11 Technical Support for more information.

Related topics

For information about...	See...
Inventory groups, plate groups and location groups	"About inventory groups" on page 173
Setting up the database	"Setting up the inventory management database" on page 171
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182 ❑ "Moving plates between storage devices" on page 185
Incubating plates	"Using a plate group to incubate plates" on page 187
Using barcode input files	"Creating a plate group with a barcode input file" on page 189

Setting up the inventory management database

Who should read this

Read this topic if your lab automation system has a Liconic StoreX, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel and you are using, or want to set up, inventory management with a database.

About setting up the database

To set up the inventory management database, contact Velocity11 Technical Support for assistance.

Setting the database connection

The database connection is specified in BenchWorks software.

To set the database connection:

1. Navigate to **Tools** > **Options**.
2. Click the **Log Options** tab.
3. In the Database connection string text box, type `dsn=velocity11`.
4. Click **Test & Save** to test the connection.

Related topics

For information about...	See...
Inventory groups, plate groups and location groups	"About inventory groups" on page 173

For information about...	See...
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182 ❑ "Moving plates between storage devices" on page 185
Incubating plates	"Using a plate group to incubate plates" on page 187
Using barcode input files	"Creating a plate group with a barcode input file" on page 189

Opening the inventory editor

About this topic

This topic describes how to open and close the inventory editor.

Who should read this

Read this topic if your lab automation system has a Liconic StoreX, Heraeus Cytomat PLC, or a Velocity11 PlateHub Carousel and you are using inventory management with a database.

Before you start

Before you can open the inventory editor, the inventory database that the editor communicates with must be set up.

Opening the inventory editor

To open the inventory editor:

1. Select **Tools** > **Inventory Editor**

You can also open it by selecting a **Load** or **Unload** task in a protocol and clicking **Edit location groups** or **Edit plate groups**.

Closing the inventory editor

To close the inventory editor:

1. Click the close box in the top right corner.

Related topics

For information about...	See...
Setting up the inventory management database	"Setting up the inventory management database" on page 171
Inventory groups, plate groups and location groups	"About inventory groups" on page 173

For information about...	See...
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182 ❑ "Moving plates between storage devices" on page 185
Incubating plates	"Using a plate group to incubate plates" on page 187
Using barcode input files	"Creating a plate group with a barcode input file" on page 189

About inventory groups

About this topic

This topic explains what inventory groups are and how to choose which type of plate group to use.

Who should read this

Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel.

Inventory groups defined

An inventory group is a group of plates that is a subset of the plates listed in the plate inventory.

Types of inventory group

There are two types of inventory groups:

❑ Location group

❑ Plate group

Location groups

Location groups are used to move plates from a specific location in the storage device.

Example:

In this example, a location group that contains slots 1–10 in cassette 1 is created.

When an Unload task uses this location plate group, the robot moves whatever plates are in cassette 1, slots 1–10, regardless of the identity of the plates, out of the storage device and in to the system.

When a Load task uses a location group, it moves the plates that are in the system into to cassette 1, slots 1–10 of the storage device, regardless of the identity of the plates.

When to use

Location plate groups are used:

- ❑ When the storage device is being filled or emptied.
- ❑ When groups of plates are removed from the lab automation system and replaced with other groups of plates on a regular basis. This would be done by replacing a cassette of plates with a new one.

Plate groups

Plate groups are used to move specific plates to or from the storage device, but without regard for the location. Plate groups can be used when operators do not routinely remove and replace whole cassettes of plates.

When a plate is first moved into the system by the BenchCel Workstation robot, such as when it is downstacked, it is assigned an identifier in the database. After that BenchWorks software tracks where that plate is at all times. This tracking does not require the plates to have barcode labels, BenchWorks software knows what it does with every plate during a protocol and so is able to track where each plate goes.

Plate groups make use of this tracking system.

Note: You cannot use a plate group with a Load task— you have to specify a location group. You can, though, associate a plate group with the location group so that the plates that are loaded are immediately given a plate group.

Note: When you load into a plate group you must also load into a location group or choose return to original locations, otherwise the software will not know where to put the plates.

Example:

A plate group in a plate storage device contains the following plates:

- ❑ Plate 26
- ❑ Plate 31
- ❑ Plate 41
- ❑ Plate 107

These plates are scattered around the storage device, not necessarily in adjacent slots of the same cassette. When the Unload task uses this plate group, it moves these plates out of the storage device into the system.

When to use

Plate groups are typically used in compound management systems where plates are housed in the storage device almost permanently.

For each protocol, a different plate group is unloaded, run and then loaded back to a storage device.

Group membership

A single plate can be a member of more than one plate group.

Related topics

For information about...	See...
Creating a location group	"Creating a location group" on page 175
Creating a plate group	"Creating a plate group" on page 177
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182 ❑ "Moving plates between storage devices" on page 185
Incubating plates	"Using a plate group to incubate plates" on page 187
Using barcode input files	"Creating a plate group with a barcode input file" on page 189

Creating a location group

About this topic

This topic describes how to create a location group, which is a list of slots that might contain plates ready to unload, or might be empty waiting to be filled.

Who should read this

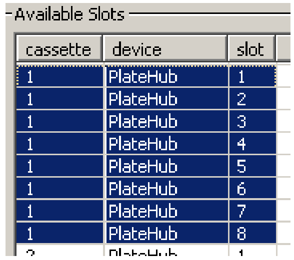
Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel.

Procedure

To create a location group:

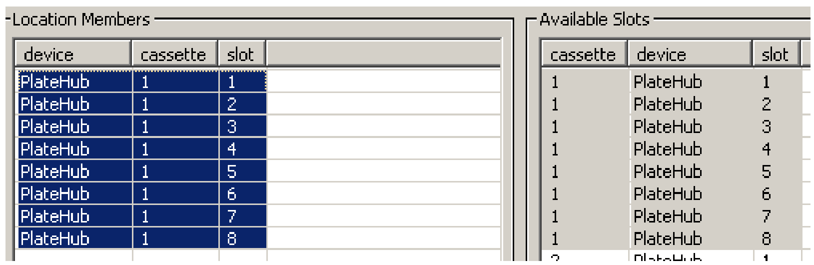
1. Select **Inventory Editor** from the **Tools** menu.
2. Click the **Location Groups** tab.
3. Click **Create new** and enter a name for the group.

4. Click **OK**.
5. Select a group of available slots.



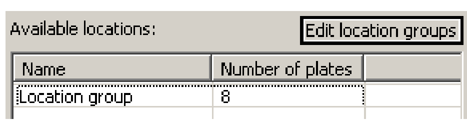
You can use CTRL + click or SHIFT + click to select more than one slot.

6. Drag the group into the **Location Members** list.



7. Click **Save Changes**.
8. Click the close box to close the inventory editor.

   The location group is listed in the **Available locations** list of the **Load Protocol Task Parameters** toolbar.



Deleting a location group

To delete a location group from the inventory:

1. Open the inventory editor.
2. Select a location group in the **Saved Locations** group box.
3. Click **Delete**.

Related topics

For information about...	See...
Creating a plate group	“Creating a plate group” on page 177
Opening the inventory editor	“Opening the inventory editor” on page 172

For information about...	See...
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182 ❑ "Moving plates between storage devices" on page 185
Incubating plates	"Using a plate group to incubate plates" on page 187
Using barcode input files	"Creating a plate group with a barcode input file" on page 189

Creating a plate group

About this topic

This topic describes how to create a plate group, which is a list of specific plates that can be moved to or out of a plate storage device without regard for in which slots they are stored.

Who should read this

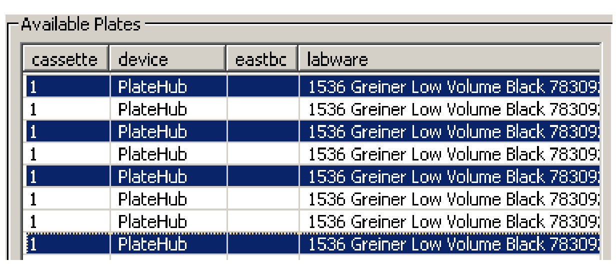
Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel.

Procedure

To create a plate group:

1. Select **Inventory Editor** from the **Tools** menu.
2. Click the **Plate Groups** tab.
3. Click **Create new** and enter a name for the group.

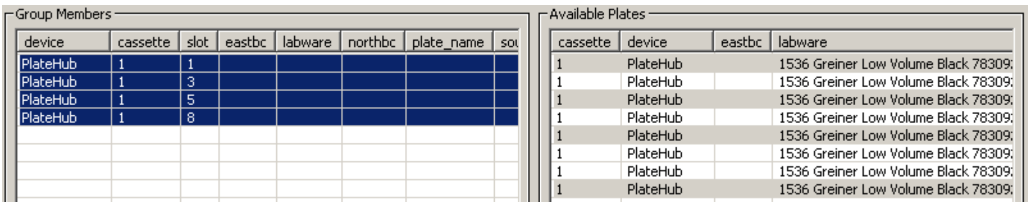
4. Click **OK**.
5. Select a group of available plates.



If there are no available plates, you must first move plates into the storage device.

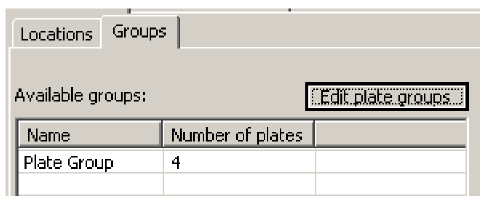
You can use CTRL + click or SHIFT + click to select more than one slot.

6. Drag the group into the **Group Members** list.



7. Click **Save Changes**.
8. Click the close box to close the inventory editor.

The plate group is listed in the **Available locations** list of the **Load Protocol Task Parameters** toolbar.

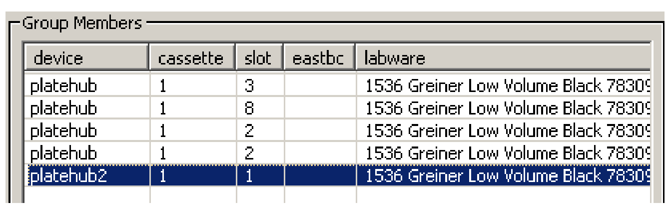


Changing the processing order

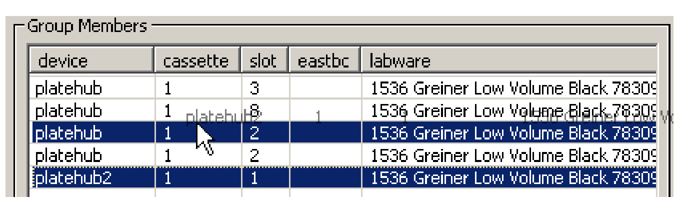
You can change the order in which the plates in a plate group will be processed.

To change the processing order:

1. In the plate group list, select a plate.



2. Drag it to a higher position in the list.



Deleting a plate group

To delete a plate group from the inventory:

1. Open the inventory editor.

2. Select the plate group in the **Saved Groups** group box.
3. Click **Delete**.

Related topics

For information about...	See...
Creating a location group	"Creating a location group" on page 175
Opening the inventory editor	"Opening the inventory editor" on page 172
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182 ❑ "Moving plates between storage devices" on page 185
Incubating plates	"Using a plate group to incubate plates" on page 187
Using barcode input files	"Creating a plate group with a barcode input file" on page 189

Moving plates into a storage device

About this topic

This topic describes how to add plates into the system for storage in a plate storage device. You would do this when first filling the device. Adding plates into the system means more than just loading them into a storage device. It means adding the plate identifications into the record that BenchWorks software keeps of plates in the system.

Who should read this

Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel.

Ways to fill a storage device

There are two ways to fill an empty storage device with plates.

❑ Robotically

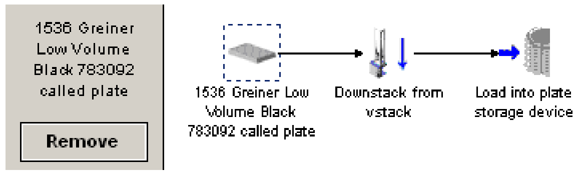
❑ Manually

Loading plates robotically

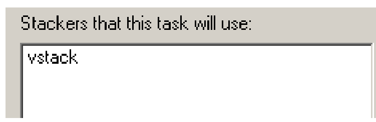
To load plates robotically, the plates are placed in a stacker, downstacked and moved to the storage device.

To load plates robotically:

1. If you are using the simulator to “virtually” load plates, make sure that the **Enable plate tracking in simulation mode** check box is selected in the **Log Options** dialog box.
2. Create a protocol like the one in the following screenshot:

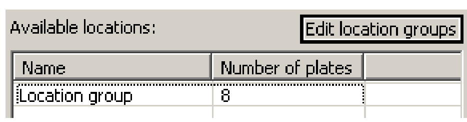


3. Make sure that the **Downstack** task is configured to use the stacker.

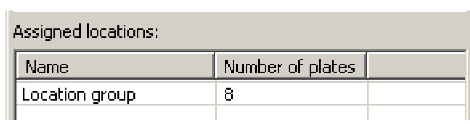


4. Create a location group.

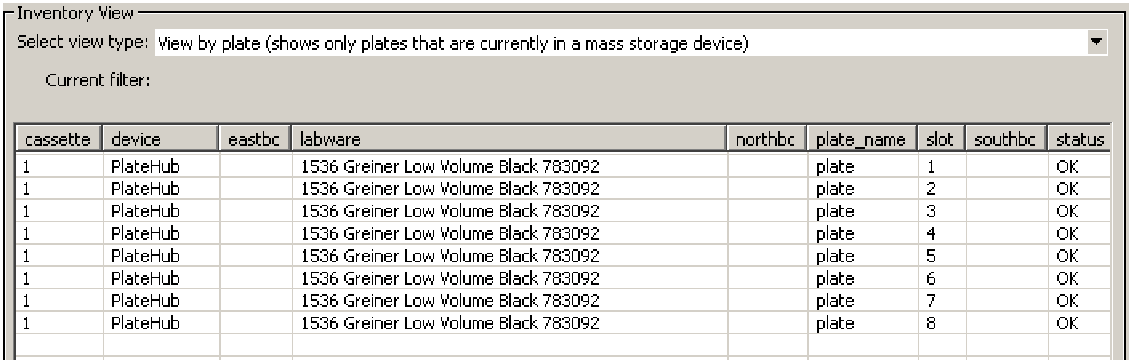
   Make sure that the location group is listed in the **Available locations** list of the **Load Protocol Task Parameters** toolbar.



5. Drag the group into the **Assigned locations** list.



6. Click **Start** and resolve any error messages.
7. In the **Number of Cycles** dialog box, enter a number that equals the number of plates you want to load into the storage device.
8. Click **OK**.
9. Confirm that the plates are in the inventory:
   a. Click the **Load** task.
   b. Click **Edit location groups** to open the inventory editor.
   c. Click the **Inventory Management** tab.



cassette	device	eastbc	labware	northbc	plate_name	slot	southbc	status
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	1		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	2		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	3		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	4		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	5		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	6		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	7		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	8		OK

Loading plates manually

To load plates manually, cassettes of plates are physically put in to the storage device and a run is simulated to create the matching list of plates in the inventory.

To load plates manually:

1. Physically load the cassettes of plates in to the storage device.
2. Follow the procedure for loading plates robotically, but click **Simulation is off** to turn on the simulator.

   Make sure that the location group matches the cassettes that you loaded.
3. Click **Start** to run the simulator.
4. Review the inventory editor to make sure that the plates listed in the inventory match the plates actually in the device.
5. Click **Simulation is on** to turn off the simulator.

Related topics

For information about...	See...
Moving plates out of a storage device	"Moving stored plates out of the system" on page 182
Moving plates between storage devices	"Moving plates between storage devices" on page 185

Moving stored plates out of the system

About this topic

This topic describes how to remove plates that are in a storage device from the system. Removing plates from the system is more than just unloading them from the storage device. It means removing the plates from the lab automation system as well as removing the plate identifications from the record of the plates in the system that BenchWorks software keeps.

Who should read this

Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel.

Ways to remove plates

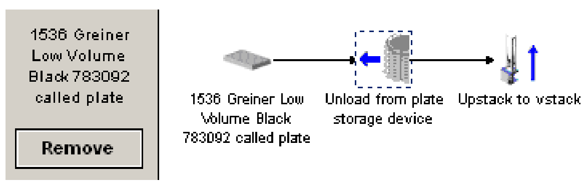
There are two ways to remove plates from a plate storage device.

- ❑ Robotically
- ❑ Manually

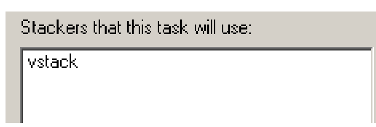
Removing plates robotically

To move plates from a storage device robotically:

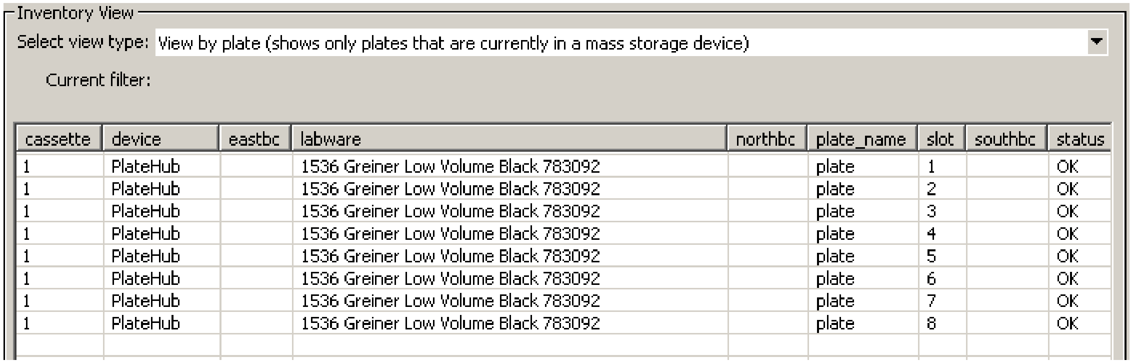
1. Create a protocol like the one shown in the following screenshot (shown using Vworks software but works identically in BenchWorks software):



2. Make sure that the **Upstack** task is configured to use the stacker.

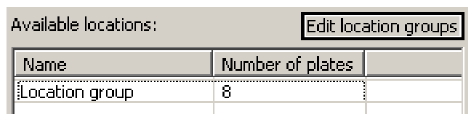


3. In the inventory editor, identify the plates that you want to move:
   a. Click the **Unload** task.
   b. Click **Edit location groups** to open the inventory editor.
   c. Click the **Inventory Management** tab.

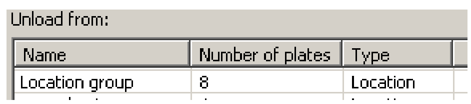


cassette	device	eastbc	labware	northbc	plate_name	slot	southbc	status
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	1		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	2		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	3		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	4		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	5		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	6		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	7		OK
1	PlateHub		1536 Greiner Low Volume Black 783092		plate	8		OK

4. Create a location group in the inventory editor, saving the changes and confirming it by making sure that it is listed in the **Available locations** list of the **Load Protocol Task Parameters** toolbar.



5. Drag the group into the **Unload from list**.



6. Click **Start**.
7. In the **Number of Cycles** dialog box, enter a number that equals the number of plates you want to remove from the storage device.
8. Click **OK**.
9. Confirm that the plates are no longer in the inventory:
   a. Click the **Load** task.
   b. Click **Edit location groups** to open the inventory editor.
   c. Click the **Inventory Management** tab.

Emptying a storage device manually

To empty a storage device manually, cassettes of plates are physically removed from the storage device and a run is simulated to remove the matching list of plates from the inventory.

To remove plates manually:

1. Physically remove the cassettes of plates from the storage device.
2. Follow step 1 to step 5 in the procedure above for emptying a storage device robotically.
3. Make sure that the **Enable plate tracking in simulation mode** (located under Tools > Options > Log Options) is selected.
4. Click **Simulation is off** to turn on the simulator.
5. Click **Start**.

6. In the **Number of Cycles** dialog box, enter a number that equals the number of plates you want to remove from the storage device.
7. Click **OK**.
8. Confirm that the plates are no longer in the inventory:
   a. Click the **Load** task.
   b. Click **Edit location groups** to open the inventory editor.
   c. Click the **Inventory Management** tab.

Note: You can also remove the plates and delete the relevant rows from the inventory editor.

Related topics

For information about...	See...
Creating a location group	"Creating a location group" on page 175
Creating a plate group	"Creating a plate group" on page 177
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving plates between storage devices" on page 185
Incubating plates	"Using a plate group to incubate plates" on page 187
Using barcode input files	"Creating a plate group with a barcode input file" on page 189

Moving plates between storage devices

About this topic

This topic provides an example to illustrate how you can move a group of plates out of one plate storage device and put them into another. The general procedure could also be used to move a group of plates within a single storage device.

Who should read this

Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel.

Before you start

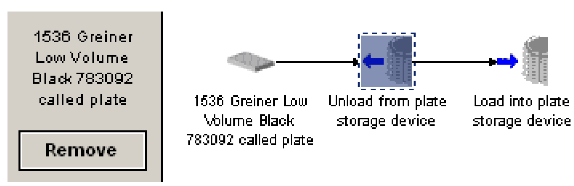
Make sure that both plate storage devices are properly configured in the device manager.

Moving a plate

In this example procedure, a group of four plates is moved from one plate storage device (PlateHub) to another (PlateHub2).

To move a plate:

1. Create a process that has a **Load** and an **Unload** task, as shown in the following example.



2. Select either the **Load** or **Unload** task and click **Edit location groups**.

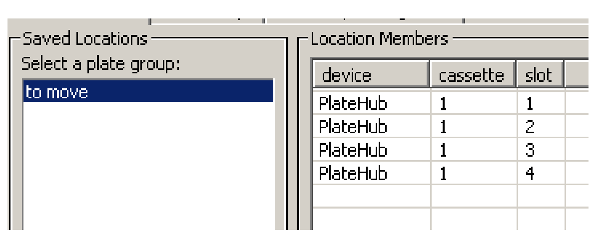
   The inventory editor opens.

3. Click the **Inventory Management** tab and note the device, cassette, and slot locations of the plates that you want to move.

   In this example, the plates will be moved from PlateHub, cassette 1, slots 5–8.

4. Click the **Location Groups** tab and create a location group for these plates.

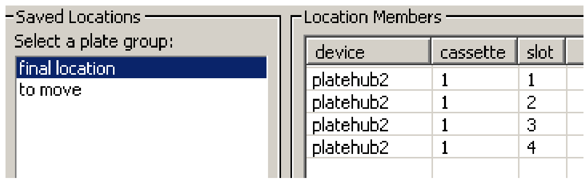
   Note: The plates do not need to be in adjacent slots for them to be in a location group.



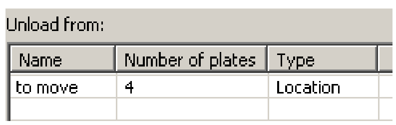
5. Return to the **Inventory Management** tab and note the device, cassette and slot numbers for the slots that you want to move the plates to.

   In this example, the plates will be moved to PlateHub2, cassette 1, slots 1–4.

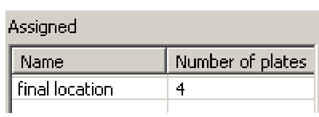
6. Click the **Location Groups** tab and create a location group for these slots.



7. Click **Save changes** and close the inventory editor.
8. Select the **Unload** task and in the **Protocol Task Parameters** toolbar drag the location group in the first device to the **Unload from** list.



9. Select the **Load** task and in the **Protocol Task Parameters** toolbar drag the location group in the second device to the **Assigned locations** list.



10. Compile the protocol and check for errors.

11. Click **Start** to start the run.
12. In the **Number of Cycles** dialog box, type in the number of plates that you are moving and click **OK**.
13. Open the inventory editor and click the **Inventory Management** tab to make sure that the plates moved as expected.

Related topics

For information about...	See...
Creating a location group	“Creating a location group” on page 175
Creating a plate group	“Creating a plate group” on page 177
Opening the inventory editor	“Opening the inventory editor” on page 172

For information about...	See...
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182
Incubating plates	"Using a plate group to incubate plates" on page 187
Using barcode input files	"Creating a plate group with a barcode input file" on page 189

Using a plate group to incubate plates

About this topic

This topic shows an example protocol where a plate group is moved out of a PlateHub Carousel into a StoreX incubator at 42 degrees Celsius, and then returned to the PlateHub Carousel.

Location groups versus plate groups

Location groups are used for:

- ❑ Groups of plates that are moved into the system and then to particular slots in a storage device
- ❑ Groups of plates in particular slots in a storage device that are moved out of the system

Several topics in this section describe how location groups are used.

Some applications require that plates are stored in the storage device for a long time but where exactly the plates are stored is not important. With these applications operators do not routinely remove and replace whole cassettes of plates so the plates do not need to be stored in particular cassettes. As long as the identities of the plates are tracked, they can be stored anywhere. Plate groups can be used for these applications.

Who should read this

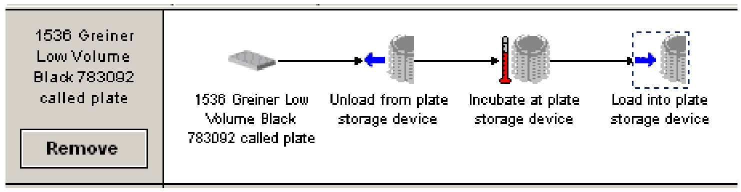
Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, Velocity11 PlateHub Carousel.

Procedure

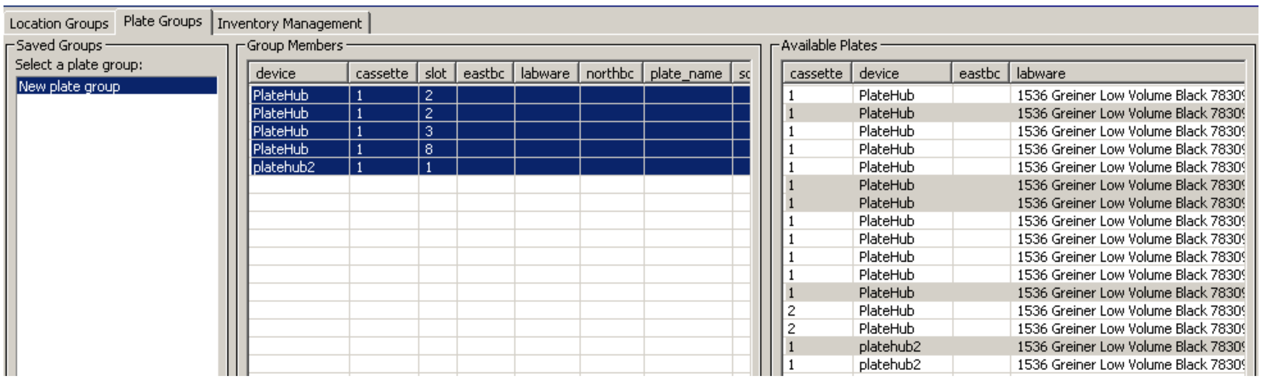
This procedure assumes that there are already plates in the PlateHub Carousel.

To incubate a plate group:

1. Create a protocol like the one shown below.



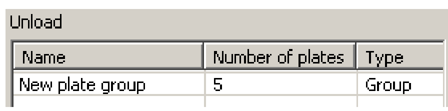
2. Create a new plate group in the inventory editor and save the changes.



device	cassette	slot	eastbc	labware	northbc	plate_name	sc
PlateHub	1	2					
PlateHub	1	2					
PlateHub	1	3					
PlateHub	1	8					
platehub2	1	1					

cassette	device	eastbc	labware
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
1	PlateHub		1536 Greiner Low Volume Black 7830
2	PlateHub		1536 Greiner Low Volume Black 7830
2	PlateHub		1536 Greiner Low Volume Black 7830
1	platehub2		1536 Greiner Low Volume Black 7830
1	platehub2		1536 Greiner Low Volume Black 7830

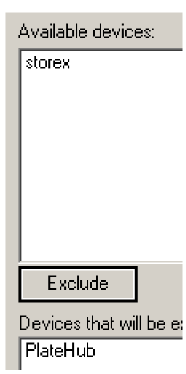
3. Select the **Unload** task and in the **Protocol Task Parameters** toolbar, drag the plate group to the **Unload** list.



Name	Number of plates	Type
New plate group	5	Group

4. Select the **Incubate** task and exclude any devices that you do not want to be used for the incubation task.

   In this example, the plates should not be incubated on a PlateHub Carousel that is available.



5. Select the **Load** task and in the **Protocol Task Parameters** toolbar, drag the plate group to the **Unload** list.

6. Run the protocol.

Related topics

For information about...	See...
Software inventory	"BenchWorks software inventory overview" on page 168
Creating a plate group	"Creating a plate group" on page 177
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182 ❑ "Moving plates between storage devices" on page 185
Using barcode input files	"Creating a plate group with a barcode input file" on page 189
Starting a run	"About performing a run" on page 50.

Creating a plate group with a barcode input file

About this topic

This topic describes how to use a barcode input file to create a plate group. This is the most efficient way to create plate group if you previously used a barcode input file to label a collection of plates. which are now stored in a plate storage device.

Who should read this

Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel.

Procedure

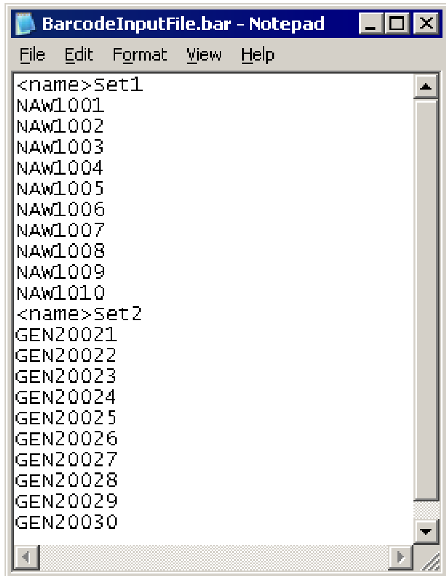
!! IMPORTANT !! All plates with barcodes listed in the selected barcode input file series must already be in the storage device.

To create a plate group with a barcode input file:

1. Open the inventory editor.
2. Click the **Groups** tab.
3. Click the **Browse** button and navigate to the .bar file that you want to use.

4. From the **Available Barcode groups** list box, select the group that you want to use.

   In the following example of a barcode input file, the options would be Set1 and Set2.




```
<name>Set1
NAW1001
NAW1002
NAW1003
NAW1004
NAW1005
NAW1006
NAW1007
NAW1008
NAW1009
NAW1010
<name>Set2
GEN20021
GEN20022
GEN20023
GEN20024
GEN20025
GEN20026
GEN20027
GEN20028
GEN20029
GEN20030
```

5. Click **Import**.

   The plates labelled with west-side barcodes listed in the series will be used to create a group and will appear in the **Plates currently in the selected group** list.

6. Specify a labware type for each plate using the labware selection function in the **Inventory Management** tab.

Related topics

For information about...	See...
Software inventory	“BenchWorks software inventory overview” on page 168
Opening the inventory editor	“Opening the inventory editor” on page 172
Using the labware selection list	“Reinventorying the plate inventory” on page 195

Inventory editor views and filters

About this topic

This topic describes how to make the inventory editor easier to work with by showing only the items in the inventory editor that are relevant at the particular time.

Who should read this

Read this topic if your lab automation system has a Liconic StoreX incubator, Heraeus Cytomat PLC, or Velocity11 PlateHub Carousel.

Inventory editor views

There are three ways to view the plates in the inventory editor.

To set the view:

1. Open the inventory editor.
2. Click to select the **Inventory Management** tab.
3. From the **Select view type** list, select one of the following options:

View	Description
View by plate	Displays every plate in the inventory. This is the most frequently used view.
View by location	Displays both plates and slots.
View unassigned plates	Displays plates that were orphaned during previous runs. This means plates that are on the system but not in a plate storage device. Unassigned plates do not appear in linker groups so cannot be used.

Filtering displayed plates

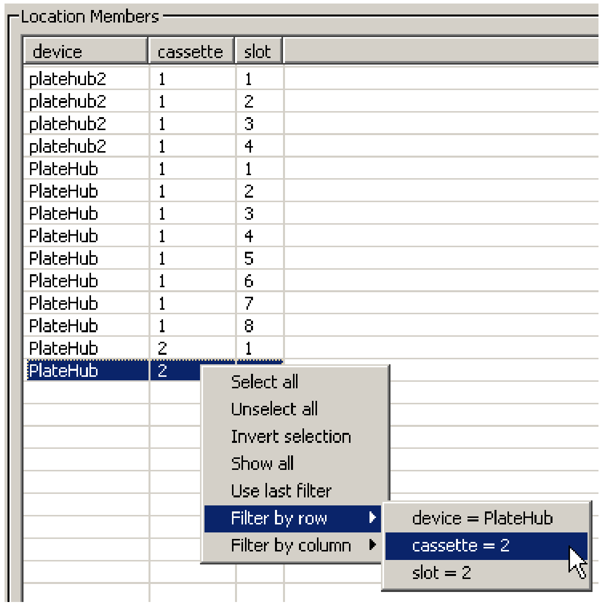
You may have many plates stored in the database. To simplify your view of the database, you can filter the records that are displayed.

To filter the plate records:

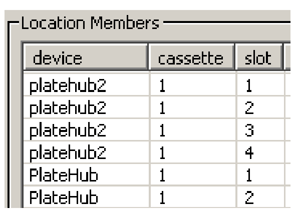
1. Right-click on a list in any of the tabbed pages of the inventory editor and select **Show all**.
2. Right-click on a particular cell and select from the available filtering options.

View	Description
Use last filter	Returns the display of items to that displayed when the last filter was applied
Filter by row	The items that have the same value as the selected item in the row are displayed
Filter by column	The items that have the same value as the selected item in the column are displayed

The items that have the same value as the selected item in the row are displayed.



The result is that only those plates in cassette number 2 are listed.



To show all plate records:

1. Right-click on the database list and select **Show all**.

Related topics

For information about...	See...
Software inventory	"BenchWorks software inventory overview" on page 168
Opening the inventory editor	"Opening the inventory editor" on page 172

Auditing plate volumes in the inventory editor

About this topic

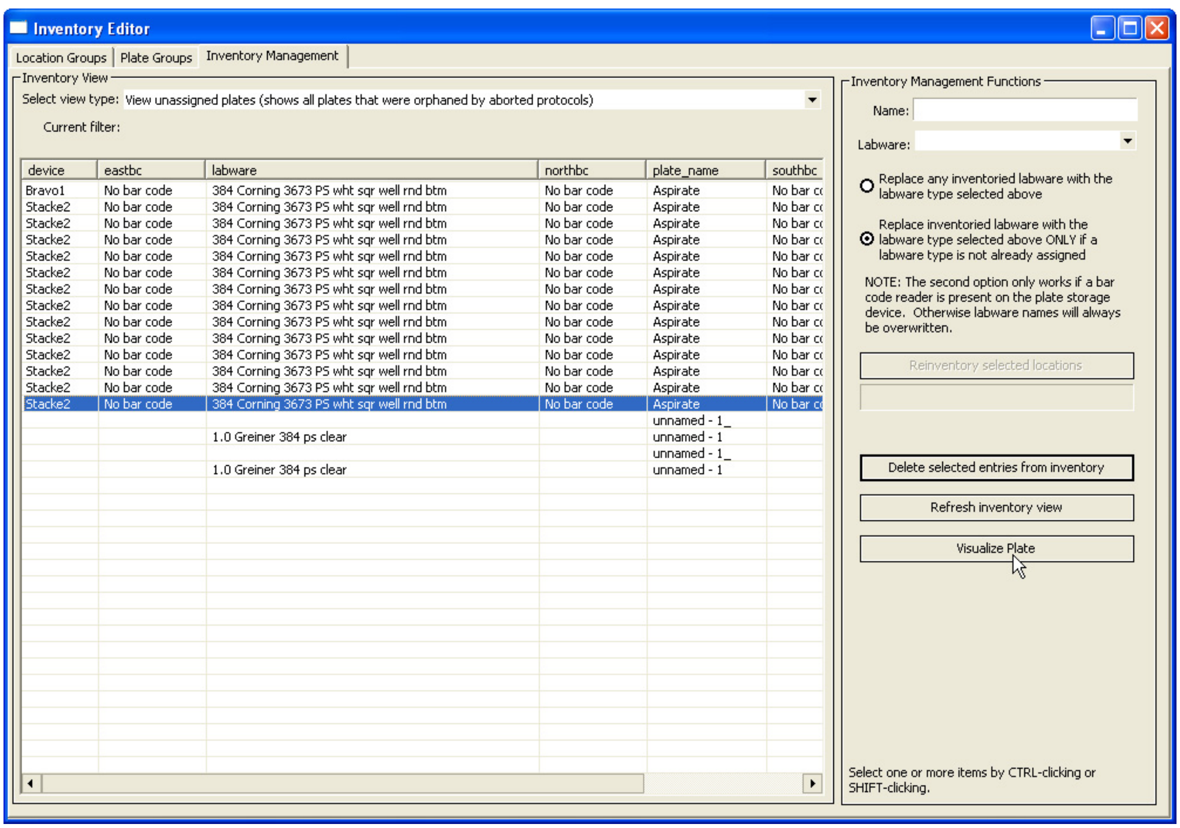
Sometimes it is useful to view the results of pipetting tasks visually. BenchWorks software does this by tracking the pipetting tasks performed on a plate during a protocol run, calculating the volume resulting from those tasks, and storing the information in the database. When the plate Then representing the volume with color.

This topic describes how to audit a plate's volume using the inventory editor.

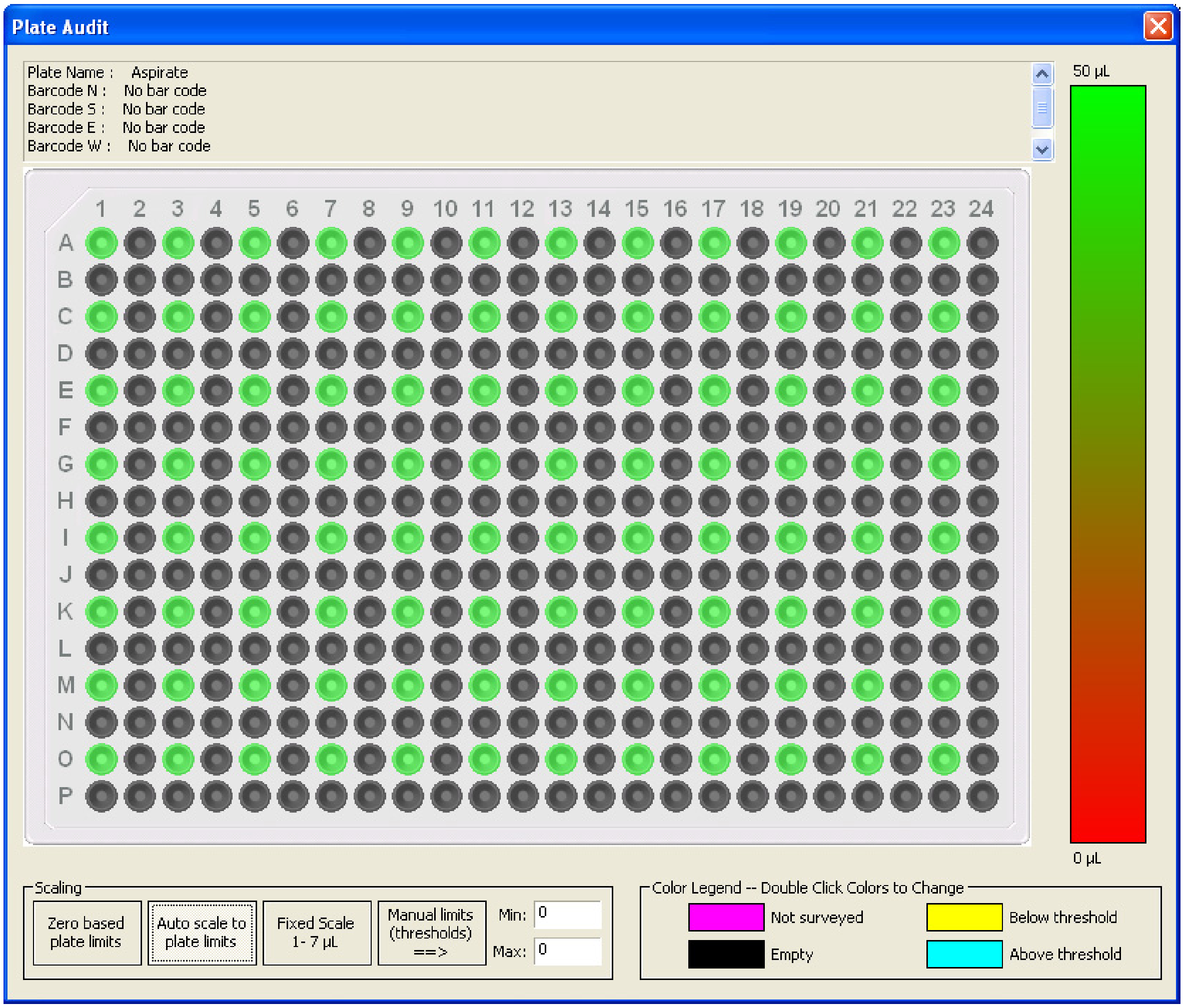
Procedure

To audit the volume of a plate:

1. Open the inventory editor.
2. Click the **Inventory Management** tab.
3. From the **Select view type** list, select the view.
4. Select the plate you want to audit.



5. Click **Visualize Plate**. The Audit Plate dialog box opens.



Related topics

For information about...	See...
Software inventory	"BenchWorks software inventory overview" on page 168
Opening the inventory editor	"Opening the inventory editor" on page 172

Reinventorying the plate inventory

About this topic

This topic describes how to use the reinventory feature of plate inventory.

This feature can be used to check for mismatches by comparing the identities of the plates actually in a plate storage device with the plates that the inventory database says should be in the plate storage device.

Mismatches can arise, for example, if you physically load plates into the storage device and then use the simulator to virtually "move the plates" into the database. In this case there will be no labware associated with the plates.

The reinventory feature can also be used to enter barcode information for plates that have been manually placed into the storage device.

Note: Reinventorying requires that the storage device have a barcode reader.

Who should read this

Read this topic if your lab automation system has a plate storage device that includes an optional barcode reader.

About performing an inventory

The accuracy of the inventory database can be checked by performing a new inventory of the database. You can perform an inventory of the entire storage device or part of it.

The device's barcode reader checks all selected slots for the presence of a barcode and reads those that it finds. The results are checked against the inventory database.

!! IMPORTANT !! For reinventorying to be successful, each plate must have a unique barcode.

Reinventorying logic

If a plate is found in a slot that, according to the inventory database, should not have a plate, a line is added to the inventory editor for that slot and the plate's barcode is recorded. If that barcode is already associated with another slot in the database, the previous association is deleted. In doing this, the system assumes that the plate has been manually moved.

If the inventory has a line for a plate in a particular slot, but the inventory finds no plate in that slot, the line is removed from the inventory. However, the data in the system that is associated with the plate is not deleted. If in the future, a plate with an identical barcode is returned to the system, when the next inventory is performed the data can be reassociated with it.

Procedure

To reinventory the plate storage device:

1. Open the inventory editor.
2. Click the **Inventory Management** tab.

3. From the **Select view type** list box, select **View by location**.

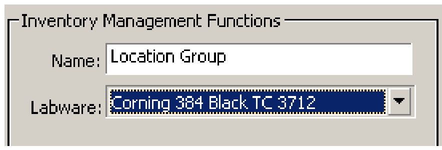
   This lists the plates in the inventory database by location.

4. Select the plates that you want to inventory.

   You can use SHIFT + click to select a range of listed plates.

5. In the **Name** text box, type the name of the location group.

6. From the **Labware** list box, select the type of labware to associate.



7. Select one of the following options:

Option	Comments
Replace any inventoried labware with the labware selected above	Labware for all selected items are replaced with the labware displayed in the list box. This overwrites labware already assigned.
Replace inventoried labware with the labware selected above ONLY if a labware is not already assigned	Labware for all selected items that do not already have a labware entry are replaced with the indicated labware.

8. Click **Reinventory selected locations**.

   A barcode reader reads each plate in the storage device and adds the barcode data to the inventory database.

Related topics

For information about...	See...
Inventory groups, plate groups and location groups	"About inventory groups" on page 173
Moving plates in and out of a storage device	❑ "Moving plates into a storage device" on page 179 ❑ "Moving stored plates out of the system" on page 182 ❑ "Moving plates between storage devices" on page 185
Changing the labware associated with plates in the inventory database	"Reinventorying the plate inventory" on page 195
Inventory editor filters	"Inventory editor views and filters" on page 191

Resolving plate inventory problems

About this topic

This topic describes how to check and test the Windows Open Database connection that is used by the BenchCel Workstation inventory management system.

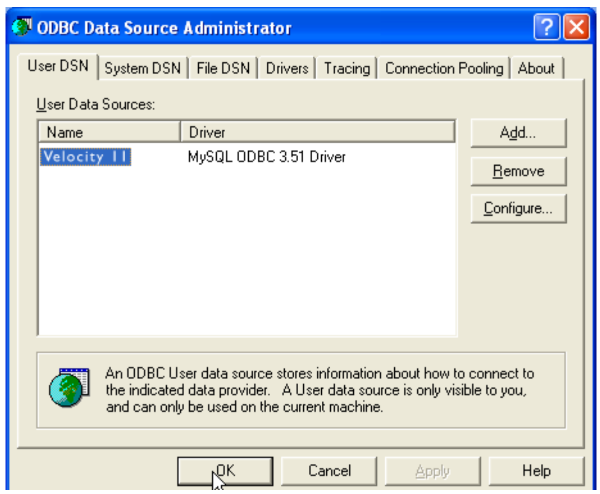
Checking the database settings

The inventory management database uses a Windows Open Database Connectivity (ODBC) interface. If you encounter inventory management problems, you may need to check the database settings.

To check the database settings:

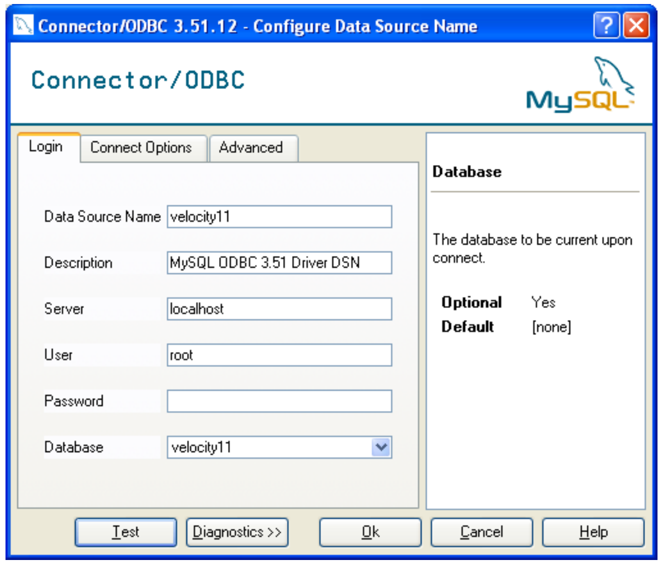
1. In Windows, navigate to **Start > Settings** > **Control Panel** > **Administrative Tools** > **Data Sources (ODBC)**.

   The **ODBC Data Sources Administrator** dialog box opens.



2. Click the **System DSN** tab.
3. Click **Configure**.

   The **Connector/ODBC** dialog box opens showing the database settings.



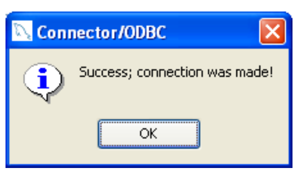
The **Data Source Name** and **Database Name** fields must both contain “velocity11”.

Testing the connection

To test the database connection:

1. Follow the procedure in “Checking the database settings” on page 197 to open the **Connector/ODBC** dialog box.
2. Click **Test**.

   A dialog box like the following example confirms a successful connection.



Related topics

For information about...	See...
Inventory groups, plate groups and location groups	“About inventory groups” on page 173
Moving plates in and out of a storage device	❑ “Moving plates into a storage device” on page 179 ❑ “Moving stored plates out of the system” on page 182 ❑ “Moving plates between storage devices” on page 185

For information about...	See...
Changing the labware associated with plates in the inventory database	"Reinventorying the plate inventory" on page 195
Inventory editor filters	"Inventory editor views and filters" on page 191

Creating a protocol: advanced topics

8

This chapter is intended for people with technician or administrator privileges. It provides the background information necessary to set up certain tasks.

Before reading this chapter you should be familiar with the concepts presented in the following chapters:

- "Creating a protocol basics" on page 67
- "Setting task parameters" on page 89
- "Setting pipette task parameters" on page 125

Note: This chapter is not a tutorial on writing protocols—it provides the basic reference information you will need to write protocols.

This chapter contains the following topics:

Setting up the LabwareSelector plug-in

About this topic

The LabwareSelector plug-in allows you to assign a plate type at the time you start your run.

Use this plug-in if your laboratory is using many plate types with the same protocols.

Procedure

To set up the LabwareSelector plug-in:

1. Select the plate icon (the first icon in a protocol process).
2. In the **Task Settings** page of the **Protocol Task Parameters** toolbar, select **LabwareSelector.dll** from the **Plugin** list box.
3. Select **<From Plugin>** from the **Plate type** list box.

Note: The software defaults to whatever is selected in the **Plate type** field. For example, if you have the **LabwareSelector.dll** selected as a **Plugin** and **Costar 99 pp black** selected as the **Plate type**, the software will execute the run with **Costar 99 pp black** as the plate type and will ignore the plugin.

Related topics

For information about...	See...
Plate icon	“About tasks, processes, and protocols” on page 68
Setting tasks parameters	“About setting task parameters” on page 80

About the FileReader plug-in

About this topic

Velocity11 has created a plug-in for BenchWorks software, called FileReader.dll. This topic describes this plug-in.

The FileReader plug-in lets BenchWorks software read from a tab-delimited or a CSV (comma separated values) file to specify the content of label fields printed with a VCode Microplate Labeler.

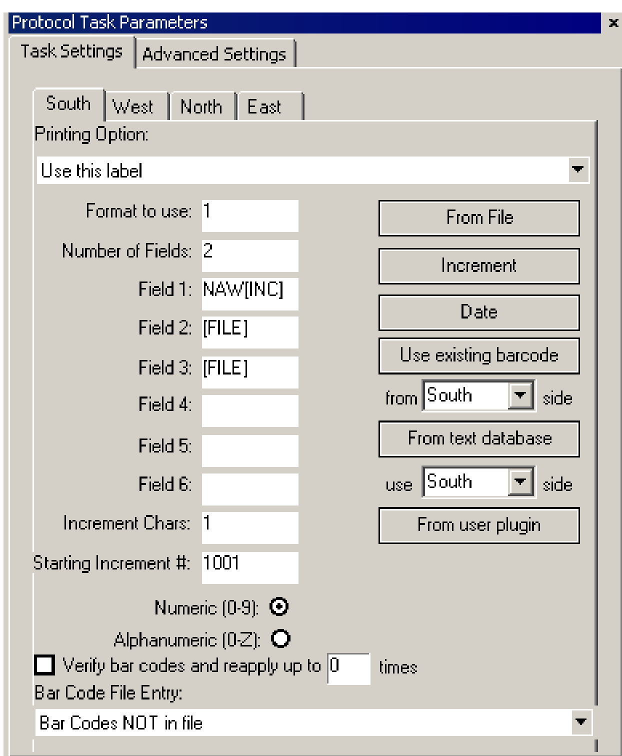
Read this topic if you are a technician or an administrator who writes protocols with Apply Label task and who wants the FileReader plug-in to read and process the label text.

Defining label field content

The Apply Label task provides several ways to define the contents of the label fields printed on a series of plates during a run. However, without plug-ins and scripting, for each label in a given run, the Apply Label task *cannot* apply:

- Two different pieces of data from the same file
- Two different increments for two fields
- Numeric increments for one field and alphanumeric increments for another different field

In the following screenshot, Field2 and Field3 use the same label input file for the data in the fields. However, this function is limited because there is no way to specify two different locations in the same file for the same label.



The FileReader plug-in allows BenchWorks software to input the data in the label fields from a text file. Functionally, the text file is similar to a label data file except that it includes data for all fields in a label instead of just one field. This allows two fields on the same label to contain different data from the same file in the same run, without using prefixes and suffixes.

Related topics

For information about...	See...
Setting up the file reader plug-in	“Using the FileReader plug-in in a protocol” on page 206
Using JavaScript with BenchCel Workstation	“Using JavaScript in BenchWorks software” on page 209
The workflow that this procedure belongs to	“Workflow for creating a protocol” on page 73

About the FileReader file format

About this topic

This topic describes the format of the text file that is read by the FileReader plug-in.

Read this topic if you are a technician or administrator who writes protocols with Apply Label tasks and who want to use the FileReader plug-in to read and process the label text.

The header row

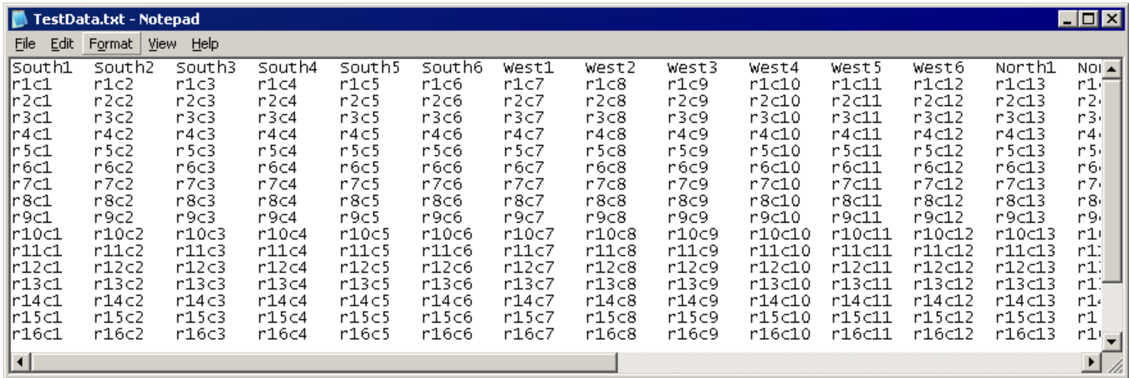
The first row in the text file must contain a header row.

The header row is a human-readable guide to show where the contents of each column will print.

The FileReader plug-in will assume that the rest of the text contains the same text separation method as the header row.

For example, if the header row uses a CSV format but the rest of the file uses a tab-delimited format, the FileReader plug-in expects commas to separate the values in the file. Having found none, it assumes that the entire text for each row after the header row is one field.

A screenshot of a FileReader plug-in text file is shown below. This example is a tab-delimited text file, but a CSV text file could also be used.



South1	South2	South3	South4	South5	South6	West1	West2	West3	West4	West5	West6	North1	Nor
r1c1	r1c2	r1c3	r1c4	r1c5	r1c6	r1c7	r1c8	r1c9	r1c10	r1c11	r1c12	r1c13	r1
r2c1	r2c2	r2c3	r2c4	r2c5	r2c6	r2c7	r2c8	r2c9	r2c10	r2c11	r2c12	r2c13	r2
r3c1	r3c2	r3c3	r3c4	r3c5	r3c6	r3c7	r3c8	r3c9	r3c10	r3c11	r3c12	r3c13	r3
r4c1	r4c2	r4c3	r4c4	r4c5	r4c6	r4c7	r4c8	r4c9	r4c10	r4c11	r4c12	r4c13	r4
r5c1	r5c2	r5c3	r5c4	r5c5	r5c6	r5c7	r5c8	r5c9	r5c10	r5c11	r5c12	r5c13	r5
r6c1	r6c2	r6c3	r6c4	r6c5	r6c6	r6c7	r6c8	r6c9	r6c10	r6c11	r6c12	r6c13	r6
r7c1	r7c2	r7c3	r7c4	r7c5	r7c6	r7c7	r7c8	r7c9	r7c10	r7c11	r7c12	r7c13	r7
r8c1	r8c2	r8c3	r8c4	r8c5	r8c6	r8c7	r8c8	r8c9	r8c10	r8c11	r8c12	r8c13	r8
r9c1	r9c2	r9c3	r9c4	r9c5	r9c6	r9c7	r9c8	r9c9	r9c10	r9c11	r9c12	r9c13	r9
r10c1	r10c2	r10c3	r10c4	r10c5	r10c6	r10c7	r10c8	r10c9	r10c10	r10c11	r10c12	r10c13	r1
r11c1	r11c2	r11c3	r11c4	r11c5	r11c6	r11c7	r11c8	r11c9	r11c10	r11c11	r11c12	r11c13	r1
r12c1	r12c2	r12c3	r12c4	r12c5	r12c6	r12c7	r12c8	r12c9	r12c10	r12c11	r12c12	r12c13	r1
r13c1	r13c2	r13c3	r13c4	r13c5	r13c6	r13c7	r13c8	r13c9	r13c10	r13c11	r13c12	r13c13	r1
r14c1	r14c2	r14c3	r14c4	r14c5	r14c6	r14c7	r14c8	r14c9	r14c10	r14c11	r14c12	r14c13	r1
r15c1	r15c2	r15c3	r15c4	r15c5	r15c6	r15c7	r15c8	r15c9	r15c10	r15c11	r15c12	r15c13	r1
r16c1	r16c2	r16c3	r16c4	r16c5	r16c6	r16c7	r16c8	r16c9	r16c10	r16c11	r16c12	r16c13	r1

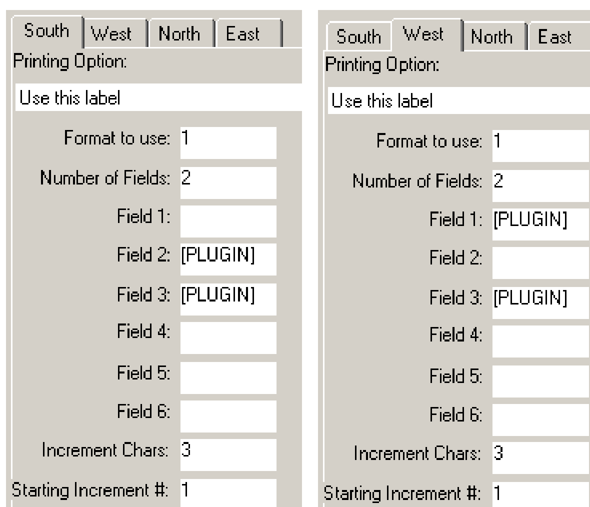
The order of the columns

Note how the order of the columns references the order of the tabs in the Apply label task Protocol Task Parameters toolbar.

The six columns of a particular side correspond to the six fields in the protocol task parameters.

The column "South3" is the column that contains the root data that will be printed on the south side of the plate in field 3. Each row of the table represents a different cycle in the run. The first row contains the root data that will be printed during the first run cycle, and so on.

The following screenshots show how the same plug-in is used in a total of four fields, on two sides of the plate.



Using these parameters, data from the above plug-in file would print the following labels:

Field	Printed labels in run cycle 1
South, Field 2	r1c2
South, Field 3	r1c3
West, Field 1	r1c7

Field	Printed labels in run cycle 1
West, Field 3	r1c9

Repeating columns

A text file with data for labels on only one side of the plate is sufficient to print the same labels on other sides of the plate.

To understand this, think of the columns as occurring in six column sets. If there are fewer than six columns, the remaining columns will be left blank.

If there is only one set in the file, the set is repeated for the other sides of the plate where you have selected "Use this label" from the box.

Related topics

For information about...	See...
Setting up the file reader plug-in	"Using the FileReader plug-in in a protocol" on page 206
Using JavaScript with BenchCel Workstation	"Using JavaScript in BenchWorks software" on page 209

Using the FileReader plug-in in a protocol

About this topic

The FileReader plug-in is installed and registered during the standard BenchCel Workstation installation. You should see the FileReader.dll file in your Velocity11\BenchWorks software\plugins directory.

This topic describes how to modify the task parameters in the protocol so that the Apply Label task uses the FileReader plug-in.

Read this topic if you are a technician or administrator who writes protocols with Apply Label tasks and who wants the FileReader plug-in to read and process the label text.

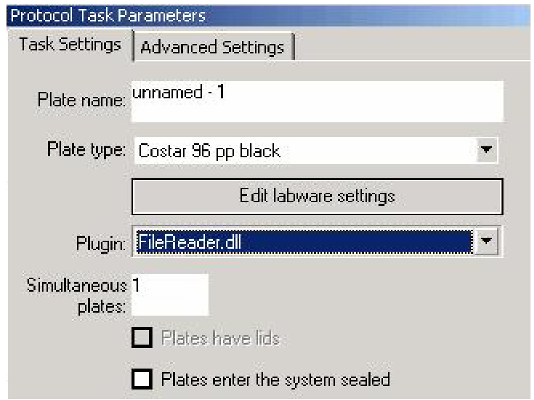
Setting up the protocol

Create a protocol, and then modify the plate icon and Apply Label task parameters as described here.

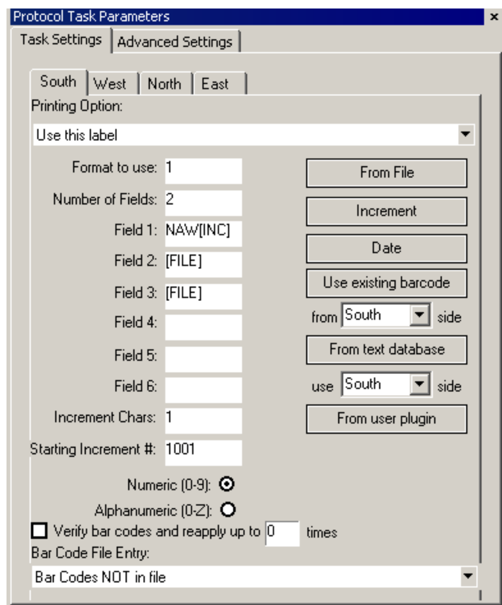
To set up the protocol to use the File Reader plug-in:

1. Select a plug-in to use:
   a. Click the plate icon in the **Protocol Editor**.
   b. Select FileReader.dll from the **Plugin** list of the **Protocol Task Parameters** area.

      If the FileReader.dll is not available for selection, it is because the FileReader.dll file is missing from the plug-ins folder.



2. Populate the **Apply label** task fields:
   a. Click the **Apply label** icon in the **Protocol Editor**.
   b. Populate the **Apply label** task fields with the **From user plugin** button.



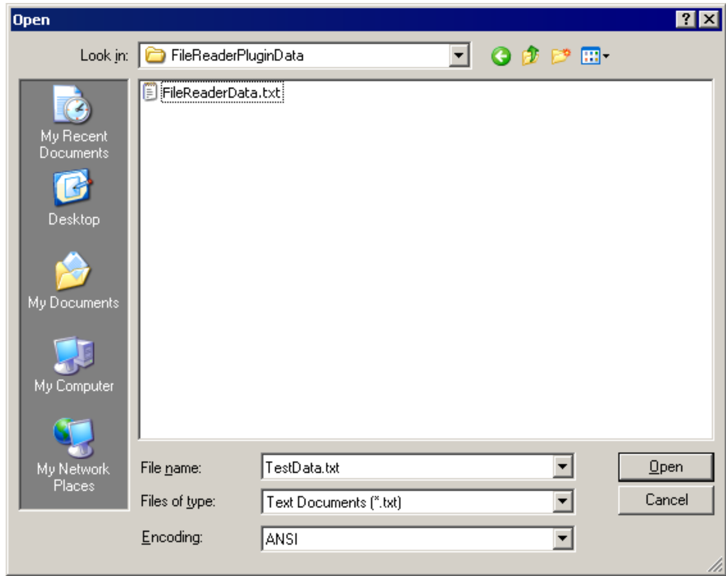
   c. If you would like to use prefixes or suffixes, enter them before or after **[PLUGIN]** in the relevant **Field** text box.

      An example field with a prefix is shown in the following screenshot.

Running the protocol

To run a protocol with a FileReader plug-in file:

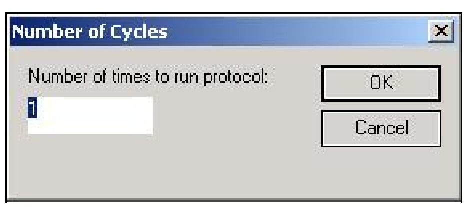
1. Open the protocol that you created to use the FileReader plug-in.
2. Click **Start** from BenchWorks software to start the protocol.
3. Select the plug-in text file from the dialog box that opens.



4. In the **FileReader** dialog box that opens, check the list of names of the columns of the text file and the total number of rows in the file.

5. Click **OK**.

   The **Number of Cycles** dialog box opens.



6. Enter the number of cycles to run.

7. Click **OK**.

   Note the following:

   If the file is not the one you intend to use, you can cancel the run.

   If the number of rows in the file is greater than the number of cycles that are run, the extra rows will be unused.

   If the number of rows is less than the number of cycles that are run, an error occurs when the rows are executed. If the error is ignored, additional labels are left blank.

   The input file does not change during a run, so if you perform another run with the same file, the same labels will print.

   If a power outage occurs during a run, and you are unable to resume the run, delete the first few rows after the header row. Then run the protocol again.

Related topics

For information about...	See...
Using JavaScript with BenchWorks software	"Using JavaScript in BenchWorks software" on page 209
The workflow that this procedure belongs to	"Workflow for creating a protocol" on page 73

Using JavaScript in BenchWorks software

About JavaScript in BenchWorks software

In BenchWorks software, JavaScript programs (scripts) can be used to:

- Configure tasks in ways that task parameters do not allow
- Change the parameters of a protocol task immediately before it is scheduled

This extends the capability of BenchWorks software because the parameters can be changed dynamically during a run, based on:

- Information passed from an external source, such as a database
- The number of times the protocol has cycled
- Feedback on changing conditions during the run

Scripts can be run before the start or after the finish of a protocol and within a protocol.

About JavaScript

JavaScript is a general-purpose programming language that requires an interpreter to run its programs.

You are probably most familiar with JavaScript where it is used to create dynamic effects in Web pages. This form of JavaScript is made up of a core language plus Web browser-specific language. It is processed by the JavaScript interpreter that is built into modern browsers.

The core JavaScript language can be used to write scripts that have nothing to do with web pages. These scripts can be used for any application that includes a JavaScript interpreter. BenchWorks software is an example of such an application—it uses a JavaScript 1.5 interpreter.

JavaScript resources

There are many JavaScript resources available online and in print. If you want to learn more about JavaScript for use in BenchWorks software, look for resources that cover the core JavaScript language separately from the Web browser-specific language and the Document Object Model.

Web references

You can find useful information at:

http://www.mozilla.org/js/

Print reference

A good print reference is *JavaScript: The Definitive Guide*, Fourth Edition, published by O'Reilly.

Examples of use

You can use JavaScript to:

- Print the parameters of a task to the BenchWorks software log
- Run a command line that launches an external application, such as a batch file or database updating program
- Simplify protocol writing, for example, by incrementing pipetting volumes each cycle of a protocol to perform a dilution series

Where scripts are written

Scripts can be written directly into the protocol, or they can be written in an external file that is called during the protocol execution.

A script can be entered directly into the text box of:

- The Start/Finish tab of Protocol Options. In this case, the script is executed before the start of the protocol (including the pre-protocol) or after the completion of the protocol (including the post-protocol).

  Start and Finish scripts are typically used to initialize variables and define functions for all the scripts used throughout the protocol. Note that they are associated with the protocol rather than the task and therefore less susceptible to accidental deletion.
- The Advanced Settings tab in the Task Parameters toolbar. In this case, the script is associated with a specific task and executed before the task.

An external script can be called by:

- Embedding the "`open()`" function in the text box

- Clicking Browse to locate and then open the script file

About BenchWorks software-defined functions and objects

The BenchWorks software interpreter supports the JavaScript 1.5 core functions and objects. Velocity11 has also defined its own functions and objects that can be used in BenchWorks software scripts.

The BenchWorks software JavaScript interpreter provides two objects that can be accessed by a script. They are the plate object and task object.

BenchWorks software-defined global functions

The following BenchWorks software-defined functions are available globally, meaning that they are not restricted to a particular object or programming context.

Function	Description
print()	Prints time-stamped messages to the BenchWorks software log. Parameter: Text string Example: `print(plate.name)`
open()	Opens a file. Parameter: Text string Example: `open("c:\VWorks4 workspace\text.txt")`
run()	Runs a program as though it is being called from a command line. Parameters: - Text string. Required. Allows you to initiate a command that you could otherwise enter into the Windows Run dialog box, such as `notepad text.txt` (opens a file named text.txt in Windows Notepad). - Boolean True/False. Optional. Default is False. If True, BenchWorks software waits for the function to complete before continuing (blocking).

Plate object

The plate object provides access to properties of the plate that the current task is operating upon.

Properties

The plate object has the following properties:

Property	Data type	Description
plate.name	String	Name of the plate.

Property	Data type	Description
plate.instance	Integer	Plate instance number.
plate.labware	String	Name of the labware type.
plate.barcode	Array	Array of four strings corresponding to SOUTH=0, WEST=1, NORTH=2, EAST=3. Example: `plate.barcode[SOUTH]= "mybarcode"`
plate.volume	Array of arrays	An array of floating point numbers. The array size depends on the number of wells in the labware (96, 384, or 1536), arranged in row, column format. This property is only enabled on BenchWorks software systems that have the volume-tracking database option.

Methods

Methods are JavaScript functions invoked through an object.

The plate object has the following methods, available on those systems with the volume-tracking database option.

Method	Comments
plate.setUserData(string key, string value)	Stores 'value' under the key 'key' in a database record associated with this plate
plate.getUserData(string key)	Returns the 'value' stored earlier using plate.setUserData

Task object

The task object is a BenchWorks software-defined generic object that refers to the currently executing task. It allows the properties of the task to be accessed using a standard syntax. Depending on which task is executing, a different set of properties might be available.

Properties

The task object provides a comprehensive set of properties that can be read/write, or read-only. These properties specifically affect the behavior of the task that is about to be executed by the BenchWorks software scheduler.

For example, the Aspirate (BenchWorks software) task has a property called "volume". To store this property in a variable you would write:

```
x = task.Volume
```

To set the volume property of the Aspirate (BenchWorks software) task to the value stored in the variable "x", you would write:

```
task.Volume = x
```

In this example, the run-time interpreter determines through the context that “task.” refers to the currently executing Aspirate (BenchWorks software) task.

Attempting to access properties that are inappropriate for the current task will result in a scripting syntax error, but will not halt the execution of your protocol.

Methods

The task object has the following methods:

Method	Comments

task.skip()	Skips execution of the current task. Use this function to conditionally execute a task, such as in this example which skips the task if the simulator is not running:
	`if (!isSimulatorRunning())`
	`task.skip()`

task.pause()	Pauses the protocol and opens a dialog box that asks you whether you want to continue or abort the run. Use this function if you need to pause the protocol to, for example, replenish the fluid in a static reservoir. You could use the print() function to add a note to the log toolbar describing the action to take when the BenchWorks software has paused.
task.isSimulatorRunning()	Returns true if this is a simulated run. Has no arguments.
task.repeat()	Schedules the task to be repeated.

None of the task object methods accept any parameters.

These are generic methods that are the same regardless of the task that is executing them. The properties of these methods are specific to the current task.

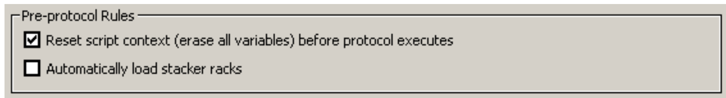
About variables

The default behavior of BenchWorks software JavaScript is that the values of all variables are cleared (set to undefined) before the next protocol is run.

You have the option to change this so that the value of a variable assigned in a script is held in memory until BenchWorks software is closed. This means that if you assign the value to a variable in one protocol, the same value will be used in the next protocol with the same variable. This is the reset script context feature.

To clear the reset variables default option:

1. Select the **Protocol Options** tab.
2. In the **Startup-Protocol Rules** area, clear the **Reset script context (erase all variables) before protocol executes** check box.



Quadrant representation

In JavaScript, an array is a built-in object that stores a collection of like values, called elements. Each element is accessed by an index value that is enclosed in square brackets. Index values can be non-negative integers or strings.

The following example script declares an array with three elements:

```
var vehicle_type = new Array(3);
vehicle_type[0] = “car”;
vehicle_type[1] = “truck”;
vehicle_type[2] = “van”;
```

Because a plate is already an array of wells, locations on plates (quadrants) are represented in Velocity11 JavaScript as an array of arrays. for example, the quadrant property of the task object for one task is represented as:

```
[[1,1]]
```

In this representation, the first number refers to the plate row and the second number refers to the plate column. These numbers can be represented by variables in a script, as shown in the following statement.

```
task.quadrants = [[disp_row,disp_column]]
```

For two quadrants, the representation would be:

```
[[1,1],[1,2]]
```

Cautions

When you run a script that dynamically changes the values of task properties, there is a risk that a value will be set that causes a problem. We therefore recommend that before using a script, you run the simulator with each set of values that will be set by the script. Running scripts cannot cause robot crashes, because scripts cannot modify teachpoints. However, an incorrect task.tipOffset property (Distance from well bottom parameter) on a VPrep could cause the pipette tips to crash into the bottom of the wells resulting in loss of sample and damage to plates.

In addition, be aware that when a protocol is being compiled, it uses the values displayed in the Protocol Task Parameters toolbar screen and not the values that will be set by any scripts. This means that there might be errors in the protocol that are not detected during compilation. The values that appear in the Task Parameter toolbar do not change to reflect the effect of any script.

Also, scripts do not check pipetting volumes before the run begins, so you must make sure that the pipetting steps make logical sense. For example, you will not be alerted beforehand if a script will attempt to aspirate 1 mL from a plate well that can only hold 0.5 mL.

Example scripts

Example 1

This script prints the word “hello” to the log toolbar and log.txt file.

```
print("hello");
```

Example 2

This one-line script opens an external file that could contain another script. The new script is run immediately.

```
open("C:\scripts\script1.txt")
```

Example 3

This script cycles through quadrants within a loop for an Aspirate, Dispense, or Mix task.

```
//put this script in wherever you want to cycle
through quadrants within a loop for an aspirate,
dispense, or mix task.

var row
if(row == undefined)
{
row = 1
}
if(row <=2)
{
task.quadrants= [[1,row]]
row++
}

else if(row > 2)
{
var column = row-2
task. quadrants = [[2, column]]
row++
}

if(row > 4)
{
row = 1
}

print("Dispensing to quadrant "+task.quadrants+"
of Destination plate.")
```

Example 4

This script prints a list of the properties for the task to the log toolbar. It is an essential part of determining the names of properties when creating JavaScripts.

```
for(x in task) {
```

```
    print("task[" + x + "]=" + task[x]);
}
```

Script-writing service

Velocity11 offers a custom script-writing service for BenchWorks software and other applications. Please contact us for more information.

Related topics

For information about...	See...
Using JavaScript in BenchWorks software	"The JavaScript task object and properties" on page 216

The JavaScript task object and properties

About this topic

The BenchWorks software JavaScript interpreter includes a task object that is defined by Velocity11.

This topic lists the properties for the Velocity11 JavaScript task object. One of the properties is for the Apply Label task. The other properties are all for pipette tasks.

Task properties

Properties available to all tasks

The following properties can be used for any task.

Property	Data type	Description
task.name	String	Name of the task, for example, "Aspirate"
task.description	String	Description of the task that is given under the icon in the protocol editor. For example, a downstack task that has the script `print(task.description)` will send the following text to the protocol log: Downstack from stacker2

Apply Label task

The JavaScript Apply Label task properties are listed below, along with the data type of the property and the names of the corresponding Apply Label task parameters.

The task.side property is an array of four label_data objects:

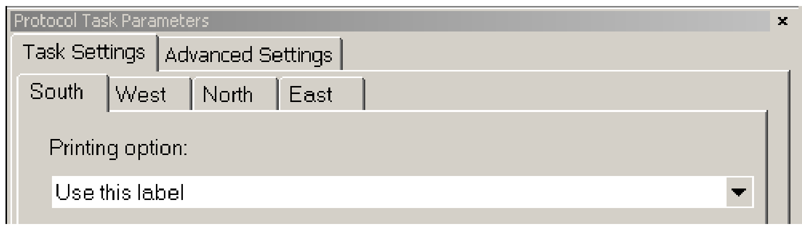
- ❑ task.side[SOUTH]
- ❑ task.side[EAST]

- task.side[NORTH]
- task.side[WEST]

Each of these task.side properties has nine properties, representing the fields on the Protocol Task Parameters toolbar for the Apply Label task.

In the table below, *point* can be replaced by SOUTH, EAST, NORTH, or WEST. For example, the Printing option field for the south label (see screenshot) is represented as:

task.side[SOUTH].printLabel



Property	**Data type**	**Task parameter(s)**	**Comments**
task.side[*point*].field	An array of six strings	Field 1, Field 2, Field 3, Field 4, Field 5, Field 6	For example, task.side[WEST].field[2] matches the Field 2 text box in the West tab of the Protocol Task Parameters toolbar. *Note:* The options here must be all caps.
task.side[*point*].format	Integer	Format to use	A number that corresponds to the barcode format that you want for side *point*. You can set a different format for each side of the plate. For information about formats, see the *VCode Barcode Print and Apply Station User Guide*.
task.side[*point*].incrementChars	Integer	Increment chars	The number of alphanumeric characters that you want to be appended to the root data.
task.side[*point*].startingIncrement	Integer	Starting increment #	The number that you want to be printed on the first label.
task.side[*point*].base	Integer	Numeric (0-9) Alphanumeric (0-Z)	0 for numeric increments 1 for alphanumeric increments
task.side[*point*].verifyBarcode	Integer	Verify barcodes	0 for no barcode verification 1 for barcode verification
task.side[*point*].maxVerifyAttempts	Integer	Reapply up to __ times	The number of attempts made to verify a barcode.

Property	Data type	Task parameter(s)	Comments
task.side[*point*].sourceBarcodeSide	Integer	Use existing barcode from ____ side	Copies the barcode from this side of the plate 0 = South 1 = West 2 = North 3 = East
task.side[*point*].printLabel	Integer	Printing option	0 = No label on side *point* 1 = Yes label on side *point*

Aspirate task

The JavaScript Aspirate task properties are listed below, along with the data type of the property, the names of the corresponding aspirate properties in the Protocol Task Parameters toolbar, and a reference to more information.

Property	Data type	Task parameter	Comments
task.plateName	String	Plate name	The name of the plate. Read only.
task.acceleration	Float	Aspirate acceleration	The rate of increase in velocity before the maximum aspirate velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.liquidClass	String	Liquid class list	The name of the liquid class.
task.postAspirateVolume	Float	Post aspirate volume	The volume of air to be drawn up after the liquid is drawn up.
task.preAspirateVolume	Float	Pre aspirate volume	The volume of air to be drawn up before the pipette tips enter the liquid.
task.quadrants	An array of pairs of integers	Quadrant selection diagram	A quadrant is an evenly spaced array of locations that is addressable by the tips on a pipette head. A 96-well head can dispense into a 96-well plate, four quadrants of a 384-well plate, and 16 quadrants of a 1536-well plate. A 384-well head can dispense into a 384-well plate or the four quadrants of a 1536-well plate.

Property	Data type	Task parameter	Comments
task.retract	Float	Tip retract distance	The distance that the tips should move downwards per unit volume of liquid being aspirated. This value allows the tips to move downwards during aspiration to maintain a certain height below the surface of the liquid. You will need to determine an appropriate value by trial-and-error for each type of plate you use. You might want this value to be the same as the Tip Retract Distance for the Dispense pipette task.
task.tipOffset (Distance from well bottom)	Float	Distance from well bottom	The distance between the bottom of the pipette tips and the bottoms of the plate wells or MicroWash tray chimneys. If you are using dynamic tip retraction this value sets the lowest point to which the tips will travel.
task.velocity	Float	Aspirate velocity	The rate at which to draw up liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.volume	Float	Aspirate volume	The volume of liquid to be drawn up into each pipette tip.

Change Tips task

These properties are the same as the properties described for the Change Tips task.

Property	Data type	Task parameter	Comments
task.plateName	String	Plate name	The name of the plate.

Property	Data type	Task parameter	Comments
task.quadrants	An array of pairs of integers	Quadrants (diagram)	A quadrant is an evenly spaced array of locations that is addressable by the tips on a pipette head. A 96-well head can dispense into a 96-well plate, four quadrants of a 384-well plate, and 16 quadrants of a 1536-well plate.
task.action	Integer	❑ Press On New Tips (integer = 1) ❑ Tips off (integer = 2)	Puts tips on to a VPrep head or removes tips from a VPrep head.

Dispense task

These properties are the same as the properties described for the Dispense task.

Property	Data type	Task parameters	Comments
task.plateName	String	Plate name	The name of the plate.
task.acceleration	Float	Dispense acceleration	The rate of increase in velocity before the Dispense Velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.blowoutVolume	Float	Blowout volume	The volume of air to blow out when the tips are in the liquid. This is typically the same as the pre-aspirate volume.
task.liquidClass	String	Liquid class (list)	The name of the liquid class.
task.postDispenseVolume	Float	Post dispense volume	The volume of air to blow out when the tips are out of the liquid.
task.quadrants	An array of pairs of integers	Quadrants (diagram)	A quadrant is an evenly spaced array of locations that is addressable by the tips on a pipette head. A 96-well head can dispense into a 96-well plate, four quadrants of a 384-well plate, and 16 quadrants of a 1536-well plate. A 384-well head can dispense into a 384-well plate or the four quadrants of a 1536-well plate.

Property	Data type	Task parameters	Comments
task.retract	Float	Retract distance	The distance that the tips should move upwards per unit volume of liquid being dispensed. This value allows the tips to move upwards during dispensing to maintain a certain height above the surface of the liquid. You will need to determine an appropriate value by trial-and-error for each type of plate you use. You might want this value to be the same as the Tip Retract Distance for the Aspirate pipette task.
task.tipOffset	Float	Distance from well bottom	The distance between the bottom of the pipette tips and the bottoms of the plate wells or MicroWash tray chimneys. If you are using dynamic tip retraction this value sets the lowest point to which the tips will travel.
task.tipTouch	Boolean	Enable tip touching	Whether you want the tips to touch the sides of the plate wells or not.
task.tipTouchHorizontalDistance	Float	Tip touch horizontal distance	When the value for this parameter is zero, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.
task.tiptouchRiseHeight	Float	Tip touch rise height	The height that the tips should move upwards before touching the side of the wells.
task.tipTouchSides	Integer	Number of sides to touch	The number of sides of the wells that you want the tips to touch.

Property	Data type	Task parameters	Comments
task.velocity	Float	Dispense velocity	The rate at which to dispense the liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.volume	Float	Dispense volume	The volume of liquid to be moved out of each pipette tip.
task.enableShake	Boolean	Enable shaking	Turns on shelf shaking during dispense.
task.shakeRPM	Integer	Shake RPM	Shaking speed (in RPM).
task.shakeDelay	Integer	Post-dispense delay	Wait time (in milliseconds) before shaking starts.
task.shakeTime	Integer	Shake time	Duration (in milliseconds) of shaking.

Loop task

These properties are the same as the properties described for the Loop task.

Property	Data type	Task parameter	Comments
task.numberOfLoops	Integer	Number of times to loop	Number of times to loop.

Mix task

These properties are the same as the properties described for the Mix task.

Property	Data type	Task parameters	Comments
task.plateName	String	Plate name	The name of the plate.
task.aspirateAcceleration	Float	Aspirate acceleration	The rate of increase in velocity before the maximum aspirate velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.aspirateVelocity	Float	Aspirate velocity	The rate at which to draw up liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor.

Property	Data type	Task parameters	Comments
task.blowoff	Float	Last cycle blowout volume	The volume of air to blow out when the tips are in the liquid. This is typically the same as the pre-aspirate volume.
task.cycles	Integer	Number of mixing cycles	The number of aspirate/ dispense operations.
task.dispenseAcceleration	Float	Dispense acceleration	The rate of increase in velocity before the Dispense Velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.dispenseVelocity	Float	Dispense velocity	The rate at which to dispense the liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.liquidClass	String	Liquid class (list)	The name of the liquid class.
task.preAspirateAirGap	Float	Pre-aspirate volume	The volume of air to be drawn up before the pipette tips enter the liquid.
task.quadrants	An array of pairs of integers	Quadrants (diagram)	A quadrant is an evenly spaced array of locations that is addressable by the tips on a pipette head. A 96-well head can dispense into a 96-well plate, four quadrants of a 384-well plate, and 16 quadrants of a 1536-well plate. A 384-well head can dispense into a 384-well plate or the four quadrants of a 1536-well plate.

Property	Data type	Task parameters	Comments
task.retract	Float	Retract distance	The distance that the tips should move upwards or downwards per unit volume of liquid being dispensed or aspirated. This value allows the tips to move upwards or downwards during dispensing or aspirating to maintain a certain height below or above the surface of the liquid. You will need to determine an appropriate value by trial-and-error for each type of plate you use.
task.tipOffset	Float	Distance from well bottom	The distance between the bottom of the pipette tips and the bottoms of the plate wells or MicroWash tray chimneys. If you are using dynamic tip retraction this value sets the lowest point to which the tips will travel.
task.tipTouch	Boolean	Enable tip touching	Whether you want the tips to touch the sides of the plate wells or not.
task.tipTouchHorizontalDistance	Float	Tip touch horiz. dist	When the value for this parameter is zero, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.
task.tiptouchRiseHeight	Float	Tip touch rise height	The height that the tips should move upwards before touching the side of the wells.
task.tipTouchSides	Integer	Number of sides to touch	The number of sides of the wells that you want the tips to touch.
task.volume	Float	Mixing volume	The volume of liquid to be aspirated and dispensed to each plate well.

Pump Reagent task

These properties are the same as the properties described for the Pump Reagent task.

Property	Data type	Task parameter	Comments
task.action	Integer	❑ Fill reservoir (value = 0) ❑ Empty reservoir (value = 1)	The Fill reservoir and Empty reservoir values determine whether the pumps will fill or empty the reservoir. To empty the reservoir you must complete the Autofill Configuration information on the Shelves tab of the VPrep Diagnostics software. For more information, see the *VPrep Pipetting System User Guide*.
task.howOften	Integer	Every	The number that controls how frequently the liquid is pumped. For example, if you type `3`, the pump will run every third time the task runs.
task.maxLevel	Integer	Max level	The maximum percentage of liquid that you want the reservoir to contain.
task.minLevel	Integer	Min level	The minimum percentage of liquid that you want the reservoir to contain.
task.plateName	String	Plate name	The name of the plate.
task.shelf	String	(unnamed list)	The shelf on which the reservoir is located.
task.speedPercent	Integer	at	The percentage of maximum pumping rate.
task.time	Integer	for	The time in seconds that the pumps pump.

Wash Tips task

These properties are the same as the properties described for the Wash Tips task.

Property	Data type	Task parameters	Comments
task.plateName	String	Plate name	The name of the plate.
task.aspirateVelocity	Float	Aspirate velocity	The rate at which to draw up liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.aspirateAcceleration	Float	Aspirate acceleration	The rate of increase in velocity before the maximum aspirate velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.blowoff	Float	Last cycle blowout volume	The volume of air to blow out when the tips are in the liquid. This is typically the same as the pre-aspirate volume.
task.cycles	Integer	Number of wash cycles	The number of aspirate/ dispense operations.
task.dispenseAcceleration	Float	Dispense acceleration	The rate of increase in velocity before the Dispense Velocity is reached. If you selected a liquid class, this value is entered automatically from the liquid library editor.
task.dispenseToWaste	Boolean	Dispense to waste at height of (check box)	The tips will dispense outside the MicroWash tray chimneys.
task.dispenseVelocity	Float	Dispense velocity	The rate at which to dispense the liquid. If you selected a liquid class, this value is entered automatically from the liquid library editor.

Property	Data type	Task parameters	Comments
task.heightAboveWaste	Float	Dispense to waste at height of (text box)	The height, in millimeters, above the MicroWash chimneys at which the tips will dispense. Used in combination with the dispense to waste property. Enter a negative number to make sure that the tips are below the tops for the chimneys.
task.inFlowPercent	Integer	Inflow pump	The relative rate of liquid flow into the MicroWash tray manifold. This value should be high enough for the washing liquid to just bubble over the tops of the chimneys.
task.liquidClass	String	Liquid class (list)	The name of the liquid class.
task.outFlowPercent	Integer	Outflow pump	The relative rate of liquid flow out of the MicroWash tray manifold. This value is typically zero because the fluid is drained by gravity.
task.preAspirateAirGap	Float	Pre-aspirate volume	The volume of air to be drawn up before the pipette tips enter the liquid.
task.quadrants	An array of pairs of integers	Quadrants (diagram)	A quadrant is an evenly spaced array of locations that is addressable by the tips on a pipette head. A 96-well head can dispense into a 96-well plate, four quadrants of a 384-well plate, and 16 quadrants of a 1536-well plate. A 384-well head can dispense into a 384-well plate or the four quadrants of a 1536-well plate.

Property	Data type	Task parameters	Comments
task.retract	Float	Retract distance	The distance that the tips should move upwards or downwards per unit volume of liquid being dispensed or aspirated. This value allows the tips to move upwards or downwards during dispensing or aspirating to maintain a certain height below or above the surface of the liquid. You will need to determine an appropriate value by trial-and-error for each type of plate you use.
task.tipOffset	Float	Distance from well bottom	The distance between the bottom of the pipette tips and the bottoms of the plate wells or MicroWash tray chimneys. If you are using dynamic tip retraction this value sets the lowest point to which the tips will travel.
task.tipTouch	Boolean	Enable tip touch	Whether you want the tips to touch the sides of the plate wells or not.
task.tipTouchHorizontalDistance	Float	Tip touch horiz. dist.	When the value for this parameter is zero, the tips will move horizontally one well radius. The well radius is defined in the labware database for the type of plate you are using. If you want the tips to touch harder, increase this value. If you want the tips to touch more lightly, enter a negative value.
task.tiptouchRiseHeight	Float	Tip touch rise height	The height that the tips should move upwards before touching the side of the wells.
task.volume	Float	Wash volume	The volume of liquid to be drawn up into each pipette tip.

Related topics

For information about...	See...
JavaScript in BenchWorks software	"Using JavaScript in BenchWorks software" on page 209
Labware editor	"About the labware editor" on page 248

About barcode reading and tracking

About this topic

This topic gives an overview of the barcode reading and tracking abilities of the BenchCel Workstation.

Read this topic if you are a technician or administrator who writes protocols with barcode reader tasks or Apply Label tasks.

barcode readers

A customized can have barcode readers installed that can read barcodes on one side of a plate (the side varies, depending on your application needs). These may be installed on VPrep Pipettor shelves or platepads. Every time a plate is moved to one of these devices, the barcode is read.

Note: To read a barcode at a platepad barcode reader or VCode Microplate labeler, use the Place Plate task.

VCode: barcode printer and optional reader

If your has a VCode Microplate Labeler, you have the ability to print and apply barcode labels.

If the VCode Microplate Labeler includes an optional reader, barcode labels can be read on any side of the plate, because the VCode Microplate Labeler can rotate the plate in a full circle.

Related topics

For information about...	See...
Planning to add barcode labels to plates	"Using barcode input files" on page 230
Adding the Apply barcode task to a protocol	"Setting Apply Label task parameters" on page 91
Reading plates at a platepad	"Setting Place Plate task parameters" on page 113

Using barcode input files

About this topic

This topic describes how to create and use barcode input files.

Read this topic if you are a technician or an administrator who writes protocols with barcode reader or Apply Label tasks.

Barcode fields

When setting up a VCode Microplate Labeler, you set task parameters that specify the content of barcode fields.

An example of a barcode field is:

NAW1001

Barcode fields can be imported from barcode input files.

For detailed information about barcode fields and formats, see the *VCode Barcode Print and Apply Station User Guide*.

Barcode input files

Filename and location

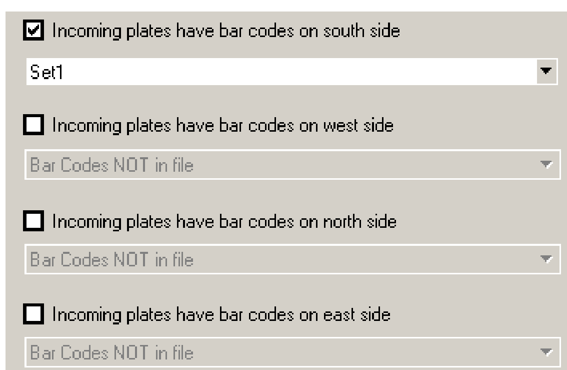
Barcode input files are text files with the naming convention (*filename*.bar). They are stored in the location specified in the general BenchWorks software options.

When to use

You can use barcode input files to do the following:

❑ Verify the barcodes on incoming plates, which are plates that are downstacked into the system.

  This function is set in the parameters for the plate icon of the incoming plates:



❑ Specify each field of a barcode that is printed on a plate.

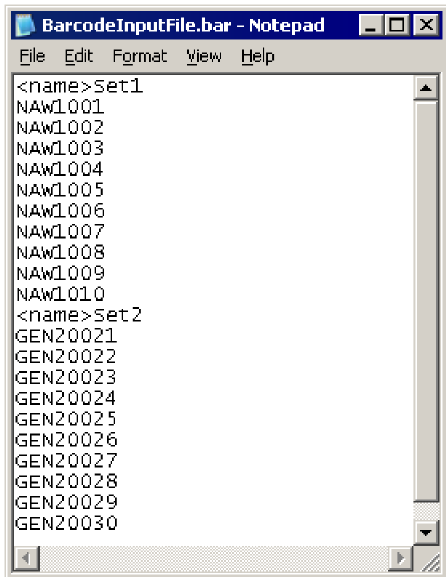
How they are created

Barcode input files are typically generated by a LIMS system, although you can create them manually.

File structure

Barcode input files contain lists of barcode fields, or parts of fields, that are grouped together in series. In the following example, there are two series:

- ❑ Set1
- ❑ Set2



Each series could be used to label a different side of the same plate or label plates during different runs.

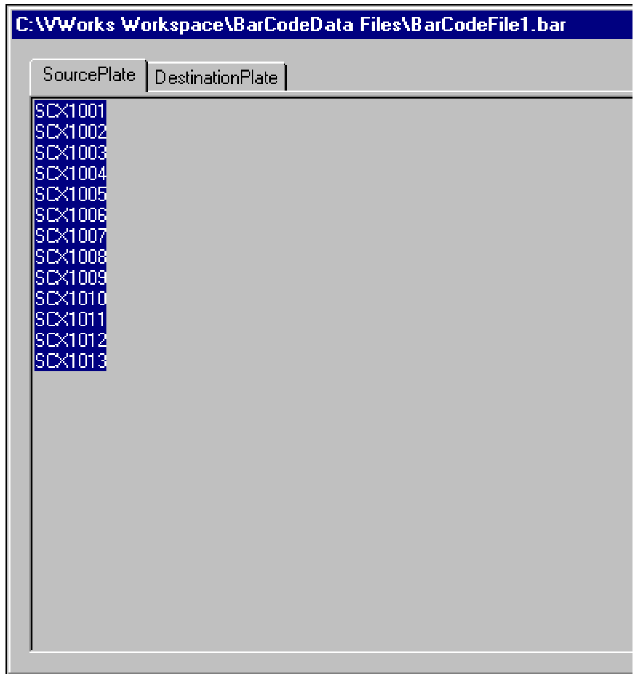
Viewing a barcode file in BenchWorks software

You can view the barcode file that is currently associated with BenchWorks software as follows.

To view the associated barcode input file:

1. Select **Tools** > **Show Barcode File**.

   This opens a view of the barcode input file.



2. Click a tab to show a different series of data.
3. To close the window, click the close box.

Updating a barcode input file

If you change a barcode input file while a protocol is running, you must reload the file for the change to be registered.

To reload a barcode input file:

1. Select **Tools** > **Reload BarCode File**.

   The barcode input file is reloaded.

Related topics

For information about...	See...
Selecting barcode files	"Setting BenchWorks software options" on page 22
Using the FileReader	"About the FileReader plug-in" on page 203

Using barcode data files

About this topic

This topic describes how to create and use barcode data files in collaboration with barcode input files.

Read this topic if you are a technician or an administrator who writes protocols with Apply Label tasks.

Barcode data files

File format and location

Barcode data files are tab-delimited text files with the name *filename*.dat. They are stored in a location specified in the general BenchWorks software options.

How they work

A barcode data file acts as a lookup table that specifies what barcode fields to print on other sides of a plate. The typical sequence of events is as follows:

1. A plate with a south-side barcode is downstacked into the system.
2. The robot picks up the plate, reads the barcode, and verifies it against a barcode input file.
3. The robot moves the plate to a VCode Microplate Labeler.
4. The barcode that was read is used as a key to look up the barcode fields to print on the other sides of the plate, using the barcode data file as the lookup table.
5. The VCode Microplate Labeler prints a barcode on the north-side, east-side, and west-side of the plate.

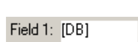
Barcode data files can also be used with incoming plates that have west-side barcodes. In this case, the barcode must be read at the VCode Microplate Labeler or platepad and not by the robot's barcode reader.

!! IMPORTANT !! Barcode data files cannot currently be used with incoming barcodes on the north or east sides.

Barcode data files can still be used if the downstacked plate has no barcode, provided that incoming barcode verification is turned off. The plate could be moved to the VCode Microplate Labeler and labelled on its south or west side. That label could then be read and used with a barcode data file to specify the labels to be printed on the other sides of the plate.

Where they are specified

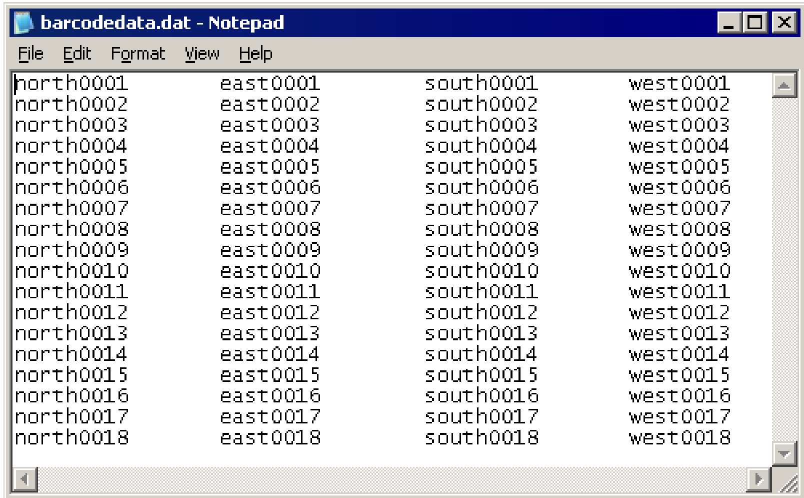
The use of barcode data files is specified when configuring task parameters for an Apply Label task.



File structure

An example of a barcode data file is shown below. The columns are separated by tabs.

!! IMPORTANT !! The columns must be in the order north, east, south and west, from left to right.



Related topics

For information about...	See...
Selecting barcode data files	"Setting BenchWorks software options" on page 22
Barcode input files	"Using barcode input files" on page 230
Applying barcodes	"Setting Apply Label task parameters" on page 91

Administrator procedures

9

This chapter is for people with administrator login privileges. It describes assorted administrative tasks. This chapter contains the following topics:

About user accounts and privileges

About this topic

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

This topic describes the privileges associated with different user roles.

The effect of privileges

Privileges have the following effects:

- ❑ 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 the functions accessed from a particular 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 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...
Guest	Run existing protocols.
Operator	❑ Perform guest functions (see above). ❑ Operate devices in real-time using diagnostics software.
Technician	❑ Perform operator functions (see above). ❑ Create and save protocols. ❑ Edit the labware database and liquid library database.
Administrator	❑ Perform technician functions (see above). ❑ Manage devices through the device manager. ❑ Create and delete user accounts. ❑ Run a protocol that contains compiler errors.

Related topics

For information about...	See...
Adding and deleting accounts	"Adding and deleting a user account" on page 237
Setting up email	"Setting up email" on page 239
Sending a registry file	"Moving or sending a registry file" on page 240

Adding and deleting a user account

About this topic

We recommend that BenchCel Workstation administrators create an account for every user. The privileges set for the account should be appropriate for the users' job role.

This topic explains how to add and delete user accounts.

About user accounts and passwords

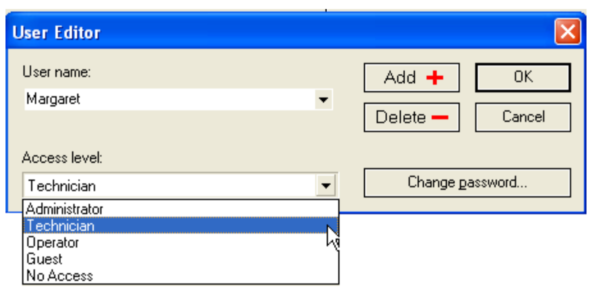
User accounts and passwords use the following conventions:

- ❑ User names and passwords are case-sensitive.
- ❑ Passwords must contain six or more characters.
- ❑ If a user enters an incorrect password three times consecutively, the user is locked out until an administrator resets the account.

Adding a user account

To add a user account:

1. Select **Tools > Manage Users**.
2. In the **User Editor** dialog box, click **Add**.
3. Enter the name if the user in the User name field.
4. Select an **Access level** from the list.



5. Click **Change password**.
6. Enter a password in the **New** field.

   Note: Leave the **Old** field empty since there is no previous password for a new account.
7. Repeat the entry in the **Confirm** field.
8. Click **OK**.

Deleting a user account

To delete a user account:

1. Select **Tools > Manage Users**.
2. Select the account.
3. Click **Delete**.
4. Click **Yes** in the alert dialog to delete the account.

Changing a password

An administrator can reset the password of any account. Operators and technicians can change their own passwords at Log in.

To reset a password:

1. Select **Tools > Manage Users**.
2. Select an account.
3. Click **Change password**.
4. Enter the old password in the **Old** field.
5. Enter the new password in the **New** and **Confirm** fields.
6. Click **OK**.

Related topics

For information about...	See...
User accounts and privileges	"About user accounts and privileges" on page 236
Setting up email	"Setting up email" on page 239

Setting up email

About this topic

This topic describes how to add an email address to BenchWorks software so you can be notified by email or pager when there is a run error.

Email setup in BenchWorks software enables you to do the following tasks:

- ❑ Automatically be notified by email or pager when errors occur during a protocol run
- ❑ Send a bug report to Velocity11

Requirements for email setup

Before you can send an email from BenchWorks software, the controlling computer must:

- ❑ Be connected to a network with internet access
- ❑ Have network access to an outgoing mail server that supports one of the authentication methods available through BenchWorks software.

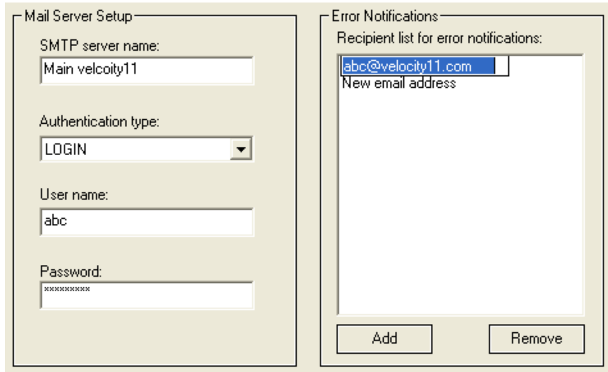
Setting up email

To set up the outgoing email server:

1. Select **Tools > Options**.
2. In the **Mail Server Setup** area, enter the name of your **SMTP server name** (outgoing email server).
3. If the server requires a user name and password:
   a. Select the **Authentication type** from the list.

!! IMPORTANT !! The authentication type is critical. Check with your network administrator to determine the best authentication network for your email server.

   b. Enter your User name and **Password** for the selected authentication type.
   c. Click **Add**. A new email address entry appears in the Recipient list for error notification.
   d. Click on the **New email address** entry and type in your email.
   e. Click **OK** in the **Options** dialog box, to save the email setup information and close the dialog box.



This information only needs to be set up once, provided the email account remains active. All email sent from BenchWorks software is authenticated using this account.

Related topics

For information about...	See...
Sending a bug report	"Sending a bug report" on page xiv
Sending a registry file	"Moving or sending a registry file" on page 240

Moving or sending a registry file

About this topic

This topic provides instructions on how to export a Windows registry file for import to another computer or for emailing to Velocity11.

When to do this

You might need to copy or send a registry file in the following situations:

- ❑ To move a labware or liquid library database to other devices using a different controlling computer
- ❑ To make a backup of a BenchWorks software profile
- ❑ To transfer a BenchWorks software profile from one computer to another
- ❑ To email a labware or liquid library database or BenchWorks software profile when requested by personnel at Velocity11

About moving data

The labware and liquid libraries and profiles are maintained in the Windows registry of the controlling computer.

If you make a change to the labware or liquids database or a profile, you can use a two-step process to propagate the change to another computer.

1. Export the Windows registry key containing the data to a file.
2. Import the file to the other computer's registry.

Damage hazard

!! DAMAGE HAZARD !! Making a mistake when editing the registry might cause critical failures with your operating system.

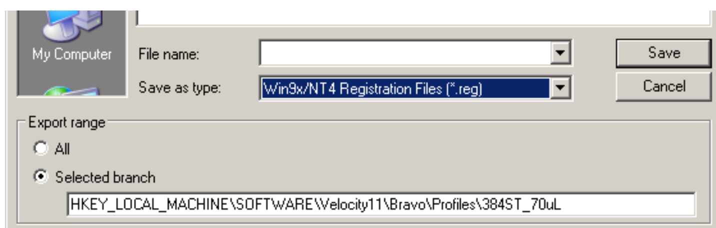
Exporting a registry key

To export a 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 and select one of the following folders:
   - HKEY_LOCAL_MACHINE\SOFTWARE\Velocity11\Shared\Labware\Labware_Entries
   - HKEY_LOCAL_MACHINE\SOFTWARE\Velocity11\Shared\Liquid Library
   - HKEY_LOCAL_MACHINE\SOFTWARE\Velocity11*device name*\Profiles
5. From the **Registry** (or **File**) menu, select **Export**.

   The **Export Registry File** browser box opens.
6. Before saving the file, make sure you:
   - Select **Selected branch**.
   - If you are moving the file to a computer with a different Windows operating system, set **Save as type** appropriately.



7. Save the file.
8. Select **Registry** > **Exit** (or **File** > **Exit)** to close the registry editor.

Importing a registry key

If this is the first time you are importing a registry file to the computer, you need to use the Open With command.

Before you start

You must have Windows Administrator permissions to perform this task.

To import a registry key:

1. Copy the registry file to any location on the recipient computer. If necessary, change the file's extension from .re_ to *.reg.
2. On the recipient computer, double-click the registry file.
3. Click **Yes** to the prompt asking if you are sure you want to do this. The information in the file is written automatically to the registry and this will be confirmed with a message.

   Note: When importing labware definitions, the labware class must be reassigned. See Related topics at the end of this topic for a procedure.

Emailing a registry file

Occasionally, you might be asked to send a registry file to Velocity11.

To email a registry file:

1. Export the Windows registry key containing the data to a file.
2. Change the file's extension to .re_ (This is necessary because many email servers do not allow *.reg files to be emailed.)
3. Email the file.

Related topics

For information about...	See...
Sending a bug report	"Sending a bug report" on page xiv
Setting up email for error notification	"Setting up email" on page 239

Obtaining information about the BenchCel Workstation network cards

About this topic

You might need to provide some of the information to your network administrator for your BenchCel Workstation to be connected to your organization's network.

Your BenchCel Workstation has two network cards. The network connections for these cards are named WAN and LAN.

This topic describes the BenchCel Workstation network cards and how to obtain their network IP addresses.

BenchCel Workstation computer network connections

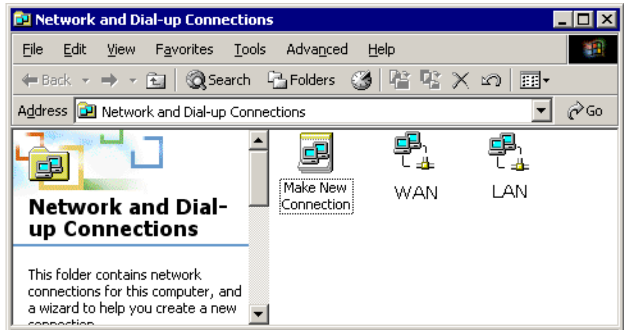
Note: Depending on how you have personalized your operating system, you might need to use a slightly different procedure from the one below.

To see the network connections in Windows:

1. In Windows, from the **Start** menu select **Settings > Control Panel**.

2. Double-click the **Network and Dial-Up Connections** icon.

   The **Network and Dial-up Connections** window opens.



LAN network card

The LAN network card is used for communication between the computer and devices that use Ethernet communication cable. This network is considered to be the local area network.

The LAN network card has a fixed IP address, which is 192.168.0.1.

WAN network card

The WAN network card is for networking with your organization's network. The settings for this card should be configured by your network administrator in the same way that any PC would be configured to make it available to your network.

The WAN network card has an IP address that is dynamically assigned by your domain name server when you start you BenchCel Workstation's computer.

Obtaining network IP addresses

To see the IP address of the two network cards:

1. In BenchWorks software, click the **Device Manager** tab.
2. Select a stack from the **Device List**.
3. Click **Device Diagnostics**.
4. In the **Discovered BioNet Devices** dialog box, click the drop-down arrow for the **Select the Ethernet adapter to use...** list.

   !! IMPORTANT !! Make sure that you do not change the selected IP address when you do this. VStacks should always be connected to the LAN network with the 192.168.0.1 IP address.

Related topics

For information about...	See...
Sending a bug report	"Sending a bug report" on page xiv
Setting up email for error notification	"Setting up email" on page 239

For information about...	See...
Users and privileges	"About user accounts and privileges" on page 236

Defining labware

10

This chapter is for people with administrator or technician login privileges. It describes the use of the labware editor dialog box and the labware parameters group box, which are used to enter information about labware. This contains the following topics:

About defining labware in BenchWorks software

Labware defined

Labware is a physical object such as a plate, lid, or tip box that will be acted upon by the tasks stored in your protocol.

Labware entry defined

A labware entry is the collection of property values used to describe a piece of labware. This information is used by BenchWorks software to command the robot and other devices to do tasks based on the information in the definition.

Entering labware parameters

All labware parameters are accessible through the Labware Editor. A subset of these parameters is also accessible in the Control tab of BenchCel Diagnostics.

Related topics

For information about...	See...
Using the labware editor	"About the labware editor" on page 248
Labware tab in BenchCel Diagnostics	❑ "About the Labware tab in BenchCel Diagnostics" on page 277 ❑ *BenchCel Microplate Handling Workstation User Guide*
Opening the labware editor	"Opening the labware editor" on page 252

Workflow for defining labware

About this topic

This topic describes the workflow for defining labware.

Labware standards

!! IMPORTANT !! All labware used with Velocity11 products must conform to the American National Standards Institute (ANSI) microplate standards. This includes deepwell and PCR plates. A group within the Society for Biomolecular Sciences (SBS) recommends and maintains the standards. Visit www.sbsonline.org **for more information, or contact your labware's manufacturer.**

Workflow

This topic provides the sequence of steps for defining labware for BenchCel Workstation.

Note: The *BenchCel Microplate Handling Workstation User Guide* has additional information on some of these steps.

Step	For this task...	See...
1	Add the labware entry to the labware editor	❑ "Opening the labware editor" on page 252 ❑ "Adding a labware entry" on page 254
2	Define the general properties of the labware	"Defining general properties" on page 256
3	Define the plate properties	"Defining plate properties" on page 257
4	Specify the robot and stacker gripping positions	❑ "Defining labware properties for a BenchCel Workstation" on page 261 ❑ *BenchCel Microplate Handling Workstation User Guide*
5	Specify any plate notch positions	❑ "Defining stacker properties" on page 265 ❑ *BenchCel Microplate Handling Workstation User Guide*
6	Assign the labware to a class	❑ "About labware classes" on page 269 ❑ "Using labware classes" on page 272

Related topics

For information about...	See...
Using diagnostics to access some of the labware settings	❑ "About the Labware tab in BenchCel Diagnostics" on page 277 ❑ *BenchCel Microplate Handling Workstation User Guide*

About the labware editor

Labware editor defined

The labware editor is the BenchCel Workstation interface through which you can enter information about labware.

You must be logged in as an administrator or technician to use the labware editor.

Types of information stored

Three types of information are stored in the labware database:

- ❑ Information about the physical and non-physical properties such as thickness, well depth, and robot handling speed.
- ❑ Information regarding the robot such as handling speed, offsets and other plate-handling options.
- ❑ Information about labware classes to which the labware belongs. Labware definitions are allowed or prohibited from being processed by a device, based on their labware classes.

About labware properties

Labware properties include both the physical properties and the robot-specific properties associated with that piece of labware.

Once a piece of labware is defined, all you have to do is select it from the labware list when you set up a protocol.

About labware classes

Labware classes are sets of labware entries, grouped so they are easier to manage than many individual labware entries.

Labware classes are used to restrict labware types from one or more locations during a protocol run. This helps to prevent wasted runs and damage to the devices on the workstation.

Related topics

For information about...	See...
Moving the labware database to another computer	"Moving or sending a registry file" on page 240

For information about...	See...
Defining labware	“Workflow for defining labware” on page 247
Opening the labware editor	“Opening the labware editor” on page 252
Editing labware parameters	“” on page 277

Labware editor overview

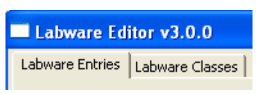
About this topic

This topic gives an overview of the organization of the labware editor’s user interface.

Labware Editor pages

The labware editor has two tabs at the top of the screen:

- ❑ *Labware Entries*. The tab contains labware definitions
- ❑ *Labware Classes*. The tab contains a list of labware classes and the labware entries for each class

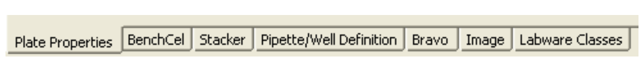


Labware Entries page

Sub-pages

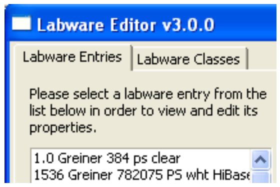
The Labware Entries tab contains the following tabs at the bottom of the screen:

- ❑ Plate Properties
- ❑ BenchCel
- ❑ Stacker
- ❑ Pipette/Well Definition
- ❑ Bravo
- ❑ Image
- ❑ Labware Classes



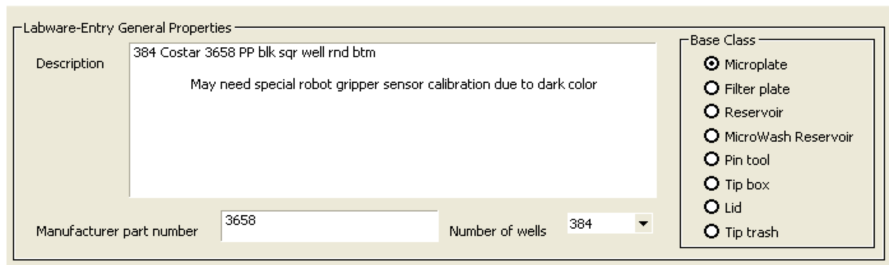
Labware selection box

The labware selection box, which is the left-hand column, is used to select a labware entry that you want to edit.



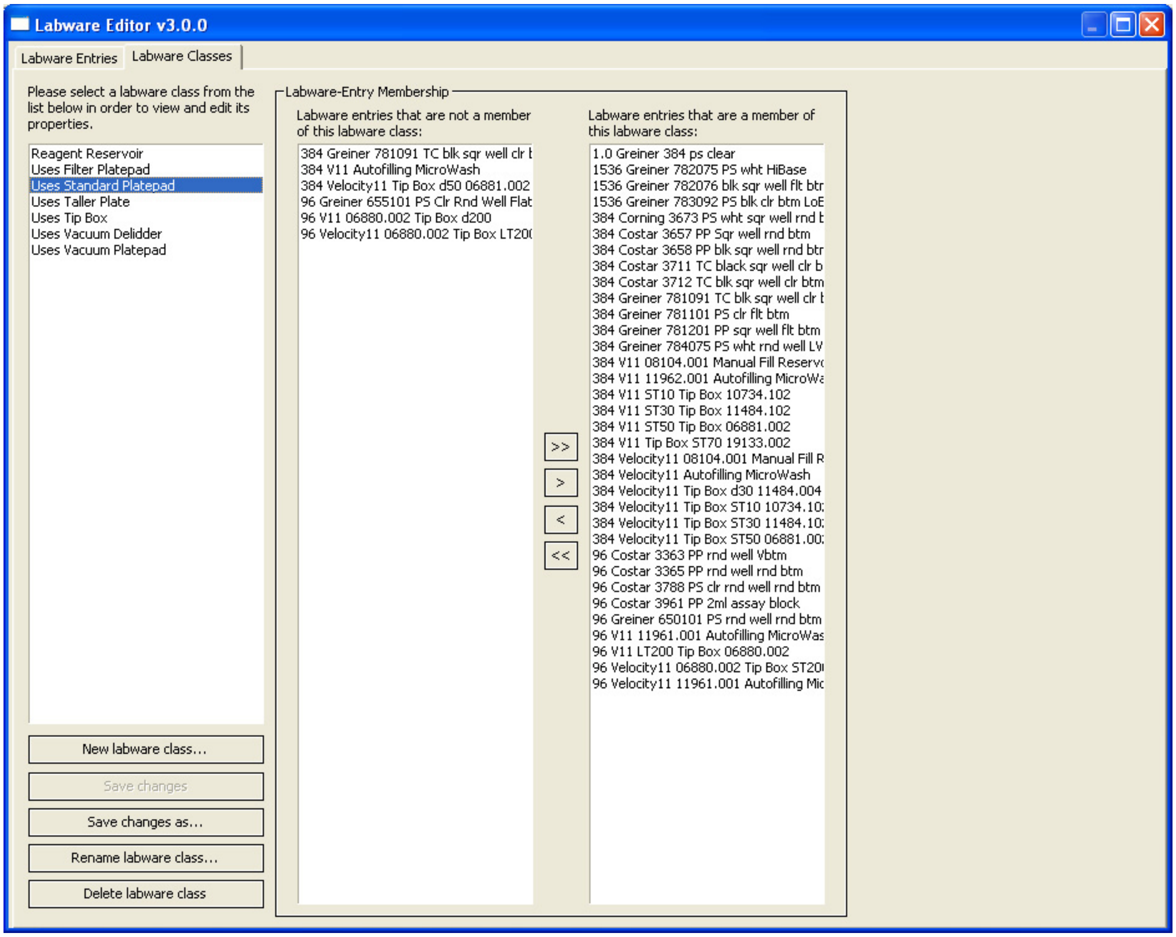
Labware-Entry General Properties area

The Labware-Entry General Properties area displays the labware-entry general properties whose selections apply across all sub-tabs.



Labware Classes page

In the Labware Classes page, you create labware classes and assign defined labware to a labware class.



Related topics

For information about...	See...
Moving the labware database to another computer	"Moving or sending a registry file" on page 240
Defining labware	"Workflow for defining labware" on page 247
Opening the labware editor	"Opening the labware editor" on page 252
Editing labware parameters	"" on page 277

Opening the labware editor

About this topic

This topic explains how to open the labware editor.

You open the labware editor when you want to:

- ❑ View existing labware entries or classes
- ❑ Edit labware entries or classes
- ❑ Add new labware entries or classes
- ❑ Delete labware entries or classes
- ❑ Rename labware entries or classes

Before you start

You must be logged in as an administrator or technician to open the labware editor.

If you are adding labware, make sure you have the following:

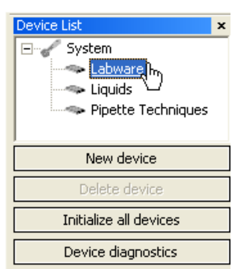
- ❑ Calipers
- ❑ Two samples of the labware you are adding

Procedure

You can open the labware editor from the device manager and from the protocol editor.

To open the labware editor from the device manager:

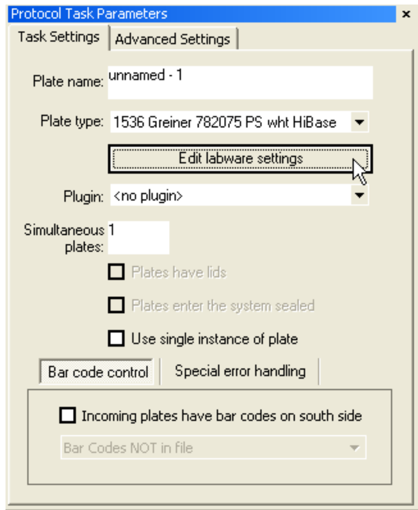
1. Click the **Device Manager** tab.
2. In the **Device List** toolbar, expand **System** and double-click **Labware** (or click **Device diagnostics**).



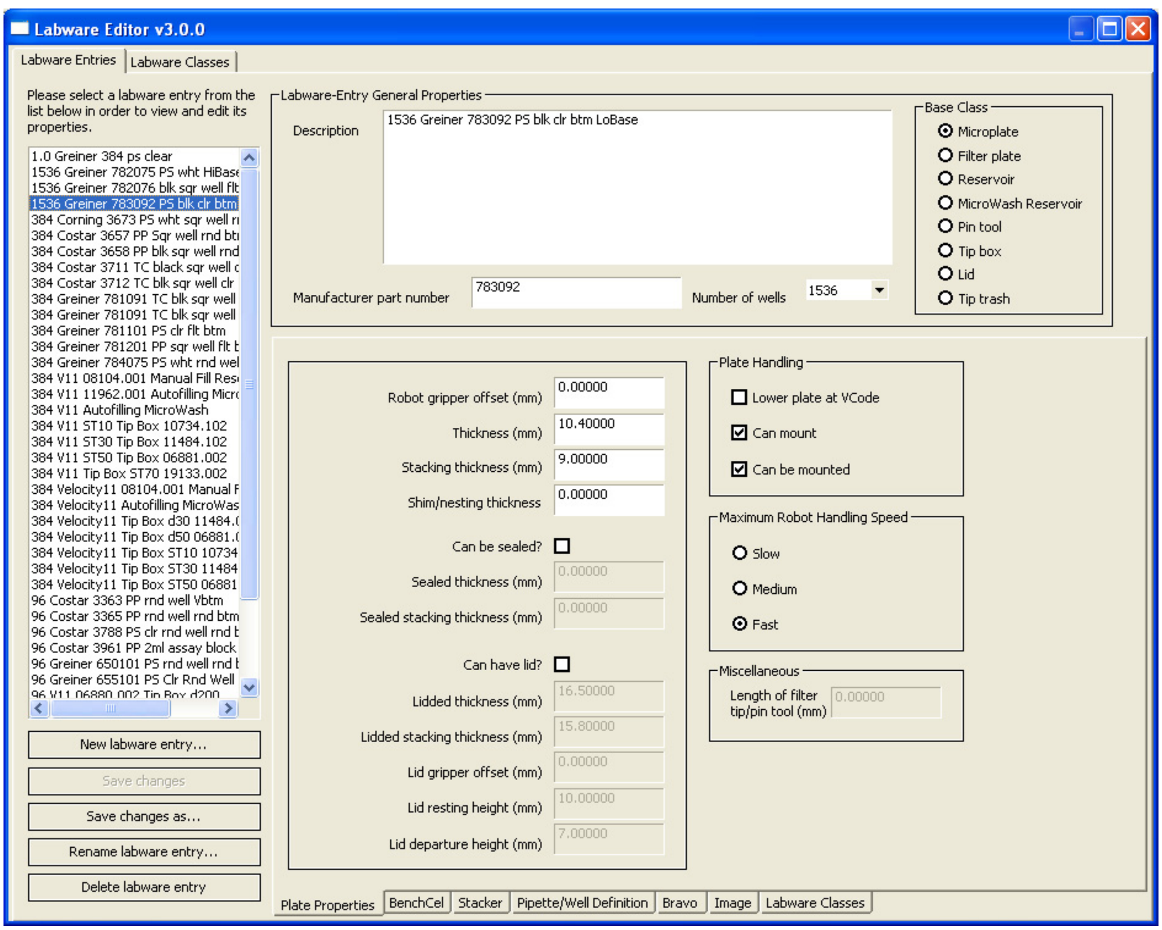
To open the labware editor from the protocol editor:

1. Click the **Protocol Editor** tab.
2. Select a plate process icon.

3. In the **Protocol Task Parameters** toolbar, click **Edit labware settings**.



The Labware Editor dialog box opens.



Related topics

For information about...	See...
Defining labware	❑ “Labware editor overview” on page 249 ❑ “Workflow for defining labware” on page 247
Editing labware parameters	*BenchCel Microplate Handling Workstation User Guide*

Adding a labware entry

About this topic

The first step in defining a new piece of labware is to add a labware entry for it.

You must be logged in as an administrator or technician to perform this procedure.

Before you start

Before you add a new labware entry:

- ❑ Check to see if it is already defined in the labware editor.

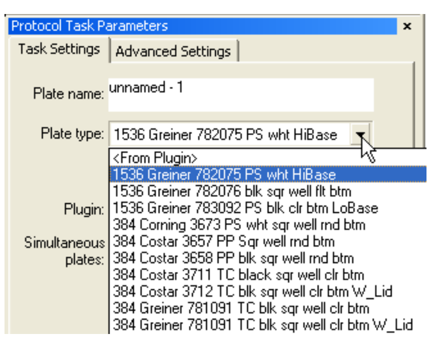
  Some common labware and some Velocity11 labware comes already defined in BenchWorks software.

- ❑ Contact Velocity11 with the definition you need.

  Velocity11 maintains a large collection of labware definitions and might be able to supply you with what you need. However, these labware definitions will still require some fine-tuning for each particular system. The generic definitions available for some plate types is a good starting point.

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

1. In BenchWorks software, click the **Protocol Editor** tab, and select the plate icon in a process.



2. In the **Protocol Task Parameters** toolbar, click the down arrow on the list box and look for the name of the plate.

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

Procedure

To add a labware entry:

1. Open the Labware Editor.
2. Under the labware selection box on the left side of the window, click **New labware entry**.

   Note: You can save a lot of time by first checking to see if there's a similar piece of labware already defined. Click **Save changes as** and enter a name for the new labware.

3. In the **New Labware Entry** dialog box, enter a name for the plate and click **OK**.

   For clarity, enter a detailed name for the labware that includes the manufacturer's name and plate-specific information.

   The entry appears in the labware selection box.

Related topics

For information about...	See...
Opening the labware editor	"Opening the labware editor" on page 252

For information about...	See...
Defining general properties of your new labware entry	"Defining general properties" on page 256
Defining the Plate Properties	"Defining plate properties" on page 257
Defining BenchCel platform properties	"Defining labware properties for a BenchCel Workstation" on page 261
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
Editing labware parameters	*BenchCel Microplate Handling Workstation User Guide*

Defining general properties

About this topic

After adding a labware entry, define the general properties of the labware. This topic describes how to define the labware's general properties.

You must be logged in as an administrator or technician to perform this procedure.

About general properties

The general properties describe the type of labware that is being entered into the database and are visible on all of the sub-tabs of the labware editor.

Before you start

You must have added a labware entry that you want to define.

Procedure

To define the general properties of a piece of labware:

1. Open the Labware Editor.
2. Select the labware in the left column.
3. In the **Description** text box, type in a detailed description of the labware.
4. For your reference, in the **Manufacturer part number** text box, enter the appropriate number.
5. In the **Number of wells** list, select the number of wells in the plate.

   If you are defining a tip box, this is the number of tips that the box can hold.

6. In the **Base Class** area, select one of the options.

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

Related topics

For information about...	See...
Opening the labware editor	"Opening the labware editor" on page 252
Adding a labware entry	"Adding a labware entry" on page 254
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
Editing labware parameters	*BenchCel Microplate Handling Workstation User Guide*

Defining plate properties

About this topic

You can specify the plate properties in either the Labware Editor or in BenchWorks software Diagnostics. The plate properties you specify in one place is automatically updated in the other.

This topic describes how to specify the plate properties in the Labware Editor.

You must have a technician or administrator user account to perform this procedure.

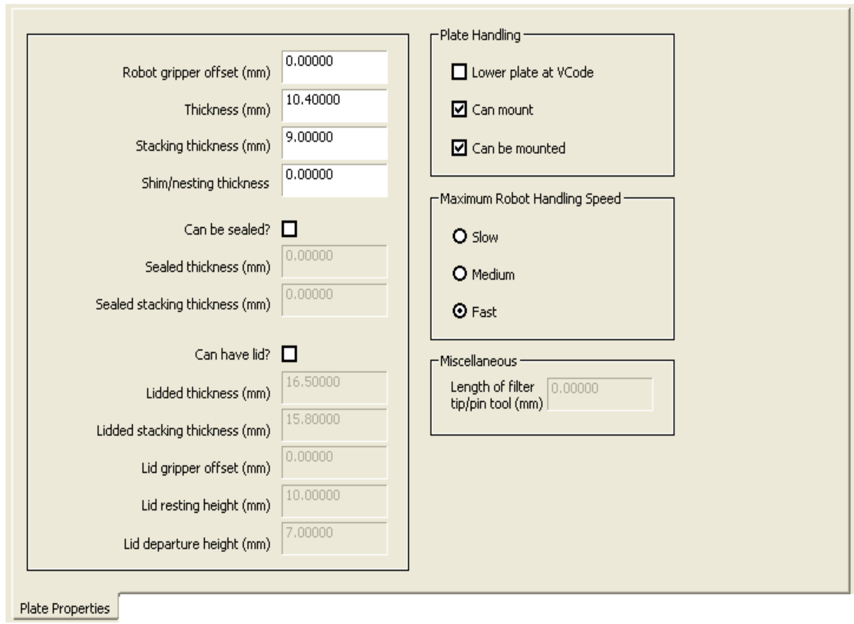
Defining plate properties

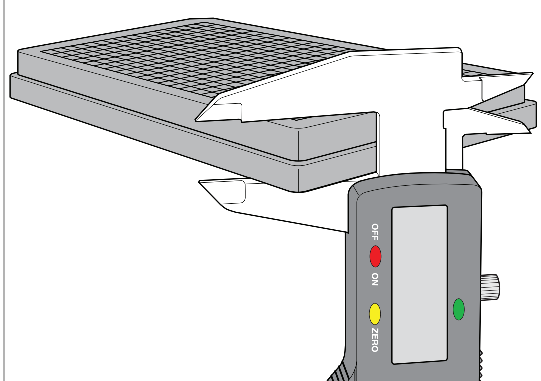
To define plate properties:

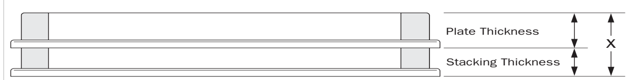
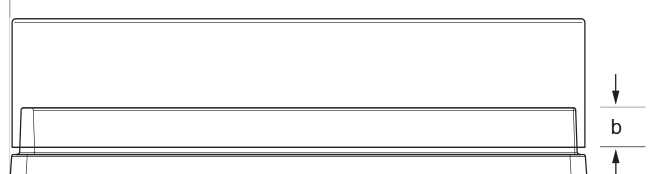
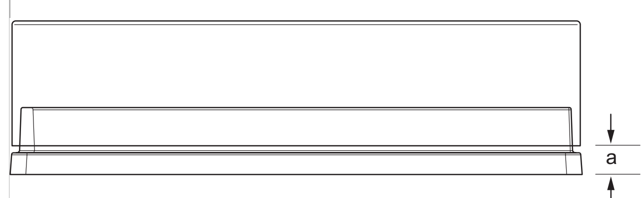
1. Click the **Plate Properties** sub-tab of the Labware Editor.
2. Enter the values for the available parameters according to the type of plate or labware you are defining.

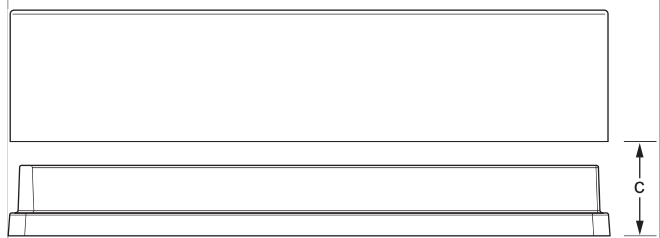
   The parameters on the **Plate Properties** sub-tab are described in the following screenshot and table.

   Note: Only the parameters associated with the **Base Class** you selected in the **General Properties** section will be available.



Property	**Description**
Robot gripper offset	This parameter is not used by BenchWorks software. This parameter refers to the offset for a BioCel System robot. The comparable parameter for the BenchCel robot is located on the BenchCel tab.
Thickness	The distance, in millimeters, from the bottom surface of the plate to the top surface of the plate. For a tip box, this is the distance from the bottom surface of the box to the top of the tips. To increase the number of contact points, measure the distance at the corner of the plate or tip box (using calipers). This method is especially useful if the plate has a lip at the top and the caliper can angle inward, producing inaccurate measurements. 

Property	Description
Stacking thickness	The thickness, in millimeters, of two stacked plates minus the thickness of one plate. Measure the distance 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?	The option to include the plate seal.
Sealed thickness	The thickness, in millimeters, of the plate with a seal in place. Available only if **Can be sealed?** is selected.
Sealed stacking thickness	The stacking thickness, in millimeters, of the plate with a seal in place. Available only if **Can be sealed?** is selected.
Can have lid?	The option to include a plate lid.
Lidded thickness	The thickness, in millimeters, of the plate with a lid in place. Available only if **Can have lid?** is selected.
Lidded stacking thickness	The stacking thickness, in millimeters, of the plate with the lid in place. Available only if **Can have lid?** is selected.
Lid gripper offset	The height, in millimeters, above the lid resting height at which to grip the lid. (Shown as *b* below.) 
Lid resting height	The height, in millimeters, above the bottom of the plate at which the bottom of a plate lid rests. (Shown as *a* below.) 

Property	Description
Lid departure height	The height, in millimeters, above the bottom of the plate to which the lid is lifted. 
Lower plate at VCode	The option to lower the plate on the stage of the VCode, if the plate has a thick skirt. This allows the VCode to place the label above the thick skirt.
Can mount	The option to place the plate 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.
Can be mounted	The option to place another plate on top of this plate. This property is for collection plates that collect filtrate from filter plates during the filtration steps of a protocol. Many different plates might 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	The maximum speed at which this type of plate should be moved. The general robot speed is set in BenchWorks software. If the plate-specific robot speed (set here) is different from the general robot speed, the slower of the two speeds is used.
Length of filter tip/pin tool	The length, in millimeters, the filter nozzle extends below the bottom edge of the skirt. Use a caliper to measure the length.

Related topics

For information about...	See...
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
Editing labware parameters	*BenchCel Microplate Handling Workstation User Guide*
Adding a piece of labware	"Adding a labware entry" on page 254

For information about...	See...
Deleting a labware entry	"Managing labware entries" on page 275

Defining labware properties for a BenchCel Workstation

About this topic

This topic describes the properties on the BenchCel sub-tab of the Labware Editor dialog box.

Note: You must also define a subset of the Stacker properties (under the Stacker sub-tab) because they apply to the built-in stackers of the BenchCel Workstation.

About the BenchCel Workstation properties

The BenchCel Workstation X-Series and R-Series each have their own gripper offsets and positions. When you add a new labware entry, default property values are automatically inserted for both series. These values are approximate and should be ignored because the labware you are defining may be different.

Any labware that you are using with the X-Series will need to be redefined to work with the R-Series BenchCel Workstation because the property values are different for the same piece of labware.

Procedure

To define the BenchCel Workstation properties:

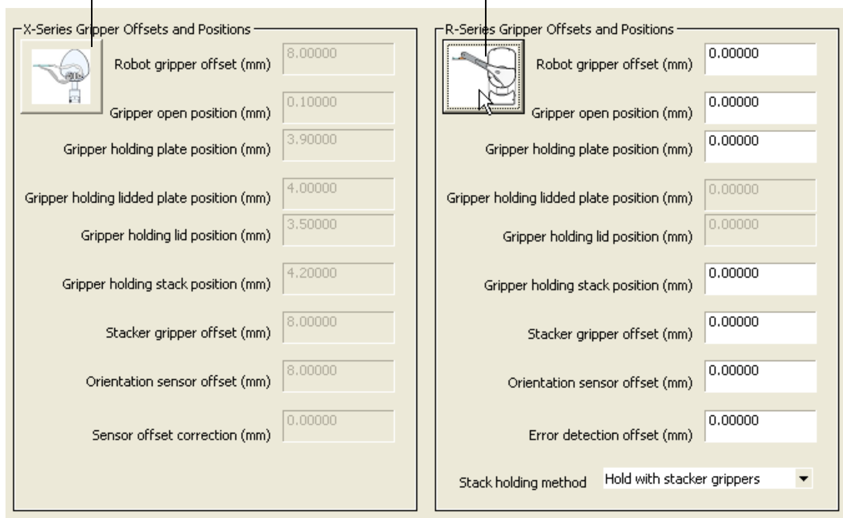
1. Click the button that corresponds to the BenchCel Workstation type that is currently operating and for which you are defining the labware.

!! IMPORTANT !! Make sure you are entering data for the correct BenchCel Workstation type. Fields for X-Series and R-Series BenchCel Workstations can be enabled regardless of the type of BenchCel Workstation that you are operating.

2. Measure the labware and enter the values into the appropriate fields.

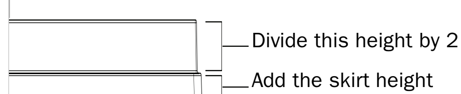
   The properties on the BenchCel sub-tab are described in the following sceenshot and table. All of the properties on this sub-tab apply to the BenchCel Workstation.

Click the button to enable the text fields



Property	Description
Robot gripper offset	The distance, in millimeters, from the bottom of the plate to the point where the grippers grip the plate. Typically this value is 6–10 mm. **!! IMPORTANT !! Make sure that the gripper points are not closing near the very edge of the skirt causing some of the gripper points to slip onto the body of the plate and the plate to be dropped.** *Note:* The robot gripper offset that appears on the Plate Properties page applies to Velocity11 robots used in BioCel Systems, not BenchCel Workstation robots.
Gripper open position	The distance, in millimeters, that each gripper moves from its home position as the robot releases a microplate. An larger value moves the grippers closer together. A smaller value opens the grippers wider. The parameter value is applied to both robot grippers. For example, a value of –1.00 mm opens each robot gripper –0.50 mm from its home position. Set this to –1 for R series and 0.1 for X Series BenchCel Workstations.

Property	Description
Gripper holding plate position	The distance, in millimeters, that the grippers move inward from their home position when holding a microplate that is not in a stack. A larger value moves the grippers closer together and holds the microplate tighter. A smaller value opens the grippers wider. The parameter value is applied to both robot grippers. For example, a value of 5.25 mm moves each robot gripper 2.625 mm toward each other from its home position. Note: How tightly the robot grippers should hold a microplate depends on the microplate material and design. You might want to run some tests to optimize the parameter.
Gripper holding lidded plate position	The distance, in millimeters, that each gripper moves inward from its home position when holding a lidded microplate. An increasing value moves the grippers closer together and holds the lidded microplate tighter. A decreasing value opens the grippers wider.
Gripper holding lid position	The distance, in millimeters, that each gripper moves inward from its home position when holding a microplate lid. An larger value moves the grippers closer together and holds the microplate tighter. A smaller value opens the grippers wider. The parameter value is applied to each robot gripper. For example, a value of 5.25 mm moves each robot gripper 2.625 mm toward each other from its home position. In general, type a value that is less than Gripper holding plate position to open the grippers slightly. Holding the lid too tightly might cause the microplate to be lifted with the lid.

Property	Description
Gripper holding stack position	The distance, in millimeters, that each gripper moves inward from its home position when holding a microplate that is in a stack. An increasing value moves the grippers closer together and holds the microplate tighter. A decreasing value opens the grippers wider. The parameter value is applied to both robot grippers. For example, a value of 5.25 mm moves each robot gripper 2.625 mm toward each other from its home position. Note: Because the weight of the entire stack will be on the robot grippers, you should use a value greater than the Gripper holding plate parameter.
Stacker gripper offset	Adjusts the height at which the stacker grippers will grab the plate. This distance is measured in millimeters from the bottom of the plate. Be careful not to grab the plate on the top edge of the skirt where the stacker grippers could slip onto the plate body. Change this value only if the stacker is not gripping the plates correctly.
Orientation sensor offset	The distance, in millimeters, from the bottom of a microplate to where the orientation sensors will check for notches. Velocity11 recommends that you calculate the offset as follows: Determine the halfway distance between the top of the microplate and the top of the microplate skirt, and then add the height of the skirt. 

Property	Description
Stack holding method (R-Series only)	Determines how the stacker holds the stack of plates. Holding the stack with grippers is more precise and slower than holding the stack with a shelf. Choose Hold with stacker gripper if your plate has a narrow gripping tolerance requiring a specific stacker gripper offset. Choose Hold with shelf if your plate has a wider gripping tolerance and does not require a specific stacker gripper offset. *Note:* Cycle time is faster with the shelf method.

Related topics

For information about...	See...
Opening the labware editor	"Opening the labware editor" on page 252
Adding a labware entry	"Adding a labware entry" on page 254
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
Editing labware parameters	*BenchCel Microplate Handling Workstation User Guide*

Defining stacker properties

About this topic

This topic describes how to define the stacker properties for your labware definition.

You must be logged in as an administrator or technician to perform this procedure.

Before you start

Make sure you have read the portions of the *BenchCel Microplate Handling Workstation User Guide* that describes the location and function of the stacker sensors.

Defining properties

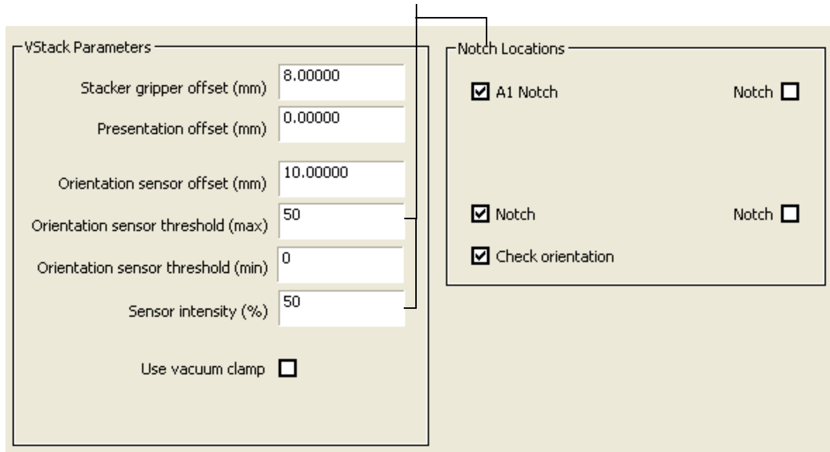
To define stacker properties:

1. Click the **Stacker** sub-tab of the **Labware Editor**.
2. Enter the values for the available parameters according to the type of plate or labware you are defining.

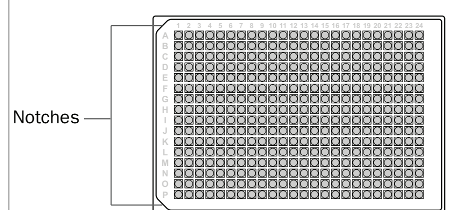
   The properties on the **Stacker** sub-tab are described in the following screenshot and table.

   For BenchCel Workstations, you only need to set the maximum orientation sensor threshold, sensor intensity and notch locations. The other settings are used by the VStack Stacker, not the BenchCel Workstation.

Set these properties for BenchCel stackers



Property	Description
Orientation sensor threshold (max)	Specifies the highest value that an orientation sensor can register when sensing a notch. Any sensor reading above this value indicates that a solid plate wall is present. Any sensor value below this threshold indicates that either a notch, or no plate is present. If the stacker does not sense a notch when it should, you will get a “wrong plate type” or a “plate rotated 180 degrees” error message. Adjust the sensor threshold value. The maximum value is 255.

Property	**Description**
Sensor intensity	Sets the percentage of maximum sensor 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 might 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.
Notch locations	With the A1 well of your plate positioned in the far, left corner as you face the BenchCel Workstation., select the corresponding notch or notches for your plate in the Notch Locations area. 
Check orientation	Turns on plate-orientation checking. The notch locations are ignored when this option is cleared.

Related topics

For information about...	**See...**
How sensors work and their location	*BenchCel Microplate Handling Workstation User Guide*
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
General properties	"Defining general properties" on page 256
Plate properties	"Defining plate properties" on page 257
BenchCel System properties	"Defining labware properties for a BenchCel Workstation" on page 261

Inserting an image

About this topic

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

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

Procedure

To insert an image:

1. Open the labware editor.
2. Select the labware in the left column.
3. Click the **Image** sub-tab of the labware editor.
4. Click the ellipsis button (...), and navigate to the folder location of the image file.

5. Double-click the image file.

   The image appears below the file name.

6. Click **Save changes**.

Related topics

For information about...	See...
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
General properties	"Defining general properties" on page 256
Plate properties	"Defining plate properties" on page 257
BenchCel System properties	"Defining labware properties for a BenchCel Workstation" on page 261

About labware classes

Labware classes defined

Labware classes contain labware entries. When you configure a device for the BenchCel System, you can associate the device with labware classes to indicate what labware can (and cannot) be used with the device. Associating a device with a labware class is performed in the Device Manager under the Allowed/prohibited labware property.

Before you create labware classes, consider what labware you want used or prohibited on each of your devices.

BenchWorks software is provided with six labware classes already defined:

- Uses Filter Platepad
- Uses Standard Platepad
- Uses Taller Plate
- Uses Tip Box
- Uses Vacuum Delidder
- Uses Vacuum Platepad
- Uses Tip Box

These default classes should be enough for your plate handling needs. However, if you want an additional special class that is excluded from a particular device or set of devices, you can create a new class.

Two places to define classes

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

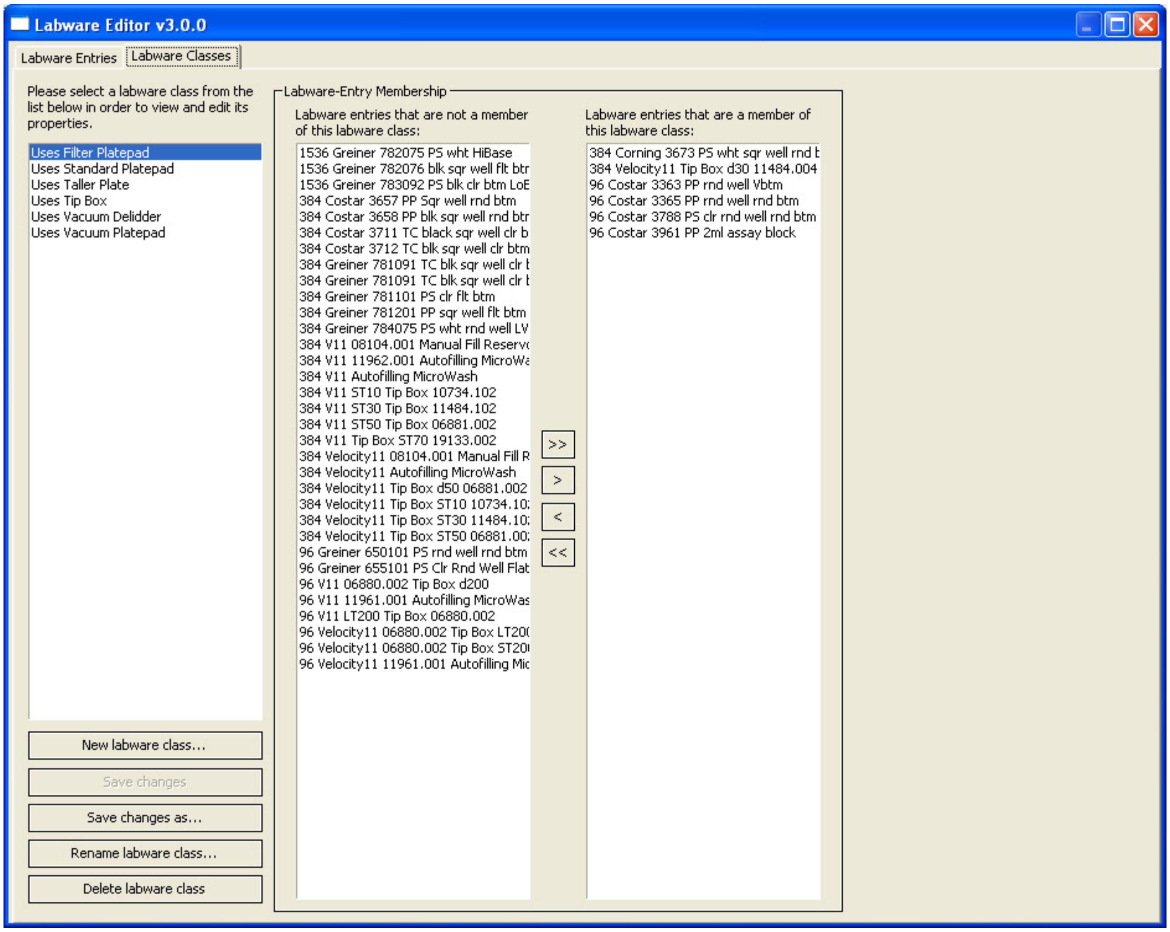
- The Labware Classes tab
- The Labware Classes sub-tab of the Labware Entries tab

These views present the same information in different ways.

About the Labware Classes tab

The Labware Classes tab is used to create and manage labware classes and to edit labware entry membership. The Labware Classes tab is located in the Labware Editor dialog box.

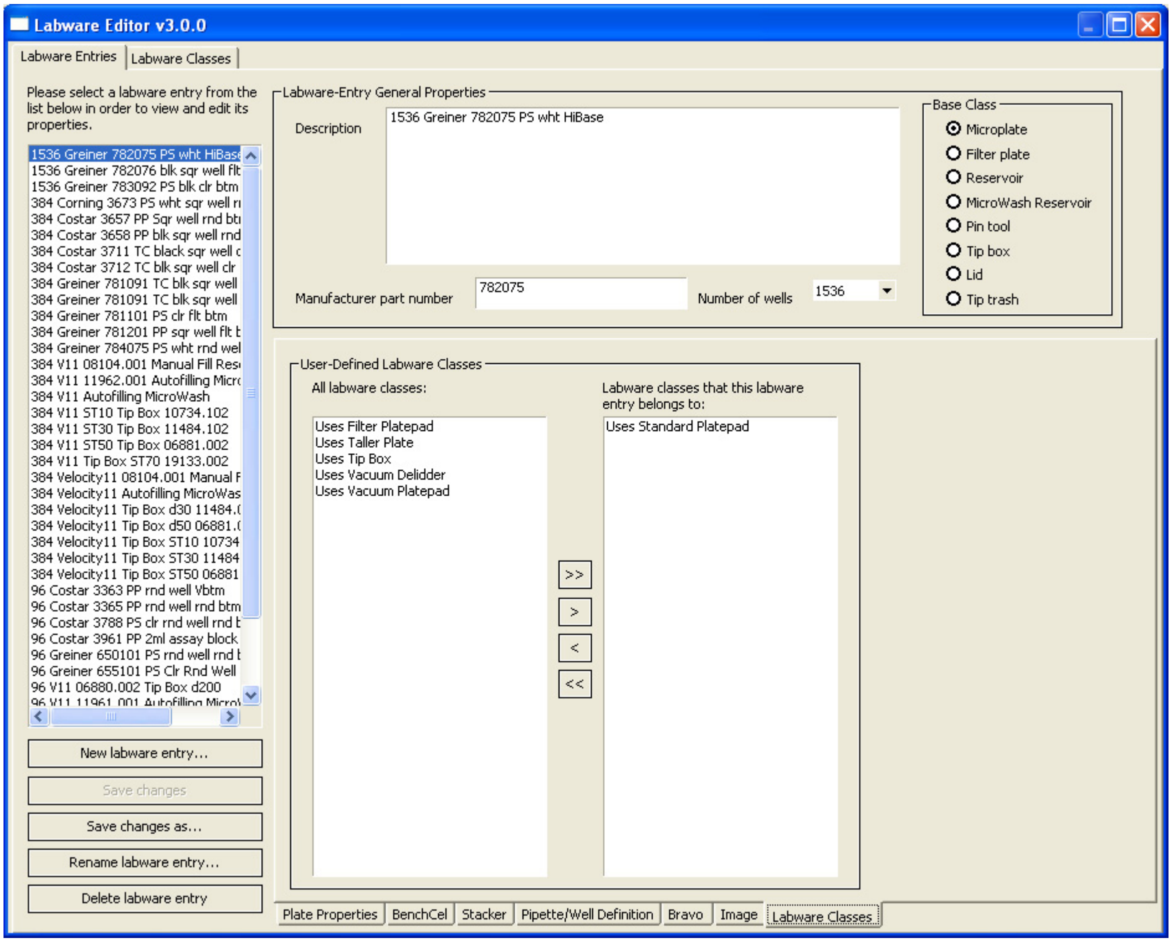
Select a class to see the labware entries that are members and non-members for that class. In the example below, the class Uses Filter Platepad is selected and the labware that are members and non-members of this class are displayed.



About the Labware Classes sub-tab

The Labware Classes sub-tab is used to assign one or more labware class to a labware entry. It is accessed through a bottom tab located on the Labware Entries tab of the Labware Editor dialog box.

In the example below, a 1536 Greiner plate is selected and the classes for which it is a member displayed.



Related topics

For information about...	See...
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
General properties	"Defining general properties" on page 256
Plate properties	"Defining plate properties" on page 257
BenchCel Workstation properties	"Defining labware properties for a BenchCel Workstation" on page 261

Using labware classes

About this topic

This topic provides an example of how to use labware classes in conjunction with a device.

The example

You have configured VPrep Pipettor shelves 2, 4, and 6 as devices that are accessible by the system's robot. You are using a mix of plates, some of which are too tall to fit on shelf 2. By using labware classes, you will ensure that the robot will never try to place the wrong type of labware on shelf 2.

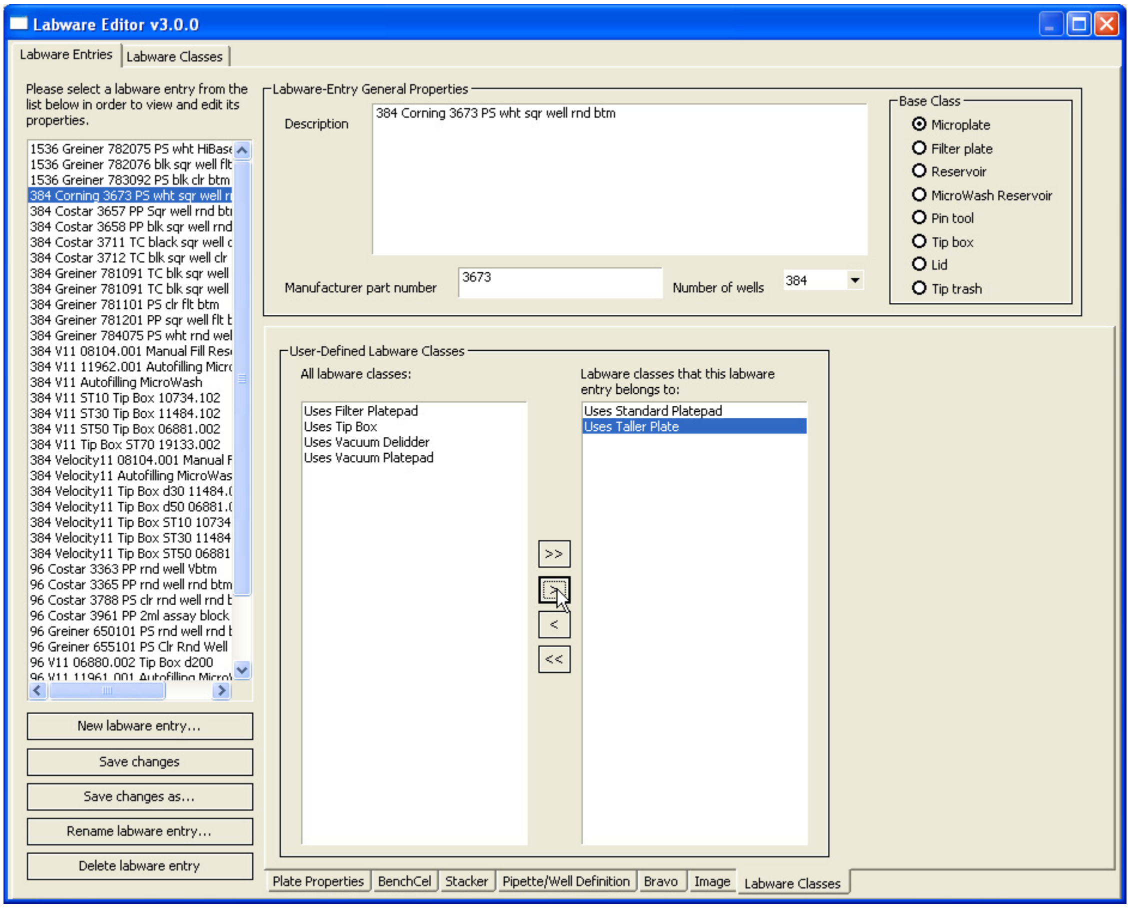
The labware has been defined and added to the labware editor but it still has the default settings for class membership. All labware, by default, are members of the Uses Standard Platepad class.

Assigning the labware

The first task is to assign the tall labware to the appropriate labware class.

To assign the labware:

1. Open the **Labware Entries** tab of the **Labware Editor**.
2. Select the labware from the list. The classes that the labware are and are not a member of is displayed.
3. Select **Uses Taller Plates** from the **All labware classes** area.
4. Move it to the **Labware classes that this labware entry belongs to** area by clicking the > arrow.
5. Click **Save changes**.

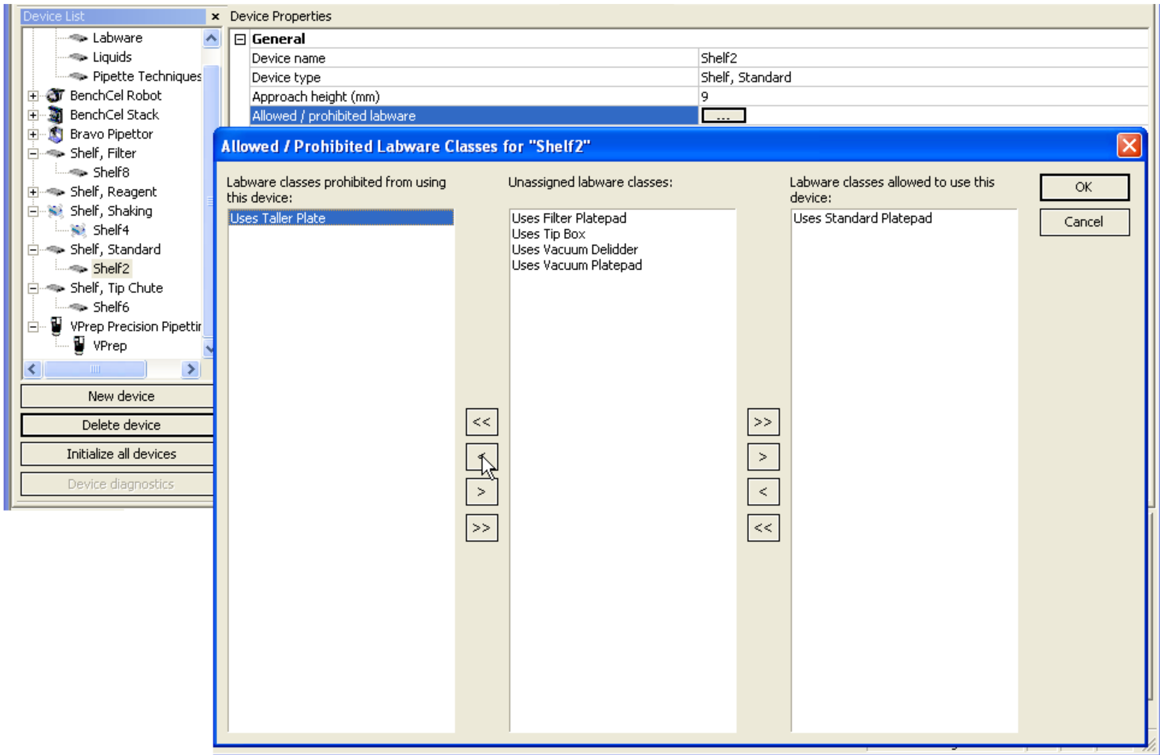


Setting restrictions for shelf 2

The next task is to restrict shelf 2 from using any labware that is a member of the Uses Taller Plates class.

To restrict shelf 2:

1. Open the **Device Manager**.
2. Select **Shelf 2** in the **Device List**.
3. Click in the cell next to **Allowed/prohibited labware** in **Device Properties**. The Allowed/Prohibited Labware Classes for Shelf 2 dialog box opens.
4. Select **Uses Taller Plates** in the **Unassigned labware classes** area and move it to the **Labware classes prohibited...** area using the left arrow (<).
5. Click **OK**.



Creating a new labware class

If you have special labware that is not covered by the six classes provided, you can create a new one.

To create a labware class:

1. Open the labware editor.
2. In the **Labware Classes** tab, click **New labware class**.
3. In the **New Labware Class** dialog box, enter a name for the labware class and click **OK**.

   The class appears in the list of labware classes.

Assign the desired labware to the new class:

1. Select the labware class.
2. Select the labware from the non-members entry list.
3. Move the labware to the member list by clicking the right arrow (>).
4. Click **Save changes**.

Related topics

For information about...	See...
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
General properties	"Defining general properties" on page 256
Plate properties	"Defining plate properties" on page 257
BenchCel System properties	"Defining labware properties for a BenchCel Workstation" on page 261

Managing labware entries

About this topic

You can manage your labware entries by copying, renaming, or deleting them. For example, to save time when creating a new entry that is similar to an existing one, you can copy an existing labware entry.

This topic describes how to do these tasks.

You must be logged in as an administrator or technician to perform this procedure.

Before you start

If you are renaming an entry, make sure either:

❑ The entry you are renaming is not already referenced in protocols, or

❑ If the entry is referenced in protocols, you update those protocols

!! 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 until the protocols are updated.

If you are deleting an entry, make sure the entry you are deleting is not referenced in a protocol.

Procedures

To rename a labware entry:

1. Open the labware editor.
2. In the labware selection box on the left side of the window, select the labware entry to be renamed.
3. Click **Rename labware entry**.
4. In the **V11Labware** dialog box, click **Yes** to confirm that you want to rename this entry.

5. In the **Rename Labware Entry** dialog box, enter the new name for the plate and click **OK**.

To copy a labware entry:

1. Open the labware editor.
2. In the labware selection box on the left side of the window, select a labware entry.
3. Click **Save changes as**.
4. In the **Save Labware Entry As** dialog box, type a name for the new entry that is different from the selected one, and click **OK**.

   The copied entry appears in the labware selection box.

To delete a labware entry:

1. Open the labware editor.
2. In the labware selection box on the left side of the window, select the labware entry to be deleted.
3. Click **Delete labware entry**.
4. In the **V11Labware** dialog box, click **Yes** to delete the entry.

Related topics

For information about...	See...
Defining labware	❑ "Labware editor overview" on page 249 ❑ "Workflow for defining labware" on page 247
General properties	"Defining general properties" on page 256
Plate properties	"Defining plate properties" on page 257
BenchCel System properties	"Defining labware properties for a BenchCel Workstation" on page 261

About the Labware tab in BenchCel Diagnostics

About the Labware tab in BenchCel Diagnostics

The BenchCel Diagnostics Labware tab exposes a subset of labware parameters that are critical for proper plate handling by the BenchCel.

Access the labware parameters directly from the Labware tab on the BenchWorks software Diagnostics Controls page.

Note: The Labware tab does not contain the parameters relevant to the any of the instruments that are integrated with the BenchCel Workstation.

When to use

Use the Labware tab to:

- ❑ Test a new plate. Once you have created an initial definition for your labware, use the Labware tab in combination with BenchCel diagnostics to fine-tune your labware definition.
- ❑ Troubleshoot a plate sensor or plate placement errors

For more information on using BenchCel Diagnostics to define labware, see the *BenchCel Microplate Handling Workstation User Guide*.

Related topics

For information about...	See...
BenchWorks software Diagnostics	*BenchCel Microplate Handling Workstation User Guide*

Setting liquid-handling definitions

11

This chapter is for people with administrator or technician login privileges. It describes the liquid library editor, which is used to set parameters that affect pipetting speed, accuracy and precision, and to save the parameters as classes for convenient reuse. This chapter contains the following topics:

About the liquid library editor

Accessing the liquid library editor

Use the liquid library editor when you have a VPrep Pipettor or Bravo Platform connected to the BenchCel Workstation. Access the liquid library editor through the diagnostic page of the device.

Liquid library editor defined

The liquid library editor is a dialog box through which users with technician or administrator privileges can enter values for properties that affect pipetting speed, accuracy, and precision.

Default liquid library entries

When installing BenchWorks software, you might have elected to install the default liquid library entries. These entries are provided as examples and thus might only approximate your particular reagents. For the best performance, you should create your own liquid library definitions.

When to use the liquid library editor

You open the liquid library editor when you want to:

- ❑ View the properties that are defined for a liquid class
- ❑ Edit the properties that are defined for a liquid class
- ❑ Add new liquid classes

!! IMPORTANT !! You should verify the pipetting of your VPrep Pipettor or Bravo Platform. Accurate and precise pipetting depends on a variety of factors including the liquid properties. Use the Liquid Library to fine-tune the volume delivered.

Liquid classes defined

The values entered into the liquid library editor can be saved as a collection, known as a liquid class. Using liquid classes saves time when writing protocols because you do not have to enter values for the liquid properties every time you create a protocol.

Types of liquid classes

You might want to create different classes for different:

- ❑ Types of liquids

  For example, water versus DMSO
- ❑ Volumes of liquids

  For example, 1 µL versus 200 µL
- ❑ Liquid operations

  For example, washing versus mixing

Liquid library database defined

The data that represents a liquid class is saved to the liquid library database, which is maintained in the Windows registry.

Using a liquid class

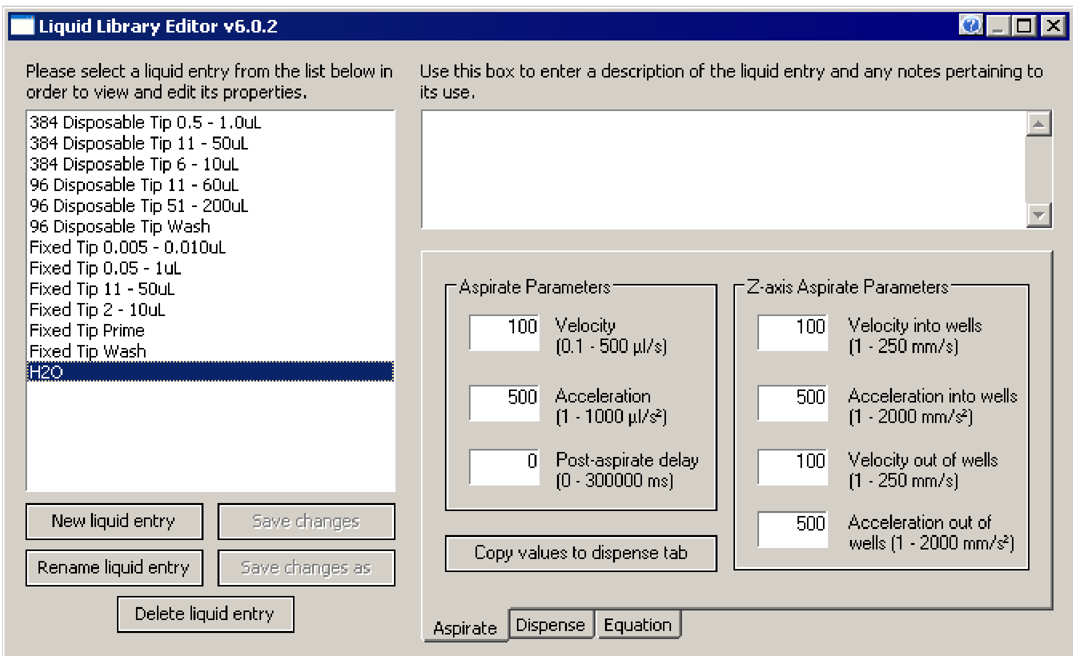
When preparing for a protocol run, you select the liquid class that you want to use. During the run, the liquid class values are referenced for pipetting operations.

Calibrating the Bravo Platform and VPrep Pipettor

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

Liquid Library Editor dialog box

A screenshot of the liquid library editor follows.



Related topics

For information about...	See...
Opening the liquid library editor	"Opening the liquid library editor" on page 282
Creating a new liquid class	"Creating a liquid class" on page 283

Opening the liquid library editor

About this topic

This topic explains how to open the liquid library editor.

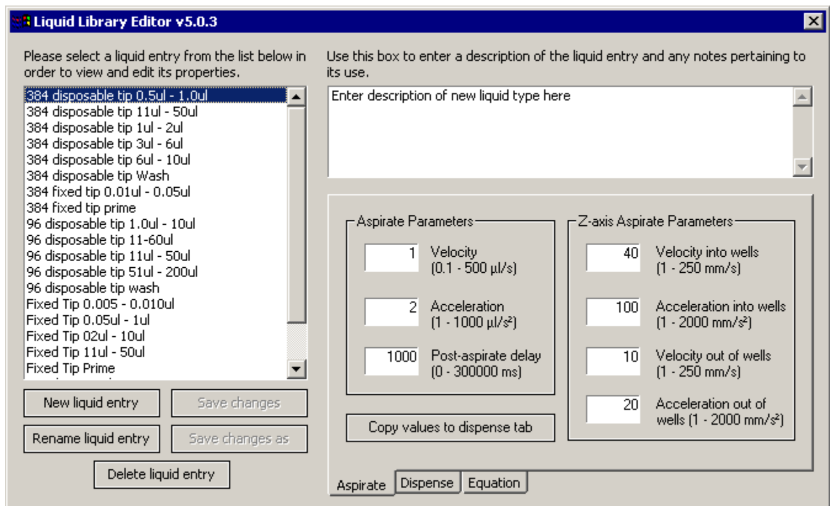
You must be logged in as an administrator or technician to open the liquid library editor.

Procedure

To open the liquid library editor from BenchWorks software:

1. Select **Tools > Liquid Library Editor**.

   The **Liquid Library Editor** opens.



Related topics

For information about...	See...
The liquid library editor	"About the liquid library editor" on page 280
Creating a new liquid class	"Creating a liquid class" on page 283

Creating a liquid class

About this topic

This topic describes how to create a liquid class using the liquid library editor.

You must be logged in as an administrator or technician to perform this procedure.

Liquid compatibility

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

Procedure

To create a liquid class:

1. Open the liquid library editor.
2. Click **New liquid entry**.
3. In the **New Liquid Entry** dialog box, enter a name for the liquid class and click **OK**.
4. Optionally, in the text box at the top right, type a note describing the liquid library entry for your records.
5. Enter values for the aspirate properties.

   The following table describes these properties.

   Note: The upper limits for some of the properties might not be achievable for the device you are using.

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.
Post-aspirate delay	Specifies the time the pipettor waits after aspiration is complete before moving the tips out of the wells, in milliseconds.
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.

6. Click the **Dispense** tab and enter values for the dispense properties.

   The following table describes these 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.
Post-dispense delay	Specifies the time the pipettor waits after the dispense stroke before moving the tips out of the wells, in milliseconds.
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.

7. Click **Save changes**.

   The changes are now stored in the liquid library database.

Related topics

For information about...	See...
Opening the liquid library editor	"Opening the liquid library editor" on page 282
The liquid library editor	"About the liquid library editor" on page 280

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Note: You can also search our technical documentation on our website at http://www.velocity11.com/site/?q=node/113.

Symbols

A

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User Guide

G5400-90003