



VWorks Automation Control

Version 14

Setup Guide

Notices

Manual Part Number

D0004377 Revision A

November 2020

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WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

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Preface

This preface contains the following topics:

- “About this guide” on page vi
- “Accessing user guides” on page ix

About this guide

Who should read this guide

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

Job role	Responsibilities
Integrator	Someone who writes software and configures hardware controlled by VWorks Automation Control.
Lab manager, administrator, or technician	Someone who is responsible for: <ul style="list-style-type: none">Developing the applications that are run using VWorks Automation ControlDeveloping training materials and standard operating procedures for operators
Operator	Someone who performs the daily production work using VWorks software and solves routine problems. Your organization may choose to create its own procedures for operators including the procedures in this guide.

What this guide covers

This guide describes

- Setting up the VWorks software
- Compliance features
- How to create and manage labware definitions and liquid classes
- Creating a labware inventory database
- Creating an experiments database
- How to migrate protocols from previous versions

Table Terms used in this guide

Term	Description
VWorks Automation Control	VWorks software component that you use to create the protocols that run your automation devices.
VWorks Plus	Collection of software components required for running the VWorks software with compliance features. This edition includes Control Panel, Shared Services, Content Management, and Content Browser.
VWorks Standard	Collection of software components required for running the standard VWorks software. This edition includes Control Panel and Shared Services.

Term	Description
Content Management (OpenLab component)	VWorks <i>Plus</i> only. The storage repository for VWorks-related records of interest. An administrator can use the Content Browser to view the VWorks project content in Content Management.
Control Panel (OpenLab component)	The Shared Services user interface for configuring and managing user access and licenses.
Microsoft Control Panel	Part of the Microsoft Windows operating system.
Shared Services (OpenLab component)	Set of administrative services that control VWorks user access and file storage. Shared Services are accessed via the Control Panel.

Software version

This guide documents VWorks software 14.0 and later versions.

Related guides

For information about the following VWorks-related topics, see the corresponding Agilent guide.

For information about ...	See...
Computer requirements and installing the software	<i>VWorks Automation Control Installation Guide</i>
<ul style="list-style-type: none">Configuring the software in Control Panel, including managing licenses and user accessBacking up and restoring the software, Shared Services database, and project content	<ul style="list-style-type: none"><i>VWorks Automation Control Plus Administrator Guide</i><i>VWorks Automation Control Standard Administrator Guide</i>
Setting up a specific device and operating the device using VWorks and device diagnostics software	Relevant Agilent device user guide
General safety information and potential safety hazards that you might encounter when using Automation Solutions products	<i>Automation Solutions Products General Safety Guide</i>
How to use the VWorks software, including: <ul style="list-style-type: none">Setting up devicesWriting protocols and creating formsRunning a protocolTroubleshooting protocols	<i>VWorks Automation Control User Guide</i>

Preface

About this guide

For information about ...	See...
Quick reference guides	<ul style="list-style-type: none">• <i>VWorks Plus Quick Reference</i>• <i>VWorks Standard Quick Reference</i>
An overview of how to use the VWorks software	<i>VWorks Quick Guide for Protocol Authors</i>

Related topics

For information about...	See...
How to access user guides	"Accessing user guides" on page ix
Setting up the VWorks software	"VWorks setup workflow" on page 2
VWorks compliance features	"Using compliance features" on page 11

Accessing user guides

About this topic

This topic describes the different formats of user information and explains how to access it for the Agilent Automation Solutions products.

Where to find user information

The user information is available in the following locations:

- *Knowledge base*. The help system for the Automation Solutions products is available from:
 - Help menu within the VWorks software: Select **Help > Knowledge Base** or press F1.
 - From the Windows desktop: Select **Start (Windows icon) > All Apps > Agilent Technologies > VWorks Knowledge Base**.
- *PDF files*. The PDF files of the user guides are installed with the VWorks software (C:\Program Files (x86)\Agilent Technologies\VWorks\UserGuides) and are available in the VWorks Knowledge Base.
- *Website*. You can search the online VWorks Knowledge Base or download the latest version of any PDF file from the Agilent website at www.agilent.com/chem/askb.

Accessing safety information

Safety information for the Agilent Automation Solutions devices appears in the *Automation Solutions Products General Safety Guide* and in the corresponding device safety guide or user guide.

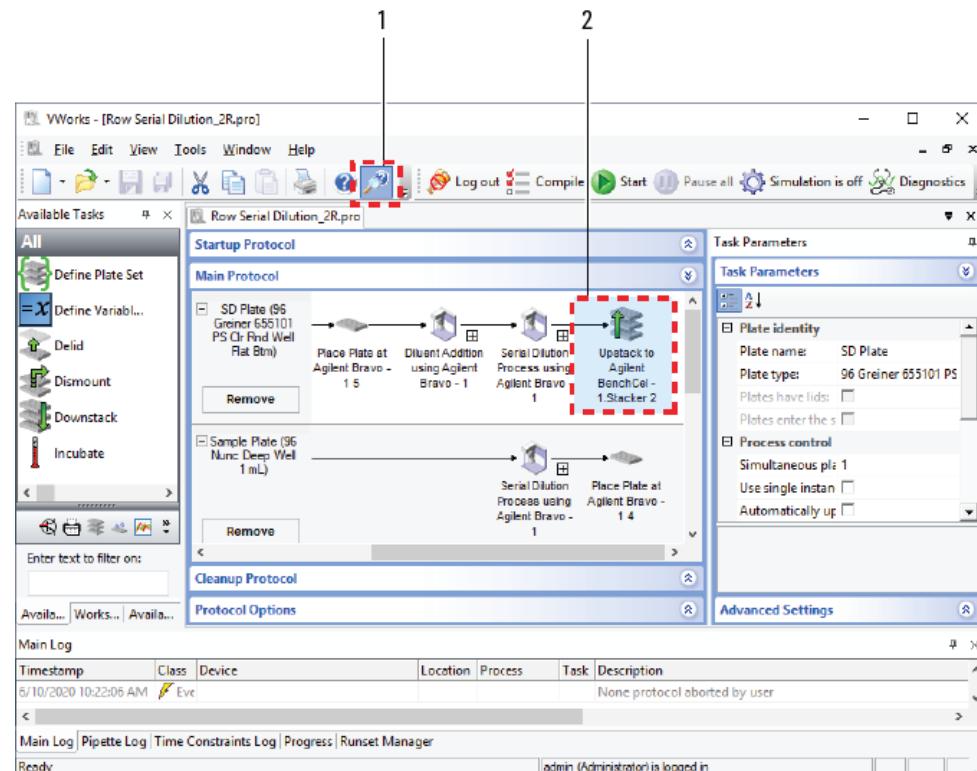
You can also search the knowledge base or the PDF files for safety information.

Using the knowledge base

Knowledge base topics are displayed using web browser software such as Microsoft Edge.

Note: If you want to use Internet Explorer to display the topics, you might have to allow local files to run active content (scripts and ActiveX controls). To do this, in Internet Explorer, open the Internet Options dialog box. Click the Advanced tab, locate the Security section, and select Allow active content to run in files on my computer.

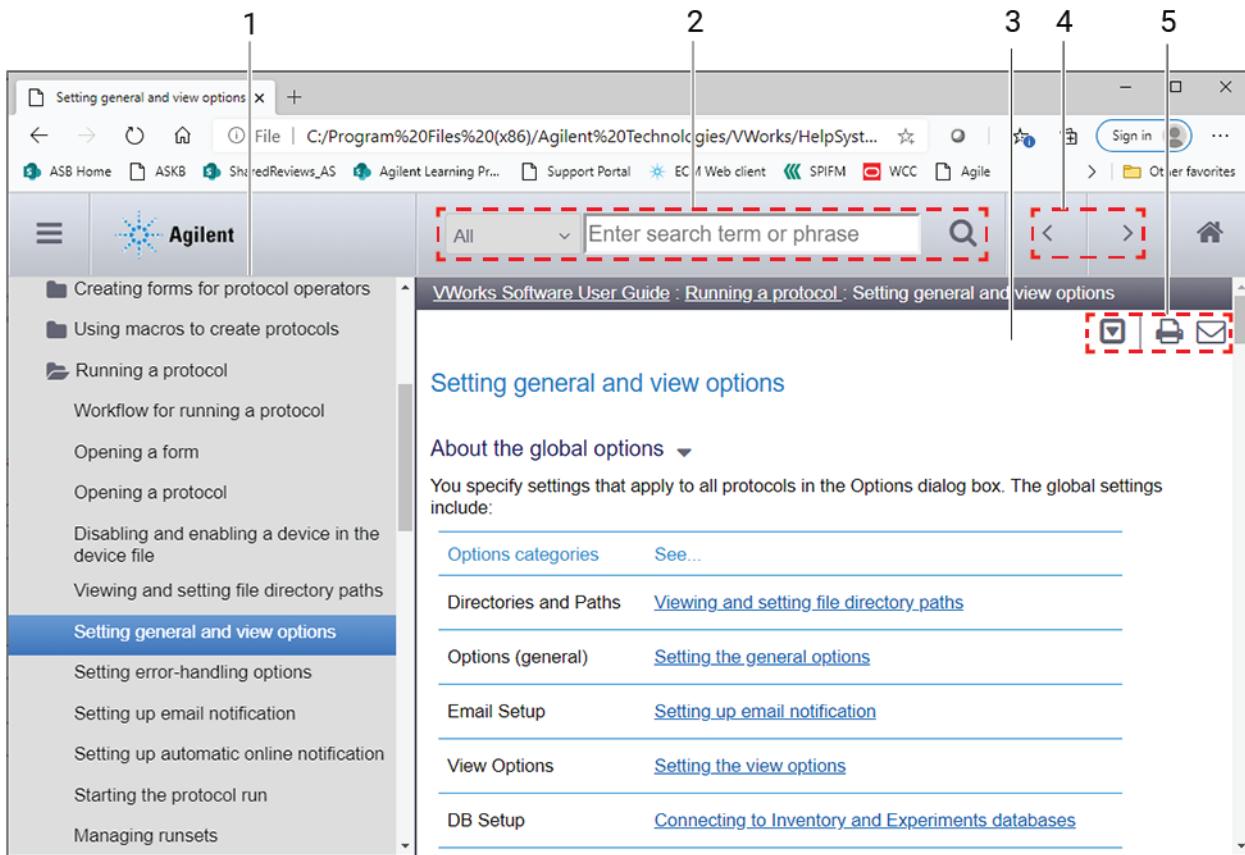
Opening the help topic for an area in the VWorks window



To access the context-sensitive help feature:

- 1 In the main window of the VWorks software, click the help button . The pointer changes to . Notice that the different icons or areas are highlighted as you move the pointer over them.
- 2 Click an icon or area of interest. The relevant topic or document opens.

Features in the Knowledge Base window



Step For this task...

- 1 *Contents pane.* Lists all the books and the table of contents of the books.
- 2 *Search.* Allows you to search the Knowledge Base (all products or selected products) using keywords.
- 3 *Topic area.* Displays the selected online help topic.
- 4 *Navigation buttons.* Enable you to navigate through the next or previous topics listed in the Contents tab.
- 5 *Toolbar buttons:* Enable you to:
 - Expand or collapse all the sections in a topic that has drop-down headings.
 - Print the topic.
 - Send feedback by email for a given topic.

Preface

Accessing user guides

Related topics

For information about...	See...
Setting up the VWorks software	"VWorks setup workflow" on page 2
VWorks compliance features	"Using compliance features" on page 11

1 Setting up the VWorks software

This chapter contains the following topics:

- “VWorks setup workflow” on page 2
- “Starting up and logging in” on page 3
- “Changing your password” on page 5
- “Software components and folder structure” on page 6
- “Reporting problems” on page 9

1 Setting up the VWorks software

VWorks setup workflow

VWorks setup workflow

If you are setting up the software for the first time, use the following workflow:

Step	For this task...	See...
1	Ensure that the software is configured correctly, including setting up user accounts.	<ul style="list-style-type: none">VWorks Automation Control Plus Administrator GuideVWorks Automation Control Standard Administrator Guide
2	Log in to the VWorks software.	"Starting up and logging in" on page 3
3	Verify your project folder requirements.	"Software components and folder structure" on page 6
4	VWorks <i>Plus</i> only. Understand how audit trails work and set options for audit trails.	"Audit trails and audit trail reports" on page 13
5	<i>If applicable.</i> Migrate protocols from VWorks 12.3 or later versions.	"Migrating files from previous VWorks versions" on page 177
6	Create labware definitions for the labware you will use during protocol runs.	"Defining labware" on page 33
7	If you have a Bravo Platform, specify the pipetting speed and accuracy. The Liquid Library Editor provides tools for specifying properties that affect pipetting speed, accuracy, and precision.	"Specifying pipette speed and accuracy" on page 69
8	Set up the devices. During setup, you add the device in the VWorks software and establish communication with the device.	Device user guide
9	If you have a labware storage device, such as the Labware MiniHub, manage the labware inventory. The Inventory Editor helps you track barcodes and labware as you move them into and out of storage or incubation.	"Tracking and managing labware in storage" on page 79
10	If you are tracking the settings that operators specify for runs of a given application, set up the Experiments database.	"Tracking experiment data" on page 135
11	Create protocols. Protocols determine the sequence of tasks you want to automate in a run. For example, you can use a protocol to apply barcode labels to 100 microplates.	VWorks Automation Control User Guide

Starting up and logging in

About this topic

To create, modify, or run a protocol, you must first log in. Contact your lab manager or administrator to set up a user account or to find out your access privileges.

This topic explains the following:

- [“Logging in” on page 3](#)
- [“Logging out” on page 4](#)
- [“About changing your VWorks password” on page 5](#)

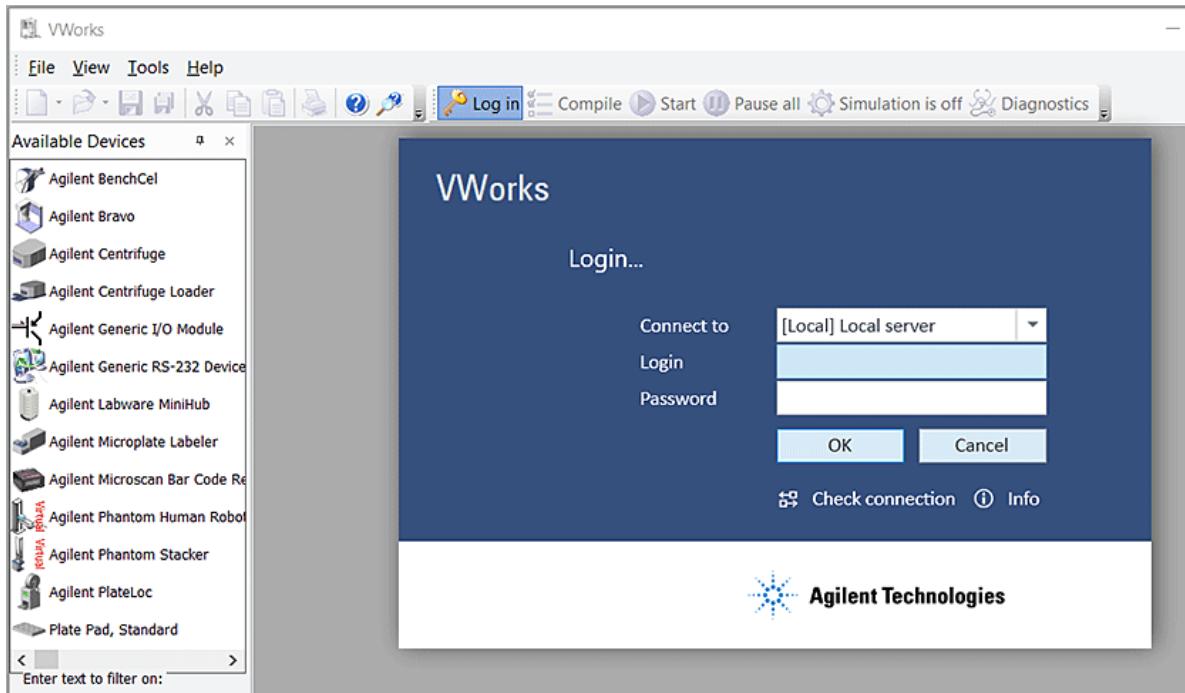
Logging in

To log in to the VWorks software:

- 1 To start the VWorks software, double-click the VWorks icon on the Windows desktop.



- 2 In the VWorks window that opens, click **Log in** on the toolbar. The Login window opens.



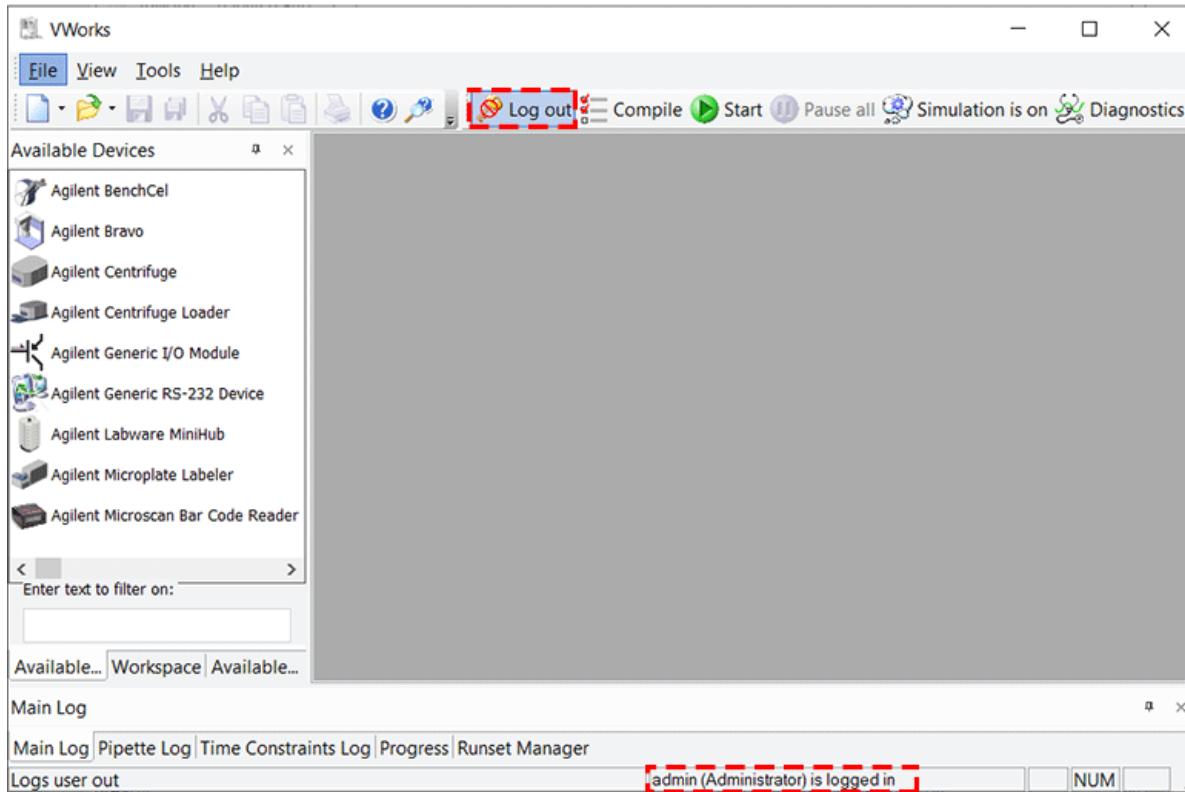
- 3 Type your VWorks **Login** and **Password**, and then click **OK**. (If no user account is set up, contact the administrator.)

In the VWorks window, the Log in button changes to Log out. In addition, the status bar indicates that the login is successful.

1 Setting up the VWorks software

Starting up and logging in

Note: Logging in establishes the connection to Shared Services and the storage repository.



Logging out

To log out of VWorks software:

In the VWorks window, click **Log out** on the toolbar.



Related information

For information about...

Setting up and managing user accounts

See...

- [VWorks Automation Control Plus Administrator Guide](#)
- [VWorks Automation Control Standard Administrator Guide](#)

Setting up the VWorks software

["VWorks setup workflow" on page 2](#)

Audit trails and records of interest

["About features that support compliance" on page 12](#)

For information about...	See...
VWorks features, supported devices, and user interface	VWorks Automation Control User Guide

Changing your password

About changing your VWorks password

An administrator uses the Control Panel (OpenLab component) to manage VWorks user access. The following procedure is valid if the following conditions are met:

- You have a current user account as a VWorks technician, operator, or guest.
- The Control Panel is configured to use Internal (not Windows Domain) authentication.

If you do not have a VWorks user account or need help changing your password, contact your administrator.

For administrator instructions, see the [VWorks Automation Control Plus Administrator Guide](#) or [VWorks Automation Control Standard Administrator Guide](#).

Procedure

To log in to Control Panel and change your VWorks user password:

- 1 Click  on the Windows desktop to start the Control Panel.

Or, from the Windows desktop, select **Start** () > **All Apps** > **Agilent Technologies** > **Control Panel**.

- 2 In the Login window, enter your VWorks user name and password.



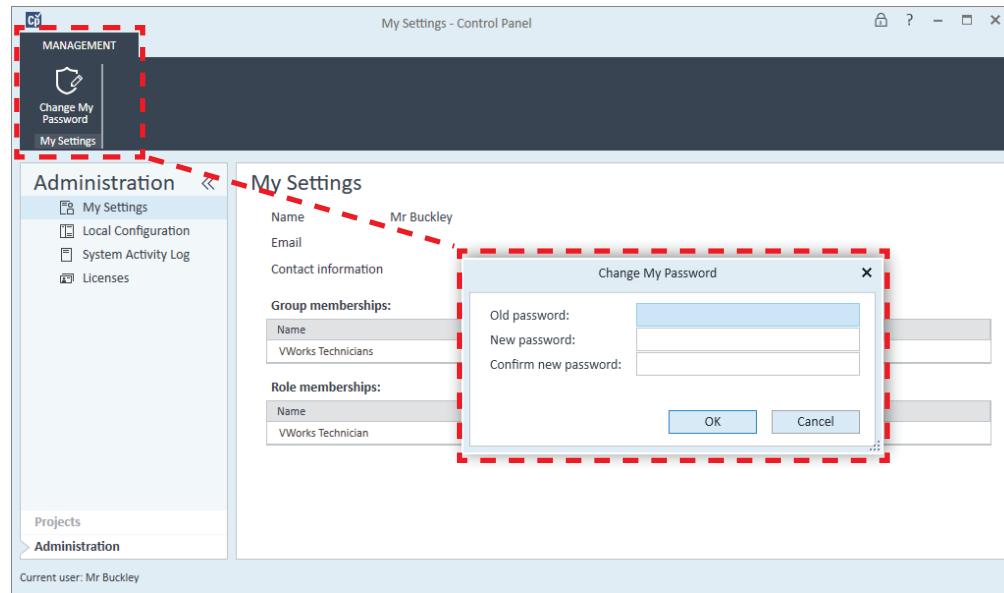
If you log in as a VWorks technician, operator, or guest, the Control Panel opens to the My Settings page.

- 3 In the ribbon at the top of the **My Settings** page, click **Change My Password**.

1 Setting up the VWorks software

Software components and folder structure

- 4 In the **Change My Password** dialog box, type the **Old password**, type the new password in the **New password** and **Confirm new password** boxes, and then click **OK**.



- 5 If you have finished viewing the My Settings page, close the Control Panel.

Software components and folder structure

Software components

Both VWorks Plus and VWorks Standard editions consist of:

- Components of the OpenLab software
- VWorks software

The following figures show the relationships between these components.

Figure VWorks Plus architecture

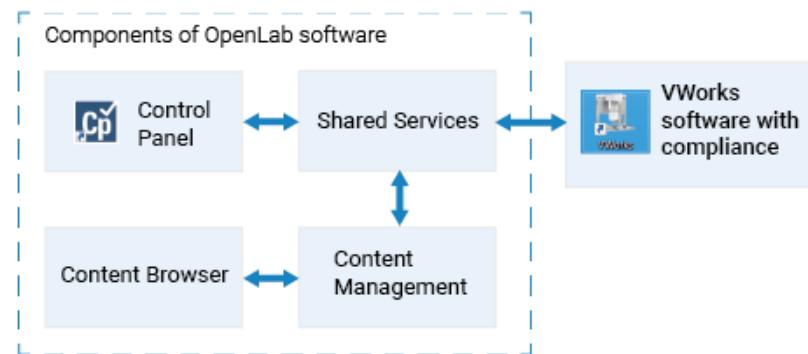
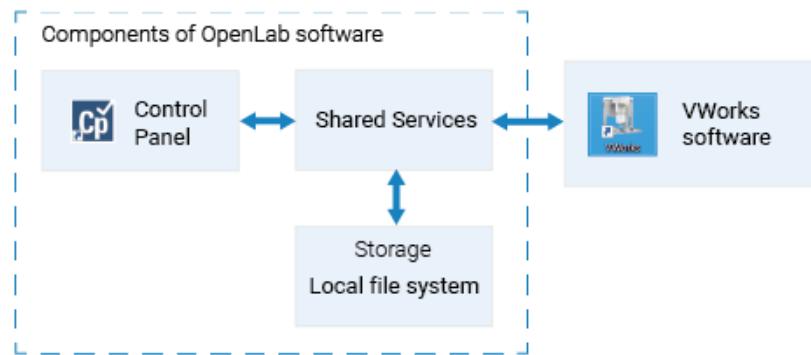


Figure VWorks Standard architecture



OpenLab components

- **Control Panel** and **Shared Services**. Control Panel is the user interface for Shared Services, which are set of administrative services. An administrator uses Control Panel to configure the following:
 - User access management
 - Software licenses
 - Storage
- **Storage types**. Shared Services uses a different storage type for each VWorks edition:
 - VWorks Plus. Uses **Content Management** to store VWorks files, records of interest, and audit trails. The files are stored in a predefined VWorks Projects folder in the Content Management repository. A system administrator can use the **Content Browser** to view and edit the project structure and contents.
 - VWorks Standard. Uses the local file system. Shared Services stores the files in a predefined VWorks Projects folder.

`/VWorks Projects/VWorks`

Note: Unlike previous VWorks versions, the VWorks 14.0 editions do not use the Windows Registry for storing records, such as labware definitions and device profiles.

VWorks software

The VWorks software controls your automation devices. You create labware definitions and liquid classes, set up your devices and create device profiles, and create and run protocols.

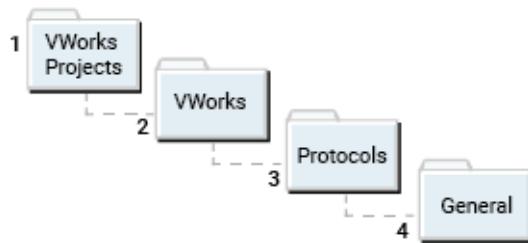
VWorks Plus. The VWorks software logs audit trails for records of interest, tracks records by record state (In Development, In Validation, and Released), and performs tamper detection on the records.

VWorks Project folder structure

During installation, a VWorks Projects folder structure is created that includes 4 levels, for example, `\VWorks Projects\VWorks\Protocols\General`.

1 Setting up the VWorks software

Software components and folder structure



You can create additional subfolders for your files, for example,
\VWorks Projects\VWorks\MyExperiments\ExperimentA\MyProtocols

Note: Files saved in folders that you create at any level other than a fourth-level folder will not be compatible with legacy OpenLab ECM 3.x servers. Refer to the following procedure if compatibility with legacy OpenLab ECM 3.x servers is required.

Folder restrictions for compatibility with legacy ECM servers

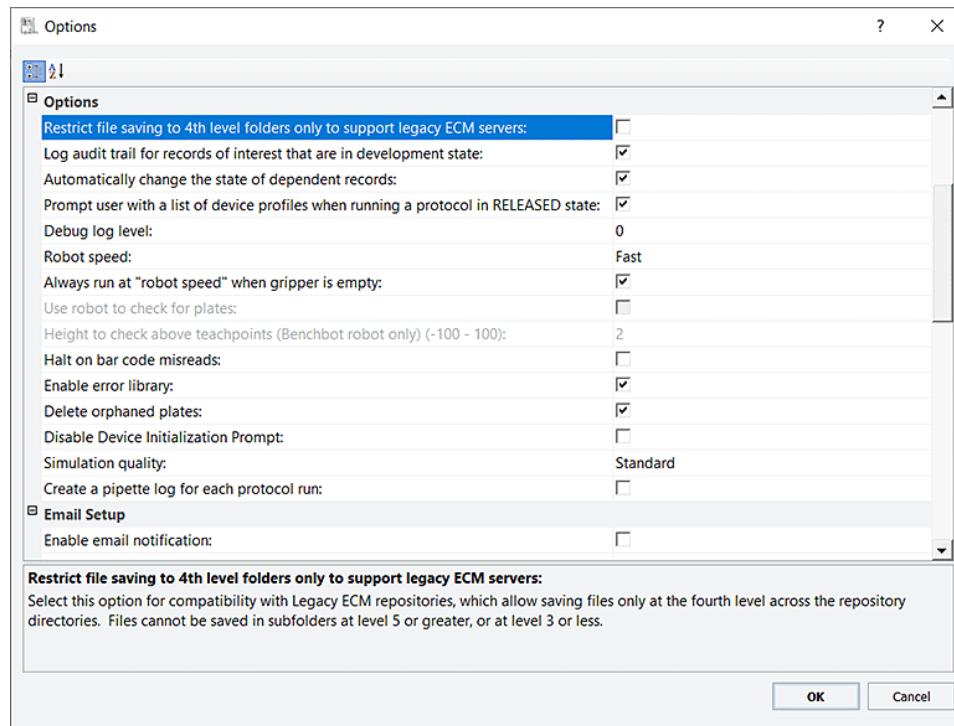
The legacy Agilent ECM servers do not allow files to be saved in subfolders above or below the fourth level. The VWorks software includes an option to restrict file saving to the fourth level folders to ensure compatibility with legacy ECM servers.

To select or clear the folder-restriction option:

- 1 In the VWorks window, click **Tools > Options**. The Options dialog box opens.
- 2 Locate the **Restrict file saving to 4th level folders only to support legacy ECM servers** check box.

This setting ensures that VWorks file-saving is restricted to fourth-level folders.

- If you require compatibility with legacy OpenLab ECM 3.x servers, select the check box.
- If you want to remove this restriction, clear the check box.



- 3 VWorks Plus. To continue setting audit trail options, see ["Setting audit trail options" on page 15](#).
- 4 Click **OK** to save the changes.
- 5 VWorks Plus. The Audit Comment dialog box opens. An audit comment is required any time you save a change to the VWorks global options. For details on audit trails and records of interest, see ["Using compliance features" on page 11](#).

For more details on setting VWorks global options, see the [VWorks Automation Control User Guide](#).

Related information

For information about...	See...
Setting up the VWorks software	"VWorks setup workflow" on page 2
Audit trails and records of interest	"About features that support compliance" on page 12
VWorks features, supported devices, and user interface	VWorks Automation Control User Guide

Reporting problems

Contacting technical support

If you find a problem with the VWorks software, contact Agilent Technical Support. For contact information, go to <https://www.agilent.com/en-us/contact-us/page>.

Note: You can also send a software bug report from within the VWorks software.

Reporting hardware problems

When contacting Agilent Technical Support, make sure you have the serial number of the device or workstation ready. See the device user guide for the location of the label.

Reporting software problems

When you contact Agilent Technical Support, make sure you provide the following:

- Short description of the problem
- Software version number
- Error message text (or screen capture of the error message dialog box)
- Screen capture of the About VWorks software dialog box
- Relevant software files

To find the VWorks software version number:

In the VWorks software, select **Help > About VWorks**.

1 Setting up the VWorks software

Reporting problems

To find the Diagnostics software version number:

- 1 Open Diagnostics.
- 2 Read the version number on the title bar of the diagnostics window.

To send compressed protocol and associated files in VZP format:

In the VWorks software, select **File > Export** to export and compress the following files:

- Protocol file
- Device file (includes the device profile and teachpoint file)
- Labware definitions
- Liquid classes
- Pipette techniques
- Hit-picking files
- Plate map files
- Barcode files
- Error library
- Log files
- Form file (*.VWForm)

Reporting user guide problems

If you find a problem with this user guide or have suggestions for improvement, send your comments using one of the following methods:

- Click the feedback button () in the online help.
- Send an email to documentation.automation@agilent.com.

2 Using compliance features

This chapter describes features in VWorks Plus edition that support compliance with Part 11 of Title 21 of the Code of Federal Regulations (21 CFR Part 11).

This chapter contains the following topics:

- ["About features that support compliance" on page 6](#)
- ["Audit trails and audit trail reports" on page 7](#)
- ["VWorks records of interest" on page 14](#)
- ["Managing record states" on page 18](#)
- ["Detecting tampering" on page 22](#)

About features that support compliance

About this topic

Read this topic to understand how features in VWorks Plus support compliance with Part 11 of Title 21 of the Code of Federal Regulations (21 CFR Part 11).

Features that support 21 CFR Part 11

The FDA rules and guidelines for compliant electronic records and computerized systems require secure data handling. The following table lists the applicable VWorks Plus features.

Table Features that support compliance with 21 CFR Part 11

Feature	Description	For details, see...
Authentication, security, and user management	Prevent unauthorized access and unauthorized modification of records of interest. The Control Panel enables management of users, groups, roles, and privileges.	VWorks Automation Control Plus Administrator Guide
Content Management	Provides secure storage with access control.	
Control Panel system activity log	Records events that occur during a Control Panel session, for example, logging in, updates to users, groups, or roles, updates to licenses, and so forth.	
Backup and restore procedures for the software and Content Management.	Provide procedures required for disaster recovery planning.	
VWorks activity logs	Record events that occur during a VWorks session. The logs include the Main log, Pipette log, and Time Constraints log. The Diagnostics software for each device displays a profile activity log, which is also stored in the Main Log.	VWorks Automation Control User Guide
Audit trails and reports	Provides traceability for records of interest, documenting who did what and when. An audit file is logged for each record of interest.	"Audit trails and audit trail reports" on page 7 "VWorks records of interest" on page 14
Record state tracking	Provides control of records that transition through development, validation and released states to ensure record integrity and traceability. The software also increments the version of a record of interest each time a change is saved.	"Managing record states" on page 18
Tamper detection	Detects corrupted records and records that have been modified externally from VWorks Plus.	"Detecting tampering" on page 22

Feature	Description	For details, see...
Exporting and importing protocols	Provides a means to export protocols and associated components to an archive file (.vzp) that can be used to transport protocols between computers, back up and recover protocols, and facilitate troubleshooting problems with protocols and other files when seeking assistance from Agilent Technical Support.	VWorks Automation Control User Guide
Backup and Restore features	Provides a means to backup and restore the following files from an archive file (.vbk). <ul style="list-style-type: none"> • Labware entries • Labware classes • Liquid classes • Pipetting techniques • Database file (.sql) for labware inventory 	VWorks Automation Control User Guide

Audit trails and audit trail reports

About this topic

This topic describes the audit trail feature in VWorks Plus edition and how to generate an audit trail report for records of interest (ROI).

For details about records of interest, see ["VWorks records of interest" on page 14](#).

Audit trails and how changes are tracked

VWorks Plus logs audit trails for files that are considered to be records of interest (ROI). Each record is stored in the Content Management Repository and includes its audit trail and a checksum file. The software uses the checksum file for tamper detection.

Note: In the Content Browser for the Repository, the displayed file names include the archive file extension (.roizip), for example, protocol-1.pro.roizip.

The audit trail contains the following for each change to a record of interest.

Table Audit trail contents

Column	Description
Local Time	The local date and time of a change to the record of interest.
UTC Time	The UTC date and time of a change to the record of interest.
Computer Name	The name of the computer on which audit trail is generated.
Software Version	The version and build of the VWorks software running on the computer listed above.
User	The user name of the logged-in user who made the change to the record of interest.

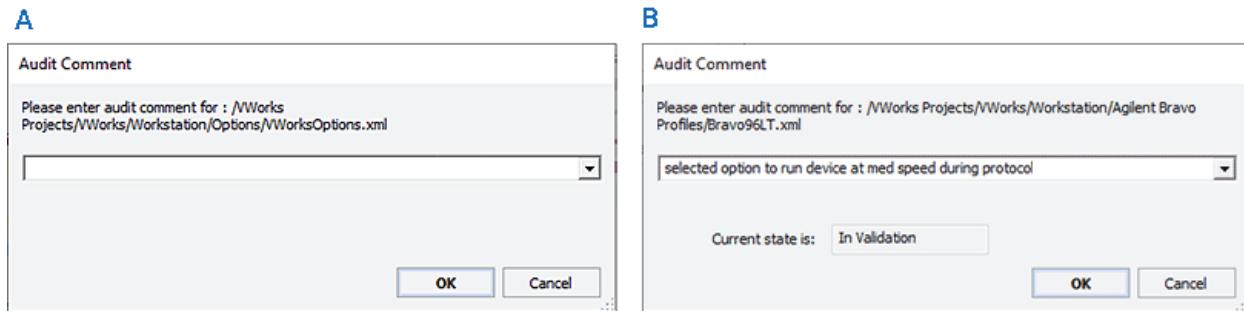
2 Using compliance features

Audit trails and audit trail reports

Column	Description
State of ROI	<p>The development state of the record of interest:</p> <ul style="list-style-type: none">Released, In Validation, or, if applicable, In Development <p>Logging an audit trail for records in the development state is optional. For details, see "Setting audit trail options" on page 9.</p> <ul style="list-style-type: none">Exempt <p>For details, see "Records exempt from state changes" on page 16.</p>
Version of ROI	<p>The version of the record.</p> <p>The version number increments after changes are made and the file is saved. The version is useful if a record is copied to create another similar record using the Save As command. For example, if you create protocol B from protocol A, it may be helpful to know which version of protocol A was used as the basis to create protocol B.</p>
Description	A software-generated description of what the changes were.
Audit Comment	<p>A comment (reason for the change) that the user entered in the Audit Comment dialog box for this change.</p> <p>Whenever a record for which the software has logged an audit trail is modified, the Audit Comment dialog box opens and requires the user to enter a comment before saving the record. Comments are restricted to 256 characters.</p> <p>Note: The last 5 audit comments entered are available as options for selection. These comments are stored in C:\VWorks Workspace\Audit Comments\comments.txt.</p>

As the following figure shows, the Audit Comment dialog box varies depending on whether the record is subject to or exempt from development state changes.

Figure Audit Comment dialog box examples: **A** Record exempt from record states, **B** Record in validation state



Setting audit trail options

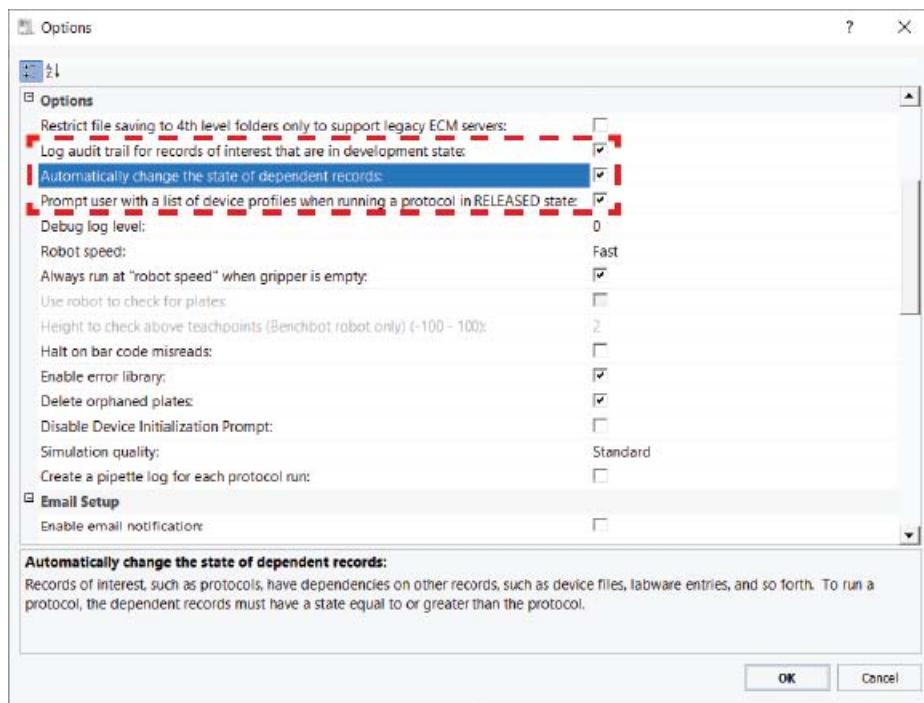
By default, the VWorks software is not configured to log audit trails for records that are in development. If you want to log audit trails for records in development, you can use the following procedure to select this option and options for record states.

CAUTION

The settings in the Options dialog box apply to all protocol runs. Always check the settings before you start a run.

To log audit trail messages for records in the development state:

- 1 In the VWorks window, click **Tools > Options**.
- 2 In the **Options** dialog box, under **Options**, set your preferences for the following options.



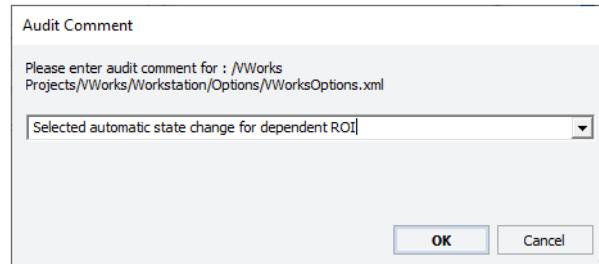
Option	Description
Log audit trail for records of interest that are in development state	<p>The option to maintain an audit trail for development state records.</p> <ul style="list-style-type: none"> • (Default) Clear the check box if you do not want to log an audit trail for records while they are in the development state. • Select the check box if you want the Audit Comment dialog box to appear anytime you create or edit records of interest while they are in the development state. <p><i>Note: You cannot delete records for which VWorks logs an audit trail.</i></p>

2 Using compliance features

Audit trails and audit trail reports

Option	Description
Automatically change the state of dependent records	<p>The option to automate record state changes for dependent records when you change the state of a record of interest.</p> <ul style="list-style-type: none">• (Default) Clear the check box if you want to manage record state changes individually. <i>Note:</i> To run a protocol all the records that it references, such as device file, labware entries, liquid classes, and so forth, must have a development state equal to or greater than the protocol.• Select the check box if you want to automate the record state changes. For example, if you change the state of a protocol from In Development to In Validation or Released, this option automatically changes the state of all the dependent records to match the protocol. <i>Note:</i> If you transition a record to the Released state and the record has a dependency on a device profile that is in the In-Validation state, the profile does not appear in the list of dependent records to be automatically changed to the Released state.
Prompt user with a list of device profiles when running a protocol in RELEASED state	<p>The option to list all the referenced device profiles that are in the validation state when running a protocol that is in the released state, or when running a protocol that references a device file that is in the released state.</p> <p><i>Note:</i> Device profiles cannot transition to the released state, because adjustments to the device teachpoints for a given device may be required if it is moved to another location or if a hardware collision occurs.</p> <ul style="list-style-type: none">• (Default) Clear the check box if you do not want the profile message to appear.• Select the check box if you want the profile message to appear.

- 3 Click **OK**. The Audit Comment dialog box opens.



- 4 Type or select a comment, and then click **OK**.

Note: For details on setting other options in the Options dialog box, click the **?** button in the top right corner to open the corresponding topic in the knowledge base.

Generating an audit trail report

The software performs tamper detection on any record selected for the audit trail report.

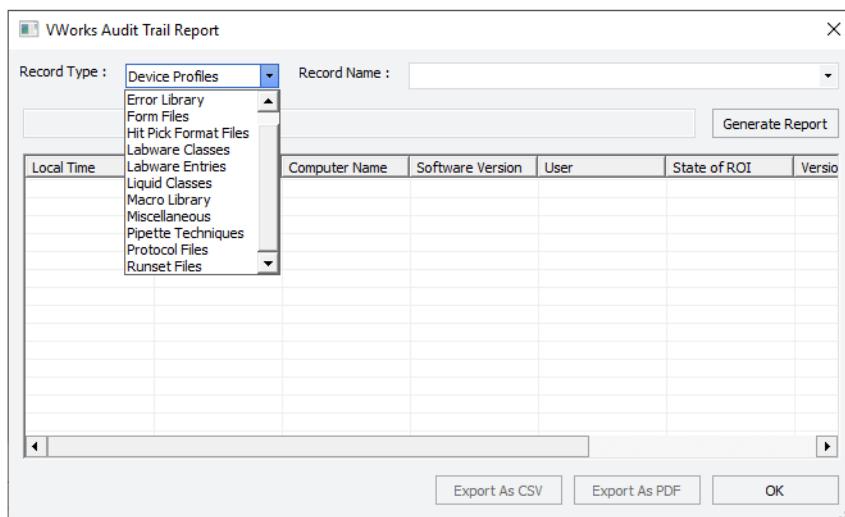
IMPORTANT

An audit trail report cannot be generated for a record if the software detects tampering or corruption of that file.

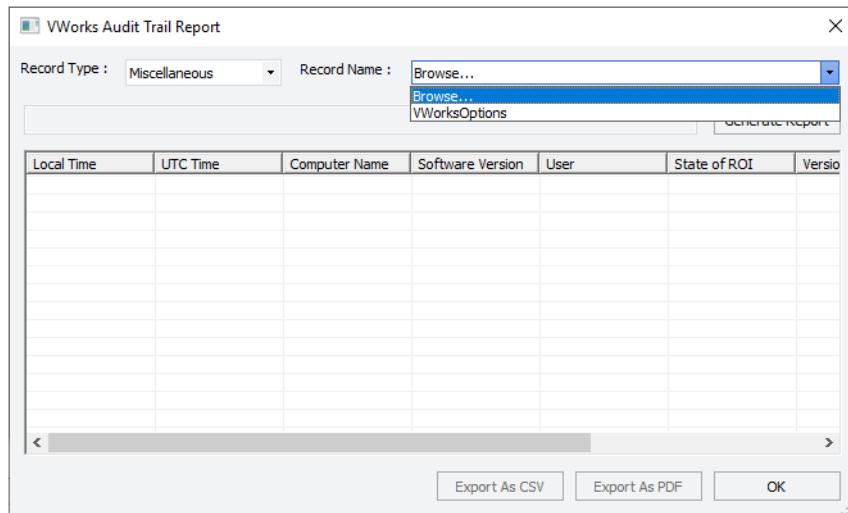
To generate an audit trail report:

- 1 In the VWorks window, click **Tools > Audit Trail Reports**. The VWorks Audit Trail Reports window opens.
- 2 In the **Record Type** list, select the record type.

Note: For a list of record types, see “[VWorks records of interest](#)” on page 14.



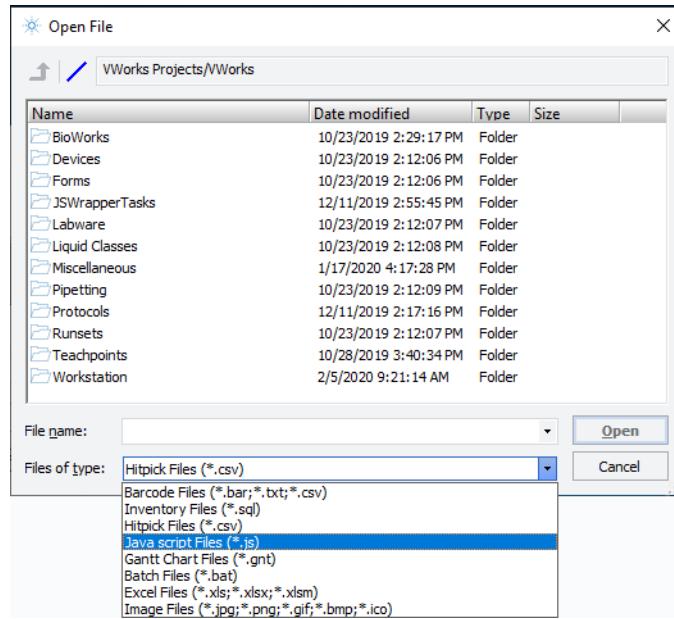
- 3 In the **Record Name** list, do one of the following.:
 - Click a record name, and then go to step 5.
 - Click **Browse**, and continue to step 4.



2 Using compliance features

Audit trails and audit trail reports

- 4 In the **Open File** dialog box, locate and select the record and then click **Open**.



Note: If the VWorks options specify to restrict file saving to fourth-level folders, the record must be in a fourth-level folder.

Note: If you selected a specific Record Type, you can open only that file type.

- 5 Ensure that the correct Record Name is selected, and then click **Generate Report**. The file path of the selected record appears in the box under Record Type. The data for the selected record appears in the window.

VWorks Audit Trail Report							
Record Type :	Device Profiles	Record Name :	/VWorks Projects/VWorks/Workstation/Agilent Bravo Profiles/Bravo96LT.xml				
Generate Report							
Local Time	UTC Time	Computer Name	Software Version	User	State of ROI	Version	
10/30/19 04:09:...	10/30/19 11:0...	5CD93970H6	14.0.0.10.28....	admin	IN_DEVELOPM...	4	
10/30/19 04:12:...	10/30/19 11:1...	5CD93970H6	14.0.0.10.28....	admin	IN_VALIDATION	4	
10/30/19 04:12:...	10/30/19 11:1...	5CD93970H6	14.0.0.10.28....	admin	IN_VALIDATION	4	
10/30/19 04:50:...	10/30/19 11:5...	5CD93970H6	14.0.0.10.28....	techn	IN_VALIDATION	5	
10/30/19 04:51:...	10/30/19 11:5...	5CD93970H6	14.0.0.10.28....	techn	IN_VALIDATION	5	
12/16/19 03:51:...	12/16/19 11:5...	5CD93970H6	14.0.0.12.11....	admin	IN_VALIDATION	6	
12/16/19 03:51:...	12/16/19 11:5...	5CD93970H6	14.0.0.12.11....	admin	IN_VALIDATION	6	
12/16/19 03:51:...	12/16/19 11:5...	5CD93970H6	14.0.0.12.11....	admin	IN_VALIDATION	6	
12/16/19 05:16:...	12/17/19 01:1...	5CD93970H6	14.0.0.12.11....	admin	IN_VALIDATION	7	
12/16/19 05:16:...	12/17/19 01:1...	5CD93970H6	14.0.0.12.11....	admin	IN_VALIDATION	7	
12/16/19 05:18:...	12/17/19 01:1...	5CD93970H6	14.0.0.12.11....	admin	IN_VALIDATION	7	
01/27/20 11:10:...	01/27/20 07:1...	5CD93970H6	14.0.0.1.22.2...	admin	IN_VALIDATION	8	
01/27/20 11:10:...	01/27/20 07:1...	5CD93970H6	14.0.0.1.22.2...	admin	IN_VALIDATION	8	
01/27/20 11:10:...	01/27/20 07:1...	5CD93970H6	14.0.0.1.22.2...	admin	IN_VALIDATION	8	

Note: For a description of each column in the report, see ["Audit trails and how changes are tracked" on page 7](#).

- 6 Click **Export As CSV** to save the report in a comma-separated text file, or click **Export As PDF**. The Save As dialog box opens. Specify the name and storage location, and then click **Save**. Click **OK** to close the confirmation message.

Related information

For information about...	See...
Compliance features	"About features that support compliance" on page 6
Records of interest	"VWorks records of interest" on page 14
Record states	"Managing record states" on page 18
Backing up and restoring the Content Management repository	<i>VWorks Automation Control Plus Administrator Guide</i>
Backing up and restoring labware definitions, liquid classes, pipette techniques, and inventory database	<i>VWorks Automation Control User Guide</i>
Tamper detection	"Detecting tampering" on page 22

2 Using compliance features

VWorks records of interest

VWorks records of interest

About this topic

Read this topic if you have VWorks Plus.

Types of records of interest

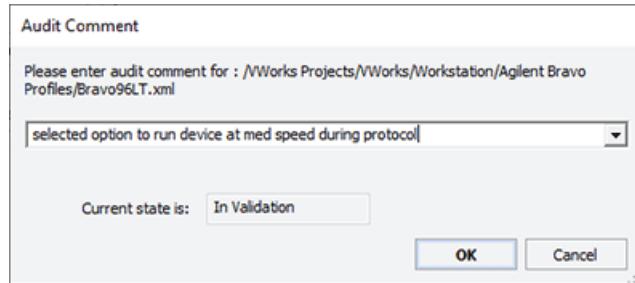
VWorks has two categories for records of interest:

- 1 Records that are subject to development state changes
- 2 Records exempt from state changes

Records that are subject to development state changes

- **In Development.** By default, the software does not create an audit trail log for records in development. However, the software includes an option to log the audit trail entries for In Development records.
- **In Validation.** An audit trail is logged for In Validation records. Such records may be modified but not deleted. The Audit Comment dialog appears any time you modify and save a record in this state.

Figure Example of Audit Comment dialog box



- **Released.** The software prevents any changes to records that are in the Released state. If you attempt to save a change for a released record, a message appears stating **This record is released and cannot be changed.**

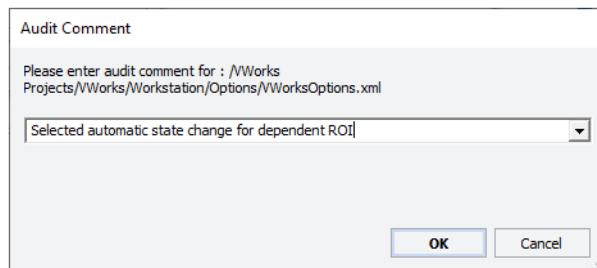
See ["VWorks records that transition through states" on page 15](#) for the list of records in this category.

Records exempt from state changes

See ["Records exempt from state changes" on page 16](#) for the list of records in this category.

VWorks logs all the audit trail entries for an exempt record of interest starting from the creation of the file. The Audit Comment dialog appears any time you modify and save a record of interest that is exempt from record states.

Figure Example of Audit Comment dialog box for exempt record



VWorks records that transition through states

The following table lists the records of interest (ROI) that are tracked based on their development state. Changes to this type of record:

- **In Development.** Changes may be logged to an audit trail depending on the setting in the Options dialog box.
- **In Validation.** Changes are always logged to an audit trail.
- **Released.** No changes are permitted.

Record of interest (file extension)	Description
Device file (.dev)	<p>A file that contains:</p> <ul style="list-style-type: none"> • The list of devices the software will communicate with and control • Configuration information of each device • Communication settings (profile)
Device profile (.xml)	<p>A file that contains a collection of settings that the VWorks software uses to communicate with a specific device, for example, the Bravo Platform.</p> <p>IMPORTANT Although profiles can transition from the In Development state to the In Validation state, these records cannot transition to the Released state. This exception is necessary because adjustments to the teachpoints for a given device may be required if the instrument is moved to another location or if a hardware collision occurs. A teachpoint adjustment would result in an update to the device profile.</p>
Error library (.elb)	A file that contains a collection of automated error responses.
Form file (.VWform)	A file that provides a simplified user interface for running a protocol.
Hit pick format (.xml)	A file that is used by hit picking protocols to specify the destination well pattern and a few other items.
Labware entry (.xml)	<p>A file that contains a collection of labware properties that the VWorks software uses to handle a given labware type in the automation system.</p> <p><i>Note:</i> Each labware entry is assigned to a labware class or classes. Labware classes are exempt from record state changes, but labware entries in the released state cannot be removed from a labware class.</p>
Liquid class (.xml)	A file that specifies pipetting settings, set up for different liquid types.

2 Using compliance features

VWorks records of interest

Record of interest (file extension)	Description
Macro library (.mlb)	A file that contains a collection of macros. A macro is a collection of protocol tasks in an abbreviated form that you can insert at various places within the same protocol or throughout other protocols where the same task sequence is required.
Pipette technique (.xml)	A file that specifies the x- and y-axis offset when pipetting.
Protocol file (.pro)	A file that contains instructions for performing a run.
Runset file (.rst)	A file that specifies a collection of protocol runs that can be scheduled in advance to be performed without operator intervention.

Records exempt from state changes

The following table lists the records of interest that are exempt from record state changes.

Record of interest (file extension)	Description
VWorksOptions (.xml)	A global options file that specifies parameter settings that apply to all the protocols on the computer running VWorks Plus. Note: To view these options in the VWorks window, click Tools > Options. For details, see the VWorks Automation Control User Guide . The software logs an audit trail for this record, starting with the creation of the record and tracks any subsequent changes.
Labware class (.xml)**	A file that lists a collection of labware entries that can be used with a given device, for example, Uses Standard Platepad or Uses Filter Platepad.
Teachpoint file (.xml)	A device-dependent file that contains your teachpoint settings, for example, a BenchCel teachpoint file.

Miscellaneous files that are imported into the Content Management Repository.

The software logs an audit trail for the following records after they are imported into the Repository.

Barcode files (.bar, .csv, or .txt)	An input file for specifying the barcodes to apply to a microplate.
Excel files (.xlsx, .xls, or .xlsm)	A utility for calculating volume requirements or for creating a method used by the AssayMAP Protein Sample Prep Workbench.
Gantt chart files (.gnt)	A file that contains a Gantt chart for one or more protocols while they are running, or for one or more open protocols that have been run in the current VWorks session. Note: You must import these files to view them in the VWorks window.
Hitpick input files (.csv)	An input file used by the Hit Pick Replication task. The file contains information about the source microplate and specifies the dispense pattern in destination microplates.

Record of interest (file extension)	Description
Image files (.jpg, .png, .bmp, or .ico)	An image file referenced by a labware definition or a form file.
Inventory database files (.sql)	A labware inventory database file.
Experiments database files (.expTags)	Archived files and exported files that contain experiment data in XML format. The software saves these files to the local file system, not Shared Services storage. Ensure that you move these files to a secure location.
JavaScript (.js)	A text file that contains JavaScript code that is used to execute instructions, for example, in a protocol task. The JS Wrapper task uses a JavaScript task file (.js).

Related information

For information about...	See...
Compliance features	"About features that support compliance" on page 6
Audit trails	"Audit trails and audit trail reports" on page 7
Record states	"Managing record states" on page 18
Global options	<i>VWorks Automation Control User Guide</i>
Miscellaneous files	<i>VWorks Automation Control User Guide</i>
Tamper detection	"Detecting tampering" on page 22
Labware inventory	"Tracking and managing labware in storage" on page 79
Experiment tags database	"Tracking experiment data" on page 135

2 Using compliance features

Managing record states

Managing record states

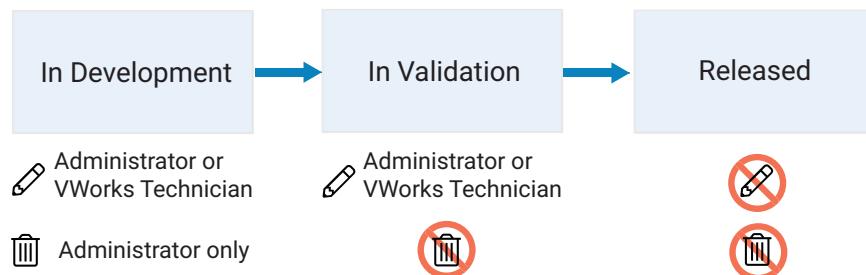
About this topic

Read this topic if you have VWorks Plus. This topic describes record states and how to change them. For a list of records that transition through states, see ["VWorks records of interest" on page 14](#).

Record states defined

A subset of the records of interest, such as device files, protocols, and so forth transition through the record states of In Development, In Validation, and Released. Each state has different limits on editing or deleting files, as the following figure shows.

Figure Editing options in different record states



Record state	Description	Editing of record allowed?
In Development	<p>The VWorks software assigns this state to new records.</p> <p>By default, the software does not log an audit trail records in development. If you want to log the audit trail for records in development, see "Setting audit trail options" on page 9.</p>	<p>Administrator or VWorks technician may edit files.</p> <p>Only administrator can delete files.</p>
In Validation	<p>A VWorks administrator or technician can change the record state from In Development to In Validation.</p> <p>The software logs an audit trail for all In Validation records.</p>	VWorks administrator or technician may edit but cannot delete these files.
Released	<p>A VWorks administrator or technician can change the record state from In Validation to Released.</p> <p>The software logs an audit trail for all Released records.</p>	No editing or deleting of files allowed.

About protocols and record-state dependencies

A VWorks protocol has dependencies on other records of interest, such as a device file, labware entries, and so forth. To run a protocol successfully, the dependent records must have a state equal to or greater than the protocol. For example, if you attempt to run a released protocol with labware entries that are still in validation, an error message appears and you must abort the protocol.

The following table lists record states permitted for dependent records at each development state of the protocol.

State of the protocol	State of the dependent records
In Development	Any of the 3 record states
In Validation	In Validation or Released only
Released	Released only

Note: Labware classes and teachpoint files (BenchCel) are exempt from record state changes.

Note: Device profiles cannot transition to the released state, because teachpoint adjustments may be required if a device is moved to another location or if a hardware collision occurs.

Changing the state of a record

Before you start:

IMPORTANT

Ensure that no records are open in the VWorks window. The command to change record of interest (ROI) state is unavailable if any records of interest are open.

- Only an administrator can change the state of a record.
- You cannot change a record's state if it references other records that are at a lower state.

For example, if you are transitioning a protocol from In Development to In Validation, the labware entries must have a state of at least In Validation. In this case, you can either:

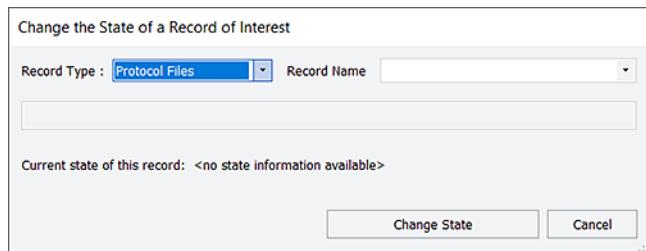
- Manually change the state of each dependent record before transitioning the protocol.
- Select the option for the software to change the state of dependent records automatically. For details, see ["Setting audit trail options" on page 9](#).

To change the state of a record:

- 1 Click **Tools > Change ROI State**. The Change the State of a Record of Interest dialog box opens.

2 Using compliance features

Managing record states



- 2 In the **Record Type** list, select the type of record, for example, Protocol Files.

Note: For a list of record types, see “VWorks records of interest” on page 14.

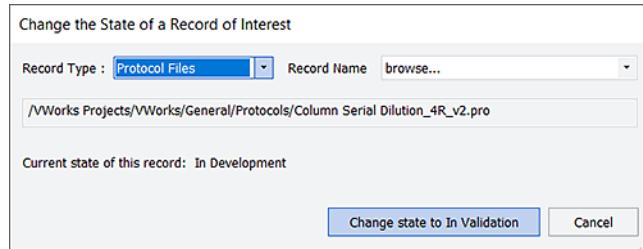
- 3 In the **Record Name** list, select the specific record:

- Click the name of the record, and then go to **step 5**.

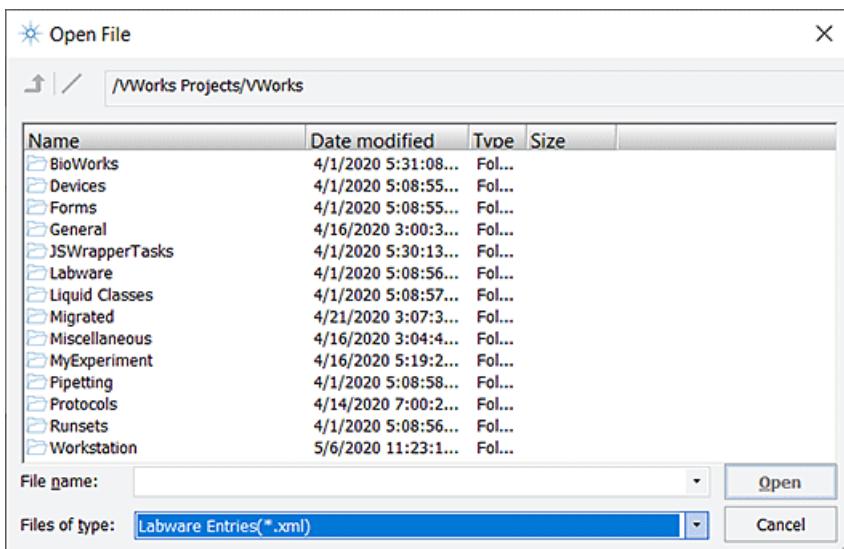
Note: The record state appears in the Current state of this record field. The label of the Change state button changes depending on the state of the selected record, for example, Change state to In Validation.

- If the record that you want is not in the **Record Name** list, click **browse** and then continue to step 4.

Note: The Browse option allows you to locate the specified Record Type stored anywhere in the Content Management Repository under the following file path: /VWorks Projects/VWorks.



- 4 In the **Open File** dialog box, locate and select the record and then click **Open**.



Note: The available Files of type options are restricted to the specified Record Type.

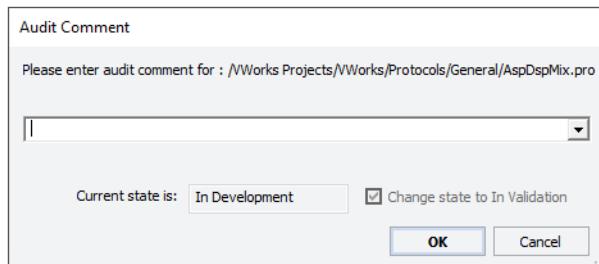
5 Click the **Change state to** (state) button.

- a If the **Automatically change the state of dependent records** option was selected, a message appears asking you to confirm the state change for the dependent records.
 - Click **Yes** to confirm the state change, and then proceed to step b.
 - Click **No** to cancel the state change. In this case, you can manually change the state of each dependent record.



Note: If a record transitioning to the Released state has a dependency on a device profile that is in the In-Validation state, the profile does not appear in the list of dependent records to be automatically changed to the Released state.

- b In the **Audit Comment** dialog box, type or select a comment, and then click **OK**. If you changed the state of multiple records, the audit comment applies to all the records effected by the transition.



Related information

For information about...	See...
Compliance features	"About features that support compliance" on page 6
Records of interest	"VWorks records of interest" on page 14
Audit trails	"Audit trails and audit trail reports" on page 7
Backing up and restoring the Content Management repository	<i>VWorks Automation Control Plus Administrator Guide</i>
Backing up and restoring labware definitions, liquid classes, pipette techniques, and inventory database	<i>VWorks Automation Control User Guide</i>
Tamper detection	"Detecting tampering" on page 22

Detecting tampering

About this topic

Read this topic if you have VWorks Plus. This topic describes the tamper detection feature.

About tamper detection

Tamper detection verifies the data integrity of records of interest. The feature detects corrupted records and records that have been modified outside of the VWorks software.

Examples of tampering include:

- Deleting any file from a record of interest archive (.roiZip) in Content Management.
Note: All records of interest are stored in an .roiZip archive that includes the audit trail file and a checksum file.
- Modifying parameter values in any file outside of the VWorks software.
- Changing the structure of an .xml file, such as removing any closing or opening XML tag.

If the software detects tampering, an error message advises you that the file cannot be loaded and to contact the VWorks administrator to try to recover the file. In this case, the VWorks administrator can restore a backup copy or use the Content Browser to recover a previous version of the record. For details, see [the VWorks Automation Control Plus Administrator Guide](#).

When does tamper detection occur

The VWorks software performs tamper detection for the following actions:

Action	Description
Starting the VWorks software and logging in	Checks the VWorks Options.xml file for tampering as well as any files referenced in VWorks Options, for example ErrorLibrary.elb or MacroLibrary.mlb files. For details, see "Tamper detection responses when opening a record of interest" on page 23 .
Using the Tamper Detection command	Checks the records of interest stored in the Content Management Repository to verify the data integrity. For details, see "Running the Tamper Detection command" on page 24 . <i>Note:</i> Depending on the number of records to be checked, this operation can take a long time.
Opening a record of interest	Checks the record for data integrity before opening the file. For details, see "Tamper detection responses when opening a record of interest" on page 23 .
Performing a protocol run	Checks the protocol when the protocol is compiled. During a run, tamper detection occurs at the point in the run when a task parameter value is set by a script or variable and the task actually executes.

Action	Description
Importing a VWorks protocol archive (.vzp file)	Checks the .vzp archive contents if the .vzp was created in VWorks version 14 or later.
Importing or restoring experiments in the Experiments Editor	Checks an experiment file that was archived or exported before allowing you to restore or import the file.
Importing an Inventory database file (.sql)	Checks the file that was exported before allowing you to import the file.
Using VWorks Backup and Restore (.vbk file)	Checks the selected files during: <ul style="list-style-type: none"> <i>Backup</i>. An error message lists any corrupted records and provides the option to continue the backup for clean records only. <i>Restore</i>. A Restore operation cannot proceed if the backup (.vbk file) is corrupted or has been tampered.
Generating an audit trail report	Checks the selected record of interest, and generates the audit trail report if the record has not been corrupted or tampered.

Tamper detection responses when opening a record of interest

When you open a record of interest, the software checks the given record for data integrity before loading it. If a record is corrupted or has been tampered, the response can vary depending on the file, as the following table shows. To resolve the problem, an administrator can use the Content Browser to restore a previous, clean version of a record.

Type of record	VWorks response if record is corrupted or has been tampered
A single record of interest, for example, a device file or labware entry	A message states that the file has been corrupted or modified outside of the VWorks software and cannot be loaded.
A record of interest that references or contains other records	The software response depends on the record type, for example: <ul style="list-style-type: none"> <i>Runset that includes a corrupted protocol</i>. A message lists the corrupted record and states that the runset cannot be loaded. <i>Protocol that references a corrupted record</i>. A message lists the corrupted record and states that the record cannot be loaded. <i>Form that references a corrupted record</i>. The form loads successfully, but the corrupted record (for example, protocol, device file, or runset) cannot be loaded. <i>Labware class that contains a corrupted labware entry</i>. The labware class loads successfully, but the corrupted labware entry cannot be loaded.

2 Using compliance features

Detecting tampering

Type of record	VWorks response if record is corrupted or has been tampered
VWorks Options.xml file (Options dialog box)	<p>The software response depends on the issue:</p> <ul style="list-style-type: none">• If the VWorksOptions.xml file is corrupted or tampered, an error message states that the VWorks software must close. In this case, an administrator can use the Content Browser to restore a clean backup copy of the file or a previous version of the file.• If a file referenced by VWorks Options, such as the error library or macro library, is corrupted or missing an error message states that the file cannot be loaded<ul style="list-style-type: none">– Administrator. You may select a different error library file or right-click the file path, and click Clear field contents in the shortcut menu.– Non-administrators. The VWorks software closes, and you must contact the administrator for assistance.• If the VWorks Options.xml file is missing, a error message opens and advises that the software will load the default values for VWorks Options. <p>An administrator can click Tools > Options, and then verify the settings in the Options dialog box.</p> <p>For details on setting the global options, see the <i>VWorks Automation Control User Guide</i>.</p>
Error library or macro library	A message states that the file has been corrupted or modified outside of the VWorks software and cannot be loaded.

IMPORTANT

The software cannot perform tamper detection on the contents of a .vbk or .vzp archive that was generated by earlier versions of the VWorks software.

Running the Tamper Detection command

The Tamper Detection command runs a check of all the records that are present in the Content Management Repository under the file path:
/VWorks Projects/VWorks

IMPORTANT

Depending on the number of records to be checked, this operation can take a long time.

To run tamper detection:

In the VWorks window, click **Tools > Tamper Detection**.

- If tampering is detected, an error message displays a list of the problem records. An administrator can restore clean versions of the corrupted records if a clean backup archive exists.
- If no tampering is detected, a message states that all the records are clean.

About restoring records

An administrator can restore records in the following ways:

- Rollback the version of a selected record to a previous clean version in the Content Browser.
- Restore records from a clean backup copy.

Related information

For information about...	See...
Compliance features	"About features that support compliance" on page 6
Audit trails	"Audit trails and audit trail reports" on page 7
Record states	"Managing record states" on page 18
Content Browser and restoring records	<i>VWorks Automation Control Plus Administrator Guide</i>

2 Using compliance features

Detecting tampering

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3 Defining labware

This chapter contains the following topics:

- ["About defining labware with the Labware Editor" on page 34](#)
- ["Labware Editor overview" on page 35](#)
- ["Workflow for defining labware" on page 39](#)
- ["Opening the Labware Editor" on page 41](#)
- ["Adding a labware entry" on page 43](#)
- ["Setting general properties" on page 46](#)
- ["Setting microplate properties" on page 48](#)
- ["Setting tip and well properties for pipetting" on page 53](#)
- ["Creating and assigning labware classes" on page 55](#)
- ["Adding a labware image" on page 58](#)
- ["Setting Centrifuge Loader properties" on page 60](#)
- ["Setting BenchCel properties" on page 61](#)
- ["Setting Bravo properties" on page 65](#)
- ["Setting Stacker properties" on page 66](#)

Note: The Labware Editor contains subtabs on the Labware Entries page for the Direct Drive Robot and BenchBot Robot, which are not supported in VWorks software version 14.

3 Defining labware

About defining labware with the Labware Editor

About defining labware with the Labware Editor

Labware defined

Labware is a physical object such as a microplate, lid, or tip box that will be acted upon by the tasks stored in your protocol.

The VWorks software requires all labware that will be handled by the automation system to be defined in the labware database.

Labware entry defined

A labware entry is the collection of properties or parameter values that describe a specific type of labware. This information is used by the VWorks software to command the robot and other devices to do tasks based on the information in the definition. Each labware entry is saved as an .xml file in Shared Services storage.

All labware parameters are entered and accessible through the Labware Editor.

VWorks Plus only. The labware entries are records of interest. The software automatically logs audit trails for the labware entries that are in the In Validation and Released states. Optionally, the software can log audit trails for these records while they are In Development.

Labware Editor defined

The Labware Editor is the VWorks software 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

Two main types of information are stored in the labware database:

- Information about the labware properties
- Information about labware classes

About labware properties or parameters

Labware has physical properties such as width, length, and number of wells. Labware can also have non-physical properties, such as robot-handling speed, robot grip offsets, and microplate-handling options.

After labware is defined in the Labware Editor, all you have to do is select the type of labware to use each time 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. Each labware class is saved as an .xml file in Shared Services storage.

Labware classes are used in combination with the device manager to restrict which types of labware can be used on which devices during a protocol run. This prevents wasted runs and damage to the devices on the platform.

An example of how damage can be prevented by labware restriction is where a tip box that is too tall for a device crashes into the device as the robot delivers it.

VWorks Plus only. The labware classes are records of interest for which the software automatically logs audit trails. These records are exempt from transitioning through development states.

Related information

For information about...	See...
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Overview of the Labware Editor	"Labware Editor overview" on page 35
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Audit trails (VWorks Plus only)	"Audit trails and how changes are tracked" on page 7

Labware Editor overview

Labware Editor tabs

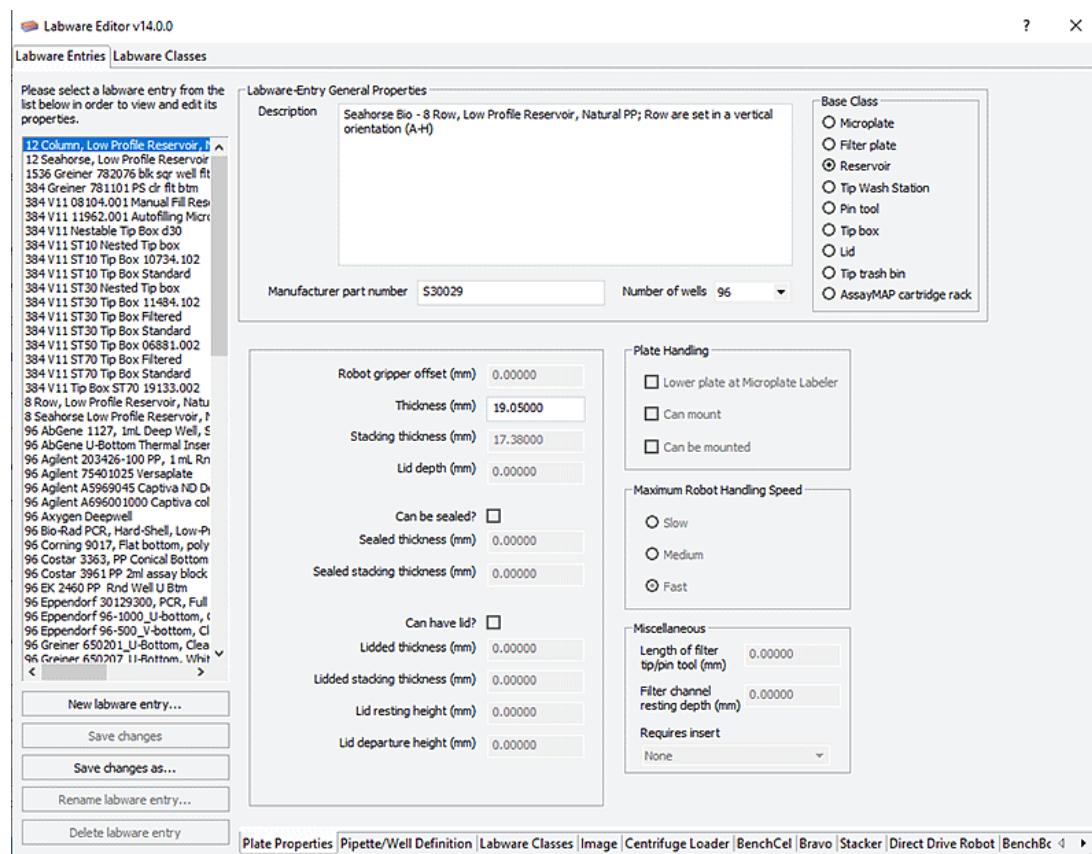
The Labware Editor has two tabbed pages:

- *Labware Entries.* Provides tools for creating and editing labware definitions.
- *Labware Classes.* Provides tools for creating and editing labware classes and the labware entries for each class.

3 Defining labware

Labware Editor overview

Labware Entries tab



Sub-tabs

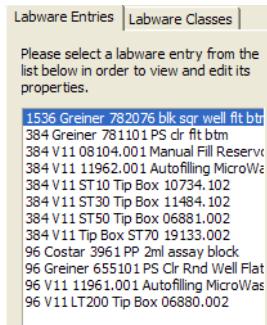
Note: The Direct Drive Robot and BenchBot Robot are not supported in VWorks software version 14.

The Labware Entries tab contains the following sub-tabs that contain the properties associated with a labware entry.

To find out more about...	See...
Plate Properties tab	"Setting microplate properties" on page 48
Pipette/Well Definition tab	"Setting tip and well properties for pipetting" on page 53
Labware Classes tab	"Creating and assigning labware classes" on page 55
Image tab	"Adding a labware image" on page 58
Centrifuge Loader tab	"Setting Centrifuge Loader properties" on page 60
BenchCel tab	"Setting BenchCel properties" on page 61
Bravo tab	"Setting Bravo properties" on page 65
Stacker tab	"Setting Stacker properties" on page 66

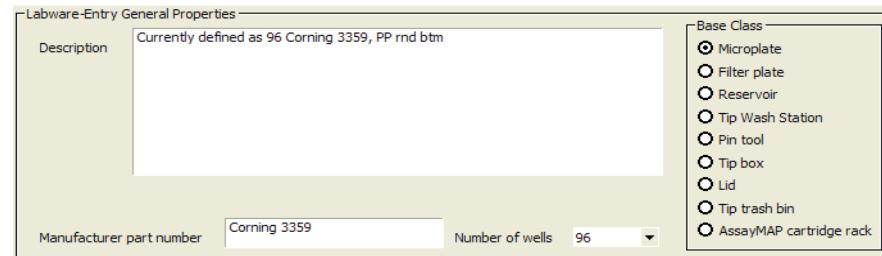
Labware selection list

The labware selection list, which is the left-hand column, displays the list of labware definitions and allows you to select the labware entry that you want to edit.



Labware-Entry General Properties area

The Labware-Entry General Properties area displays the labware properties that apply across all sub-tabs.

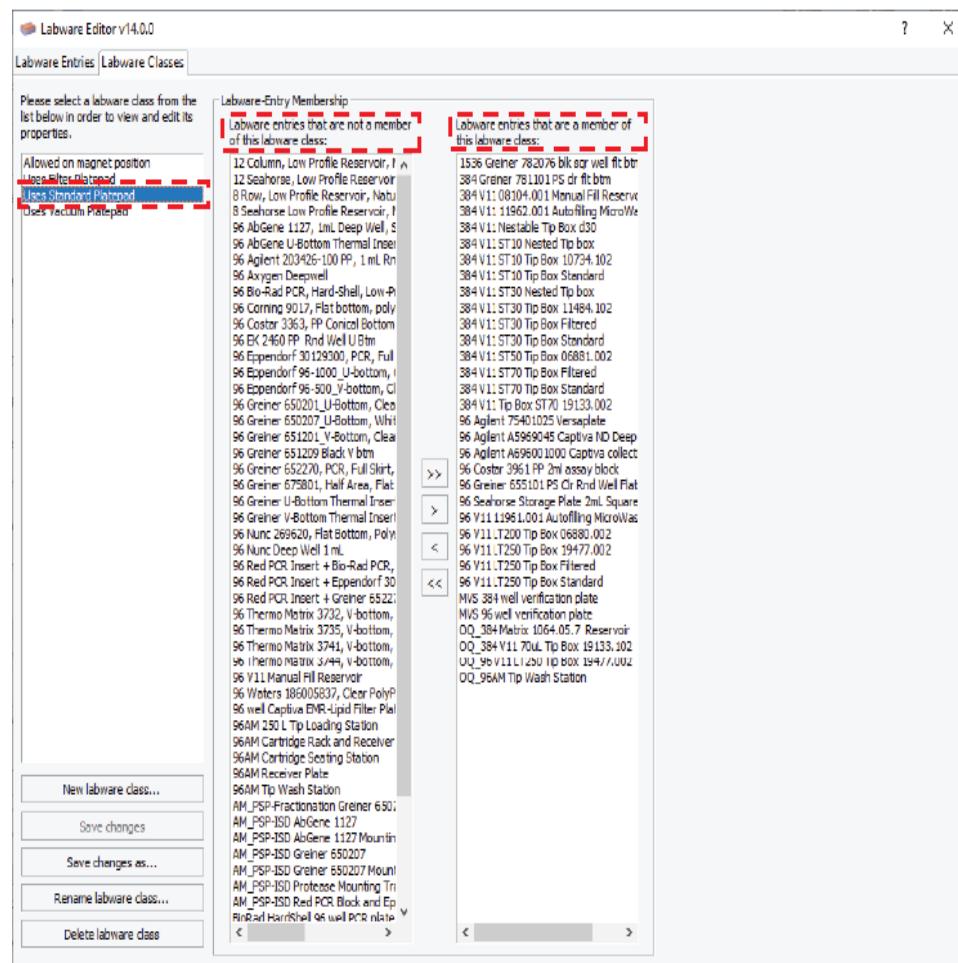


Labware Classes tab

You use the Labware Classes tab to create labware classes and assign defined labware to a labware class.

3 Defining labware

Labware Editor overview



Related information

For information about...

The Labware Editor

See...

["About defining labware with the Labware Editor" on page 34](#)

Workflow for defining labware in the Labware Editor

["Workflow for defining labware" on page 39](#)

VWorks Plus only. Audit trails

["Audit trails and how changes are tracked" on page 7](#)

Workflow for defining labware

Labware standards and considerations

IMPORTANT

All labware used with Agilent products must conform to the American National Standards Institute (ANSI) microplate standards. This includes deepwell and PCR plates.

Workflow

The following table presents the sequence of steps to define labware for devices that use the VWorks software.

IMPORTANT

The VWorks software supports only the following Agilent devices: Benchcel, Bravo, Centrifuge, Centrifuge Loader, Labware Minihub, Microplate Labeler, Microscan Barcode Reader, and PlateLoc. Any labware settings for other devices are not used.

Note: Some of these steps may be omitted, depending on your system configuration.

Step	For this task...	See...
1	Add the labware entry to the Labware Editor.	<ul style="list-style-type: none">“Opening the Labware Editor” on page 41“Adding a labware entry” on page 43
2	Set the general properties of the labware.	“Setting general properties” on page 46
3	Set the microplate properties.	“Setting microplate properties” on page 48
4	<i>Bravo Platform only.</i> Set the pipetting properties.	“Setting tip and well properties for pipetting” on page 53
5	Assign the labware to a class.	“Creating and assigning labware classes” on page 55
6	<i>Optional.</i> Add a labware image.	“Adding a labware image” on page 58
7	<i>Centrifuge Loader only.</i> Set the robot gripper offset if using a Centrifuge Loader.	“Setting Centrifuge Loader properties” on page 60
8	<i>BenchCel Microplate Handler only.</i> Set the robot and stacker gripping positions.	“Setting BenchCel properties” on page 61
9	<i>Bravo Platform only.</i> Set properties for the Bravo gripper, if applicable.	“Setting Bravo properties” on page 65

3 Defining labware

Workflow for defining labware

Step	For this task...	See...
10	<i>BenchCel Microplate Handler only.</i> Set the gripper and sensor settings and any microplate notch positions.	"Setting Stacker properties" on page 66
11	Save a new or edited labware entry.	"Adding a labware entry" on page 43

Related information

For information about...	See...
Labware Editor	<ul style="list-style-type: none">• "About defining labware with the Labware Editor" on page 34• "Labware Editor overview" on page 35
Opening the Labware Editor	"Opening the Labware Editor" on page 41
VWorks Plus only. Audit trails	"Audit trails and how changes are tracked" on page 7

Opening the Labware Editor

About this topic

You use the Labware Editor when you want to view, add, delete, edit, or rename labware entries or labware classes. This topic explains how to open the Labware Editor from the Tools menu and protocol editor in the VWorks software. See the device user guide for details on how to open the Labware Editor from the device diagnostics software.

Before you start

You must be logged in as an administrator or technician to open the Labware Editor.

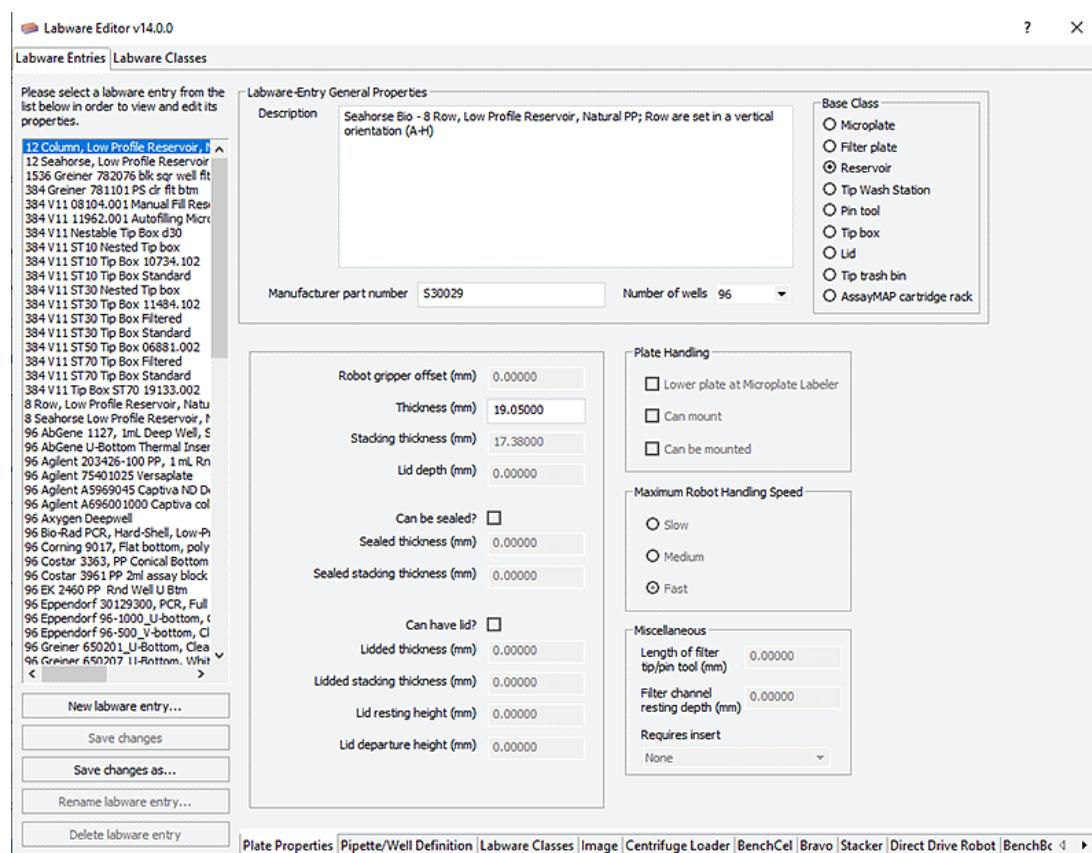
If you are adding labware, make sure you have the following:

- Calipers
- Two samples of the labware you are adding

Procedure

To open the Labware Editor from the Tools menu:

In the **VWorks** window, choose **Tools** > **Labware Editor**. The Labware Editor window opens.



3 Defining labware

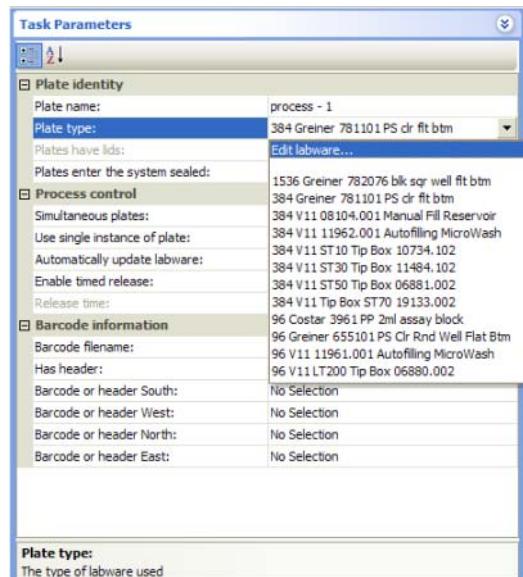
Opening the Labware Editor

To open the Labware Editor from the protocol editor:

- 1 Open a protocol file (**File > New > Protocol** or **File > Open**). This opens the Main Protocol area with Process-1 and a list of Plate properties in the Task Parameters area.

Note: If the Task Parameters area is empty, click **Add Process** in the Main Protocol area.

- 2 Select **Edit labware** from the Plate type list under Plate identity.



Related information

For information about...	See...
Labware Editor	“About defining labware with the Labware Editor” on page 34 “Labware Editor overview” on page 35
Workflow for adding labware to the Labware Editor	“Workflow for defining labware” on page 39
Adding a labware entry	“Adding a labware entry” on page 43
VWorks Plus only. Audit trails	“Audit trails and how changes are tracked” on page 7

Adding a labware entry

Before you start

You must be logged in as an administrator or technician to perform this procedure.

Before you add a new labware entry:

- Check to see if it is already defined in the Labware Editor.

Some common labware and some Agilent labware comes already defined in the VWorks software.

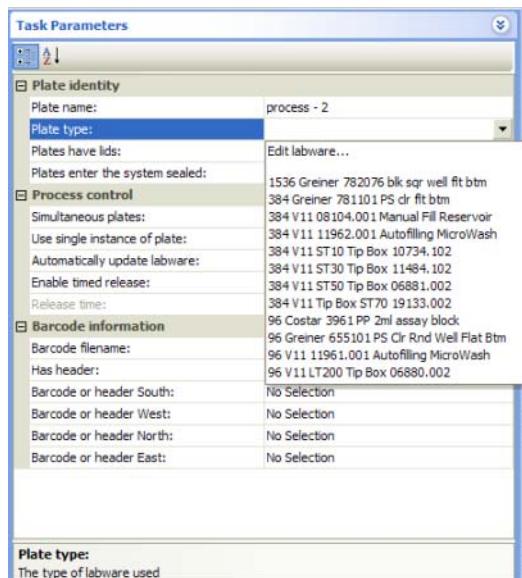
- Contact Agilent Technical Support with the definition you need.

Agilent Technical Support 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 microplate types are a good starting point.

- VWorks *Plus only*. The labware entries are records of interest. The software automatically logs audit trails for the labware entries that are in the In Validation and Released states. Optionally, the software can log audit trails for these records while they are in the In Development state. For details, see ["Setting audit trail options" on page 9](#).

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

- In the VWorks window, click **Main Protocol**, and select the microplate icon in a process.
- In the **Plate identity** area, click the **Plate type** list and look for the microplate name. If the list does not contain an entry for the microplate type, it is not yet defined.



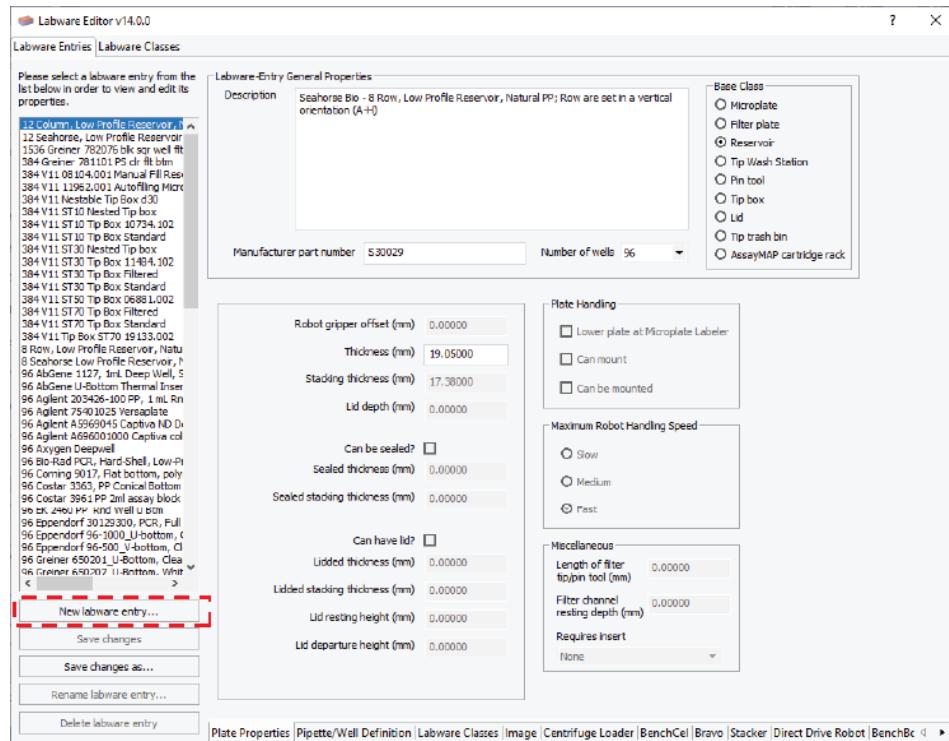
3 Defining labware

Adding a labware entry

Procedure

To add a labware entry:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tab, click **New labware entry** at the bottom left of the window.



Note: You can save time by using a definition for a similar labware type as a template. Select the pre-existing definition in the list, click **Save changes as**, and enter a name for the new labware definition.

- 3 In the **New Labware Entry** dialog box, type a name for the labware type, and click **OK**. The new entry appears in the labware list.

For clarity, enter a detailed name for the labware that includes labware-specific information. For example, the name should include the number of wells, the manufacturer's name and part number, and descriptive terms, such as *square-well*, *flat-bottom* or *tip box*.

IMPORTANT

If you plan to use a .csv file to import labware into an inventory database, avoid using any commas in the name that you assign to the labware entry in the Labware Editor.

To save the labware entry:

- 1 Edit the properties as appropriate for the labware type. See ["Workflow for defining labware" on page 39](#).
- 2 Click **Save changes** to save the newly defined labware entry.
- 3 *VWorks Plus only.* If an audit trail is being logged for records in the development state, the Audit Comment dialog box opens. Select or type the audit comment, and then click **OK**.

Related information

For information about...	See...
Labware Editor	<ul style="list-style-type: none">“About defining labware with the Labware Editor” on page 34“Labware Editor overview” on page 35
Plate Properties tab	“Setting microplate properties” on page 48
Workflow for adding labware to the Labware Editor	“Workflow for defining labware” on page 39
Opening the Labware Editor	“Opening the Labware Editor” on page 41
Audit trails (VWorks Plus only)	“Audit trails and how changes are tracked” on page 7

Setting general properties

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.

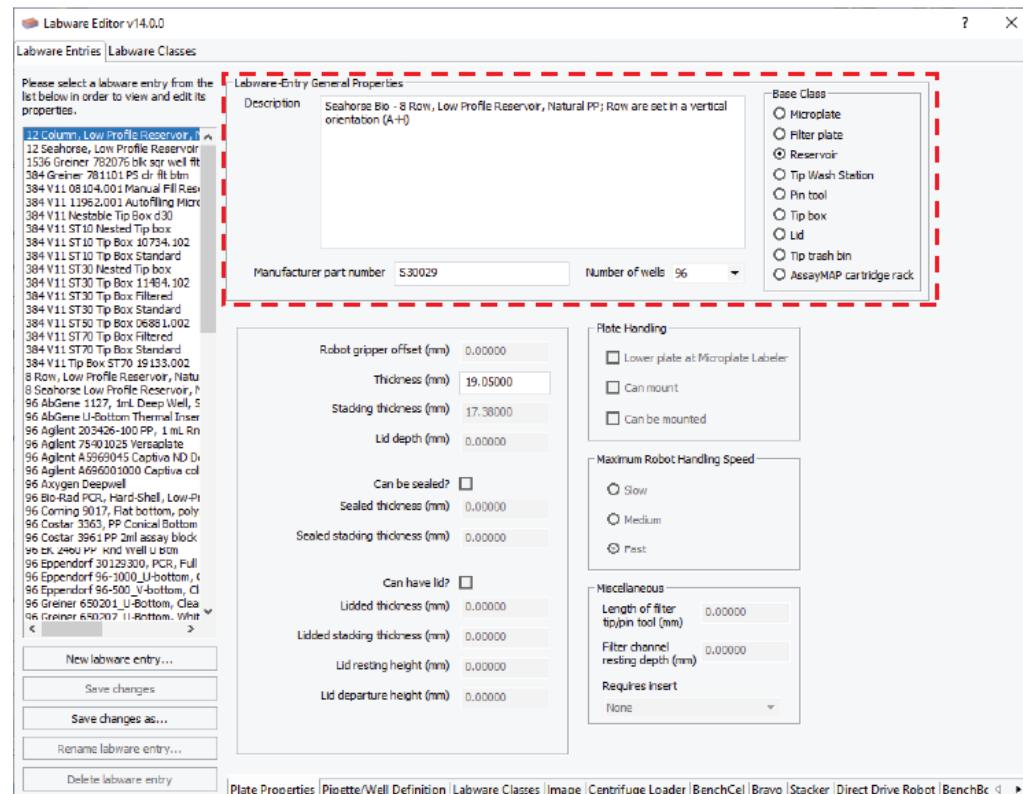
Before you start

- You must be logged in as an administrator or technician to perform this procedure.
- You must first create an entry for the labware.
- *VWorks Plus only.* You cannot edit or delete labware entries that have transitioned to the Released state. The parameter settings in the Labware Entries tab are unavailable for these labware entries.

Procedure

To define the general properties of a piece of labware:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tab, select the labware from the list.
- 3 Under **Labware-Entry General Properties**, type a detailed description of the labware in the **Description** box.



- 4 In the **Manufacturer part number** box, type the appropriate number for your reference.
- 5 In the **Number of wells** list, select the number of wells in the microplate.
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.
Note: The Pin tool base class is not used.

Related information

For information about...	See...
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Setting microplate properties for labware	"Setting microplate properties" on page 48

3 Defining labware

Setting microplate properties

Setting microplate properties

Before you start

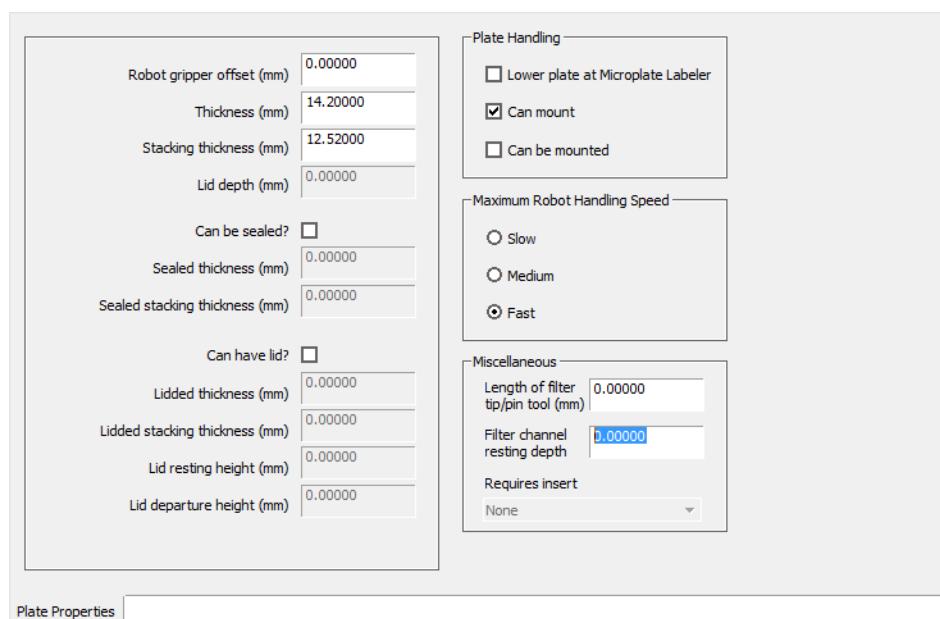
- You must be logged in as an administrator or technician to perform this procedure.
- You must first create an entry for the labware.
- *VWorks Plus only.* You cannot edit or delete labware entries that have transitioned to the Released state. The parameter settings in the Labware Entries tab are unavailable for these labware entries.

Setting microplate properties

To set *microplate properties*:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tab, click the **Plate Properties** sub-tab.

Figure Plate Properties sub-tab



- 3 Enter the values for the available parameters according to the labware type you are defining. The following table describes each parameter.

Note: The Base Class you select in the General Properties section determines which microplate properties are available.

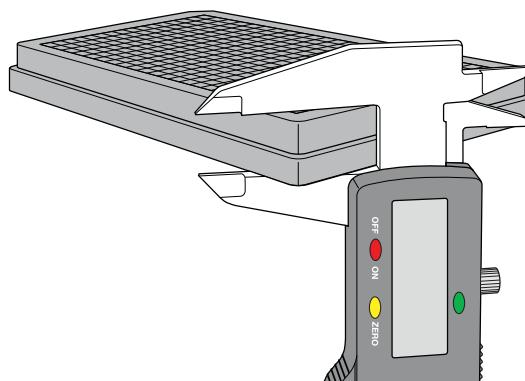
Parameter	Description
3-Axis Robot only. Robot gripper offset (mm)	<i>Not supported.</i> This VWorks version does not support the 3-Axis Robot or the BioCel Systems.

Parameter	Description
Thickness (mm)	The distance from the bottom of the microplate skirt to the top of the microplate.
	For a tip box, this is the distance from the bottom of the box to the top of the tips.
	For a filter plate that has filter nozzles that extend below the skirt, measure the distance from the bottom of the filter plate skirt to the top of the filter plate. You will use the parameters in the Miscellaneous section to account for the filter nozzles.

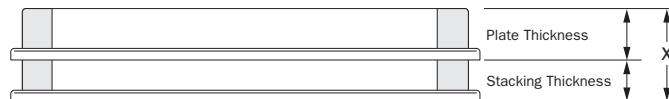
Figure Example of the thickness measurement for a filter plate



To increase the number of contact points, measure the distance at the corner of the microplate or tip box (using calipers). This method prevents the calipers from angling inward, which can produce inaccurate measurements.

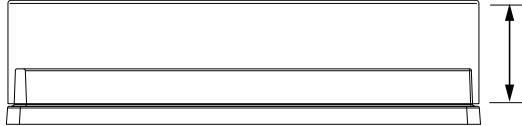
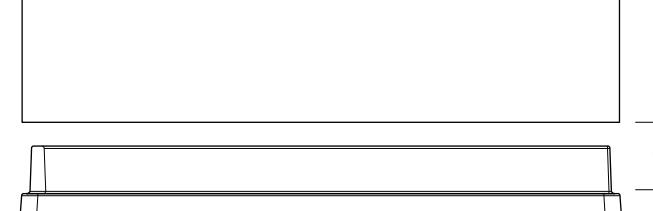


Stacking thickness (mm)	The thickness of two stacked microplates of the same type minus the thickness of one microplate. Measure the distance using calipers. Example: Thickness of two stacked microplates (x) = 23.14 mm Thickness of one microplate = 14.14 mm Stacking thickness: 23.14 mm - 14.14 mm = 9.00 mm
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3 Defining labware

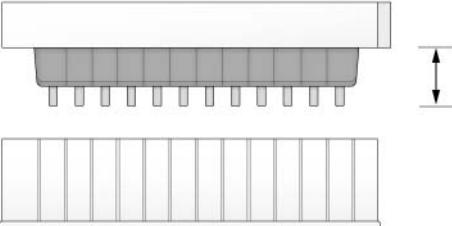
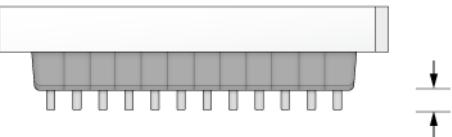
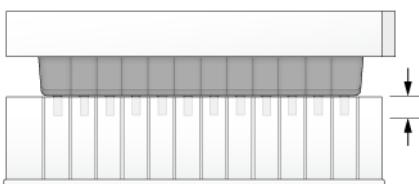
Setting microplate properties

Parameter	Description
Lid depth (nm)	The height of the lid interior, which is measured from the bottom resting surface of the lid to the underside of the lid's top surface.
	
Can be sealed?	The option to include the microplate seal.
Sealed thickness (mm)	The thickness of the microplate with a seal in place. Available only if Can be sealed? is selected.
Sealed stacking thickness (mm)	The stacking thickness of the microplate with a seal in place. Available only if Can be sealed? is selected.
Can have lid?	The option to include a microplate lid.
Lidded thickness (mm)	The thickness of the microplate with a lid in place. Available only if Can have lid? is selected.
Lidded stacking thickness (mm)	The stacking thickness of the microplate with the lid in place. Available only if Can have lid? is selected.
Lid resting height (mm)	The height (c) above the bottom of the microplate (d) at which the bottom of a microplate lid rests.
	
Lid departure height (mm)	The height (e) above the lid resting height to which the lid is lifted. In the BenchCel Microplate Handler, the lid is lifted to this height, and then the lid is removed.
	
Plate Handling	

Parameter	Description
Lower plate at Microplate Labeler	<p>The option to lower the Microplate Labeler stage if the microplate has a tall skirt or a raised surface in the middle of each side. Lowering the stage allows the Microplate Labeler to place the label above the tall skirt or raised surface.</p> <p>Note: The two vertical plate stage positions are set mechanically. To adjust the positions, see the Microplate Barcode Labeler User Guide for instructions.</p>
Can mount	<p>The option to place this microplate on top of another microplate.</p> <p>This property is for filter plates that are placed on top of waste plates during filtration steps of a protocol.</p> <p>This option can also be used to mount lids onto microplates.</p>
Can be mounted	<p>The option to place another microplate on top of this microplate.</p> <p>This property is for collection microplates that collect filtrate from filter plates during the filtration steps of a protocol. Many different microplates might be able to fit under any one type of filter plate.</p> <p>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.</p> <p>This option can also be used to mount lids onto microplate.</p>
Maximum Robot Handling Speed	
Maximum robot handling speed	<p>The maximum speed at which the robot can move this type of microplate.</p> <p>In addition to this microplate-specific speed, you set the general robot speed via the Tools > Options menu in the VWorks software. If these speeds are different, the robot uses the slower of the two speeds.</p> <p>Note: To increase throughput, you can use a higher speed when the robot is not carrying labware. To set this option, click Tools > Options to display the Options dialog box. For details, see the VWorks Automation Control User Guide.</p>
Miscellaneous	

3 Defining labware

Setting microplate properties

Parameter	Description
Length of filter tip/pin tool (mm)	Available for labware of the Filter plate or Pin tool Base Class only. The length of the pins that protrude below the pin tool head, or the distance that the filter nozzle extends below the bottom edge of the filter plate skirt. Use a caliper to measure the length.
Figure Length of filter tip	
Filter channel resting depth	Available for labware of the Filter plate Base Class only. The distance from the tip of the protruding filter nozzles to the point at which the filter plate rests on another plate. Use a caliper to measure the distance.
Figure Filter plate channel resting depth	
Figure Filter channel resting depth (filter plate on microplate)	
Requires insert	The option to require an insert for use with nestable tip boxes.

Related information

For information about...	See...
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Setting general properties for labware	"Setting general properties" on page 46

Setting tip and well properties for pipetting

If the VWorks software is controlling a Bravo Platform, you must set the properties for the labware type in the Pipette/Well Definition sub-tab.

Before you start

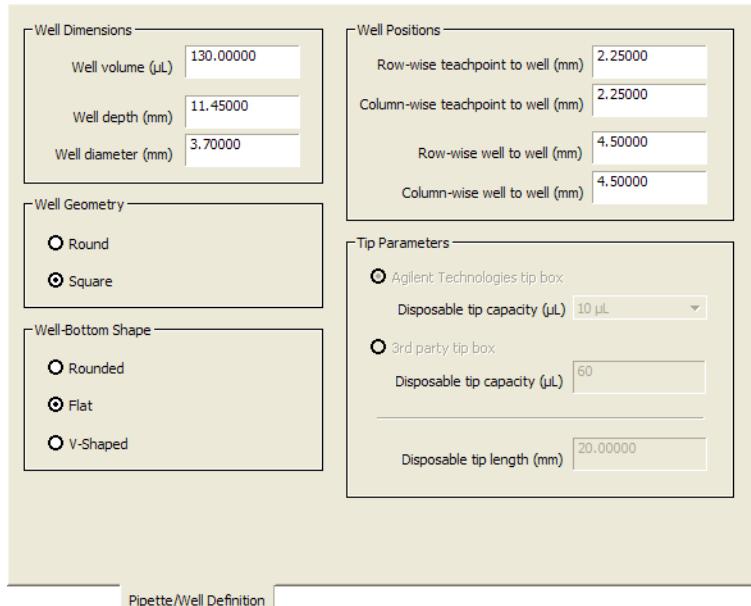
- You must be logged in as an administrator or technician to perform this procedure.
- You must first create an entry for the labware.
- VWorks Plus only. You cannot edit or delete labware entries that have transitioned to the Released state. The parameter settings in the Labware Entries tab are unavailable for these labware entries.

Setting properties

To set pipette/well properties:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tab, click the **Pipette/Well Definition** sub-tab.

Figure Pipette/Well Definition sub-tab



- 3 Enter the values for the available parameters according to the labware type that you are defining. The following table provides a description of each parameter.

Use calipers to carefully measure the labware you are defining in the Labware Editor.

IMPORTANT

Parameter	Description
Well volume	Maximum volume (µL) of fluid for one well.

3 Defining labware

Setting tip and well properties for pipetting

Parameter	Description
Well depth	Distance (mm) from the top of the microplate to the bottom of the well.
Well diameter	Diameter of the well (mm).
Well Geometry	Shape of the wells: round or square.
Well-Bottom Shape	Shape of the well bottoms: rounded, flat, or V-shaped.
Row-wise teachpoint to well	Distance (mm) from the teachpoint to the center of the A1 well along the row (letter axis). This setting should be 0 mm for standard 96-well microplates and 2.25 mm for standard 384-well microplates.
Column-wise teachpoint to well	Distance (mm) from the teachpoint to the center of the A1 well along the column (number axis). This setting should be 0 mm for standard 96-well microplates and 2.25 mm for standard 384-well microplates.
Row-wise well to well	Distance (mm) from well-center to well-center across the row. This setting should be 9 mm for standard 96-well microplates and 4.5 mm for standard 384-well microplates.
Column-wise well to well	Distance (mm) from well-center to well-center across the column. This setting should be 9 mm for standard 96-well microplates and 4.5 mm for standard 384-well microplates.
Disposable tip capacity	Volume capacity (μ L) of the disposable tips when labware is a tip box.
Disposable tip length	Length (mm) of the disposable tips being used when labware is a tip box.

Related information

For information about...	See...
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Setting general properties for labware	"Setting general properties" on page 46
Setting microplate properties for labware	"Setting microplate properties" on page 48

Creating and assigning labware classes

About labware classes

When you configure a device for the VWorks software, 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 file under the Allowed/prohibited labware property.

The VWorks software includes several labware classes that are already defined:

- Uses Filter Platepad
- Uses Standard Platepad
- Uses Vacuum Platepad

These default classes should be enough for your microplate 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.

VWorks Plus only. Each labware class is a record of interest for which the software logs an audit trail. The labware classes are exempt from transitioning through development states.

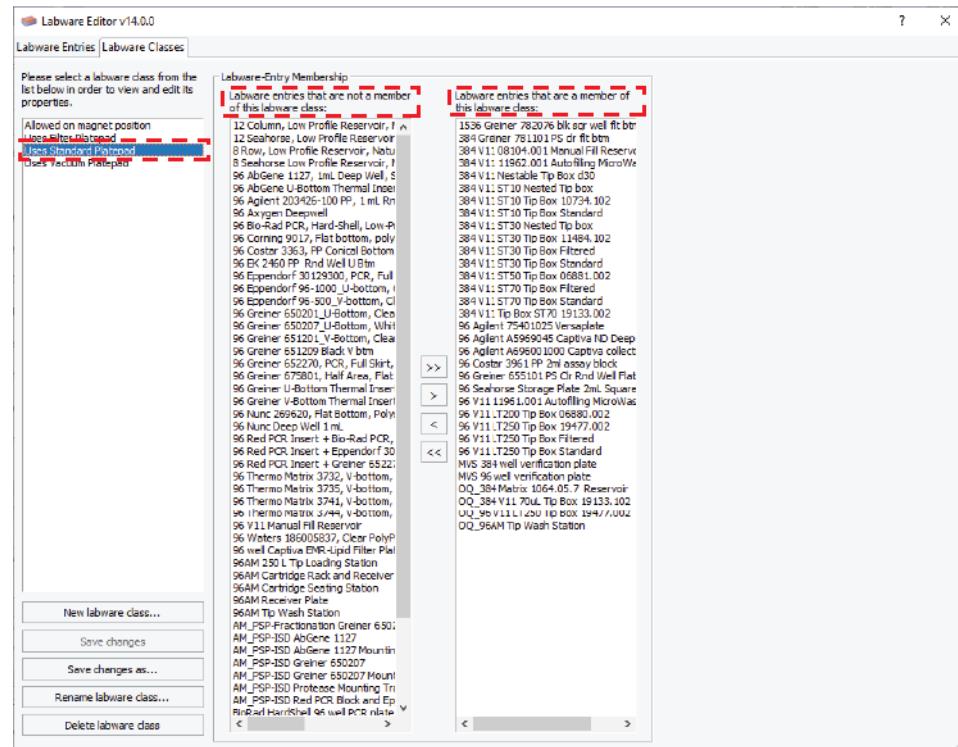
About creating and assigning labware classes

The Labware Classes tab in the Labware Editor provides the tools for creating and managing labware classes and labware entry membership.

Select a class (in the left-most column) to see the labware entries that are members and non-members for that class (right two columns). 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.

3 Defining labware

Creating and assigning labware classes



Creating labware classes

Before you start:

You must be logged in as an administrator or technician to perform this procedure.

To create a new 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.

Note: You can also create a new labware class by clicking **Save changes as** and entering a different name.

Assigning labware classes

VWorks Plus only. Labware entries are records of interest for which the software logs audit trails. A labware entry that has transitioned to the Released state cannot be deleted from or added to a labware class.

To associate a specific piece of labware with a labware class:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Classes** tab, select an item from the middle column.
- 3 Click **>** to move the labware entries or labware classes to the right-hand column.

To select more than one item, use SHIFT+click or CTRL+click. If you want to move all entries, click >>.

- 4 Click **Save Changes** to save your changes.
- 5 *VWorks Plus only.* The Audit Comment dialog box opens. Select or type a comment about the changes made, and then click **OK**.

Note: You can also assign labware to a class using the Labware Classes tab on the Labware Entries tab. This may be more convenient when you are defining a new piece of labware and want to assign it to an existing labware class.

Related information

For information about...	See...
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
<i>VWorks Plus only.</i> Transitioning records through development states	"Managing record states" on page 18
<i>VWorks Plus only.</i> Audit trails.	"Audit trails and audit trail reports" on page 7

3 Defining labware

Adding a labware image

Adding a labware image

About labware images

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

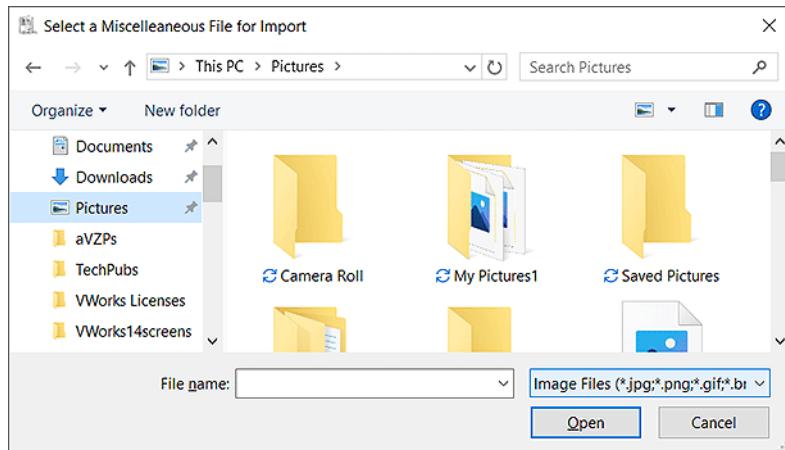
Before you start

- You must be logged in as an administrator or technician to perform this procedure.
- Make sure that the image file is in the JPG, GIF, or BMP format.
- *VWorks Plus only.* You cannot edit or delete labware entries that have transitioned to the Released state. The parameter settings in the Labware Entries tab are unavailable for these labware entries.

Importing the image file

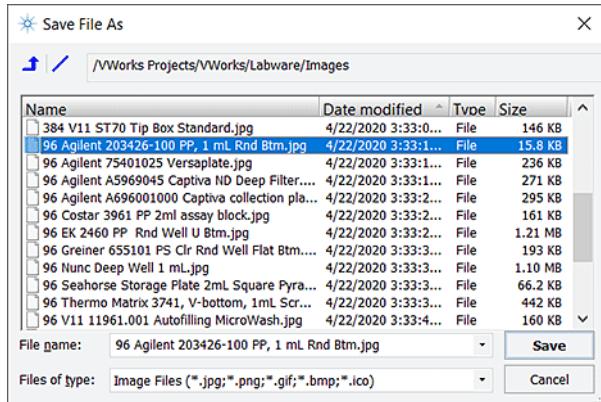
To import the image file:

- 1 In the VWorks window, click **File > Import Misc File**. The Select a Miscellaneous File for Import dialog box opens.



- 2 Select **Image Files** as the file type, locate and select the file, and then click **Open**.
- 3 In the **Save File As** dialog box, select the storage location and click **Save**.

For example, you might select /VWorks Projects/VWorks/Labware/Images/ as the storage location.

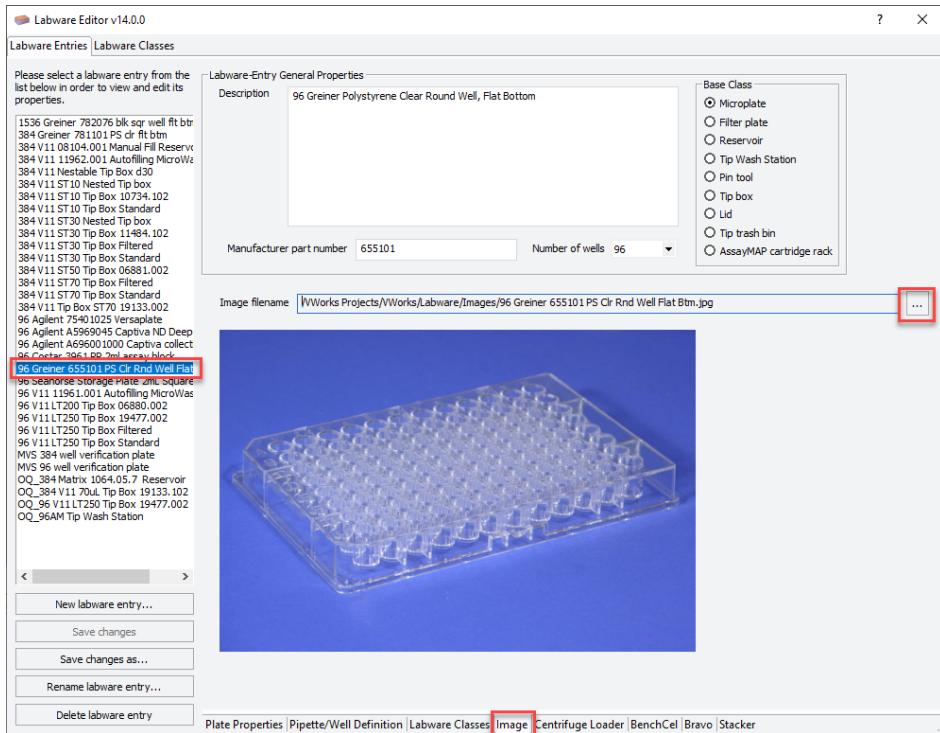


- 4 VWorks Plus only. The Audit Comment dialog box opens. Select or type a comment about the changes made, and then click **OK**.

Inserting an image in Labware Editor

To insert an image:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tab, select the labware in the left column, and then click the **Image** sub-tab.



- 3 At the **Image filename** box, click the **...** button to locate the file.
- 4 In the **Open** dialog box, select the image file and click **Open**.
The image appears below the file name.

3 Defining labware

Setting Centrifuge Loader properties

- 5 Click **Save changes**.
- 6 *VWorks Plus only.* If an audit trail is being logged, the Audit Comment dialog box opens. Select or type the audit comment, and then click **OK**.

Related information

For information about...	See...
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Using the Labware Editor	"Labware Editor overview" on page 35

Setting Centrifuge Loader properties

If you are operating a Centrifuge with a Centrifuge Loader, set the corresponding properties in the Centrifuge Loader sub-tab of the Labware Editor.

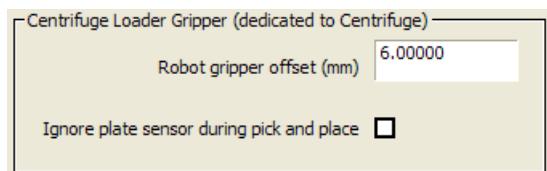
Before you start

- You must be logged in as an administrator or technician to perform this procedure.
- You must first create an entry for the labware.
- *VWorks Plus only.* You cannot edit or delete labware entries that have transitioned to the Released state. The parameter settings in the Labware Entries tab are unavailable for these labware entries.

Procedure

To set the Loader properties:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tab, click the Centrifuge Loader sub-tab.
- 3 In the Robot gripper offset (mm) box, type the distance from the bottom of the microplate where the robot can grip the microplate.
- 4 *Optional.* Select the **Ignore plate sensor during pick and place** check box if you want to ignore the microplate sensor, for example if you are using a black microplate that has a finish and skirt that would otherwise avoid detection.



For information about...	See...
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Using the Labware Editor	"Labware Editor overview" on page 35

Setting BenchCel properties

About the BenchCel properties

The BenchCel Microplate Handler X-Series and R-Series each have their own gripper offsets and positions. When you add a new labware entry, default parameter 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 must be redefined to work with the R-Series BenchCel Microplate Handler because the parameter values are different for the same piece of labware.

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 Microplate Handler.

Before you start

- You must be logged in as an administrator or technician to perform this procedure.
- You must first create an entry for the labware.
- *VWorks Plus only.* You cannot edit or delete labware entries that have transitioned to the Released state. The parameter settings in the Labware Entries tab are unavailable for these labware entries.

Procedure

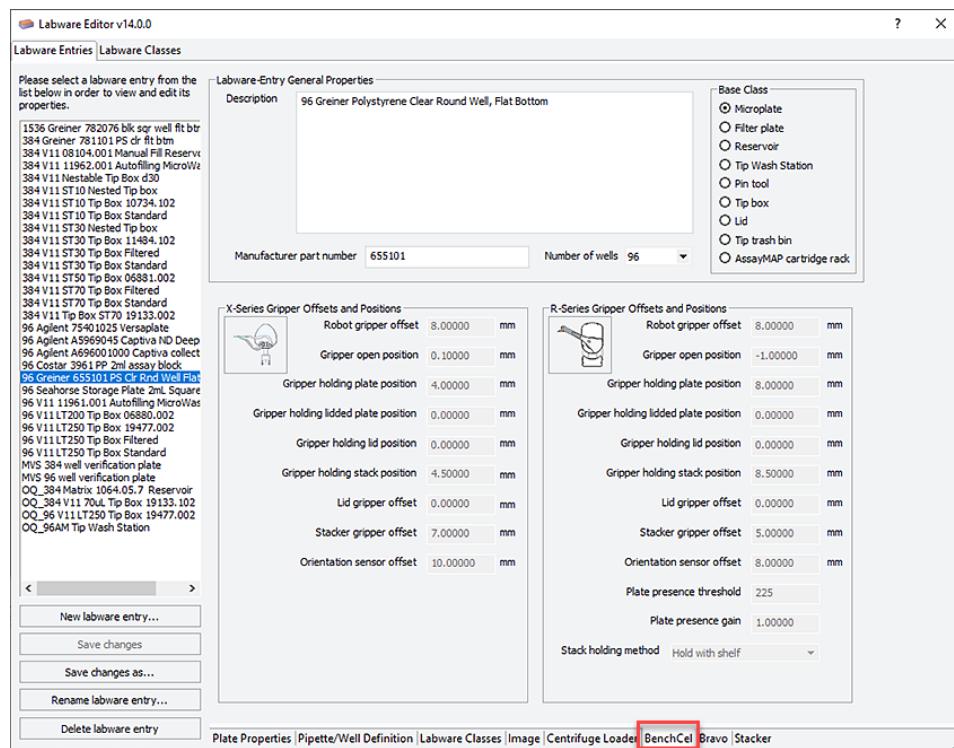
To define the BenchCel properties:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tab, click the BenchCel sub-tab.

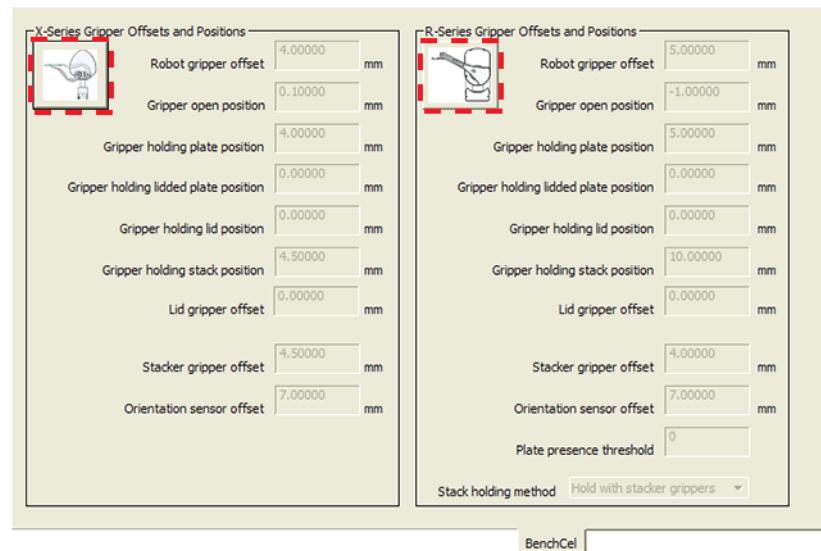
3 Defining labware

Setting BenchCel properties

Figure BenchCel sub-tab



- 3 Click the button that corresponds to the BenchCel Microplate Handler type that is currently operating and for which you are defining the labware.



IMPORTANT

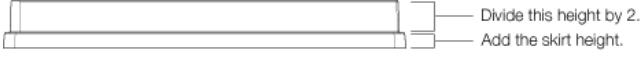
Make sure you enter values for the correct model of the BenchCel Microplate Handler. Fields for X-Series and R-Series BenchCel Microplate Handlers can be enabled regardless of the type of BenchCel Microplate Handler that you are operating.

- 4 Measure the labware and enter the values for the following fields.

Parameter	Description
Robot gripper offset (mm)	<p>The distance from the bottom of a microplate to where the robot grippers will hold the microplate.</p> <p>IMPORTANT Make sure that the gripper points do not close at the edge of the skirt. Otherwise, the gripper can slip onto the body of the microplate and drop the microplate.</p>
Gripper open position (mm)	<p>The distance the grippers move from the home position as the robot releases a microplate. A larger value moves the grippers closer together. A smaller value opens the grippers wider.</p> <p>Set this to -1 for R series and 0.1 for X Series BenchCel Microplate Handlers.</p>
Gripper holding plate position (mm)	<p>The distance 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.</p> <p><i>Note:</i> 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.</p>
Gripper holding lidded plate position (mm)	<p>The distance that the grippers move inward from 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.</p>
Gripper holding lid position (mm)	<p>The distance the grippers move inward from home position when holding a microplate lid. Increasing the value moves the grippers closer together and holds the lid tighter. Decreasing the value opens the grippers wider.</p> <p>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.</p>
Gripper holding stack position (mm)	<p>The distance the grippers move inward from the home position when holding a microplate that is in a stack. A larger value moves the grippers closer together and holds the microplate tighter. A smaller value opens the grippers wider.</p> <p><i>Note:</i> 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.</p>

3 Defining labware

Setting BenchCel properties

Parameter	Description
Lid gripper offset (mm)	<p>The height (a) above the lid resting height (b) at which the gripper can grip the lid.</p> 
Stacker gripper offset (mm)	<p>The distance from the bottom of a microplate to where the stacker grippers will hold the microplate.</p> <p>Be careful not to grab the microplate on the top edge of the skirt where the stacker grippers could slip onto the microplate body.</p> <p>Change this value only if the stacker is not gripping the microplates correctly.</p>
Orientation sensor offset (mm)	<p>The distance from the bottom of a microplate to where the orientation sensors will check for notches.</p> <p>You can calculate the initial offset as follows:</p> <p>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.</p> 
Stack holding method	<p><i>R-Series only.</i> The option that specifies how the stacker holds the stack of microplates:</p> <ul style="list-style-type: none">• <i>Hold with stacker gripper.</i> For the greatest precision, select this method, for example, if your microplate has a narrow gripping tolerance requiring a specific stacker gripper offset. Holding the stack with grippers results in slower cycle time than the Hold with shelf method.• <i>Hold with shelf.</i> For faster cycle time, select this method if your microplate has a wider gripping tolerance and does not require a specific stacker gripper offset.

Related information

For information about...

Using the Labware Editor

See...

"Labware Editor overview" on page 35

For information about...	See...
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Setting general properties for labware	"Setting general properties" on page 46

Setting Bravo properties

When to set Bravo properties

If you are operating a Bravo Platform that has a robot gripper, use this procedure to ensure that the parameter values are set correctly.

Note: The Bravo gripper is an optional feature.

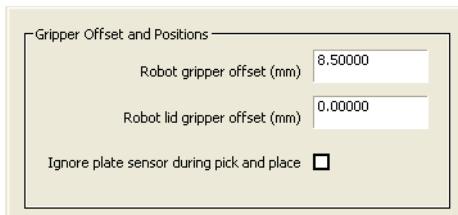
Before you start

- You must be logged in as an administrator or technician to perform this procedure.
- You must first create an entry for the labware.
- VWorks Plus only. You cannot edit or delete labware entries that have transitioned to the Released state. The parameter settings in the Labware Entries tab are unavailable for these labware entries.

Procedure

To set Bravo properties:

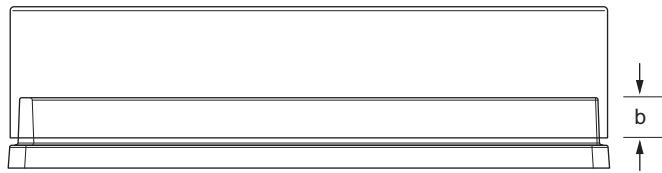
- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tabs, click the Bravo sub-tab.
- 3 Under **Gripper Offset and Positions**, type the **Robot gripper offset**. This is the height (mm) of the gripper above any teachpoint when the Bravo gripper is picking up or placing a microplate of this type.



- 4 Enter the **Robot lid gripper offset**. This is the height (mm) above the lid resting height at which to grip the lid. (Shown as *b* below.)

3 Defining labware

Setting Stacker properties



- 5 Select **Ignore plate sensor during pick and place** to tell the robot gripper to ignore the feedback from the microplate sensor during a pick and place for this labware. Typically, this is selected when troubleshooting.

Related information

For information about...	See...
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Using labware classes	"Creating and assigning labware classes" on page 55

Setting Stacker properties

When to set Stacker properties

If you are using a BenchCel Microplate Handler in your automation system, you must set the properties in the Stacker sub-tab of the Labware Editor.

Before you start

- You must be logged in as an administrator or technician to perform this procedure.
- You must first create an entry for the labware.
- Make sure you have read the sections of the [BenchCel Microplate Handler User Guide](#) that describe the location and function of the stacker sensors.
Note: This VWorks version does not support the Labware Stacker.
- *VWorks Plus only.* You cannot edit or delete labware entries that have transitioned to the Released state. The parameter settings in the Labware Entries tab are unavailable for these labware entries.

Setting properties

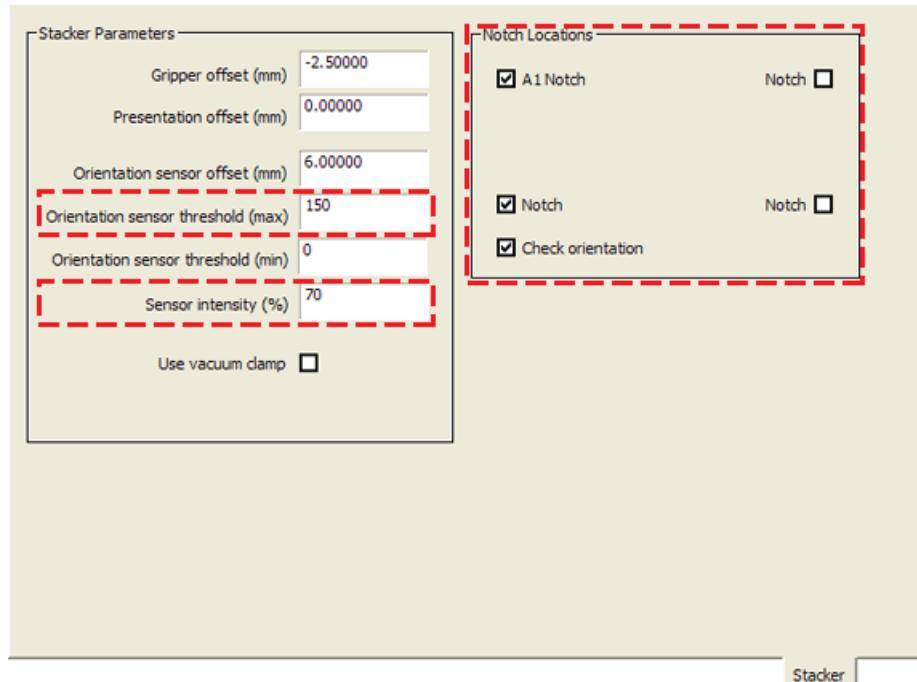
To set stacker properties:

- 1 Open the **Labware Editor**.
- 2 In the **Labware Entries** tab, click the **Stacker** sub-tab.

- 3 Enter the values for the available properties according to the labware you are defining.

Set only the maximum orientation sensor threshold, sensor intensity, and notch locations. The other settings are not used.

Figure Properties required for the BenchCel Microplate Handler



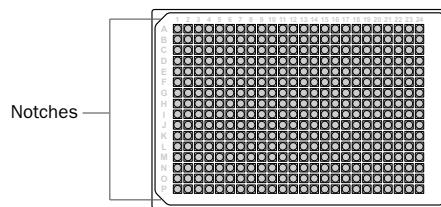
The following table provides descriptions of each parameter required for the BenchCel Microplate Handler.

Parameter	Description
Stacker Parameters	
Orientation sensor threshold (max)	<p>Specifies the highest value that an orientation sensor can register when sensing a notch. Any sensor reading above this value indicates that a solid microplate wall is present. Any sensor value below this threshold indicates that either a notch, or no microplate is present.</p> <p>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.</p> <p>The maximum value is 255.</p>

3 Defining labware

Setting Stacker properties

Parameter	Description
Sensor intensity	Sets the percentage of maximum sensor intensity for all sensors. If the sensor intensity is set too low, a microplate 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 microplate.
Notch Locations	
Check orientation	Turns on microplate-orientation checking based on the selected notch locations for your microplate. The notch locations are ignored when this check box is cleared.
Notch location check boxes	Select the corresponding notch or notches for your microplate. For BenchCel Microplate Handlers, the A1 well of the microplate is positioned in the far, left corner as you face the front of the BenchCel Microplate Handler.



IMPORTANT

If the device orientation sensors detect notches in the correct location, the sensors will not flag an incorrect orientation for the wrong microplate type.

Related information

For information about...	See...
Workflow for adding labware to the Labware Editor	"Workflow for defining labware" on page 39
Opening the Labware Editor	"Opening the Labware Editor" on page 41
Using the Labware Editor	"Labware Editor overview" on page 35

4 Specifying pipette speed and accuracy

This chapter contains the following topics:

- ["About liquid classes" on page 70](#)
- ["Opening the Liquid Library Editor" on page 72](#)
- ["Creating a liquid class" on page 73](#)
- ["Calibrating the pipettor" on page 76](#)

4 Specifying pipette speed and accuracy

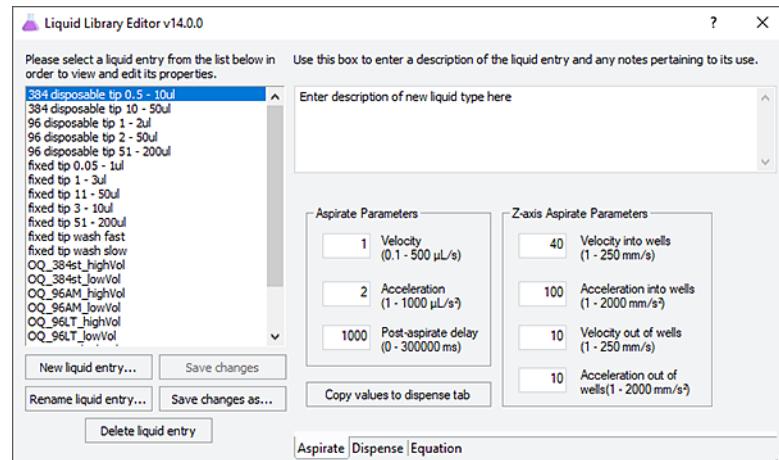
About liquid classes

About liquid classes

Liquid Library Editor defined

The Liquid Library Editor provides tools for users with technician or administrator privileges to enter values for properties that affect pipetting speed, accuracy, and precision.

Figure Liquid Library Editor window



Default liquid library entries

When installing VWorks 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 use the Liquid Library to fine-tune the volume aspirated or dispensed by your Bravo Platform.

IMPORTANT

Verify the pipetting of your Bravo Platform. Accurate and precise pipetting depends on a variety of factors including the liquid properties.

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 μ L versus 200 μ L
- Liquid operations
For example, washing versus mixing

How liquid classes are stored

Each liquid class is saved as an .xml file in Shared Services storage.

VWorks Plus only. The liquid classes are records of interest. The software automatically logs audit trails for liquid classes that are in the In Validation and Released states. Optionally, the software can log audit trails for these records while they are in the In Development state. For details, see ["Setting audit trail options" on page 9](#).

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

The Liquid Library Editor also has an equation editor that can be used to calibrate the Bravo Platform.

Related information

For information about...	See...
Opening the Liquid Library Editor	"Opening the Liquid Library Editor" on page 72
Creating a liquid class	"Creating a liquid class" on page 73
Calibrating your pipettor	"Calibrating the pipettor" on page 76
Audit trails and records of interest	"Using compliance features" on page 5

4 Specifying pipette speed and accuracy

Opening the Liquid Library Editor

Opening the Liquid Library Editor

Before you start

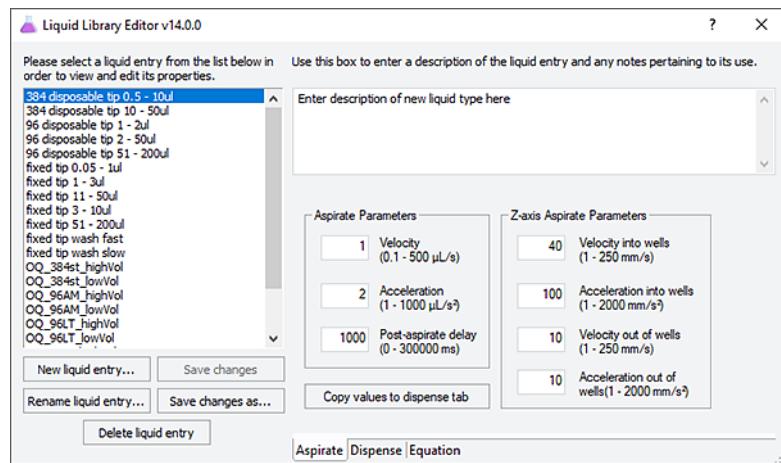
You must be logged in as an administrator or technician to open the Liquid Library Editor.

Procedure

To open the Liquid Library Editor:

- 1 Select Tools > Liquid Library Editor.

The Liquid Library Editor opens.



Related information

For information about...	See...
Liquid classes	"About liquid classes" on page 70
Creating a liquid class	"Creating a liquid class" on page 73
Calibrating your pipettor	"Calibrating the pipettor" on page 76

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

WARNING

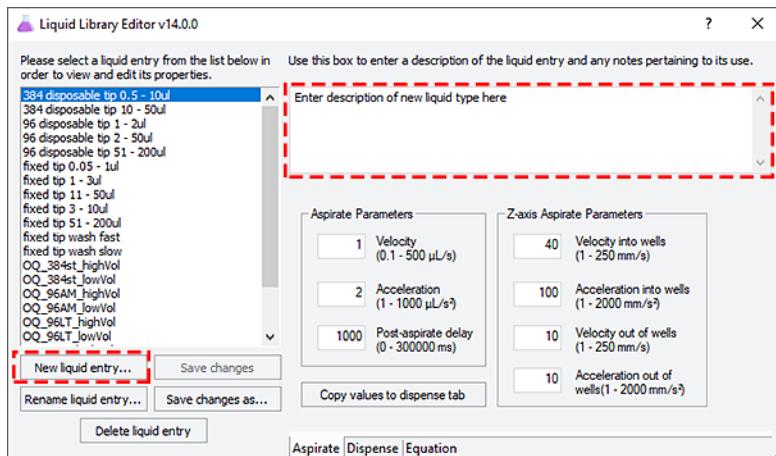
Agilent Technologies products are intended to be used with non-hazardous liquids. Contact Agilent Technical Support before using any non-aqueous solvents or solvents generally considered to be hazardous.

Agilent Automation Solutions product surfaces are designed to be compatible with small volumes of aqueous solutions, common biological buffers, solvents, and common reducing agents. You can find a list of compatible chemicals in the *Automation Solutions Products General Safety Guide*.

Procedure

To create a liquid class:

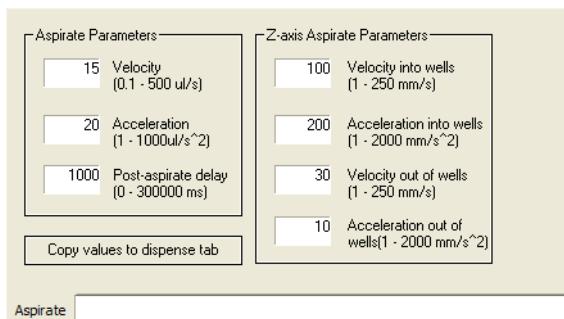
- 1 Open the **Liquid Library Editor**.
- 2 Click **New liquid entry**.



- 3 In the **New Liquid Entry** dialog box, type a name for the liquid class and click **OK**.
- 4 *Optional.* In the box at the top right of the **Liquid Library Editor** window, type a note describing the entry for your records.
- 5 On the **Aspirate** tab, type the values for the following aspirate parameters.

4 Specifying pipette speed and accuracy

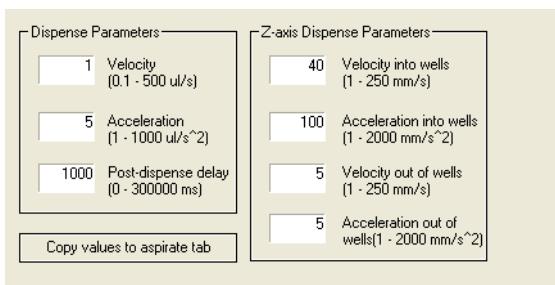
Creating a liquid class



Note: The upper limits for some of the parameters might not be achievable for the device you are using.

Aspirate	Definition
Velocity (µL/s)	Specifies the speed of the aspiration stroke.
Acceleration (µL/s ²)	Specifies acceleration during the aspiration stroke.
Post-aspirate delay (ms)	Specifies the time the pipettor waits after aspiration is complete before moving the tips out of the wells.
Z-axis velocity into wells (mm/s)	Specifies how fast the pipettor moves as the tips enter the wells.
Z-axis acceleration into wells (mm/s ²)	Specifies the acceleration of the pipettor as the tips move into the wells.
Z-axis velocity out of wells (mm/s)	Specifies how fast the tips leave the wells.
Z-axis acceleration out of wells (mm/s ²)	Specifies the acceleration of the pipettor as the tips move out of the wells.

- 6 Click the **Dispense** tab and enter values for the dispense properties.



The following table describes the dispense parameters.

Dispense	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.

Dispense	Definition
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**.
- 8 *VWorks Plus only.* If an audit trail is being logged, the Audit Comment dialog box opens. Select or type the audit comment, and then click **OK**.

Related information

For information about...	See...
Liquid classes	"About liquid classes" on page 70
Opening the Liquid Library Editor	"Opening the Liquid Library Editor" on page 72
Calibrating your pipettor	"Calibrating the pipettor" on page 76
Audit trails and records of interest	"Using compliance features" on page 5

Calibrating the pipettor

About calibrating the pipettor

You can improve the accuracy of pipetted volumes by:

- Calibrating the pipettor
- Plotting the actual volume dispensed as a function of the set dispense volume
- Calculating the polynomial coefficients of the plot
- Entering the coefficients into the liquid library equation editor

Do you need to calibrate your pipettor?

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

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

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

Method overview

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

To calibrate a pipettor, an independent method of measuring dispensed volume is required. One method is to dispense a solution of fluorescein dye and measure the fluorescence emitted from each microplate well.

IMPORTANT

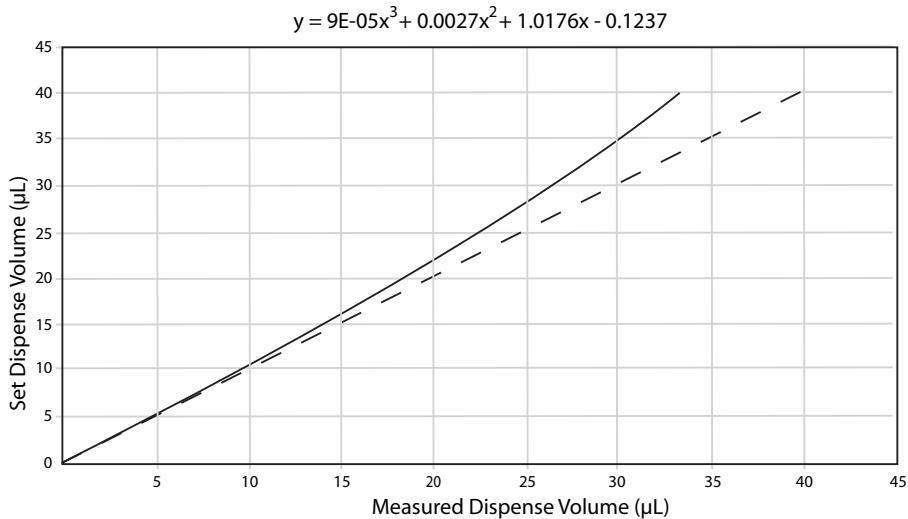
Whichever method you use, verify that the error in the detection method is significantly smaller than the pipetting error. Otherwise, the error you detect might be from the detection method and not the pipetting error.

The overall method is:

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

The plot will be a curve, reflecting the fact that absolute error is a function of the magnitude of the measurement.

- 5 Use the statistical functions of the spreadsheet program to fit a curve to the data. Your result might look like this:



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

- 6 Enter the curve information into the equation editor of the Liquid Library Editor. If you repeat the experiment, you will find that the curve is much closer to a straight line. This is because the equation you entered adjusts the action of the servo motor that determines aspirate and dispense volumes, thereby calibrating the dispense.

Using the equation editor

You use the equation editor in the Liquid Library Editor to enter the calibration curve data and correct for pipetting inaccuracy.

To enter a polynomial into the equation editor:

- 1 Open the Liquid Library Editor.
- 2 Click the **Equation** tab to display the equation editor.
- 3 In the **Highest order of polynomial** text box, enter the value for the highest order of the polynomial.

This is the largest exponent in the equation and tells you how many terms are in the equation. For example, if the highest order of the polynomial is 3, the equation will have the general form: $y = a + bx + cx^2 + dx^3$, where 'x' is the volume specified by any pipettor task that uses this liquid class. With an exponent of three, four rows are added to the equation editor table.

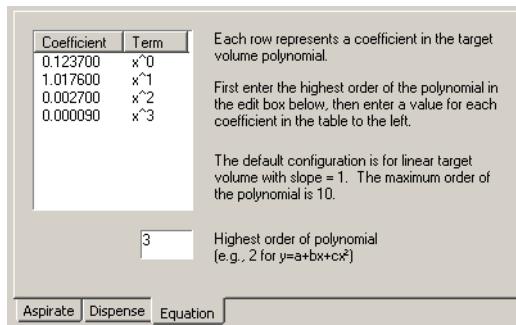
- 4 In the Coefficient/Term table, enter the coefficient and exponent for each of the terms in the equation, starting with the zero order term.

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

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

4 Specifying pipette speed and accuracy

Calibrating the pipettor



- 5 Click **Save changes**.
- 6 *VWorks Plus only.* If an audit trail is being logged, the Audit Comment dialog box opens. Select or type the audit comment, and then click **OK**.

Related information

For information about...	See...
Liquid classes	"About liquid classes" on page 70
Opening the Liquid Library Editor	"Opening the Liquid Library Editor" on page 72
Creating a liquid class	"Creating a liquid class" on page 73
Audit trails and records of interest	"Using compliance features" on page 5

5 Tracking and managing labware in storage

This chapter contains the following topics:

- ["About labware inventory management" on page 80](#)
- ["Opening the Inventory Editor" on page 83](#)
- ["About inventory groups" on page 86](#)
- ["Creating and managing location groups" on page 88](#)
- ["Creating and managing plate groups" on page 91](#)
- ["Adding labware information in the inventory database" on page 94](#)
- ["Moving labware between storage devices" on page 103](#)
- ["Removing labware information from the inventory database" on page 106](#)
- ["Using a plate group to process labware" on page 111](#)
- ["Creating plate group with barcode input file" on page 116](#)
- ["Inventory Editor views and filters" on page 119](#)
- ["Auditing plate volumes in the Inventory Editor" on page 120](#)
- ["Reinventorying the labware inventory" on page 123](#)
- ["Exporting and importing the inventory data" on page 125](#)
- ["Resolving labware inventory problems" on page 130](#)

5 Tracking and managing labware in storage

About labware inventory management

About labware inventory management

About this topic

This topic provides the background information on how to use the VWorks Inventory Editor to track labware moving into and out of storage devices, such as the Labware MiniHub.

You must be logged in as an administrator or technician to open the Inventory Editor. ["Creating and managing location groups" on page 88](#)

Barcode tracking versus inventory management

Barcode tracking

Barcode tracking without an inventory system is limited because the labware locations are stored in memory and are lost when you exit the VWorks software.

Inventory management

The inventory management system allows long-term tracking of microplates because barcode data is permanently stored in a database. This is useful for lab automation systems with devices that store microplates for a long time, such as the Agilent Labware MiniHub.

VWorks *Plus only*. The Inventory database file (.sql) is a record of interest that is exempt from record state changes. VWorks logs an audit trail for this file.

Prerequisites

To use inventory management, you must have established a VWorks connection to the Inventory database. For instructions, see ["Connecting to Inventory and Experiments databases" on page 175](#).

How labware is stored

The long-term storage devices (Labware MiniHub) supported by the VWorks software store labware in cassettes and slots. A cassette is a vertical rack that has many slots, where each slot holds one labware.

Information that is stored

The inventory database maintains a list of labware located in long-term labware storage devices. Each labware entry in the database includes the following information:

- Device in which the labware is located
- Cassette and slot location of the labware
- Names of the location and plate groups to which it belongs
- Labware type
- Any north-side, south-side, east-side, and west-side barcodes
- Volume of the wells in the labware

How to access data in the inventory database

You use the VWorks Inventory Editor to access the data in the inventory database. In the Inventory Editor, you can:

- View the information in the inventory database.
- Add or import labware information in the database.
- Remove labware information from the database.
- Create or modify plate groups.
- Import plate groups from a barcode file.
- Create or modify location groups.
- Inventory the labware in a storage device.
- Export and import the entire inventory database.

The list of labware in the database is automatically updated every time the robot moves a labware into or out of a storage device.

Figure Inventory Editor window

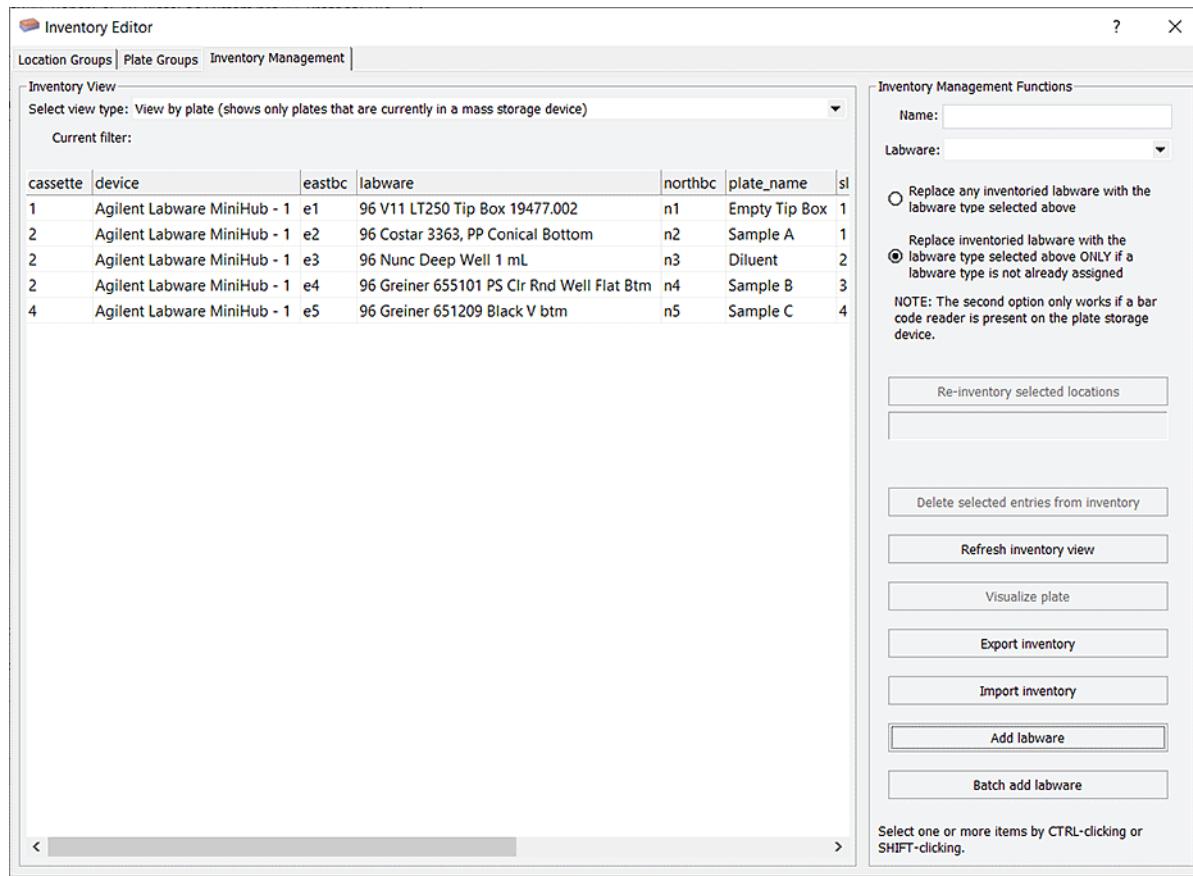


Plate groups and location groups

With long-term storage devices, typically only a subset of the labware stored in the device is used in one protocol. You can set up two different types of labware subsets, called plate groups and location groups. Which you choose for a particular protocol depends on what you are planning to do.

5 Tracking and managing labware in storage

About labware inventory management

- A plate group consists of a group of labware where the group membership is often based on the labware's unique database identifier.
- A location group is a group of slots in a storage device.

For more information, see ["About inventory groups" on page 86](#).

Inventory management tasks

The following protocol tasks interact with the inventory database:

- clearInventory
- exportDatabase
- ImportCsvToInventory
- Load
- Unload
- Incubate at microplate storage device

For more information about the tasks, see [VWorks Automation Control User Guide](#).

About adding labware into inventory

You can add labware information into the inventory database using one of the following methods:

- Run a protocol to physically move labware into the storage device. During the run, the system will update the inventory.
- Use the Inventory Editor to:
 - Add an individual labware into the inventory.
 - Add multiple labware by importing a CSV file.

For detailed instructions, see ["Adding labware information in the inventory database" on page 94](#).

Terminology

The following terms are used to describe the movement of labware in the system.

Term	Definition
Unload	The act of moving labware from a storage device into the system.
Load	The act of moving labware from the system into a storage device.
System	Labware that are being processed by the current protocol are considered to be in the system. For example: <ul style="list-style-type: none">• Labware on a platepad is in the system.• Labware being incubated in an incubator is in the system.• Labware half-way up a BenchCel rack is not in the system, unless it will be moved during the current protocol.• Labware being stored in a Labware MiniHub is not in the system unless it will be moved during the current protocol.

Database backup

You can back up the inventory database by exporting it to an SQL file. For instructions, see ["Exporting and importing the inventory data" on page 125](#).

To back up the inventory database along with the VWorks software system files, see [VWorks Automation Control User Guide](#). For assistance, contact Agilent Technical Support.

Related information

For information about...	See...
Inventory groups, plate groups and location groups	"About inventory groups" on page 86
Setting up the database	"Setting up and connecting to a MySQL database" on page 155
Moving labware in and out of a storage device	<ul style="list-style-type: none">"Adding labware information in the inventory database" on page 94"Removing labware information from the inventory database" on page 106"Moving labware between storage devices" on page 103
Incubating labware	"Using a plate group to process labware" on page 111
Using barcode input files	"Creating plate group with barcode input file" on page 116

Opening the Inventory Editor

About this topic

This topic explains the two ways you can open the Inventory Editor:

- ["Opening from the Tools menu" on page 84](#)
- ["Opening from within a protocol" on page 84](#)

Read this topic if your lab automation system has a random-access storage device, such as the Labware MiniHub.

Before you start

Before opening the Inventory Editor, make sure you have established a VWorks connection to the Inventory database. For details, see ["Connecting to Inventory and Experiments databases" on page 175](#).

You must be logged in as an administrator or technician to open the Inventory Editor.

5 Tracking and managing labware in storage

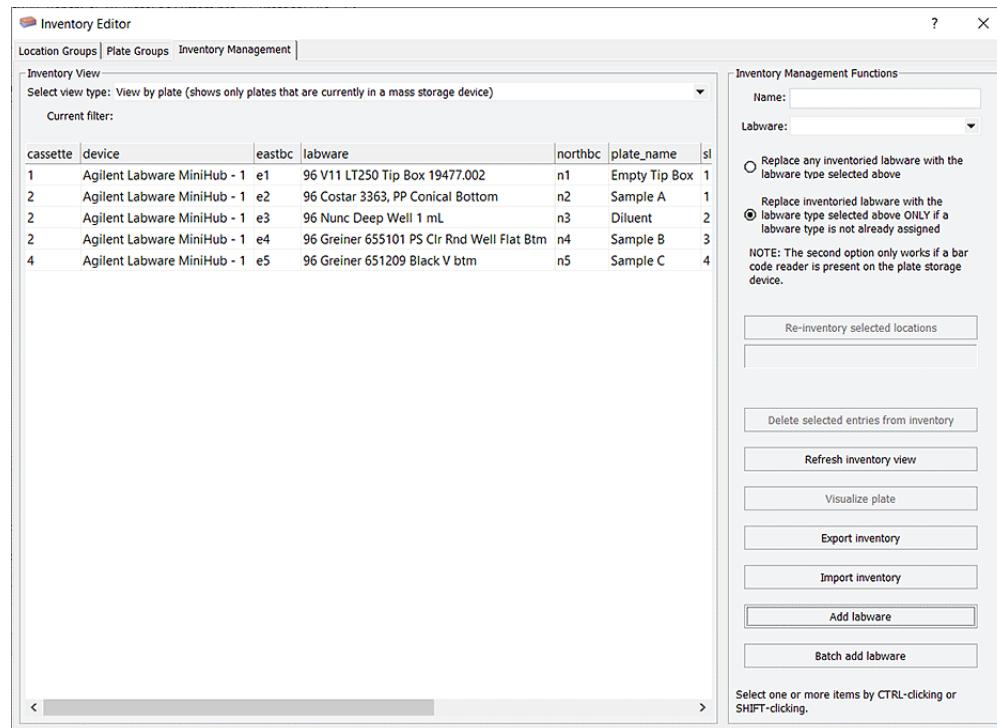
Opening the Inventory Editor

Each labware entry in the inventory database is associated with a storage location. To view the contents of the inventory database, you must first open the relevant device file and initialize the devices.

Opening from the Tools menu

To open the Inventory Editor from the Tools menu:

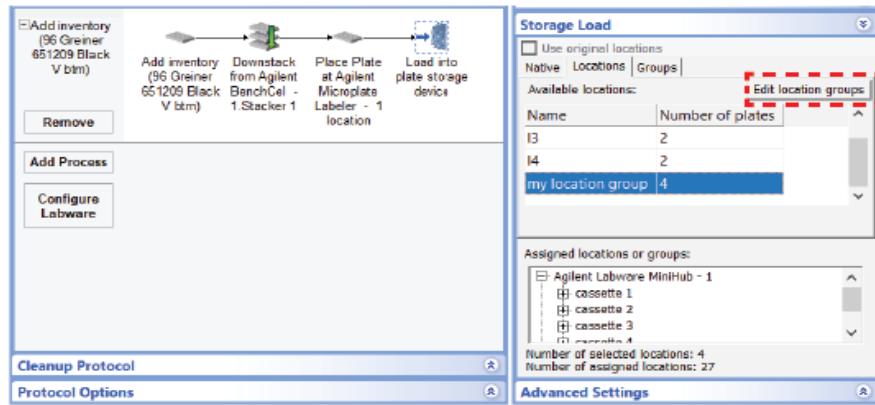
In the VWorks window, select **Tools > Inventory Editor**.



Opening from within a protocol

To open the Inventory Editor from within a protocol:

- 1 In the protocol, select a **Load** or **Unload** task.
- 2 Click **Storage Load** in the **Task Parameters** area.
- 3 Do one of the following:
 - In the **Locations** tab, click **Edit location groups**.
 - In the **Groups** tab, click **Edit plate groups**.



Related information

For information about...	See...
Inventory groups, plate groups and location groups	"About inventory groups" on page 86
Moving labware in and out of a storage device	<ul style="list-style-type: none"> "Adding labware information in the inventory database" on page 94 "Removing labware information from the inventory database" on page 106 "Moving labware between storage devices" on page 103
Incubating labware	"Using a plate group to process labware" on page 111
Using barcode input files	"Creating plate group with barcode input file" on page 116

About inventory groups

Who should read this

Read this topic if your lab automation system has a random-access storage device, such as the Labware MiniHub.

Inventory groups defined

An inventory group is a group of labware or slots that is a subset of the labware listed in the inventory.

Types of inventory groups

The two types of inventory groups are:

- Location groups
- Plate groups

Location groups

Location groups are used to move labware to and or 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 group, the robot moves whatever labware are in cassette 1, slots 1–10, regardless of the identity of the labware, out of the storage device and into the system.

When a Load task uses a location group, it moves the labware that are in the system into cassette 1, slots 1–10 of the storage device, regardless of the identity of the labware.

When to use

Location groups are used when:

- The storage device is being filled or emptied.
- The groups of labware are removed from the lab automation system and replaced with other groups of labware on a regular basis. This would be done by replacing a cassette of labware with a new one.

Plate groups

Plate groups are used to move specific labware 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 labware.

When a labware is first moved into the system by the system's robot, such as when it is downstacked, it is assigned an identifier in the database. After that, the VWorks software tracks where that labware is at all times. This tracking does not require the labware to have barcode labels. The VWorks software tracks the movement of each labware throughout a protocol.

Note: You cannot use a plate group with a Load task, unless a native location or location group is associated with it—you must specify a location. You can associate a plate group with the location group so that the labware that are loaded are simultaneously loaded into a plate group as well.

Note: When you load into a plate group you must also load into a location group, native location, or choose return to original locations, otherwise the software will not know where to put the labware.

Example:

A plate group in a storage device contains the following microplates:

- Plate 1
- Plate 26
- Plate 31
- Plate 41

These microplates 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 microplates out of the storage device and into the system.

When to use

Plate groups are typically used in compound management systems where labware 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. As long as the identification of the labware is tracked, the labware can be stored in any open location.

Group membership

A single labware can be a member of more than one plate group.

Related information

For information about...	See...
Creating a location group	"Creating and managing location groups" on page 88
Creating a plate group	"Creating and managing plate groups" on page 91
Moving labware in and out of a storage device	<ul style="list-style-type: none">• "Adding labware information in the inventory database" on page 94• "Removing labware information from the inventory database" on page 106• "Moving labware between storage devices" on page 103
Incubating labware	"Using a plate group to process labware" on page 111

5 Tracking and managing labware in storage

Creating and managing location groups

For information about...	See...
Using barcode input files	<ul style="list-style-type: none">“Creating plate group with barcode input file” on page 116VWorks Automation Control User Guide•

Creating and managing location groups

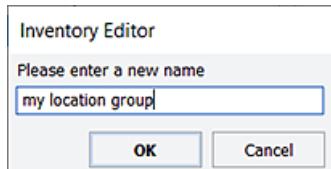
About this topic

This topic describes how to create a labware location group in the Inventory Editor. Read this topic if your lab automation system has a random-access storage device, such as the Labware MiniHub.

Procedure

To create a location group:

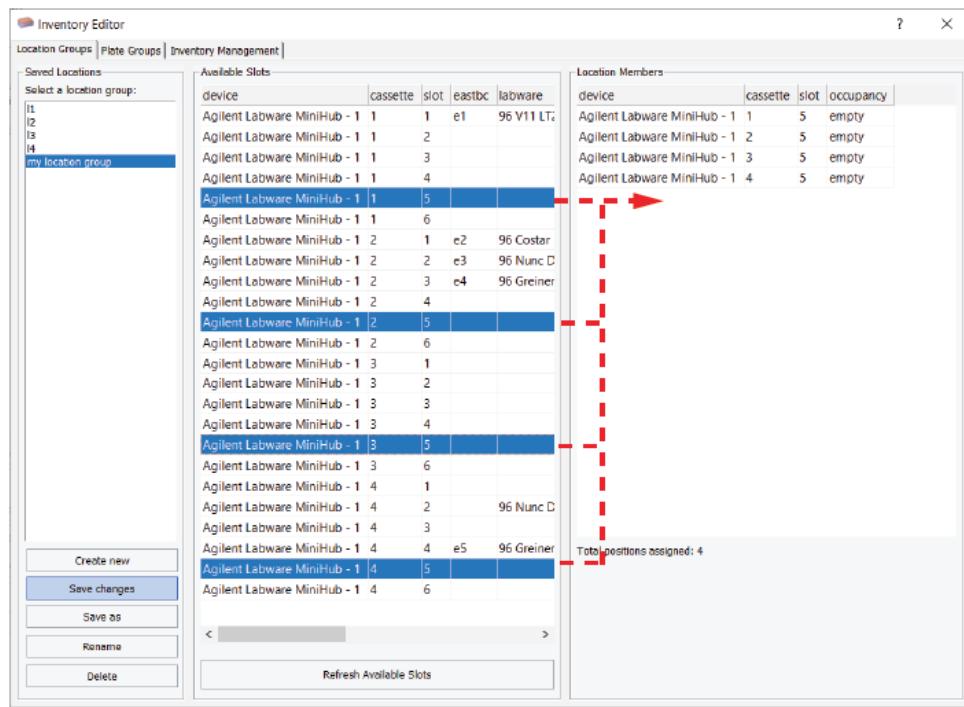
- 1 In the VWorks window, select **Tools < Inventory Editor**.
- 2 In the **Inventory Editor** window, click the **Location Groups** tab.
- 3 Click **Create new**, type a name for the group, and click **OK**.



- 4 In the **Available Slots** area, select a group of slots and drag the selection into the **Location Members** area.

You can use CTRL+click or SHIFT+click to select more than one slot. Alternatively, you can double-click a slot to add it to the location group.

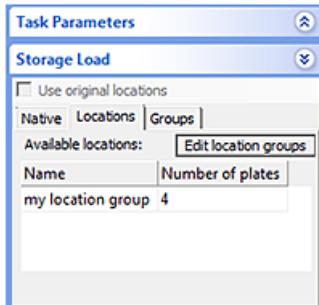
Note: The slots do not have to be adjacent to each other. For example, if you have different height shelves in the Labware MiniHub, you might want the location group to define the same shelf (slots) in all four cassettes.



Note: To delete a member of the location group, select the item in the Location Members area, and then press DELETE.

- 5 Click **Save Changes**.
- 6 Close the Inventory Editor window.

The new location group is listed as an available location in Locations tab of the Load/Unload Task Parameters area.



Deleting a location group

To delete a location group from the inventory:

- 1 In the **Inventory Editor** window, click the **Location Groups** tab.
- 2 Select a location group in the **Saved Locations** area.
- 3 Click **Delete**.

5 Tracking and managing labware in storage

Creating and managing location groups

Related information

For information about...	See...
Creating a plate group	"Creating and managing plate groups" on page 91
Opening the Inventory Editor	"Opening the Inventory Editor" on page 83
Moving labware in and out of a storage device	<ul style="list-style-type: none">• "Adding labware information in the inventory database" on page 94• "Removing labware information from the inventory database" on page 106• "Moving labware between storage devices" on page 103
Incubating labware	"Using a plate group to process labware" on page 111
Using barcode input files	<ul style="list-style-type: none">• "Creating plate group with barcode input file" on page 116• <i>VWorks Automation Control User Guide</i>
Using storage tasks in a protocol	<i>VWorks Automation Control User Guide</i>

Creating and managing plate groups

About this topic

This topic describes how to create a plate group, which is a list of specific labware that can be moved into or out of a labware storage device without regard for which slots they are stored in.

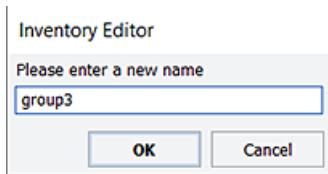
Read this topic if your lab automation system has a random-access storage device, such as the Labware MiniHub.

For instructions on how to add labware into the database, see ["Adding labware information in the inventory database" on page 94](#).

Procedure

To create a plate group:

- 1 In the VWorks window, select **Tools < Inventory Editor**.
- 2 In the **Inventory Editor** window, click the **Plate Groups** tab.
- 3 Click **Create new**, type a name for the group, and click **OK**.

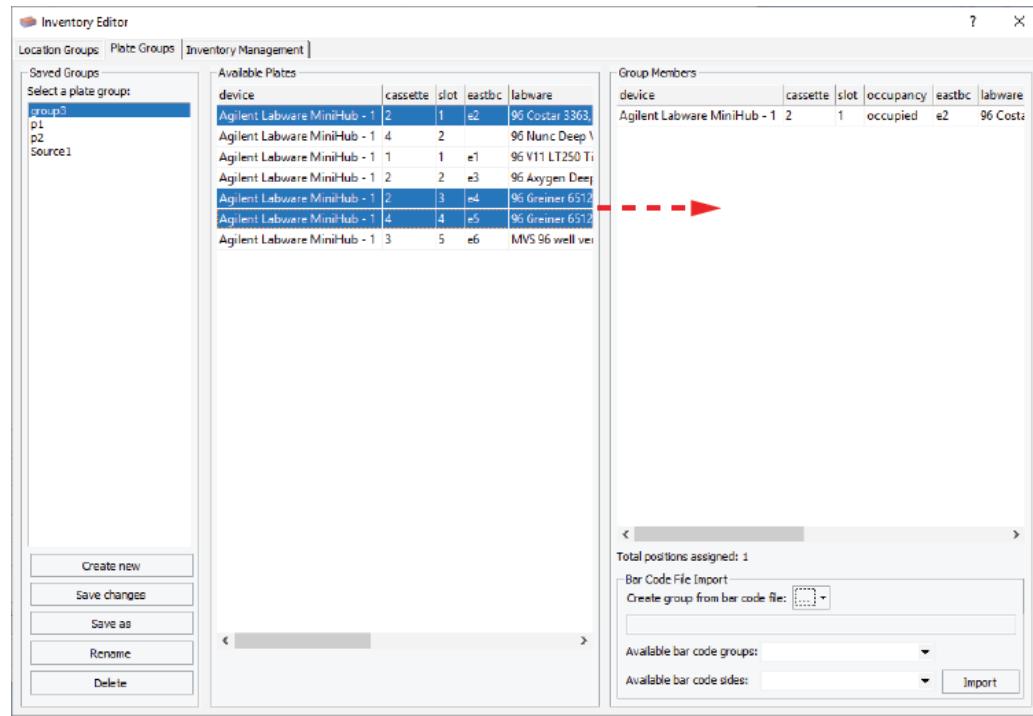


To add labware to the plate group:

- 1 In the **Available Plates** area, select a group of available labware, and drag the selection into the **Group Members** area.
You can use CTRL+click or SHIFT+click to select more than one labware.
Alternatively, you can double-click a plate to add it to the plate group.

5 Tracking and managing labware in storage

Creating and managing plate groups

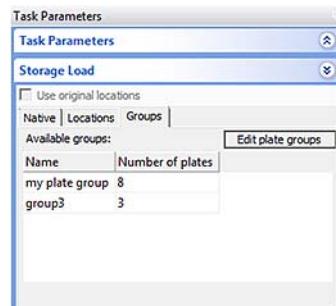


Note: To delete a plate from the plate group, select the plate in the Group Members area, and then press DELETE.

2 Click **Save Changes**.

3 Close the Inventory Editor window.

The plate group is listed as a available groups in the Groups tab in the Load/Unload Task Parameters area.



Changing the processing order

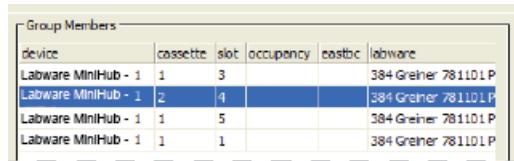
You can change the order in which the labware in a plate group will be processed.

To change the processing order:

1 In the plate group list, select a labware.

Group Members					
device	cassette	slot	occupancy	eastbc	labware
Labware MiniHub - 1	1	3			384 Greiner 781101P
Labware MiniHub - 1	1	5			384 Greiner 781101P
Labware MiniHub - 1	1	1			384 Greiner 781101P
Labware MiniHub - 1	2	4			384 Greiner 781101P

- 2 Drag it to another position in the list.



Group Members					
device	cassette	slot	occupancy	lastloc	labware
Labware MiniHub - 1	1	3			384 Greiner 781101P
Labware MiniHub - 1	2	4			384 Greiner 781101P
Labware MiniHub - 1	1	5			384 Greiner 781101P
Labware MiniHub - 1	1	1			384 Greiner 781101P

Deleting a plate group

To delete a plate group from the inventory:

- 1 In the **Inventory Editor** window, click the **Plate Groups** tab.
- 2 In the **Saved Groups** area, select the plate group.
- 3 Click **Delete**.

Related information

For information about...	See...
Creating a location group	"Creating and managing location groups" on page 88
Opening the Inventory Editor	"Opening the Inventory Editor" on page 83
Moving labware in and out of a storage device	<ul style="list-style-type: none">"Adding labware information in the inventory database" on page 94"Removing labware information from the inventory database" on page 106"Moving labware between storage devices" on page 103
Incubating labware	"Using a plate group to process labware" on page 111
Using barcode input files	<ul style="list-style-type: none">"Creating plate group with barcode input file" on page 116VWorks Automation Control User Guide
Using storage tasks in a protocol	VWorks Automation Control User Guide

5 Tracking and managing labware in storage

Adding labware information in the inventory database

Adding labware information in the inventory database

About this topic

You can add labware information in the inventory database in one of many ways.

If you want to...	See...
<ul style="list-style-type: none">Load a batch of labware into storage devices.Add the labware information in the database.	“Running a protocol to load labware into a storage device” on page 94
Add the information for a batch of labware in the database. Note: The labware are already in the storage devices.	“Adding multiple labware by importing a CSV file” on page 97
<ul style="list-style-type: none">Load a few labware into storage devices.Add the labware information in the database.	“Adding individual labware in the inventory database” on page 100
Add the information for a few labware in the database. Note: The labware are already in the storage devices.	“Adding individual labware in the inventory database” on page 100

You can also use the plateDB and InventoryLabware JavaScript functions to add labware information. For more information, see [VWorks Automation Control User Guide](#).

Running a protocol to load labware into a storage device

You can run a protocol to load a batch of labware into storage devices. During the run, the system will update the inventory database.

- If the labware has barcode labels and the system has a barcode reader, see [“Loading labware into storage devices and updating the inventory database” on page 94](#).
- If the labware does not have barcode labels, or if the system does not have a barcode reader, see [“Updating the inventory database without barcode readers” on page 96](#).

Loading labware into storage devices and updating the inventory database

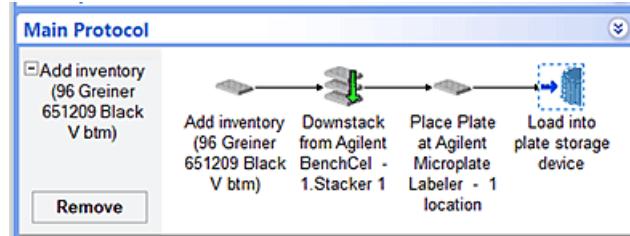
To run a protocol to load labware into a storage device:

- Load the labware in a BenchCel labware rack by hand before running the protocol.
- Write a protocol that contains the following:
 - Downstack** task to move the labware from the BenchCel stacker.
 - A task that reads the barcode on the labware.

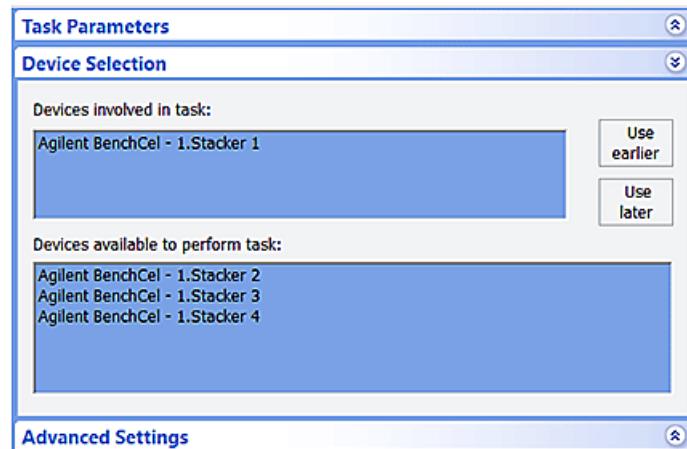
For example, if the barcode reader is on a device with a plate stage, add the **Place Plate** task. Make sure the process labware parameter specifies the side on which the barcode label resides. The side that you select must match the side on which the barcode reader is installed. In addition, select **Barcode not in file** from the **Barcode or header** list.

If the storage device has an integrated barcode reader, you might not need to add this task.

- **Load** task to move the labware into the storage device.



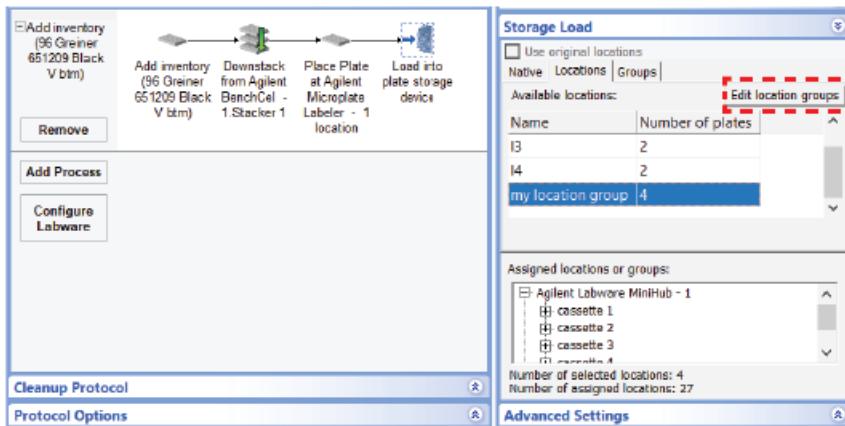
- 3 Make sure that the **Downstack** task is configured to use the stacker.



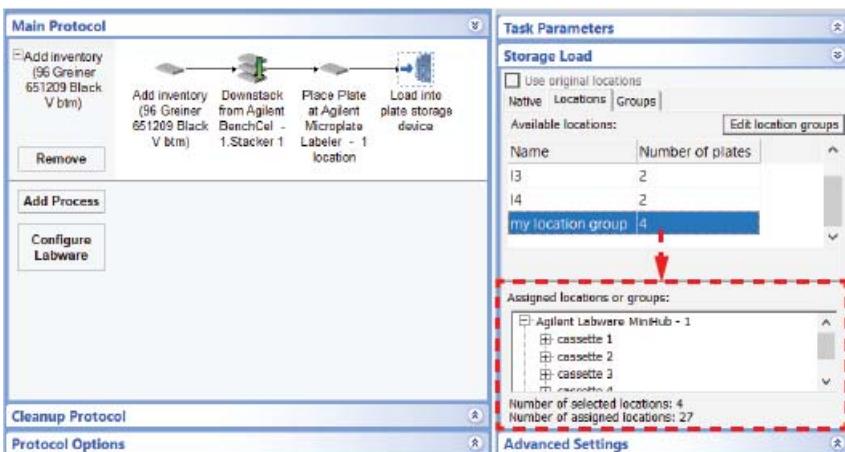
- 4 When adding the **Load** task, create a location group:
 - Select the **Load** task.
 - Click **Storage Load**.
 - Click the **Locations** tab.
 - Click **Edit location groups**.
 - See “[Creating and managing location groups](#)” on page 88 for instructions.
 - Make sure that the location group is listed in the Available locations area of the Load Task Parameters area.

5 Tracking and managing labware in storage

Adding labware information in the inventory database



- 5 Drag the group into the **Assigned locations or groups** area.

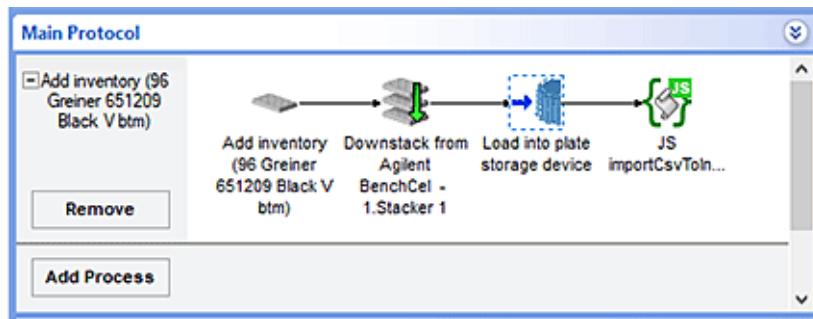


- 6 Compile the protocol and resolve any error messages.
- 7 Run the protocol (click **Start**).
- 8 In the **Run Configuration** dialog box that appears, specify the number of times to run the protocol. Type a number that is equal to or less than the number of labware you want to load into the storage device.
- 9 Click **Finish**. The protocol run starts.
- 10 To confirm that the labware are in the inventory database, open the Inventory Editor. See "["Opening the Inventory Editor" on page 83](#).

Updating the inventory database without barcode readers

If the labware do not have barcode labels, or if the system does not have a barcode reader:

- 1 Load the labware in a BenchCel labware rack by hand before running the protocol.
- 2 Write the protocol described in "["Loading labware into storage devices and updating the inventory database" on page 94](#). You do not need to include the barcode-reading task.
- 3 Add the importCsvToInventory task at the end of the protocol. For more information, see ["VWorks Automation Control User Guide"](#).



- 4 Compile the protocol and resolve any error messages.
- 5 Run the protocol (click **Start**).
- 6 In the **Run Configuration** dialog box that appears, specify the number of times to run the protocol. Type a number that is equal to or less than the number of labware you want to load into the storage device.
- 7 Click **Finish**. The protocol run starts.
- 8 To confirm that the labware are in the inventory database, open the Inventory Editor. See ["Opening the Inventory Editor" on page 83](#).

Adding multiple labware by importing a CSV file

You can add the information for a batch of labware by importing a CSV file in the Inventory Editor. Use this method if a large number of labware physically exist in the storage device, and you want to enter the labware information in the inventory database.

CSV file format requirements

The CSV file must be a text file, created in Notepad or equivalent editor, and have the .csv file name extension. The file can be stored anywhere on the computer that runs the VWorks software. However, if you want to store the file in Shared Services storage, make sure that you import the file using the **File > Import Misc File** command.

Make sure the CSV file meets the following requirements:

- The accepted delimiters are comma, tab, colon, and semicolon.
- The first row contains the header.
- The columns must consist of the following, in the order shown:

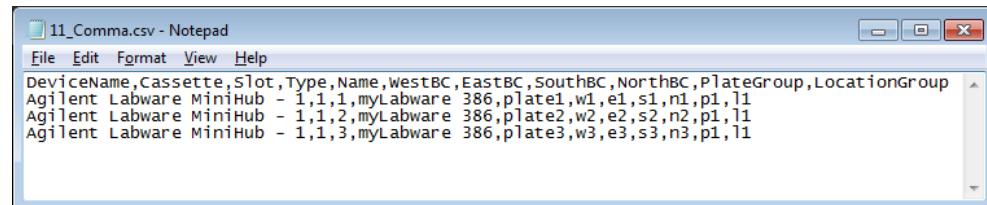
Property	Description
DeviceName	<p><i>Required column.</i> The name of the device in which the labware resides.</p> <p>Make sure the device name in this column matches the name in the device file. Be sure to include any spaces, underscores, dashes, and capitalization in the name.</p>
Cassette	<p><i>Required column.</i> The cassette in which the labware resides.</p> <p>Make sure the cassette number in this column is valid. For example, if the device only has four cassettes, the valid values are 1, 2, 3, and 4.</p>

5 Tracking and managing labware in storage

Adding labware information in the inventory database

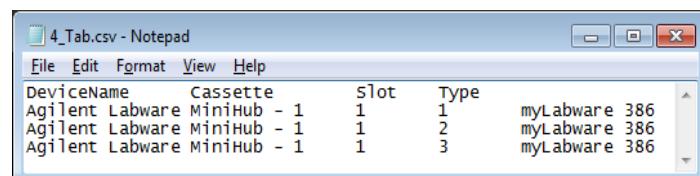
Property	Description
Slot	<i>Required column.</i> The slot in which the labware resides. Make sure the slot number in this column is valid. For example, if the cassette only has 5 slots, the valid values are 1, 2, 3, 4, and 5.
Type	<i>Required column.</i> The type of labware. Make sure the labware type in this column matches the name in the Labware Editor.
	IMPORTANT The labware type may not contain any commas.
Name	The name of the labware.
WestBC	The barcode that is on the west side of the labware.
	IMPORTANT The west-side barcode must be unique, or the labware information will not be imported.
EastBC	The barcode that is on the east side of the labware.
SouthBC	The barcode that is on the south side of the labware.
NorthBC	The barcode that is on the north side of the labware.
PlateGroup	The plate group to which the labware belongs.
LocationGroup	The location group to which the labware belongs.

The following example shows that the columns in the file are separated by commas. In this example, all required and optional columns are specified in the file.



```
11_Comma.csv - Notepad
File Edit Format View Help
DeviceName,Cassette,Slot,Type,Name,WestBC,EastBC,SouthBC,NorthBC,PlateGroup,LocationGroup
Agilent Labware MiniHub - 1,1,1,myLabware 386,plate1,w1,e1,s1,n1,p1,l1
Agilent Labware MiniHub - 1,1,2,myLabware 386,plate2,w2,e2,s2,n2,p1,l1
Agilent Labware MiniHub - 1,1,3,myLabware 386,plate3,w3,e3,s3,n3,p1,l1
```

Instead of commas, you can use one of the other delimiters. The following example shows the use of tabs instead of commas to separate the columns. In this example, only the required columns are included.



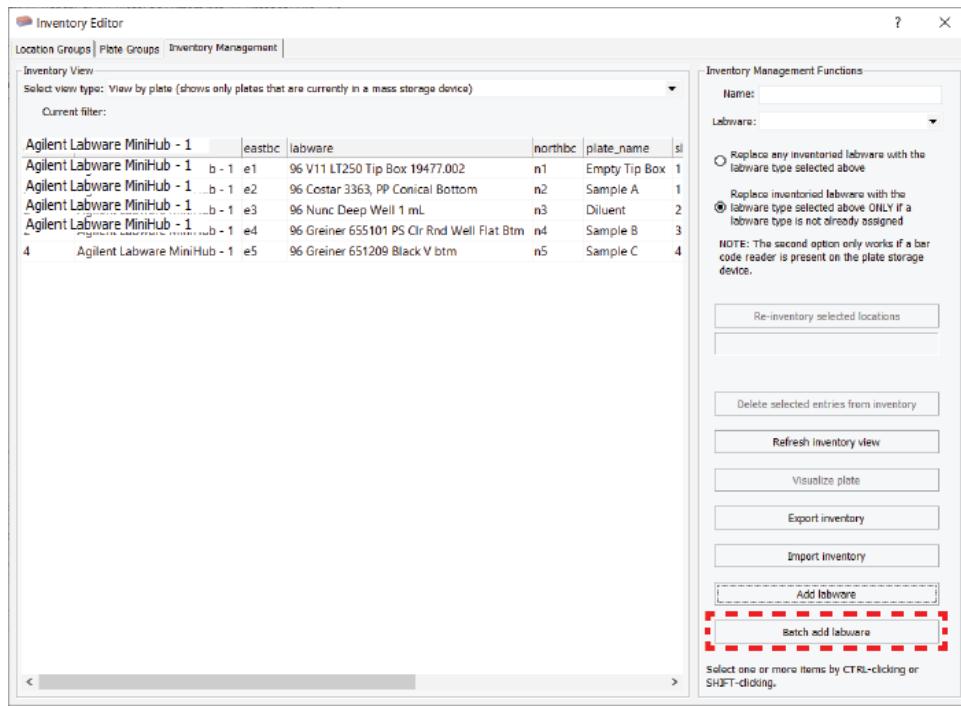
```
4_Tab.csv - Notepad
File Edit Format View Help
DeviceName Cassette Slot Type
Agilent Labware MiniHub - 1 1 1 myLabware 386
Agilent Labware MiniHub - 1 1 2 myLabware 386
Agilent Labware MiniHub - 1 1 3 myLabware 386
```

Procedure to batch add labware

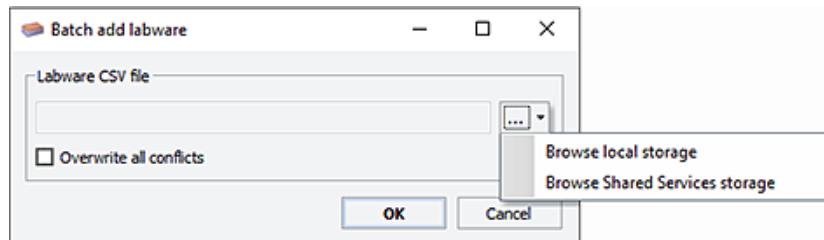
To add multiple labware by importing a CSV file:

- 1 Physically load the cassettes of labware into the storage device.
- 2 Open the **Inventory Editor**. See ["Opening the Inventory Editor" on page 83](#).
- 3 Click the **Inventory Management** tab.

4 Click **Batch add labware**.



- 5 In the **Batch add labware** dialog box that opens, click the  button, and then click one of the following options:
- **Browse local storage.** The Open dialog box opens. Locate and select the CSV file in the local file system, and then click **Open**.
 - **Browse Shared Services storage.** The Open File dialog box opens. Locate and select the CSV file in the Shared Services Repository, and then click **Open**.



- 6 Select **Overwrite all conflicts** if an entry already exists in the database and you want to replace it with the data in the CSV file. If you do not select this option, the software will skip the current labware in the CSV file.

- 7 Click **OK** to start importing the labware data.

During the import process:

- The software will import each row of data in the CSV file.
- If one of the required columns is missing, the software will halt the import process and display an error message.
- If the storage location is already occupied by a labware:
 - The software will overwrite the existing data if you selected Overwrite all conflicts, and record the incident in the Main log.

5 Tracking and managing labware in storage

Adding labware information in the inventory database

- The software will skip the current row in the CSV file if you cleared the Overwrite all conflicts check box.
- If a specified device in the CSV file does not exist in the device file, the software will proceed to add the labware information and record the error in the log file.
- If the west-side barcode is not unique, the system will skip the current row in the CSV file and record the incident in the main log.

IMPORTANT

Make sure you reconcile any conflict before running a protocol. Running a protocol with an out-of-date inventory database will cause the run to abort.

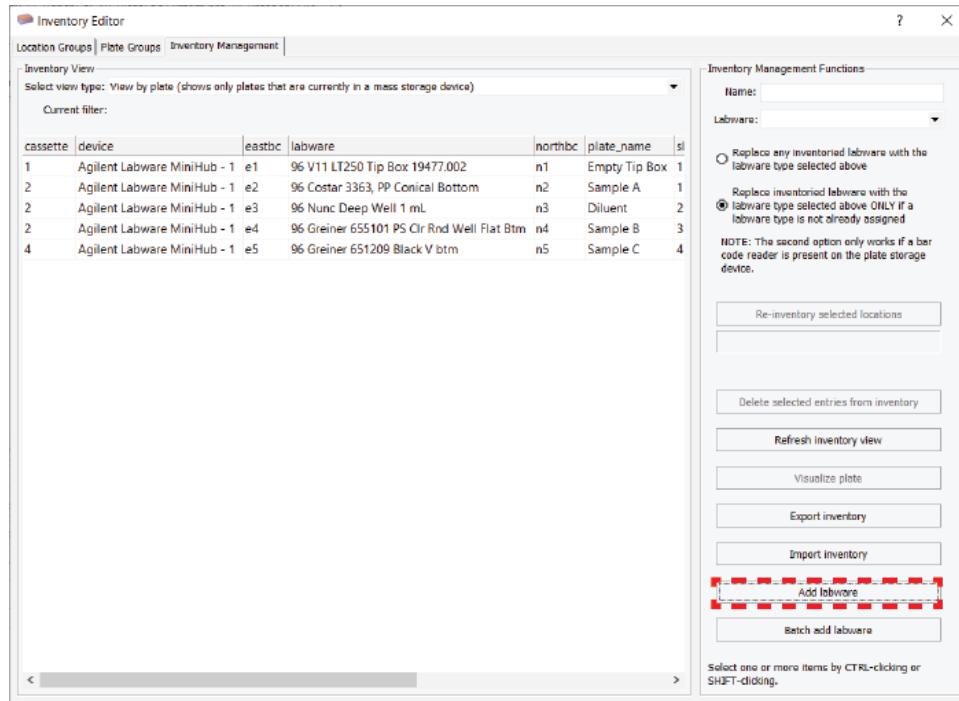
» to above

Adding individual labware in the inventory database

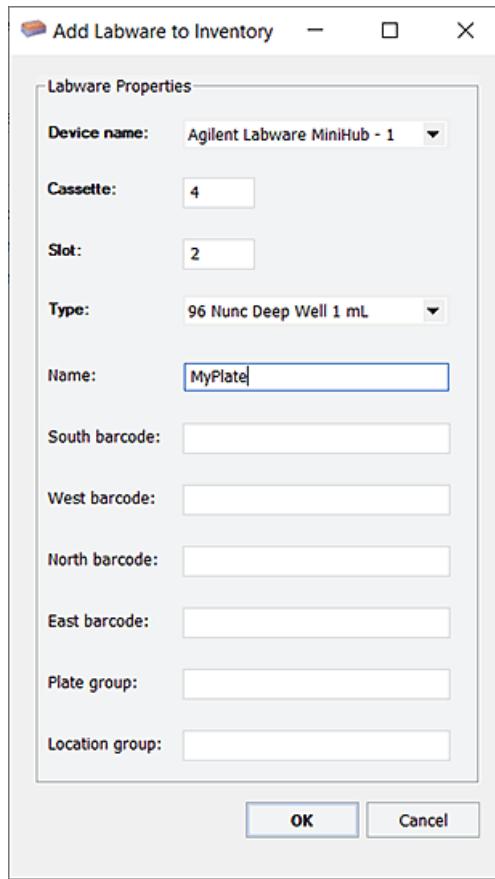
You can add an individual labware entry in the inventory database. Use this method if you want to add a nominal number of labware entries in the inventory database. For example, instead of running a protocol, you can load the labware in the storage device by hand, and then use the Inventory Editor to update the inventory database.

To add an individual labware in the inventory database:

- 1 Open the **Inventory Editor**. See “[Opening the Inventory Editor](#)” on page 83.
- 2 Click the **Inventory Management** tab.
- 3 Click **Add labware**.



- 4 In the **Add Labware to Inventory** dialog box, set the labware properties:



Property	Description
Device name	<i>Required field.</i> The name of the device in which the labware resides. Select the device from the list.
Cassette	<i>Required field.</i> The cassette in which the labware resides. Type the cassette number.
Slot	<i>Required field.</i> The slot in which the labware resides. Type the slot number.
Type	<i>Required field.</i> The type of labware. Select the labware type from the list. <i>Note:</i> During a protocol run, the labware type specified in the process plate parameters area will override the specification in the inventory database.
Name	The name of the labware. Type a name that identifies the labware.

5 Tracking and managing labware in storage

Adding labware information in the inventory database

Property	Description
South/West/North/ East barcode	The barcode associated with the labware. Type or manually scan the barcode to enter it in the box. Be sure to enter the barcode in the appropriate box to indicate the location of the barcode label. For example, if the barcode label is on the south side of the labware, enter the barcode in the South barcode box.
Plate group	The plate group to which the labware belongs.
Location group	The location group to which the labware belongs.

- 5 When you are finished, click **OK** to save the changes in the database. The new labware entry appears in the Inventory View.
- 6 If you have not done so, make sure you physically load the labware in the storage device so that its location matches the information in the database.

Related information

For information about...	See...
Moving labware out of a storage device	"Removing labware information from the inventory database" on page 106
Moving labware between storage devices	"Moving labware between storage devices" on page 103
The Load and Unload tasks	VWorks Automation Control User Guide
Exporting the database data	"Exporting and importing the inventory data" on page 125

Moving labware between storage devices

About this topic

This topic provides an example to illustrate how you can move a group of labware from one storage device to another storage device. The general procedure could also be used to move a group of labware within a single storage device.

Who should read this

Read this topic if your lab automation system has incubators and random-access storage devices such as the Labware MiniHub.

Before you start

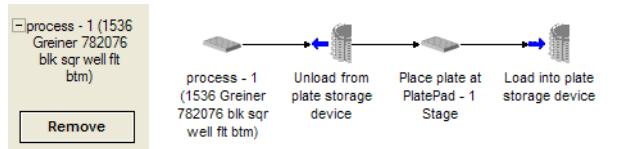
Make sure that both labware storage devices are properly configured in the device manager.

Moving a labware

In this example procedure, a group of four microplates is moved from one storage device (Labware MiniHub1) to another (Labware MiniHub2).

To move a labware:

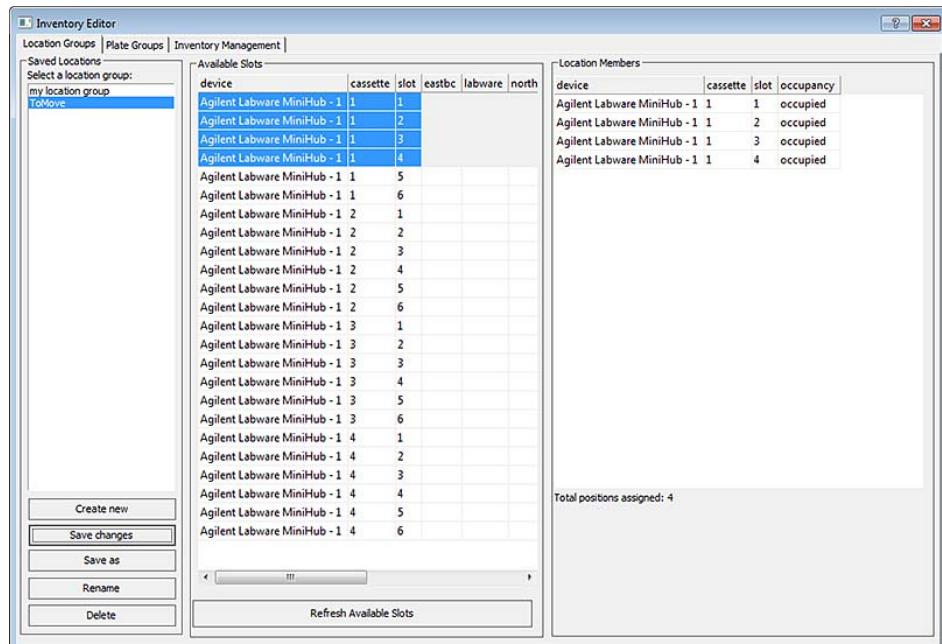
- 1 Create a process that has a Load and an Unload task, as shown in the following example.



- 2 Select either the **Load** or **Unload** task, and in the **Task Parameters** area, click **Edit location groups**.
The Inventory Editor opens.
- 3 Click the **Inventory Management** tab and note the device, cassette, and slot locations of the microplates that you want to move.
In this example, the microplates will be moved from MiniHub1, cassette 1, slots 1 to 4.
- 4 Click the **Location Groups** tab and create a location group for these microplates.

5 Tracking and managing labware in storage

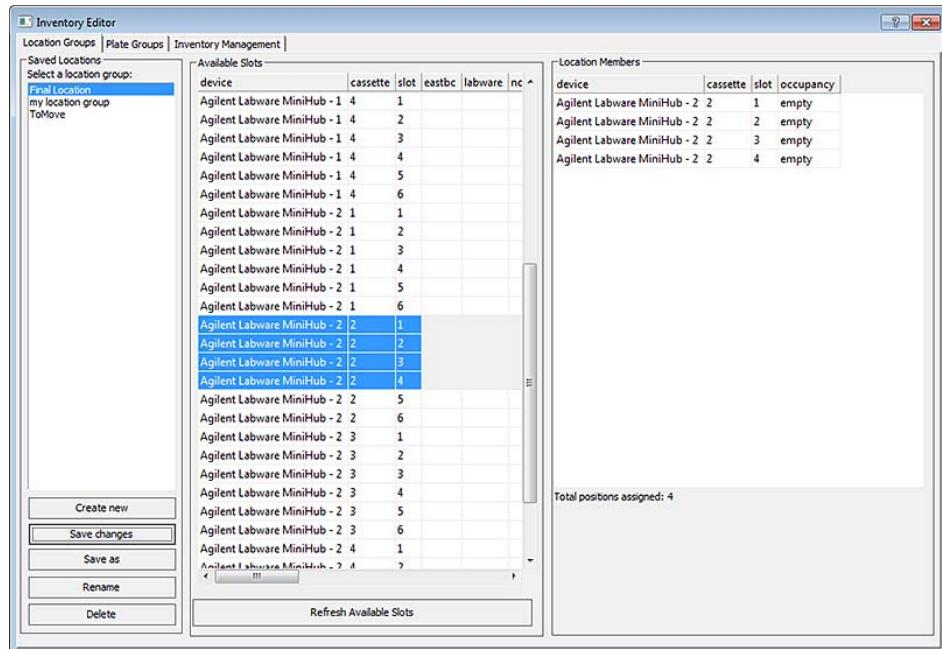
Moving labware between storage devices



- 5 In the **Inventory Management** tab, note the device, cassette, and slot numbers for the destination slots.

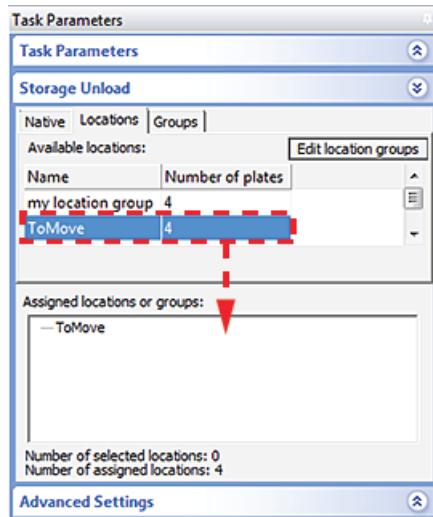
In this example, the microplates will be moved to MiniHub2, cassette 2, slots 1 to 4.

- 6 Click the **Location Groups** tab and create a location group for these slots.

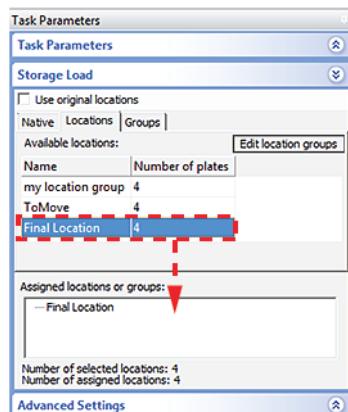


- 7 Click **Save changes** and close the Inventory Editor.

- 8 Select the **Unload** task, and in the **Task Parameters** area, drag the location group in the first device to the **Assigned locations** area.



- 9 Select the **Load** task, and in the **Protocol Task Parameters** area drag the location group in the second device to the **Assigned locations** area.



- 10 Compile the protocol and check for errors.

Main Log				
Timestamp	Class	Process	Task	Description
10/8/2008 3:46:47 PM	Info	process - 1	2	Add Location Group: Final location
10/8/2008 3:56:15 PM	Info			Compile protocol
10/8/2008 3:56:15 PM	Info			Compile complete with 0 errors and 0 warnings

- 11 Click **Start** to start the run.
- 12 In the **Number of Cycles** dialog box, type the number of microplates that you are moving and click **OK**.
- 13 Open the Inventory Editor, and click the **Inventory Management** tab to make sure that the microplates moved as expected.

5 Tracking and managing labware in storage

Removing labware information from the inventory database

Related information

For information about...	See...
Creating a location group	"Creating and managing location groups" on page 88
Creating a plate group	"Creating and managing plate groups" on page 91
Opening the Inventory Editor	"Opening the Inventory Editor" on page 83
Moving labware in and out of a storage device	<ul style="list-style-type: none">"Adding labware information in the inventory database" on page 94"Removing labware information from the inventory database" on page 106
Incubating labware	"Using a plate group to process labware" on page 111
Using barcode input files	<ul style="list-style-type: none">"Creating plate group with barcode input file" on page 116VWorks Automation Control User Guide
Using storage tasks in a protocol	VWorks Automation Control User Guide

Removing labware information from the inventory database

About this topic

You can remove labware information from the inventory database in one of many ways.

If you want to...	See...
<ul style="list-style-type: none">Unload a batch of labware from storage devices.Remove the labware information from the database.	"Running a protocol to unload labware from a storage device" on page 107
Remove the information for a batch of labware from the database. Note: The labware have been removed from the storage devices previously.	"Removing selected labware information from the database" on page 109
<ul style="list-style-type: none">Unload a few labware from storage devices.Remove the labware information from the database.	"Removing selected labware information from the database" on page 109

If you want to...	See...
Remove the information for a few labware from the database. Note: The labware have been unloaded from the storage devices previously.	"Removing selected labware information from the database" on page 109

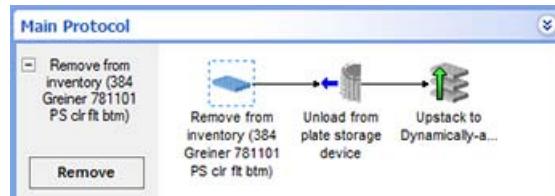
To replace the entire inventory database with known configuration and contents, use the inventory management export and import commands. For instructions, see "Exporting and importing the inventory data" on page 125.

Running a protocol to unload labware from a storage device

You can run a protocol to unload a batch of labware from storage devices. During the run, the system will automatically track the labware (with or without barcodes) and update the inventory database.

To run a protocol to remove labware from a storage device:

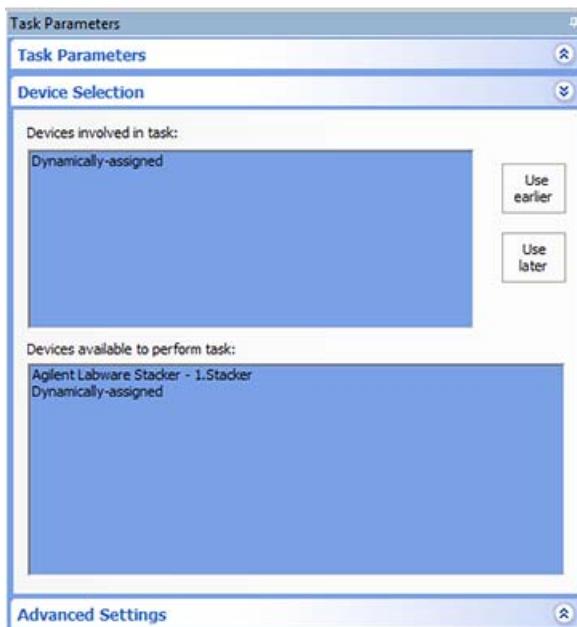
- 1 Ensure that one or more labware racks are empty on the BenchCel stackers before running the protocol.
- 2 Write a protocol that contains the following:
 - **Unload** task to remove the labware from the storage device.
 - **Upstack** task to move the labware into an available BenchCel stacker.



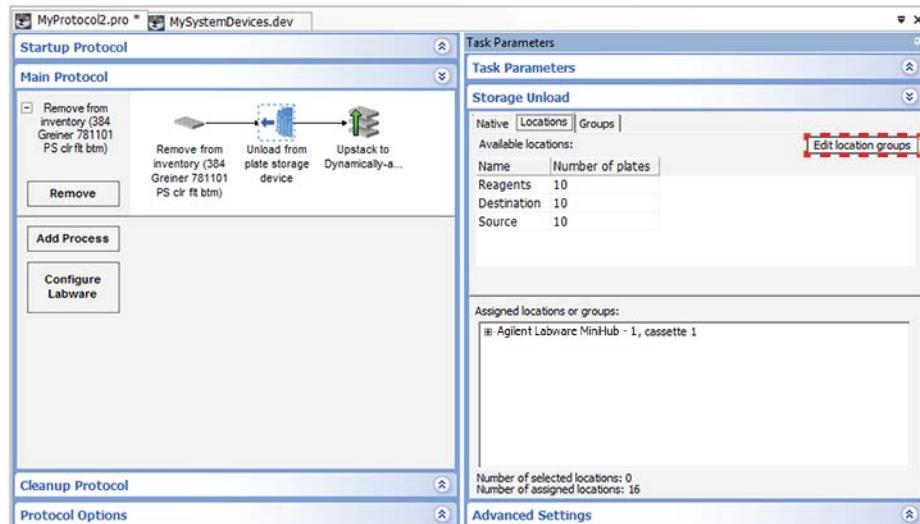
- 3 Make sure that the **Upstack** task is configured to use the appropriate stacker.

5 Tracking and managing labware in storage

Removing labware information from the inventory database



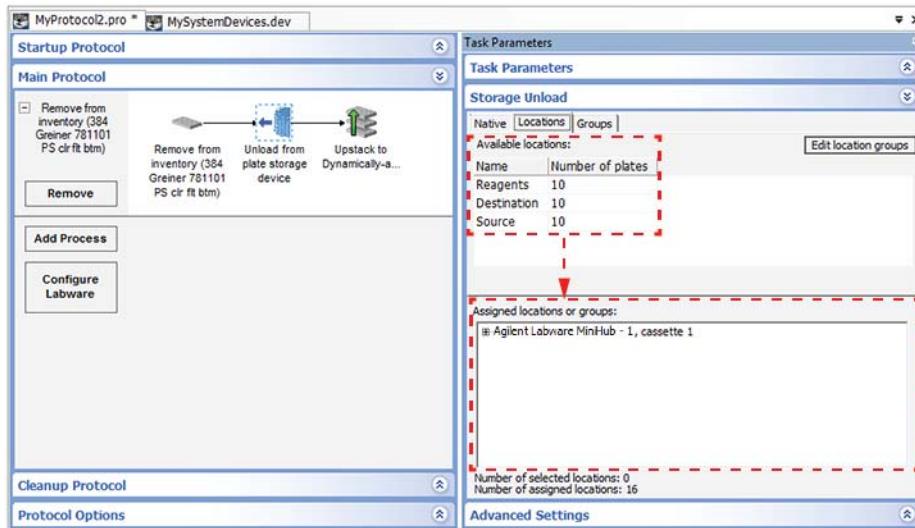
- 4 In the **Inventory Editor**, identify the labware that you want to move:
 - a Click the **Unload** task.
 - b Click **Storage Load**.
 - c Click the **Locations** tab.
 - d Click **Edit location groups** to open the Inventory Editor.
 - e Click the **Inventory Management** tab. Note the device, cassette and slot numbers for the labware that you want to remove.



- 5 If necessary, create a location group in the Inventory Editor that contains the labware you want to remove. See ["Creating and managing location groups" on page 88](#) for instructions.

Save the changes and confirm it by making sure it is listed in the Available locations area on the Locations tab of the Load Task Parameters toolbar.

- 6 Drag the location group into the **Assigned locations** area.



- 7 Compile the protocol and resolve any error messages.
- 8 Run the protocol (click **Start**).
- 9 In the **Run Configuration** dialog box that appears, specify the number of times to run the protocol. Type a number that is equal to or less than the number of labware you want to unload from the storage device.
- 10 Click **Finish**. The protocol run starts.
- 11 To confirm that the labware are removed from the inventory database, open the Inventory Editor. See ["Opening the Inventory Editor" on page 83](#).

Removing selected labware information from the database

You can remove individual labware entries in the inventory database. Use this method if you want to remove labware entries under the following scenarios:

- Instead of running a protocol, you can unload individual labware in the storage device by hand, and then use the Inventory Editor to update the inventory database.
- A batch of labware was already removed from storage devices, but you need to remove the corresponding entries from the inventory database.

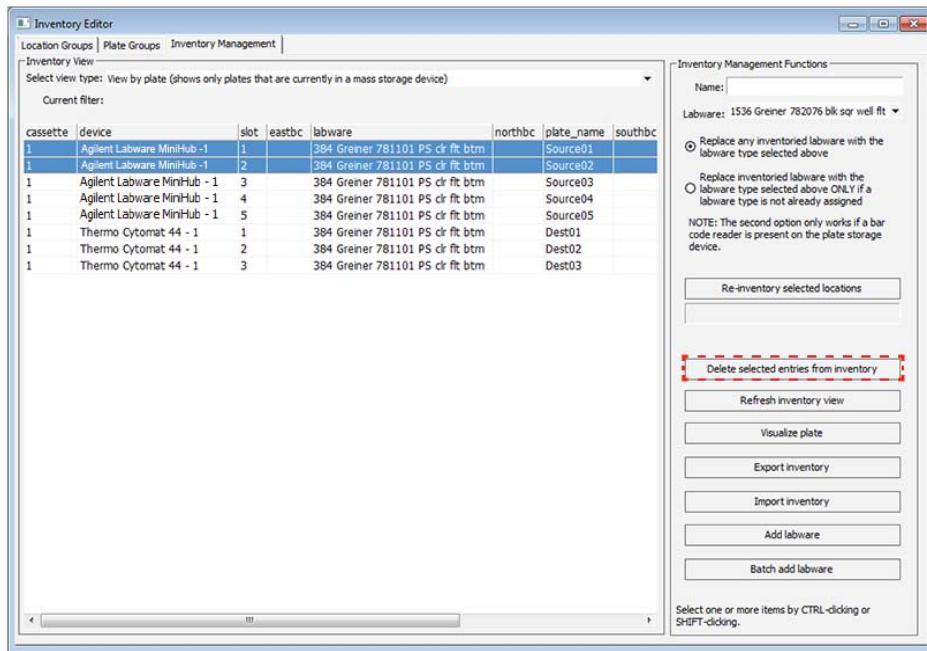
To remove labware entries from the database:

- 1 Open the **Inventory Editor**. See ["Opening the Inventory Editor" on page 83](#).
- 2 Click the **Inventory Management** tab.
- 3 Select the labware entries you want to delete, and then click **Delete selected entries from inventory**.

If you are deleting a batch of labware entries, you can CTRL+click to select non-contiguous entries, or SHIFT+click to select contiguous entries.

5 Tracking and managing labware in storage

Removing labware information from the inventory database



- 4 Make sure you physically unload the labware from the storage device so that the storage state of the device matches the information in the database.
- 5 *Storage devices that have their own barcode readers.* To validate the changes, in the **Inventory Editor Inventory Management** tab, click **Re-inventory selected locations**. For instructions, see “Reinventorying the labware inventory” on page 123.

Related information

For information about...	See...
Creating a location group	“Creating and managing location groups” on page 88
Creating a plate group	“Creating and managing plate groups” on page 91
Moving labware in and out of a storage device	<ul style="list-style-type: none">• “Adding labware information in the inventory database” on page 94• “Moving labware between storage devices” on page 103
Incubating labware	“Using a plate group to process labware” on page 111
Exporting the database data	“Exporting and importing the inventory data” on page 125
Using barcode input files	<ul style="list-style-type: none">• “Creating plate group with barcode input file” on page 116• VWorks Automation Control User Guide•

For information about...	See...
Using storage tasks in a protocol	VWorks Automation Control User Guide

Using a plate group to process labware

About this topic

This topic shows an example protocol where a plate group is moved out of a Labware MiniHub, transferred to a liquid-handling device where liquid is aspirated, and then loaded back into the same or different locations of the Labware MiniHub.

Who should read this

Read this topic if your lab automation system has incubators and random-access storage devices such as the Labware MiniHub.

Before you start

- Place the labware in Labware MiniHub and make sure the labware are added to the Inventory Editor.
- Create a plate group containing the labware that you want to process.

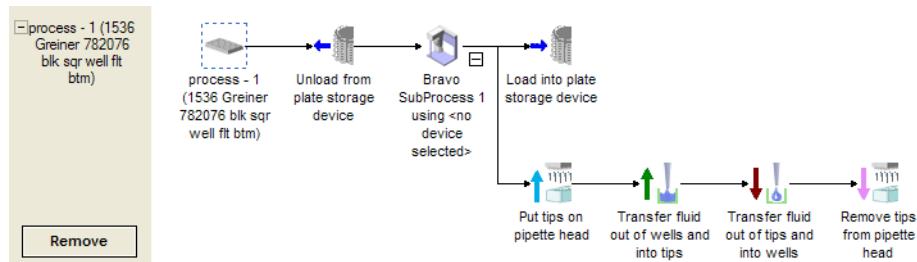
To enable the software to track individual plates:

- Under **Protocol Options**, select the **Dynamically assign empty slot to load to storage device option**.

Processing a plate group and returning the plates to the original location

To process a plate group:

- Create a process like the one shown below.

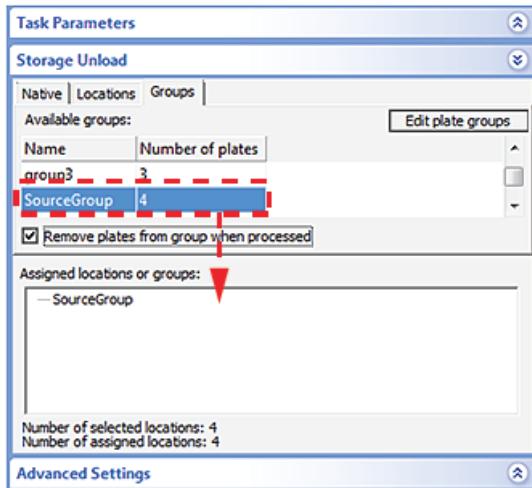


- Select the **Unload** task, and in the **Task Parameters** area, click the **Groups** tab and drag the plate group to the **Assigned location** area.
- If you want the labware to be handled in the same numerical order or will not be reusing the labware, select **Remove plates from group when processed**.

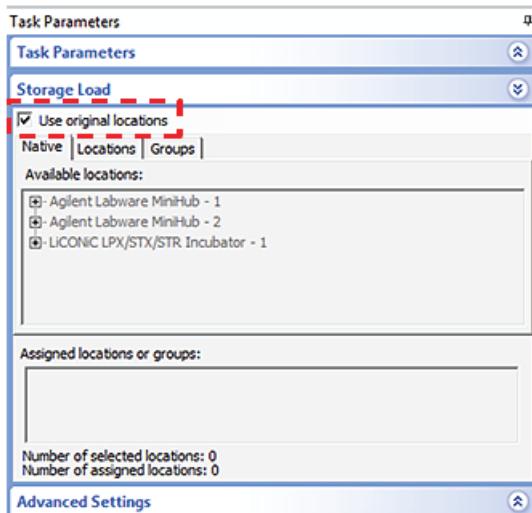
5 Tracking and managing labware in storage

Using a plate group to process labware

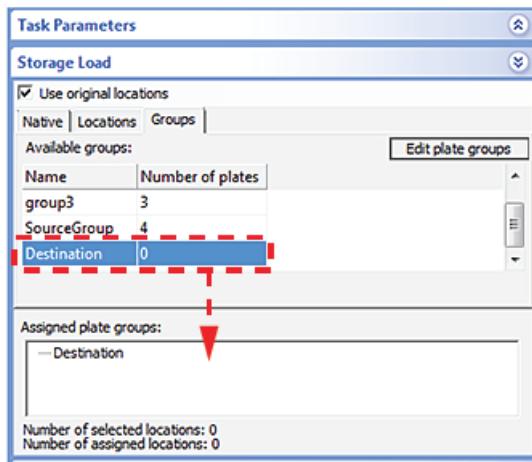
Note: The labware can be loaded back into the group during the Load task execution.



- 4 Select the **Load** task and then select **Use original locations**. The Locations and Native tabs will become unavailable.



Optional. You can reassign the labware back to the original group or to a new plate group. Click the **Groups** tab and drag the plate group from the **Available groups** area to the **Assigned locations** area.

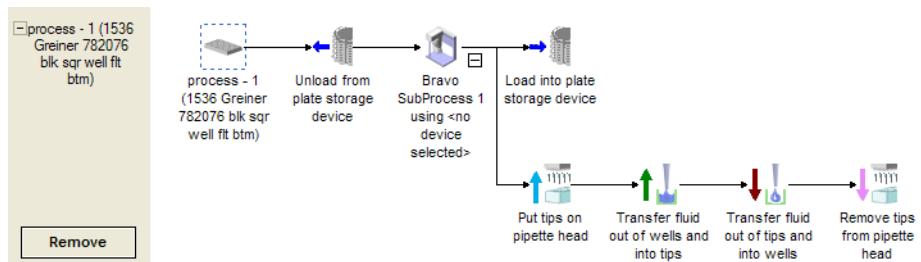


- 5 Click **Start**.
- 6 In the **Number of Cycles** dialog box, enter a number that is equal to or less than the number of labware that you want to process from the group.
- 7 Click **OK**.
- 8 To confirm that the labware have been returned to their original position in the inventory:
 - a Click the **Load** task.
 - b Click **Edit location groups** or **Edit plate groups**.
 - c Click the **Inventory Management** tab.

Processing a plate group and returning the labware to a different location

To process a plate group:

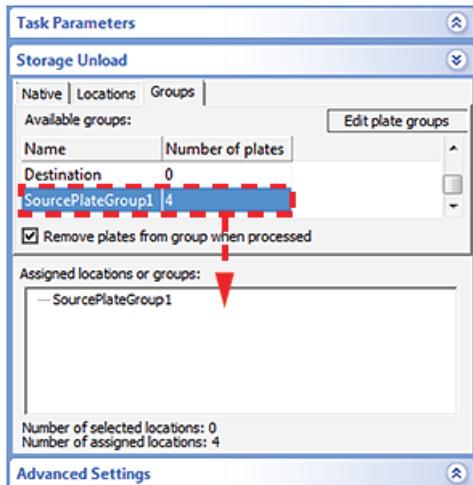
- 1 Create a protocol like the one shown below.



- 2 Select the **Unload** task. In the **Task Parameters** area, click the **Groups** tab and drag the plate group to the **Assigned locations or groups** area.

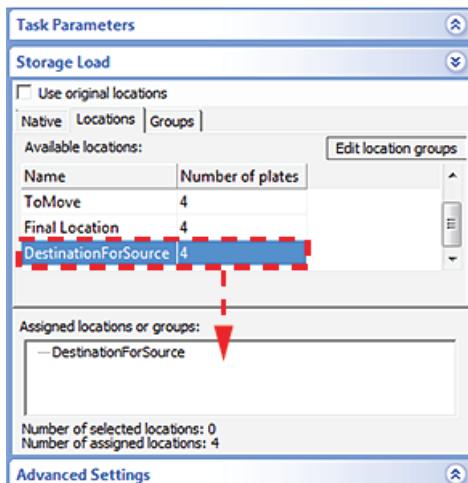
5 Tracking and managing labware in storage

Using a plate group to process labware

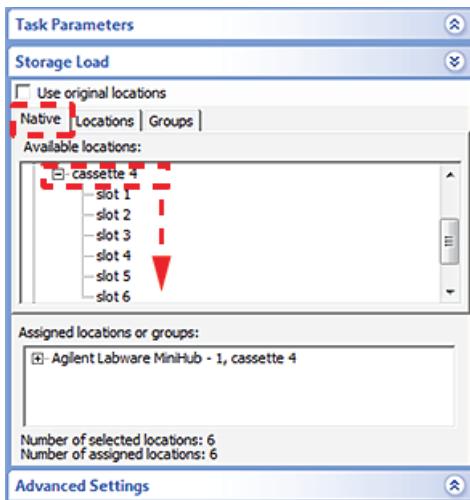


- 3 Select the **Load** task. In the **Task Parameters** area, choose one of the following ways to load the labware into a different location.

- Specify a predefined location group to load to. To specify a predefined location group, click the **Locations** tab and drag the location group to the **Assigned locations or groups** area.



- Assign specific locations to load to without using a location group, as follows: Click the **Native** tab, and drag the selected locations to the **Assigned locations or groups** area.



- 4 Click **Start**.
- 5 In the **Number of Cycles** dialog box, enter a number that is equal to or less than the number of labware that you want to process from the group.
- 6 Click **OK**.
- 7 To confirm that the labware have been returned to their assigned positions in the inventory:
 - a Click the **Load** task.
 - b Click **Edit location groups** or **Edit plate groups**.
 - c Click the **Inventory Management** tab.

Related information

For information about...	See...
Software inventory	"About labware inventory management" on page 80
Creating a plate group	"Creating and managing plate groups" on page 91
Moving labware in and out of a storage device	<ul style="list-style-type: none">• "Adding labware information in the inventory database" on page 94• "Removing labware information from the inventory database" on page 106• "Moving labware between storage devices" on page 103
Using barcode input files	<ul style="list-style-type: none">• "Creating plate group with barcode input file" on page 116
Load and Unload tasks	<i>VWorks Automation Control User Guide</i>

5 Tracking and managing labware in storage

Creating plate group with barcode input file

Creating plate group with 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 a plate group if you previously used a barcode input file to label a collection of labware that are now stored in a storage device.

Who should read this

Read this topic if your lab automation system has a random-access storage device, such as the Labware MiniHub.

Barcode input files

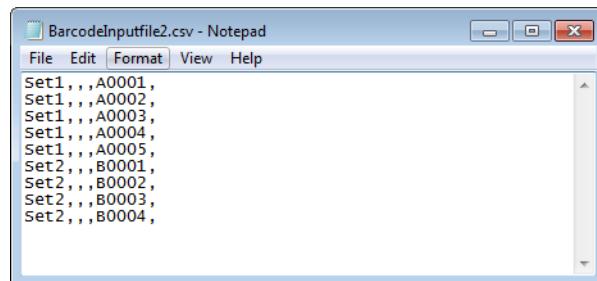
The barcode input file must be a text file, created in Notepad or equivalent editor, and have the .csv or .bar file name extension.

The input file can be stored anywhere on the computer that runs the VWorks software. However, if you want to store the barcode input file in Shared Services storage, make sure that you import the file using the **File > Import Misc File** command.

File requirements for .csv files

- The file may contain any number of columns, but only the first 5 columns are significant.
- The first column file indicates the barcode group name.
- The second, third, fourth, and fifth columns indicate the north, south, west, and east barcode, respectively.

In the following example, Set1 and Set2 are the group names. Plates A0001 through A0005 in the Set1 group, and plates B0001 to B0004 are in the Set2 group. All barcodes are on the west side in this example.

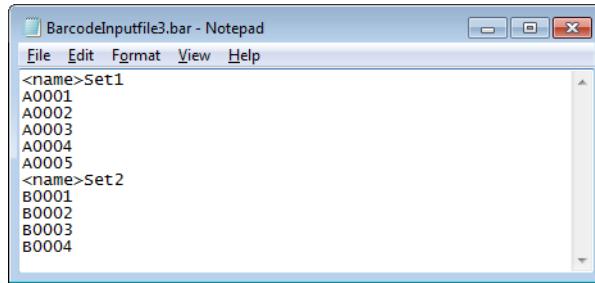


```
BarcodeInputfile2.csv - Notepad
File Edit Format View Help
Set1,,,A0001,
Set1,,,A0002,
Set1,,,A0003,
Set1,,,A0004,
Set1,,,A0005,
Set2,,,B0001,
Set2,,,B0002,
Set2,,,B0003,
Set2,,,B0004,
```

File requirements for .bar files

- The file must contain only one column. The column can contain as many groups of plates as desired.
- The first row in each plate group must contain the string, <name>, followed by the group name.

In the following example, Set1 and Set2 are the group names. All barcodes are on the west side of the plate. Plates A0001 through A0005 are in the Set1 group, and plates B0001 to B0004 are in the Set2 group.



Procedure

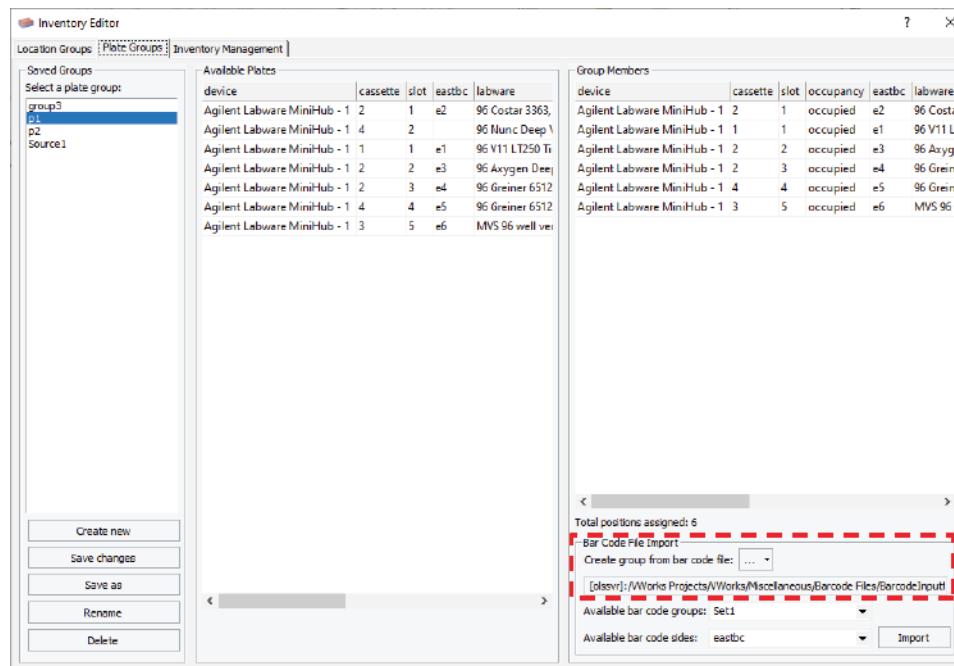
IMPORTANT

All labware with barcodes listed in the selected barcode input file series must already be in the storage device. To load labware into storage devices, see ["Adding labware information in the inventory database" on page 94](#).

To create a plate group with a barcode input file:

- 1 In the **Inventory Editor** window, click the **Plate Groups** tab.
- 2 In the **Bar Code File Input** area, click the  button, and then click one of the following options:
 - **Browse local storage.** The Open dialog box opens. Locate and select the .csv or .bar file in the local file system, and then click **Open**.
 - **Browse Shared Services storage.** The Open File dialog box opens. Locate and select the .csv or .bar file in the Shared Services Repository, and then click **Open**.

The file path of the selected file appears in the Bar Code File Input area.

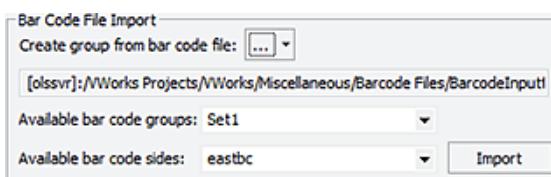
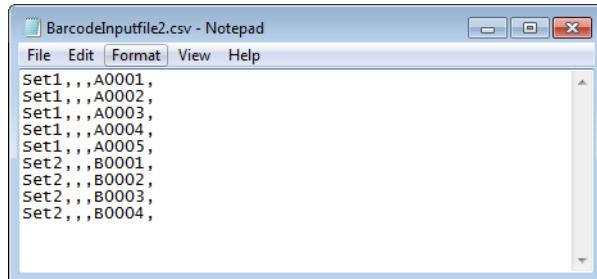


5 Tracking and managing labware in storage

Creating plate group with barcode input file

- 3 From the **Available bar code groups** list, select the group that you want to use. If you do not see the desired group name, check the input file. See “[Barcode input files](#)” on [page 116](#).

If you are using the input file in the following example, you should see Set1 and Set2 in the Available bar code groups list.



- 4 In the **Available bar code sides** list, select which of the plate’s four barcodes is going to be matched with a barcode read from the imported file.

If the imported file is a .csv file, this list also specifies which column in the .csv file to use when matching the existing plate’s barcode:

- **northbc** means match to column 2
- **southbc** means match to column 3
- **westbc** means match to column 4
- **eastbc** means match to column 5

The software ignores the other three barcode columns in the .csv file.

- 5 Click **Import**.

The labware labeled with the barcodes listed in the series will be used to create a plate group.

- 6 In the **Inventory Management** tab, specify a labware type for each labware.

Related information

For information about...	See...
Software inventory	“About labware inventory management” on page 80
Opening the Inventory Editor	“Opening the Inventory Editor” on page 83
Using the labware selection list	“Reinventorying the labware inventory” on page 123

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 incubators and random-access storage devices such as the Labware MiniHub.

Inventory Editor views

There are three ways to view the labware in the Inventory Editor.

To set the view:

- 1 In the **Inventory Editor** window, click the **Inventory Management** tab.
- 2 In the **Select view type** list, select one of the following options:

View	Description
View by plate	Displays every labware in the inventory. This is the most frequently used view.
View by location	Displays both labware and slots.
View unassigned plates	Displays labware that were orphaned during previous runs, or the labware that are in the system but not in a storage device.

Filtering displayed labware

To simplify your view of the database, you can filter the records that are displayed.

To filter the labware records:

- 1 Right-click a list in any of the tabbed pages of the Inventory Editor and select **Show all**.
- 2 Right-click a particular cell and select from the available filtering options.

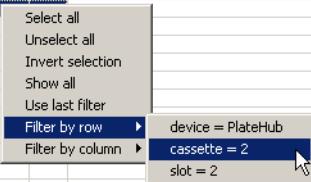
View	Description
Use last filter	Returns the display of items to that displayed when the last filter was applied.
Filter by row	The items that have the same value as the selected item in the row are displayed.
Filter by column	The items that have the same value as the selected item in the column are displayed.

The items that have the same value as the selected item in the row are displayed.

5 Tracking and managing labware in storage

Auditing plate volumes in the Inventory Editor

Location Members		
device	cassette	slot
platehub2	1	1
platehub2	1	2
platehub2	1	3
platehub2	1	4
PlateHub	1	1
PlateHub	1	2
PlateHub	1	3
PlateHub	1	4
PlateHub	1	5
PlateHub	1	6
PlateHub	1	7
PlateHub	1	8
PlateHub	2	1
PlateHub	2	



The result is that only those plates in cassette number 2 are listed.

Location Members		
device	cassette	slot
PlateHub	2	1
PlateHub	2	2

To show all labware records:

Right-click on the database list and select **Show all**.

Related information

For information about...	See...
Software inventory	"About labware inventory management" on page 80
Opening the Inventory Editor	"Opening the Inventory Editor" on page 83

Auditing plate volumes in the Inventory Editor

About this topic

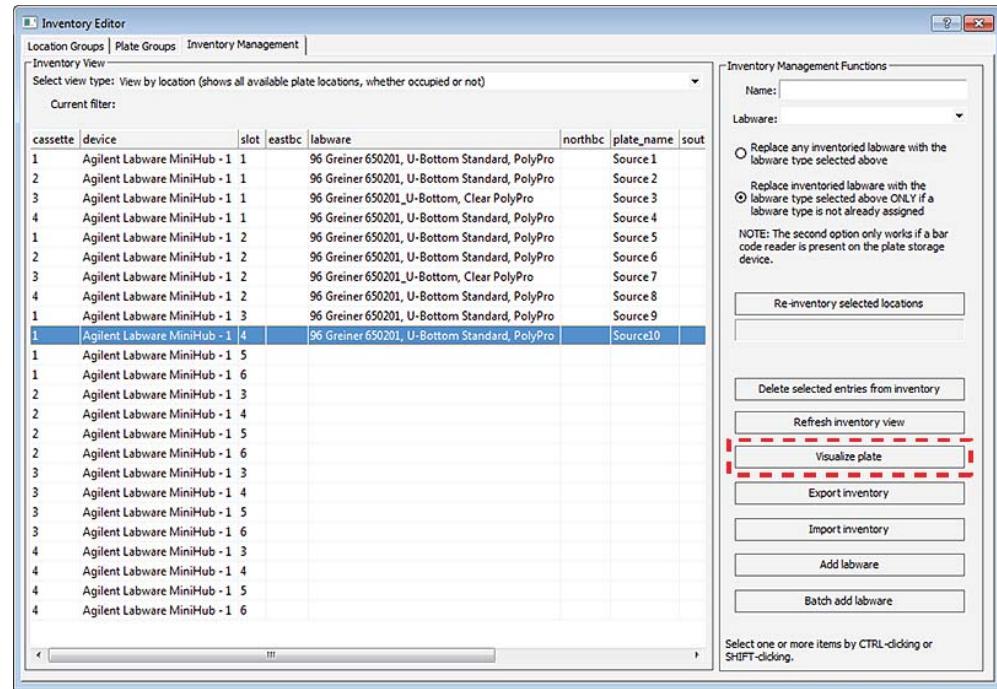
The VWorks software tracks the pipetting tasks performed on the labware during a protocol run, calculating the volume resulting from those tasks, and storing the information in the database. When the labware is displayed in the software, the volume is represented with color.

This topic describes how to use the Inventory Editor to audit the volume in a labware.

Procedure

To audit the volume of a labware:

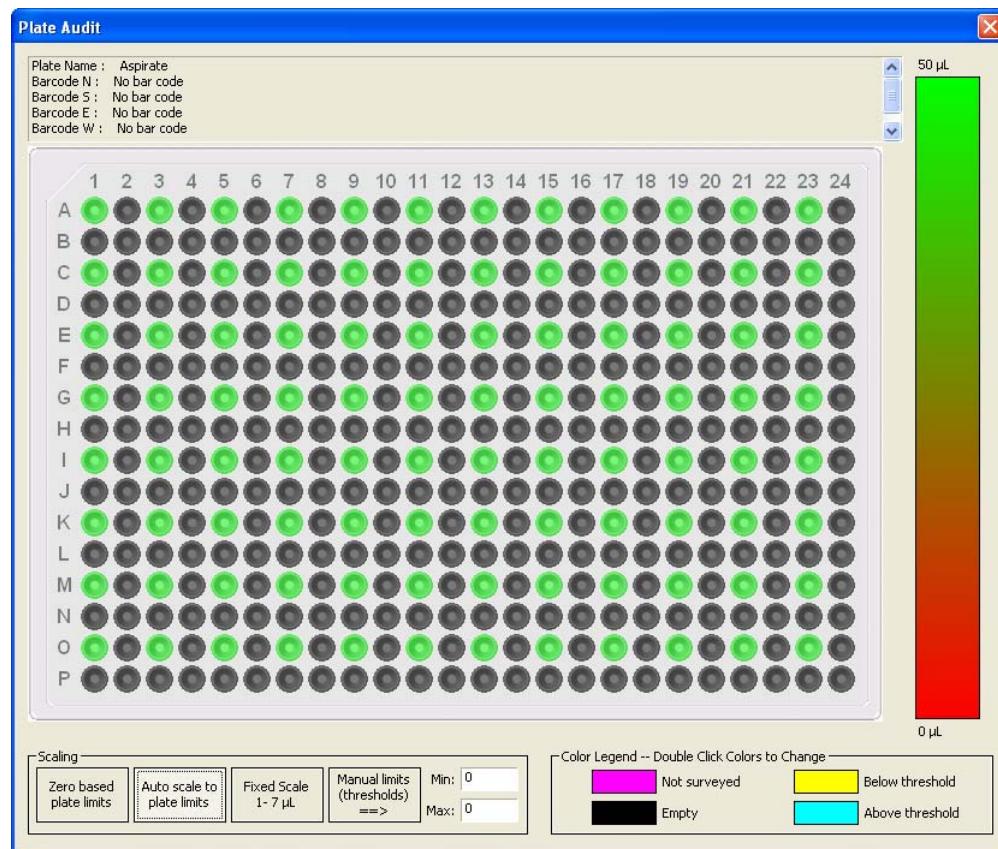
- 1 In the **Inventory Editor** window, click the **Inventory Management** tab.
- 2 From the **Select view type** list, select the view.
- 3 Select the labware you want to audit.



- 4 Click **Visualize Plate**. The Audit Plate dialog box opens.

5 Tracking and managing labware in storage

Auditing plate volumes in the Inventory Editor



The liquid volume is displayed on the right. You can change the limits of this scale in the Scaling area.

Click this button...	To...
Zero based plate limits	Set the gradient limits from 0 μ L to the highest volume found in the labware.
Auto scale to plate limits	Set the scale limits to the lowest and highest volume found in the labware.
Fixed Scales 1-7 μ L	Set the minimum and maximum limits to 1 μ L and 7 μ L, respectively.
Manual limits (thresholds)	Manually set the lower and upper limits. Enter the value (in μ L) in the Min and Max boxes.

The color legend indicates the following conditions.

Condition	Description
Not surveyed	The well is not available for measurement.
Empty	The well is empty.
Below threshold	The well is below the lower limit set by the user.
Above threshold	The well is above the upper limit set by the user.

Double-click on a color in the legend to change it.

Related information

For information about...	See...
Software inventory	"About labware inventory management" on page 80
Opening the Inventory Editor	"Opening the Inventory Editor" on page 83

Reinventorying the labware inventory

About this topic

This topic describes how to use the reinventory feature of labware inventory.

This feature can be used to check for mismatches by comparing the identities of the labware actually in a storage device to the labware that the inventory database says should be in the storage device.

The reinventory feature can also be used to enter barcode information for labware that have been manually placed into the storage device.

Note: Reinventorying requires that the storage device has a barcode reader.

Who should read this

Read this topic if your lab automation system has a 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 labware must have a unique barcode.

Reinventorying logic

If a labware is found in a slot that, according to the inventory database, should be empty, a line is added to the Inventory Editor for that slot and the labware 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 labware has been manually moved.

5 Tracking and managing labware in storage

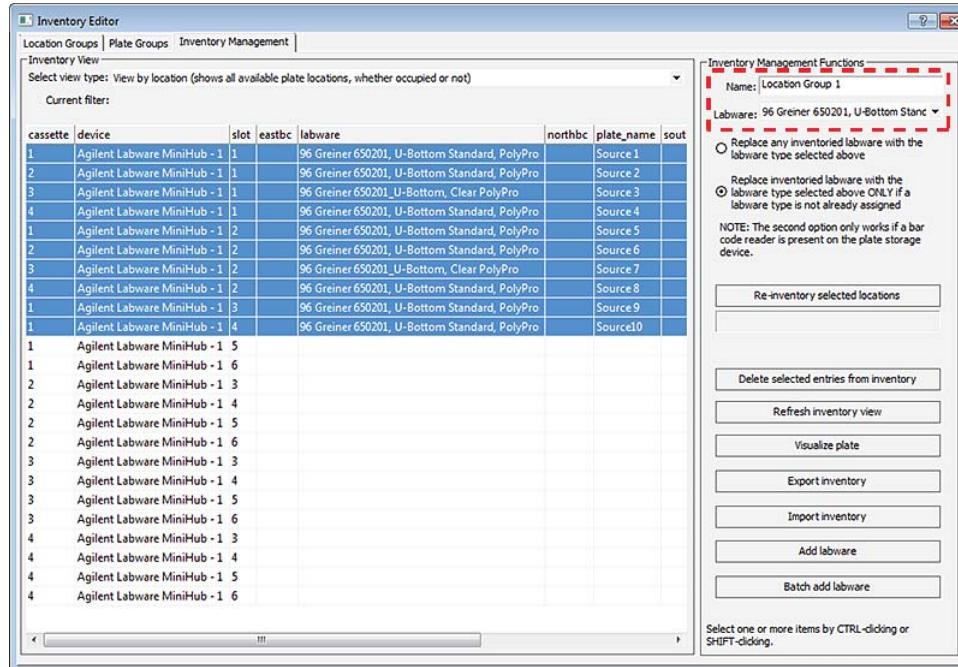
Reinventorying the labware inventory

If the inventory has a line for a labware in a particular slot, but the inventory finds no labware in that slot, the line is removed from the inventory. However, the data in the system that is associated with the labware is not deleted. If in the future, a labware 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 storage device:

- 1 In the **Inventory Editor** window, click the **Inventory Management** tab.
- 2 From the **Select view type** list box, select **View by location**.
This lists the labware in the inventory database by location.
- 3 Select the labware that you want to inventory.
You can use SHIFT+click to select a range of listed labware.
- 4 Under Inventory Management Functions, type the **Name** of the location group.
- 5 In the **Labware** list, select the type of labware.



- 6 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.

- 7 Click **Reinventory selected locations**.

A barcode reader reads each labware in the storage device and adds the barcode data to the inventory database.

Related information

For information about...	See...
Inventory groups, plate groups and location groups	"About inventory groups" on page 86
Moving labware in and out of a storage device	<ul style="list-style-type: none">"Adding labware information in the inventory database" on page 94"Removing labware information from the inventory database" on page 106"Moving labware between storage devices" on page 103
Changing the labware associated with labware record in the inventory database	"Reinventorying the labware inventory" on page 123

Exporting and importing the inventory data

About this topic

You can export the inventory data to create a backup copy of the inventory database without performing a system-wide backup. You can also use the backup copy to restore the inventory data in case they become damaged or lost.

This topic describes how to use the following methods to back up and recover the inventory data:

- "[Exporting the inventory data](#)" on page 125
- "[Importing the inventory data](#)" on page 127

To back up all VWorks software system files, see [VWorks Automation Control User Guide](#).

Exporting the inventory data

You can export the inventory data for backup and recovery.

VWorks Plus only. The software performs tamper detection on the files selected for export and prevents you from exporting a file that is corrupted or has been modified outside of the VWorks software.

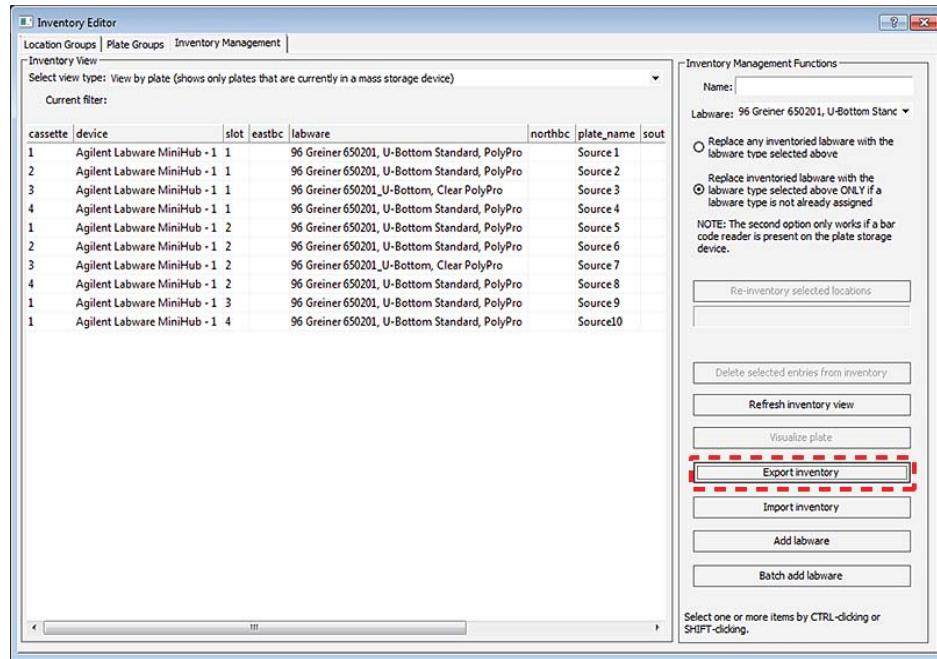
To export the inventory data:

- 1 Open the **Inventory Editor**. See "[Opening the Inventory Editor](#)" on page 83.
- 2 Click the **Inventory Management** tab.

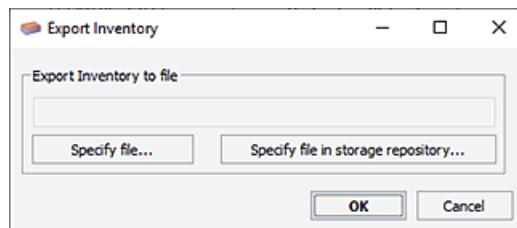
5 Tracking and managing labware in storage

Exporting and importing the inventory data

- 3 Make sure the inventory data is up-to-date. See “Reinventorying the labware inventory” on page 123.
- 4 Click **Export inventory**.

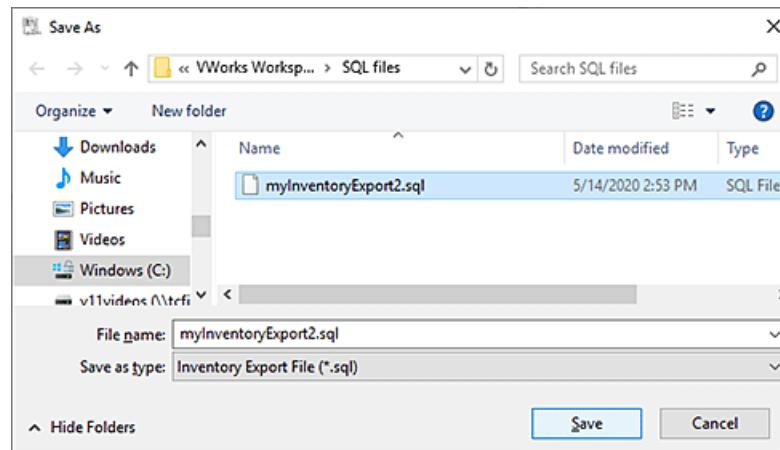


The Export Inventory dialog box opens.

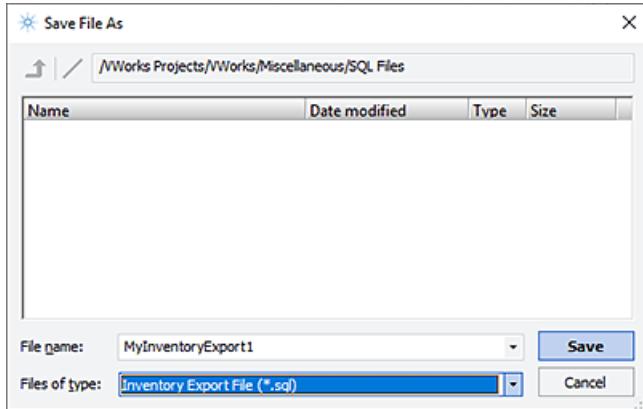


- 5 Do one of the following:

- If you are exporting the file to local file storage, click **Specify file**. In the **Save As** dialog box, specify the storage location, and then click **Save**.



- If you are exporting the file to the Shared Services repository, click **Specify file in storage repository**. In the **Save File As** dialog box, type the file name, and click **Save**.



VWorks Plus only. In this case, the exported SQL file is a record of interest that is exempt from record state changes.

- 6 Click **OK**. The software exports the inventory data. The exported file has an .sql file name extension.

Importing the inventory data

You can import the inventory data as part of the data recovery process.

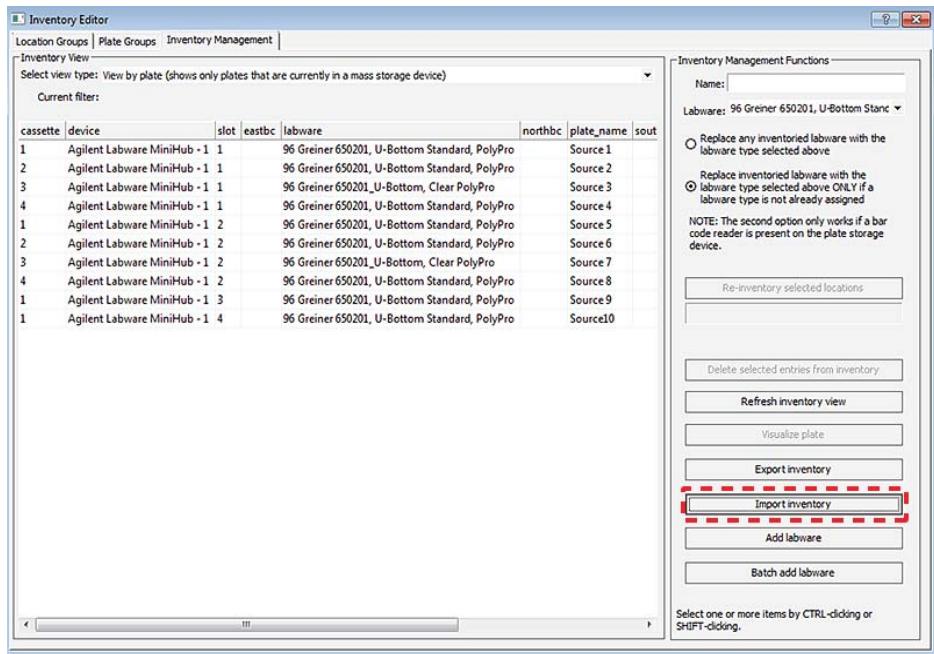
VWorks Plus only. If the imported inventory data was exported from VWorks software v14.0 or later, the software performs tamper detection on the file to be imported. If the software detects that the file is corrupted or has been modified outside of VWorks software v14.0, an error message appears and you cannot import the file.

To import the inventory data:

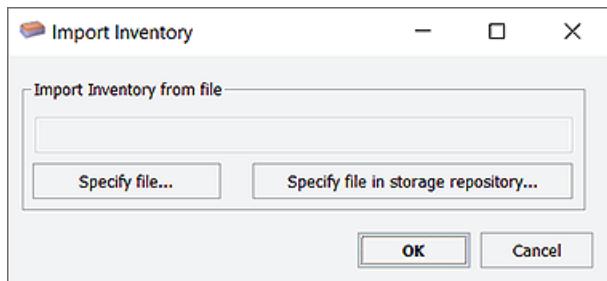
- 1 Open the **Inventory Editor**. See “[Opening the Inventory Editor](#)” on page 83.
- 2 In the **Inventory Management** tab, click **Import inventory**.

5 Tracking and managing labware in storage

Exporting and importing the inventory data

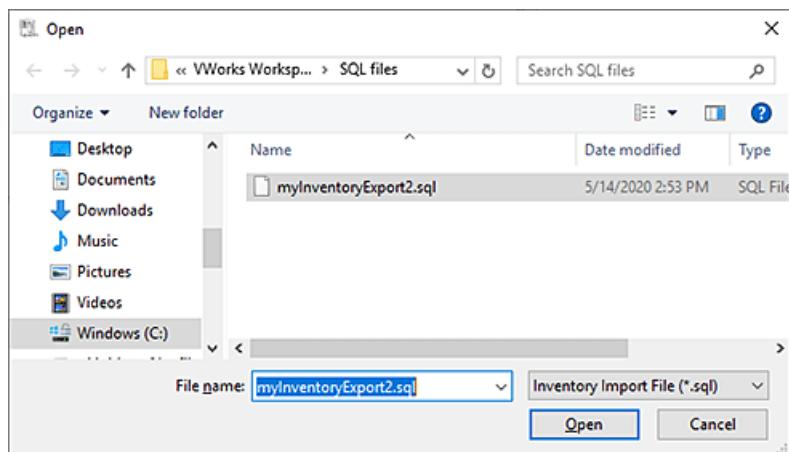


The Import Inventory dialog box opens.

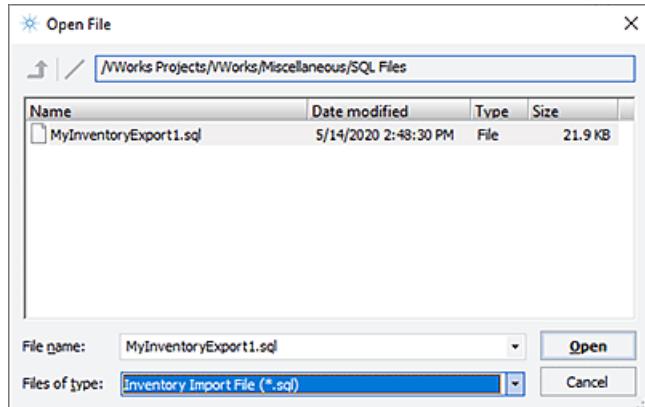


3 To select the file:

- If you are importing the file from local file storage, click **Specify file**. In the **Open** dialog box, select the file and click **Open**.



- If you are importing the file from the Shared Services repository, click **Specify file in storage repository**. In the **Open File** dialog box, select the file and click **Open**.



VWorks Plus only. In this case, the SQL file is a record of interest that is exempt from record state changes.

- 4 In the **Import Inventory** dialog box, click **OK**. The software imports the inventory data. A confirmation message appears if the operation is successful.

Related information

For information about...	See...
Inventory groups, plate groups and location groups	"About inventory groups" on page 86
Moving labware in and out of a storage device	<ul style="list-style-type: none"> • "Adding labware information in the inventory database" on page 94 • "Removing labware information from the inventory database" on page 106 • "Moving labware between storage devices" on page 103
Changing the labware associated with labware record in the inventory database	"Reinventorying the labware inventory" on page 123
Inventory Editor filters	"Inventory Editor views and filters" on page 119

Resolving labware inventory problems

About this topic

This topic describes how to check and test the database connection that is used by the VWorks inventory management system.

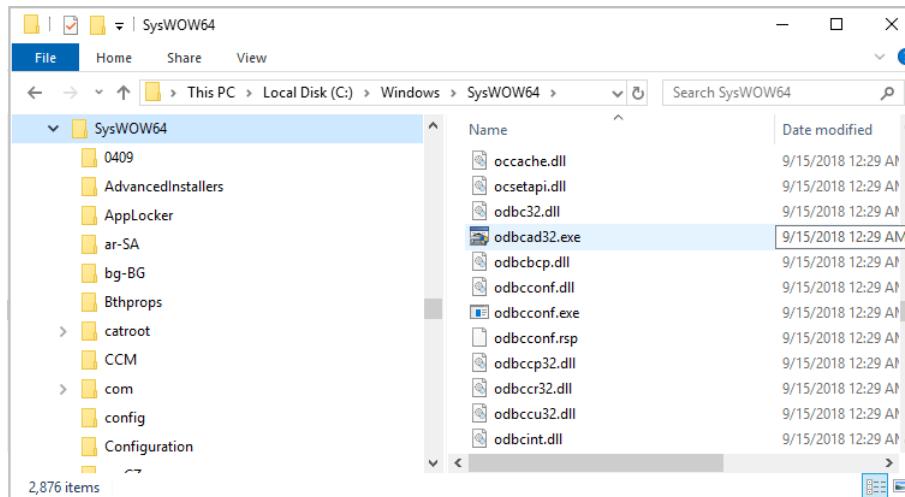
Checking the database settings

The inventory 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:

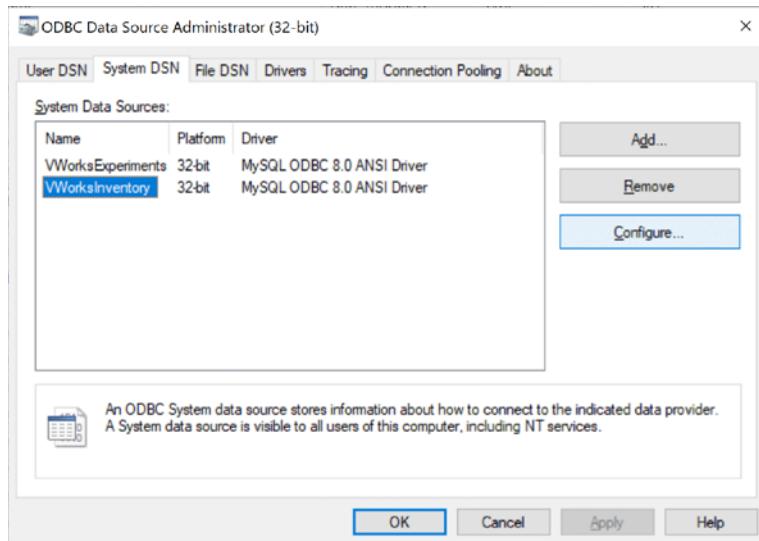
- 1 Open the ODBC Data Source Administrator as follows:

In the **C:\Windows\SysWOW64** folder, right-click **odbcad32.exe**, and then select **Run as administrator**.

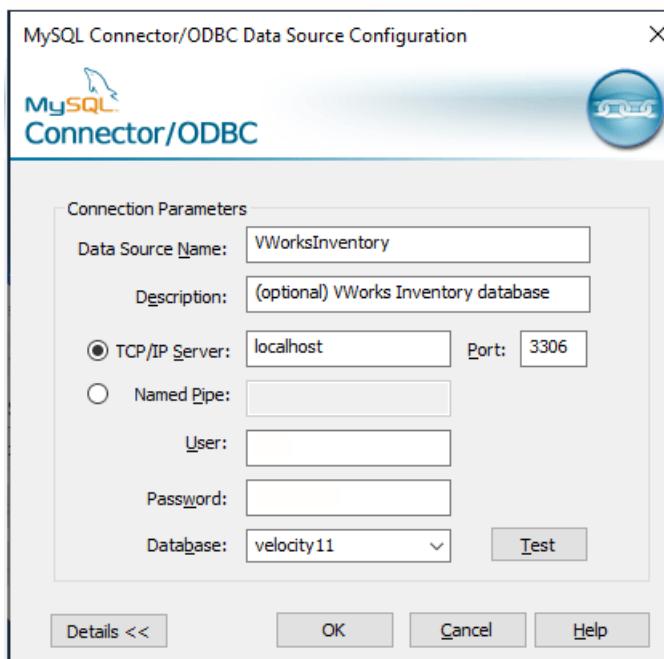


- 2 In the **ODBC Data Source Administrator (32-bit)** dialog box:

 - a Click the **System DSN** tab.
 - b Select the **VWorksInventory** data source, and then click **Configure**.



The MySQL Connector/ODBC Data Source Configuration dialog box opens.



- 3 Verify the following settings:

Connection Parameters	Settings
Data Source Name	VWorksInventory
Description	(optional) VWorks Inventory database
TCP/IP Server	localhost
User	
Password	
Database	velocity11

5 Tracking and managing labware in storage

Resolving labware inventory problems

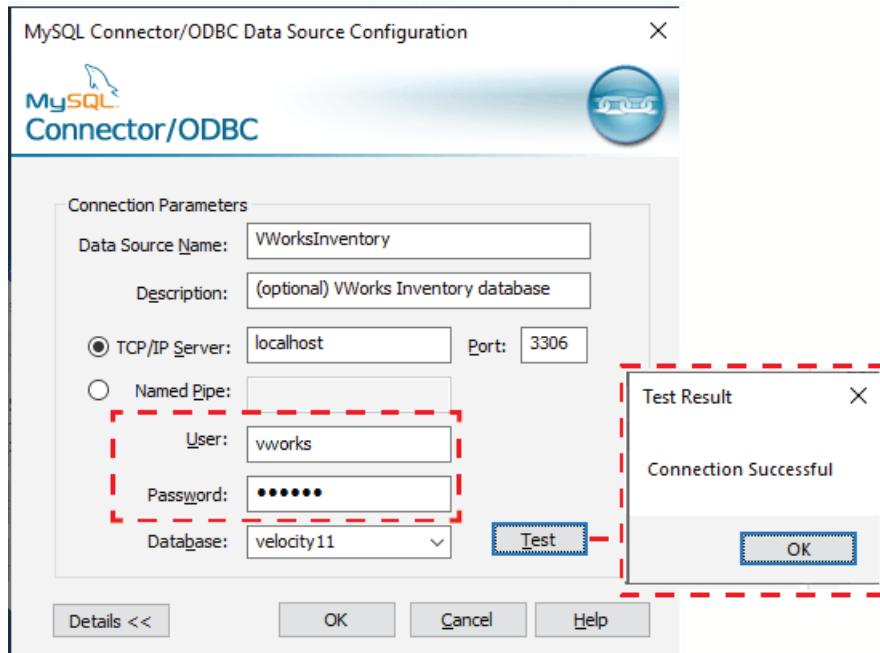
Testing the connection

To test the database connection:

- 1 In the **MySQL Connector/ODBC Data Source Configuration** dialog box, set the User and Password as follows.

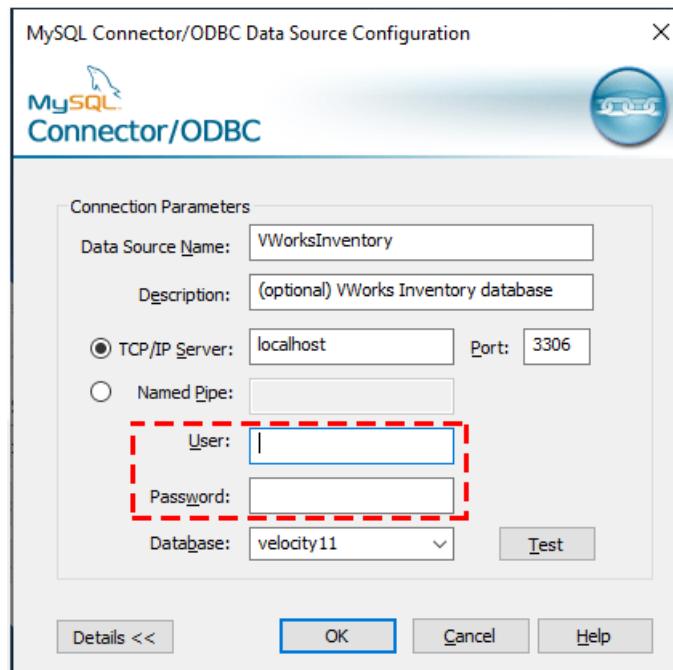
Connection Parameters	Settings
User	vworks
Password	vworks

- 2 Click **Test**.
- 3 When the **Connection Successful** message appears, click **OK**.

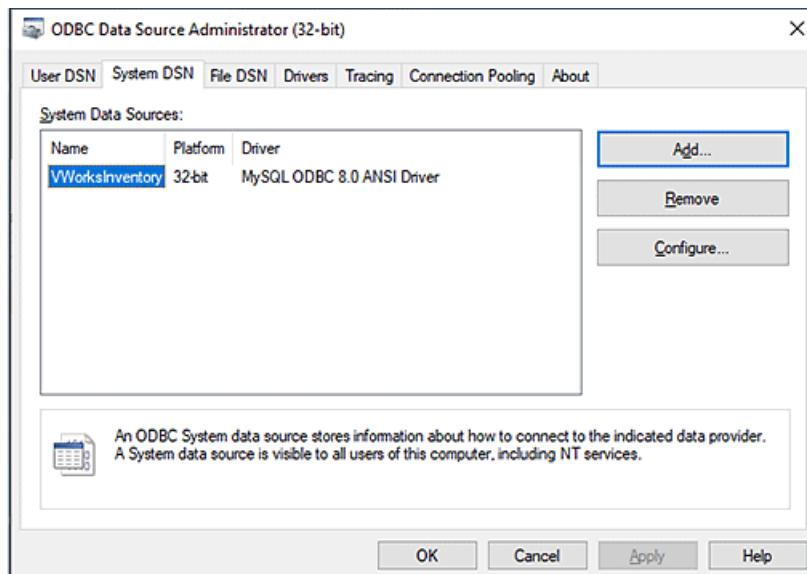


- 4 In the **Connection Parameters** area, clear the **User** and **Password** fields, as the following figure shows, and then click **OK**.

Note: The VWorks software will specify the user name and password, so, you must clear the User and Password fields after testing the connection.



- 5 Click **OK** to close the ODBC Data Source Administrator (32-bit) dialog box.



5 Tracking and managing labware in storage

Resolving labware inventory problems

Related information

For information about...	See...
Inventory groups, plate groups and location groups	"About inventory groups" on page 86
Moving labware in and out of a storage device	<ul style="list-style-type: none">• "Adding labware information in the inventory database" on page 94• "Removing labware information from the inventory database" on page 106• "Moving labware between storage devices" on page 103
Changing the labware associated with plates in the inventory database	"Reinventorying the labware inventory" on page 123
Inventory Editor filters	"Inventory Editor views and filters" on page 119

6 Tracking experiment data

This chapter contains the following topics:

- “About tracking data from experiments” on page 136
- “Creating and managing experiment IDs” on page 139
- “Creating an experiment ID report” on page 142
- “Archiving, exporting, and restoring experiment data” on page 145
- “Troubleshooting Experiments database connection” on page 150

About tracking data from experiments

About this topic

Read this topic if you are a administrator or a VWorks technician who creates protocols and forms. This topic describes the VWorks Experiments Editor and how to keep track data entered in a form or protocol in the Experiments database.

About the Experiments Editor and Experiments database

The Experiments Editor and database enables the tracking of parameter settings involved in preparing a microplate for downstream analysis. The protocol and form must be associated with an experiment ID and include parameters tagged to be tracked automatically. For each protocol run of a given experiment ID, the software records information for the tagged parameters in the database. To retrieve the data, you can create a report (.pdf file) for any experiment in the Experiments database.

How the data is tagged

The software uses the following tags to track the data of interest:

Tag	Description
Experiment ID	The name of the experiment (microplate or group of microplates) that you want to track. An experiment can include one or more applications.
Application	The name of the protocol and form.
Iteration	The number of times the application has been run for this Experiment ID.
Step name	A tagged task sequence or task in the protocol relevant to a given application run. For example, a Wash step might contain a tagged task sequence of Aspirate, Mix, Dispense to Waste. In the protocol, the task sequence is bracketed by a pair of tasks that indicate the starting and stopping points of interest.
Field name	The name of a parameter setting within the tagged task sequence for a given step. For example, a Wash step that contains Aspirate, Mix, Dispense to Waste tasks might have field names such as, Aspirate Volume, Mix Volume, Dispense Volume, and so forth.
Field value	The setting for a given field name. For example, a field name of Dispense Volume (μ L) might have a value of 10 or 0.5.

For each run (iteration) of a given application for an experiment ID, the software records the values assigned to each of the specified fields and the time when the data was recorded in the Experiments database.

Prerequisites

The Experiments Editor feature requires that you do the following.

Item	Requirement	See...
1	Set up a MySQL database on the computer that runs the VWorks software.	"Installing MySQL" on page 156
2	Establish a connection to the Experiments database.	"Connecting to Inventory and Experiments databases" on page 175
3	<p>Determine whether to use a form to run the protocol.</p> <ul style="list-style-type: none"><i>Using a form</i> The VWorks form has built-in features that expedite how you add tags for the data to be tracked.<i>Using a protocol without a form</i> The VWorks JavaScript interpreter includes an experimentTagsDB object that you use to specify how to add tags for the data to be tracked. To use this built-in object, you should know how to write programs in JavaScript or have a basic understanding of programming.	"Workflow for using a form to track experiment data" on page 138 VWorks Automation Control User Guide , experimentTagsDB object topic

6 Tracking experiment data

About tracking data from experiments

Workflow for using a form to track experiment data

If you are creating a form to run the protocol, perform the steps in the following workflow.

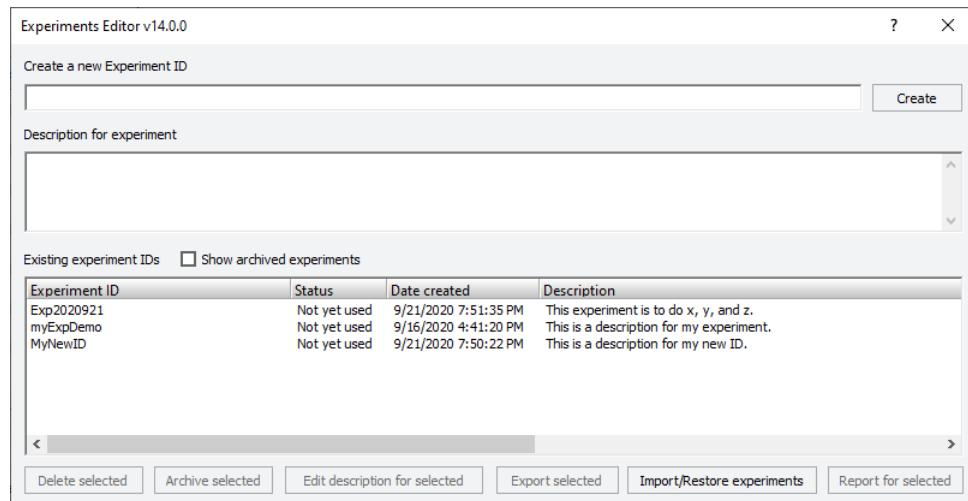
Step	For this task...	See...
1	Create a protocol for your application.	VWorks Automation Control User Guide
2	Create a form for the protocol that contains the following components for tagging: a <i>Application name</i> . The form creator uses a setting in the Form Designer window to specify the application name. b <i>Experiment ID control</i> . This control lists every Experiment ID in the Experiments database and is required on forms for which you are tracking experiments. The control enables the form user to select an existing experiment or open the Experiments Editor and create an experiment ID. c <i>Step Name and Field Name tags</i> . For every form control that has a Data entry property, the form creator uses the Experiment tag Step Name and Field Name properties to specify the data to be tracked.	VWorks Automation Control User Guide
3	Edit the protocol associated with the form to include the Step Started/Completed task before and after each task sequence to be tracked.	VWorks Automation Control User Guide
4	To run the protocol: <ul style="list-style-type: none">Open the form and use the Experiments ID control on the form to select or create an experiment ID for the run.Specify any other required settings on the form, and then click the run protocol button. During the protocol run, the software updates the database with the specified information for the selected experiment ID.	"Creating and managing experiment IDs" on page 139
5	Generate reports using the Experiments Editor.	"Creating an experiment ID report" on page 142
6	Periodically make a backup copy of the Experiments database and store the backup in a secure location. Ensure that the backup copy includes: <ul style="list-style-type: none">Exported data currently in the Experiments database.Archived experiment data.	"Archiving, exporting, and restoring experiment data" on page 145

Creating and managing experiment IDs

Before you start

The Experiments Editor requires a connection to the Experiments database. For instructions on how to establish a connection, see ["Connecting to Inventory and Experiments databases" on page 175](#).

Figure Experiments Editor window



Opening Experiments Editor

To open the Experiments Editor from the Tools menu:

In the VWorks window, click Tools > Experiments Editor.

To open the Experiments Editor from within a form:

- 1 Open a form that contains the Experiment ID control.
- 2 In the **Experiment ID** list, click **<create new>**.

Creating an experiment ID

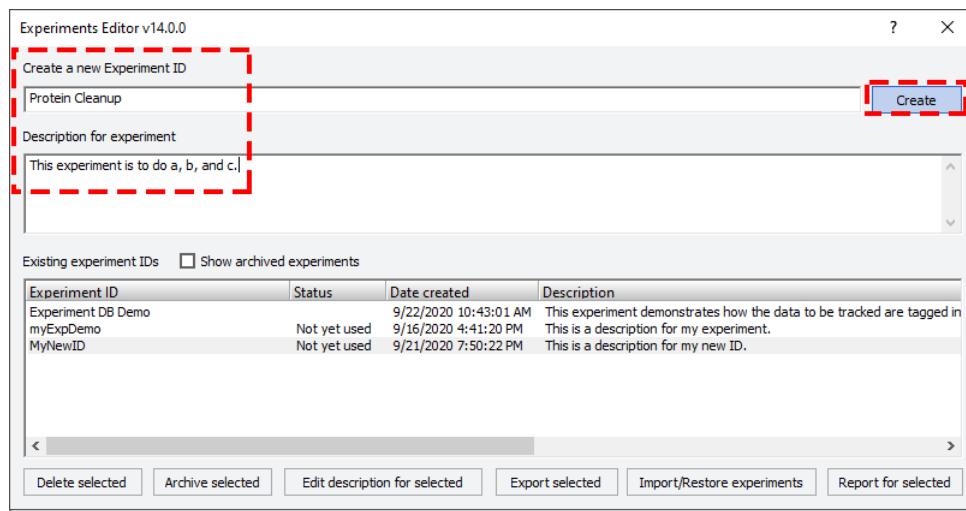
To create an experiment ID:

- 1 In the **Experiment Editor** window, type a name in the **Create a new Experiment ID** box.
- 2 In the **Description for experiment** box, type a description for this experiment.
- 3 Click **Create**.

The new ID appears in the Experiment ID table. The Description column displays any comments you provided in step 2. The Status column displays a status of **Not yet used**.

6 Tracking experiment data

Creating and managing experiment IDs



Note: The software saves each experiment ID with a hidden unique identifier (GUID).

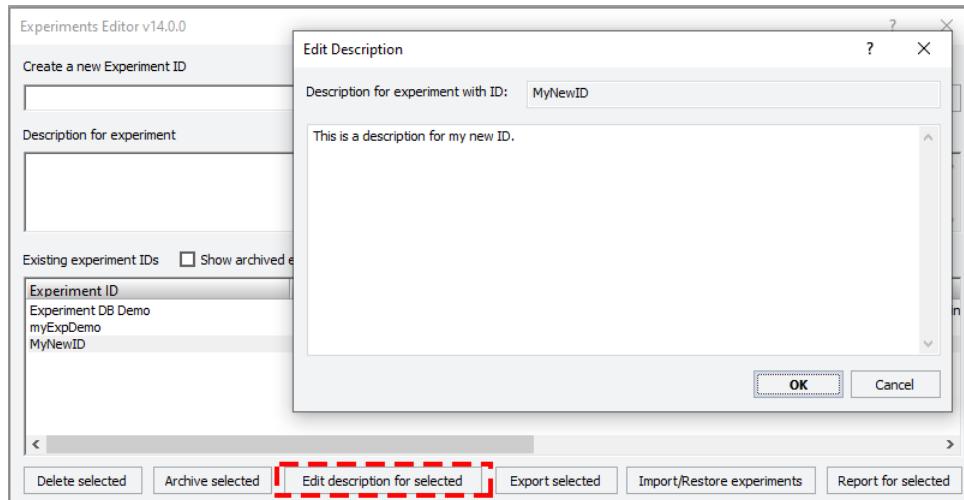
Editing descriptions for an experiment

Note: Archived experiments cannot be edited.

VWorks Plus. You may edit the description only for an experiment ID with a status of Not Yet Used.

To edit the description for an experiment:

- 1 In the **Experiment Editor** window, select the experiment in the **Experiment ID** table, and then click **Edit description for selected**.
- 2 In the **Edit Description** dialog box, type or modify the description, and then click **OK**. The new description appears in the Description column of the Experiment ID table.



Deleting an experiment

An administrator may delete an experiment ID using the following procedure.

VWorks Plus. Only an experiment ID with a Not Yet Used status can be deleted.

Note: Archived experiments cannot be deleted.

To delete an experiment:

- 1 In the **Experiment Editor** window, select the experiment in the **Experiment ID** table, and then click **Delete selected**.
- 2 In the confirmation message that appears, click **Yes** to delete this experiment.
The experiment no longer appears in the Experiment ID table.

Related information

For information about...	See...
How to establish a connection to the Experiments database.	"Connecting to Inventory and Experiments databases" on page 175
Tracking experiment data using a VWorks form	"Workflow for using a form to track experiment data" on page 138
Experiment ID reports	"Creating an experiment ID report" on page 142

Creating an experiment ID report

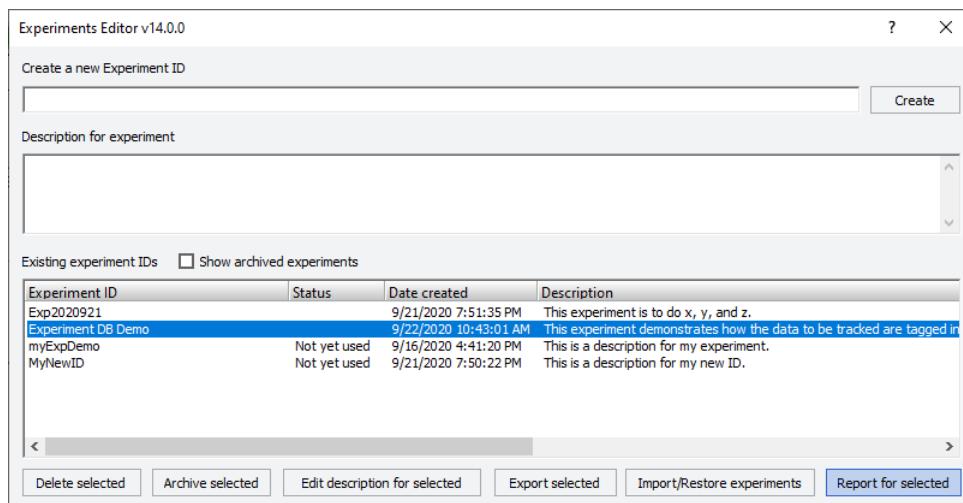
About this topic

This topic describes how to create a report of the records associated with an experiment in the Experiments database.

Creating a report for an experiment

To create a report for an experiment:

- 1 Open the **Experiments Editor**. See “[Creating and managing experiment IDs](#)” on [page 139](#).
- 2 *Optional.* To include archived experiments in the Experiment ID table, select **Show archived experiments**.
The Status column displays Archived (date @ time) for any archived experiments in the table.
- 3 In the **Experiments Editor** window, select the Experiment ID in the table, and then click **Report for selected**.



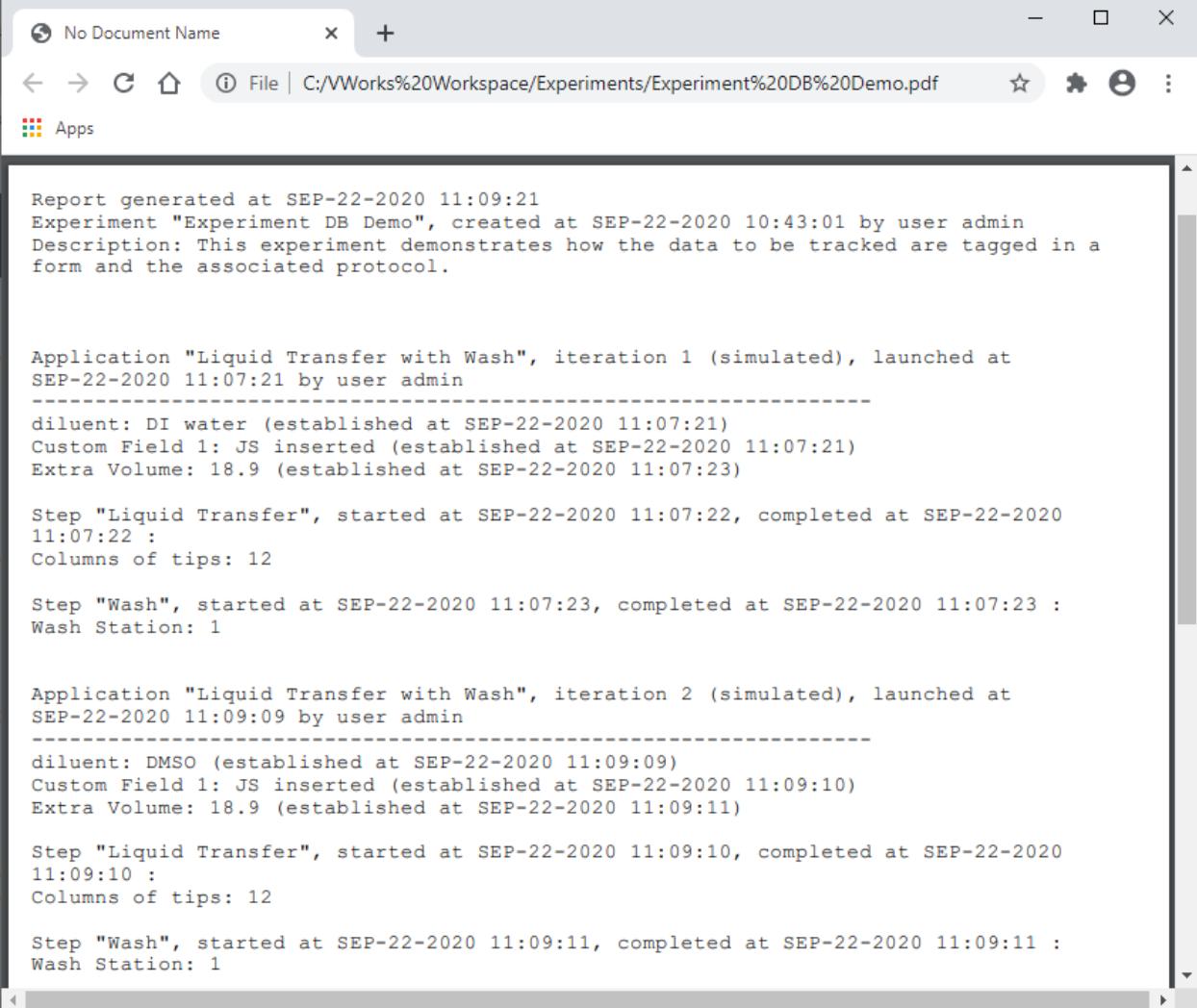
- 4 In the **Save As** dialog box, type a file name for the report, select a storage location, and then click **OK**. The software saves the report for the selected experiment to a file (.pdf) at the specified location.

Note: The VWorks software uses the Microsoft Print to PDF virtual printer to generate .pdf files. This virtual printer is installed on all Windows 10 systems by default. If the virtual print has been removed, the report generation feature will not work.

Experiment ID report contents

The following figure shows an example of an experiment ID report, the following table describes the report contents.

Figure Example experiment ID report (simulated runs)



Report generated at SEP-22-2020 11:09:21
 Experiment "Experiment DB Demo", created at SEP-22-2020 10:43:01 by user admin
 Description: This experiment demonstrates how the data to be tracked are tagged in a form and the associated protocol.

Application "Liquid Transfer with Wash", iteration 1 (simulated), launched at SEP-22-2020 11:07:21 by user admin

diluent: DI water (established at SEP-22-2020 11:07:21)
 Custom Field 1: JS inserted (established at SEP-22-2020 11:07:21)
 Extra Volume: 18.9 (established at SEP-22-2020 11:07:23)

Step "Liquid Transfer", started at SEP-22-2020 11:07:22, completed at SEP-22-2020 11:07:22 :
 Columns of tips: 12

Step "Wash", started at SEP-22-2020 11:07:23, completed at SEP-22-2020 11:07:23 :
 Wash Station: 1

Application "Liquid Transfer with Wash", iteration 2 (simulated), launched at SEP-22-2020 11:09:09 by user admin

diluent: DMSO (established at SEP-22-2020 11:09:09)
 Custom Field 1: JS inserted (established at SEP-22-2020 11:09:10)
 Extra Volume: 18.9 (established at SEP-22-2020 11:09:11)

Step "Liquid Transfer", started at SEP-22-2020 11:09:10, completed at SEP-22-2020 11:09:10 :
 Columns of tips: 12

Step "Wash", started at SEP-22-2020 11:09:11, completed at SEP-22-2020 11:09:11 :
 Wash Station: 1

Table Report contents

Item	Description
Report header	The following information appears at the top of the report: <ul style="list-style-type: none"> • Date that the report was generated • Experiment ID, creation date, and user log in of experiment ID creator • Description provided for the experiment
Archival status and history, if applicable	Archival status of experiment ID: <ul style="list-style-type: none"> • Date of archival or restoration • User who archived or restored • File name and path of the archived to or restored from location

6 Tracking experiment data

Creating an experiment ID report

Item	Description
Application name and iteration number	<p>The name and iteration of the protocol run, and if it was simulated.</p> <p><i>Note:</i> Each application iteration is listed separately, and ordered by launch time. Two blank lines separate application iterations from subsequent application iterations. Individual steps within an application iteration are separated by a single blank line.</p>
User that ran the given application iteration	The user log in of the user.
Step	For each step, the report indicates when the step was started and when it completed, or if not completed.
Field name and value	<p>Each field name and field value pair for a given step is listed on its own line.</p> <p>Any field name-and-value pairs that are not part of a step are listed before the first step.</p>

Related information

For information about...	See...
How to establish a connection to the Experiments database.	"Connecting to Inventory and Experiments databases" on page 175
Tracking experiment data using a VWorks form	"Workflow for using a form to track experiment data" on page 138
Archive, export, or import experiment data	"Archiving, exporting, and restoring experiment data" on page 145

Archiving, exporting, and restoring experiment data

About archiving and exporting experiments data

IMPORTANT

To ensure that you can recover the experiment data if the computer crashes or data get corrupted or lost, keep a backup copy of all data from the Experiments database and any archived experiments in a secure location.

You can archive closed experiment IDs and export active experiment IDs from the Experiments database to files in the local file system. When importing or restoring experiment IDs, the software performs a tamper check to verify that no changes were made to the exported or archived experiment ID files.

- **Archiving.** Saves all data associated with the archived experiment to a file and then erases the experiment data from the active database. Archiving helps prevent the database from being overloaded. You can archive individual or multiple experiment IDs to a given archive file.
 - You should periodically archive the data for experiment IDs that are no longer active, and keep a backup copy in a secure location.
 - You can view and generate reports for archived experiments in the Experiments Editor. However, archived experiments do not appear in the Experiment ID list in a VWorks form.
 - You cannot delete or export archived experiments, and you cannot edit their descriptions. If necessary, you can restore archived experiments to active status.
- **Exporting.** Exports a copy of the experiment data for selected **active** experiment IDs from the database to a file. You can export individual or multiple experiment IDs to a given file. The exported data does not include archived experiment IDs.
 - You should periodically export the data for all active experiment IDs to create a backup copy of the database. You can import the backup copy to recover the experiment data in case the data become damaged or lost.
 - You can view and generate reports for active experiments in the Experiments Editor.
 - *VWorks Plus.* If protocols have been run for an experiment ID, the experiment ID description cannot be edited.

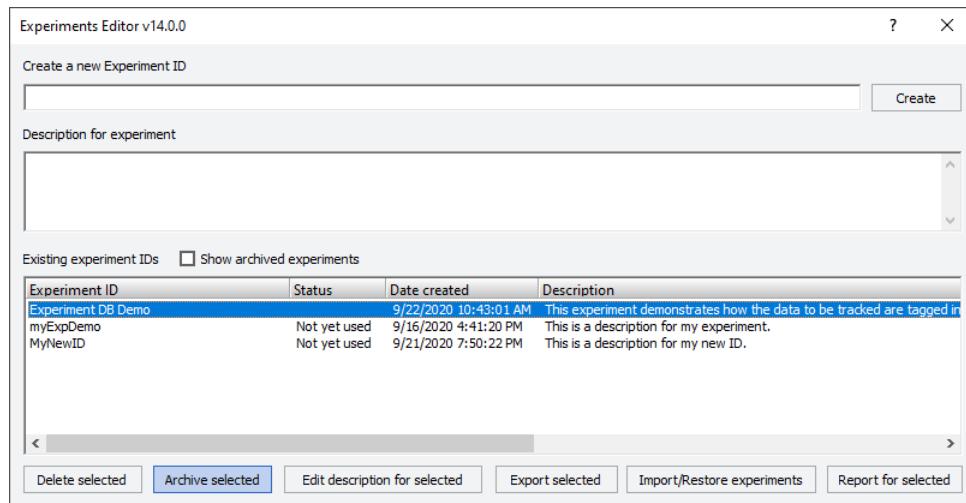
Archiving experiments

To archive experiments:

- 1 In the **Experiment Editor** window, select the experiments in the **Experiment ID** table, and then click **Archive selected**.

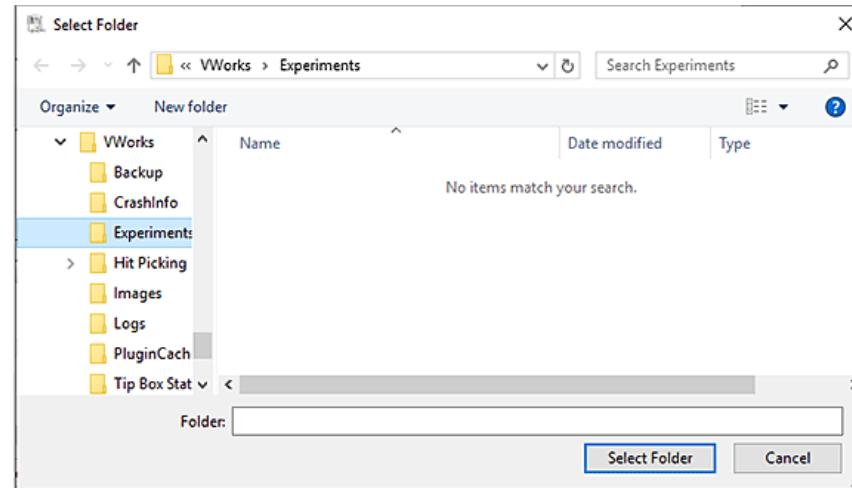
6 Tracking experiment data

Archiving, exporting, and restoring experiment data



- 2 When the confirmation message appears, click **Yes**.
- 3 In the **Select Folder** dialog box, select or type the name of the folder, and then click **Select Folder**.
- 4 When the confirmation message appears, click **OK**.

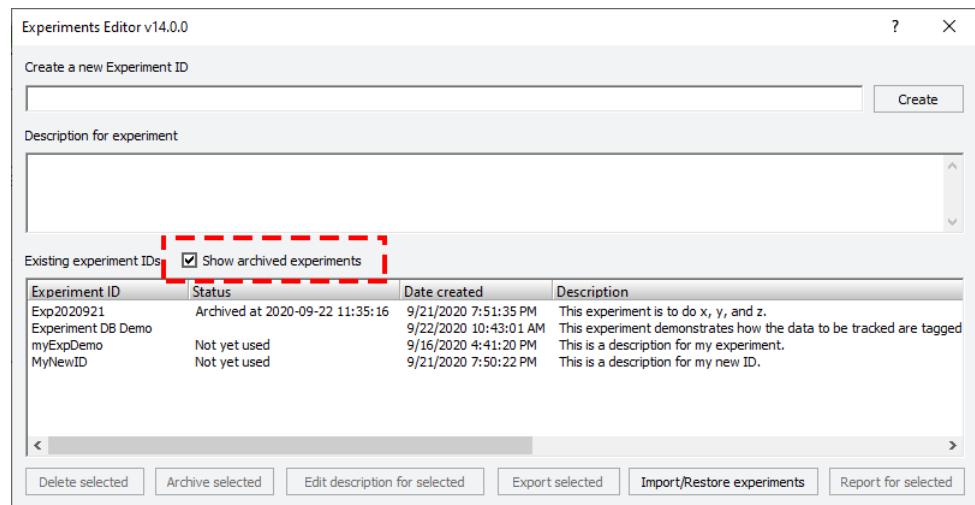
The software saves the archive with a file name of *(date @ time).expTags*.



Displaying or hiding archived experiments

To display or hide archived experiments:

In the **Experiment Editor** window, select **Show archived experiments**. The Experiment ID tables lists any archived experiments. The Status column displays their status as Archived *(date @ time)*.



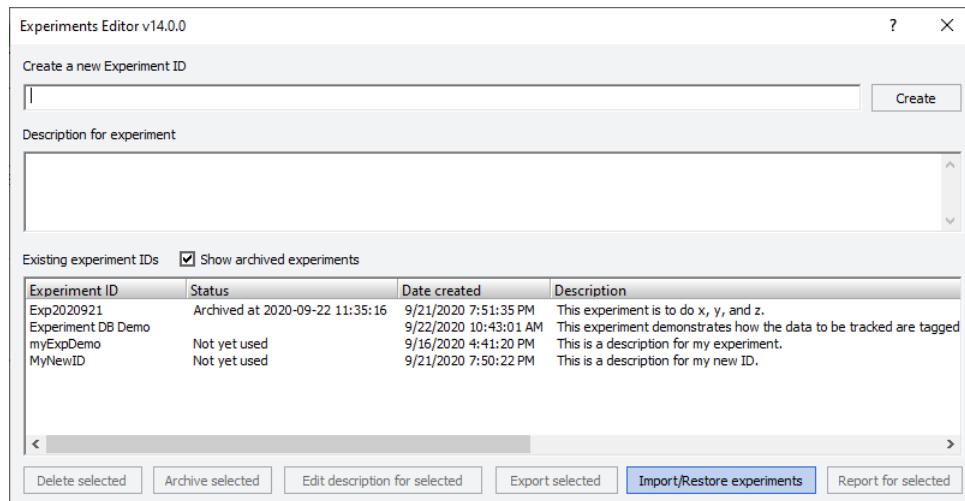
Clear the **Show archived experiments** check box to remove the archived experiments from the Experiment ID table.

To generate a report for an archived experiment, see “[Creating an experiment ID report](#) on page 142.

Restoring an archived experiment to active status

To restore an archived experiment:

- 1 In the **Experiment Editor** window, click **Import/Restore experiments**.



- 2 In the **Open** dialog box, select the **(date @ time).expTags** archive, and then click **Open**.
 - 3 When the confirmation message appears, click **OK** to restore the experiment to active status.
- The restored experiment appears in the Experiment ID table, and the Status column no longer specifies Archived.

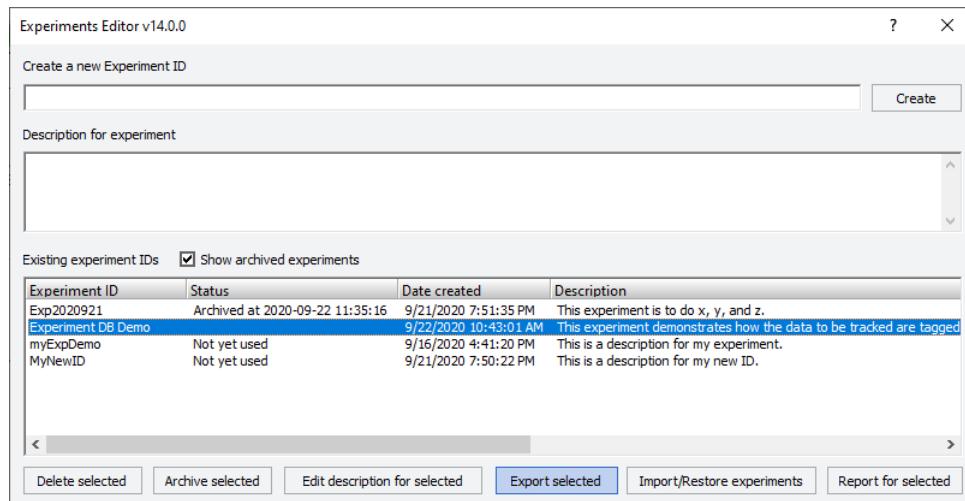
6 Tracking experiment data

Archiving, exporting, and restoring experiment data

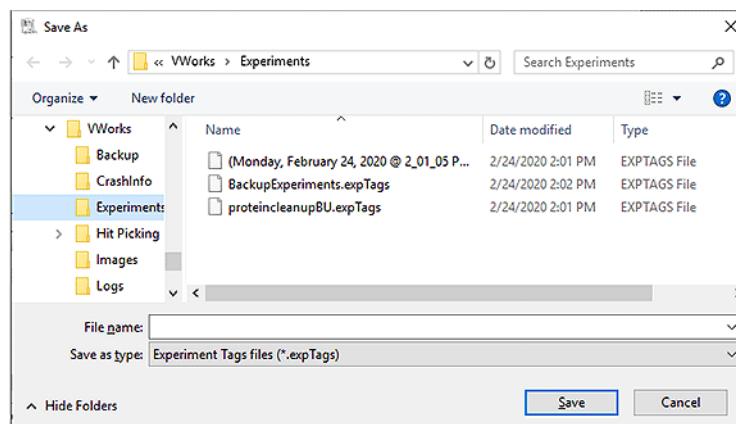
Exporting experiment data

To export the experiments data:

- 1 In the **Experiments Editor** window, select the experiments from **Experiment ID** table, and then click **Export selected**.



The Save As dialog box opens.



- 2 Select the storage location, type a file name, and then click **OK**.

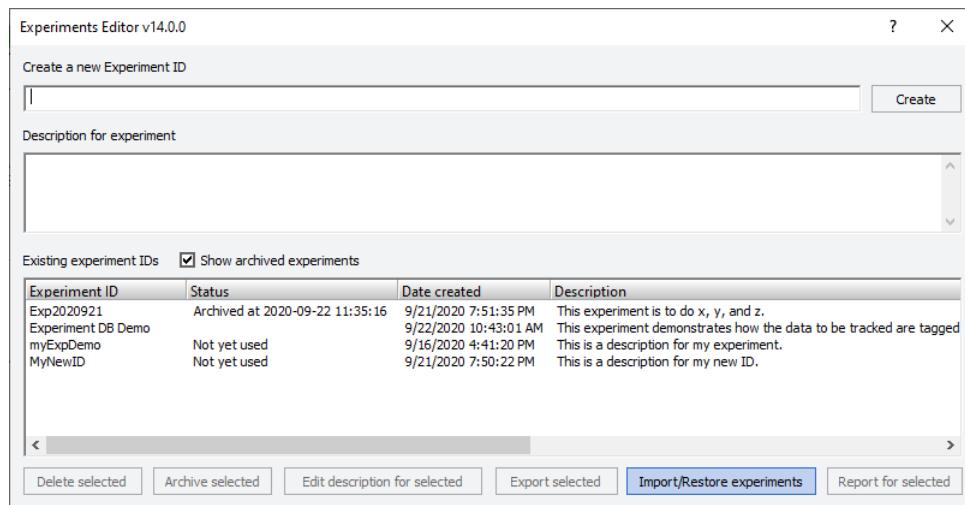
The software exports all the data for the selected experiments to an .expTags file, which is in XML format.

Importing experiment data

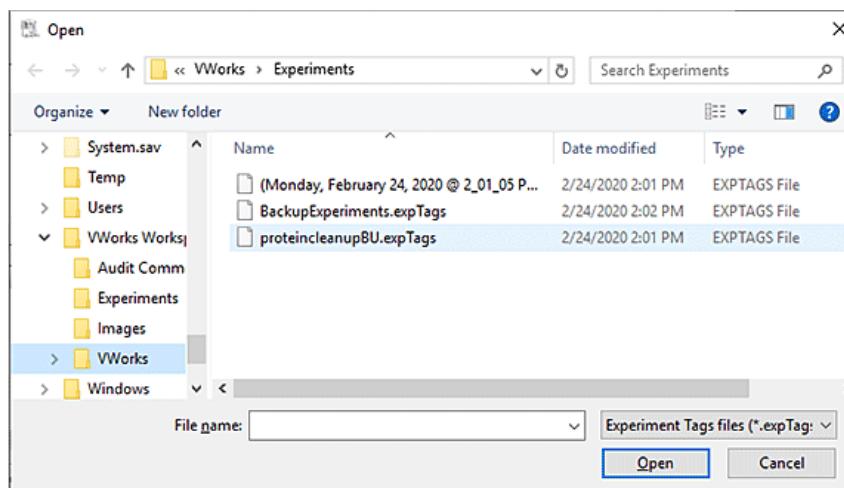
You can import the experiment data from a previously saved *.expTags file, for example as part of a data recovery process.

To import the experiment data:

- 1 Open the **Experiments Editor**. See "Creating and managing experiment IDs" on page 139.
- 2 In the **Experiments Editor** window, click **Import experiments**.



The Open dialog box opens.



- 3 Select the file (*.expTags) that contains the data for the experiments to be imported, and then click **Open**.

The software imports the data for all experiments in the selected file, except for any experiments whose experiment ID already exists, into the experiments database.

Related information

For information about...	See...
How to establish a connection to the Experiments database.	"Connecting to Inventory and Experiments databases" on page 175
Tracking experiment data using a VWorks form	"Workflow for using a form to track experiment data" on page 138

6 Tracking experiment data

Troubleshooting Experiments database connection

For information about...	See...
Generating reports	"Creating an experiment ID report" on page 142

Troubleshooting Experiments database connection

About this topic

This topic describes how to check and test the database connection that is used by the Experiments database.

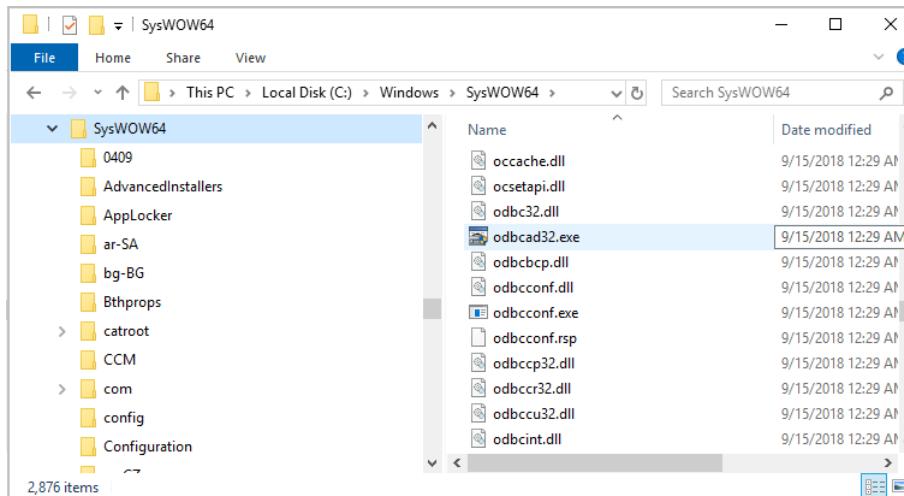
Checking the database settings

The Experiments database uses a Windows Open Database Connectivity (ODBC) interface. If you encounter connection problems, you may need to check the database settings.

To check the database settings:

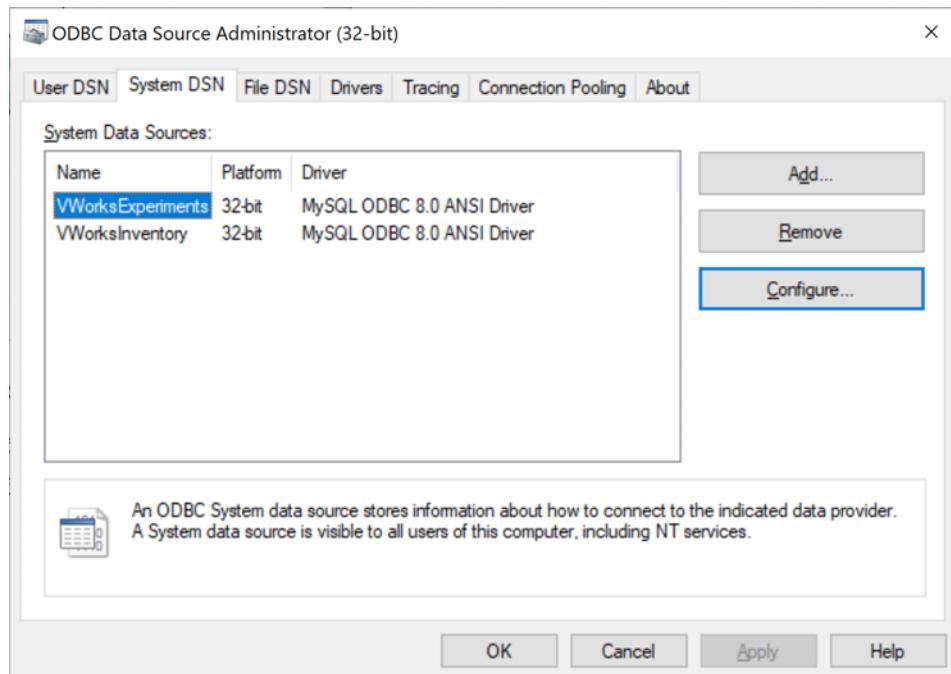
- 1 Open the ODBC Data Source Administrator as follows:

In the **C:\Windows\SysWOW64** folder, right-click **odbcad32.exe**, and then select **Run as administrator**.

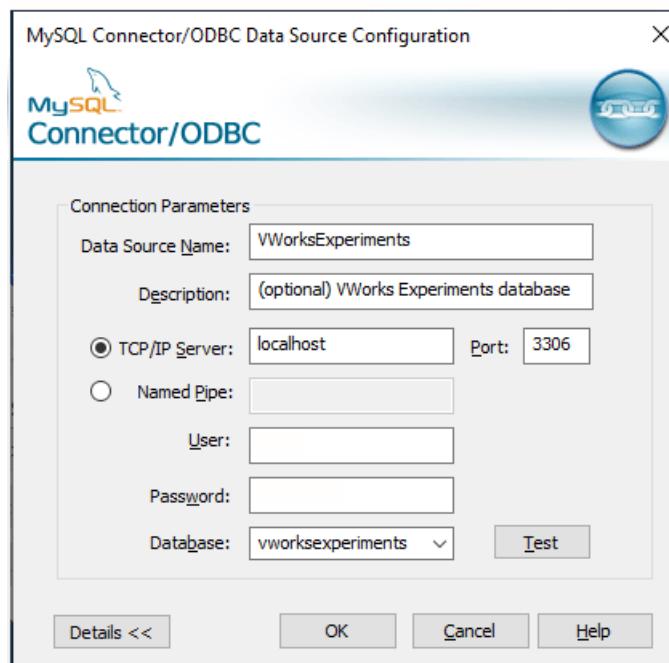


- 2 In the **ODBC Data Source Administrator (32-bit)** dialog box:

- a Click the **System DSN** tab.
- b Select the **VWorksExperiments** data source, and then click **Configure**.



The MySQL Connector/ODBC Data Source Configuration dialog box opens.



- 3 Verify the following settings:

Connection Parameters	Settings
Data Source Name	VWorksExperiments
Description	(optional) VWorks Experiments database
TCP/IP Server	localhost

6 Tracking experiment data

Troubleshooting Experiments database connection

Connection Parameters	Settings
User	
Password	
Database	vworksexperiments

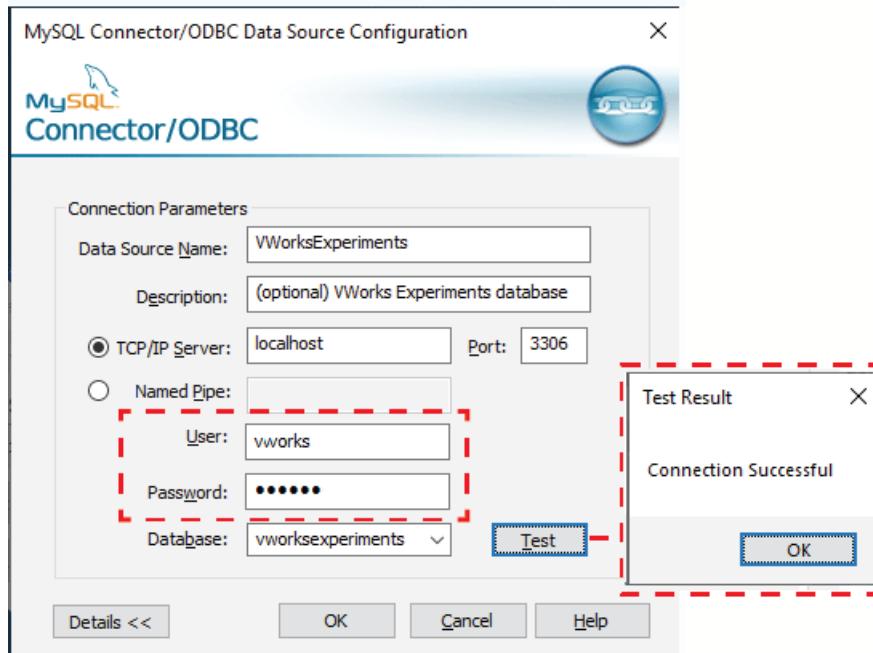
Testing the connection

To test the database connection:

- 1 In the **MySQL Connector/ODBC Data Source Configuration** dialog box, set the User and Password as follows.

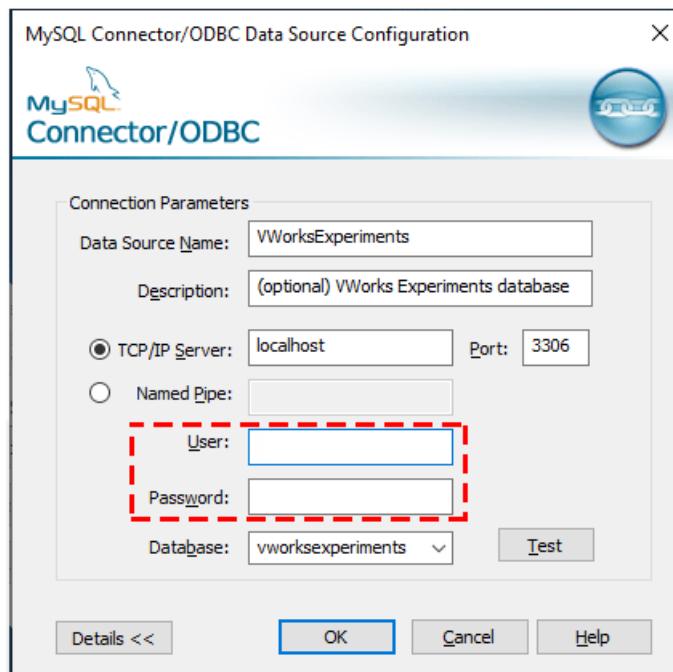
Connection Parameters	Settings
User	vworks
Password	vworks

- 2 Click **Test**.
- 3 When the **Connection Successful** message appears, click **OK**.

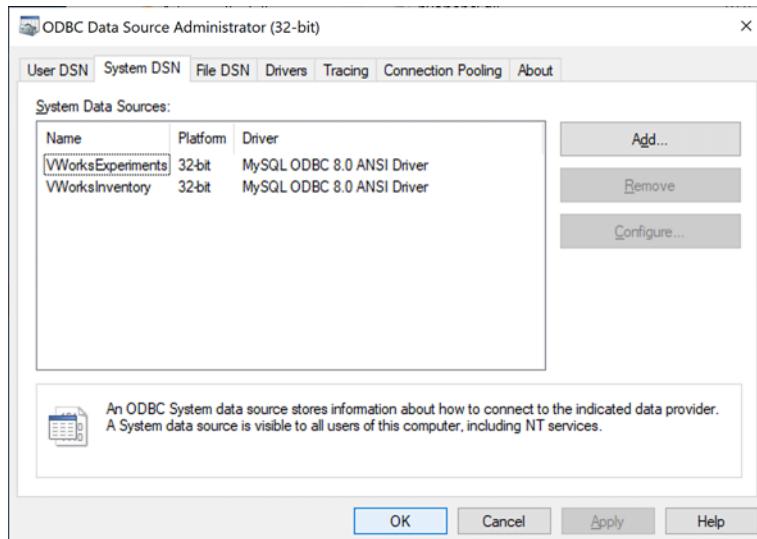


- 4 In the **Connection Parameters** area, clear the **User** and **Password** fields, as the following figure shows, and then click **OK**.

Note: The VWorks software will specify the user name and password, so, you must clear the User and Password fields after testing the connection.



- 5 Click **OK** to close the ODBC Data Source Administrator (32-bit) dialog box.



6 Tracking experiment data

Troubleshooting Experiments database connection

Related information

For information about...	See...
How to establish a connection to the Experiments database.	"Connecting to Inventory and Experiments databases" on page 175
Tracking experiment data using a VWorks form	"Workflow for using a form to track experiment data" on page 138
Generating Experiment ID reports	"Creating an experiment ID report" on page 142

A Setting up and connecting to a MySQL database

The VWorks Inventory Editor and Experiments Editor require a MySQL database connection. This section describes how to install MySQL, set up the data sources, and connect to the databases.

Note: The inventory and experiments databases may be configured already if the computer was provided by Agilent Technologies.

The topics are:

- “Installing MySQL” on page 156
- “Installing and setting up a MySQL ODBC” on page 167
- “Connecting to Inventory and Experiments databases” on page 175

A Setting up and connecting to a MySQL database

Installing MySQL

Installing MySQL

If the computer was provided by Agilent Technologies, the MySQL software may already be installed, and the inventory and experiments databases may be configured already. In this case, see “[Connecting to Inventory and Experiments databases](#)” on [page 175](#).

Before you start

Required installation files

Ensure you have the following installation files:

- VC_redist.x64.exe
- VC_redist.x86.exe
- mysql-installer-community-8.0.18.0.msi
- vworks_mysql_8.0.sql

This file is installed with the VWorks software in C:\\Program Files (x86)\\Agilent Technologies\\VWorks\\Schema\\vworks_mysql_8.0.sql.

For assistance, contact Agilent Technical Support.

Required computer settings

Before you install the software:

- Log on to the computer as an administrator with full rights.
- In Microsoft Windows Explorer, select the following **View > Show** settings:
 - Select **Hidden items**.
 - Select **File name extensions**.

For detailed instructions, see the Microsoft Windows user documentation.

Installation and setup workflow

Step	For this task...	See...
1	Uninstall any existing MySQL versions, and then restart the computer.	“Uninstalling previous versions of MySQL” on page 157
2	Install MySQL Server 8.0.18	“Installing MySQL 8.0.18” on page 159
3	Install MySQL ODBC and set up the data sources.	“Installing and setting up a MySQL ODBC” on page 167
4	Connect to the VWorks databases.	“Connecting to Inventory and Experiments databases” on page 175

Uninstalling previous versions of MySQL

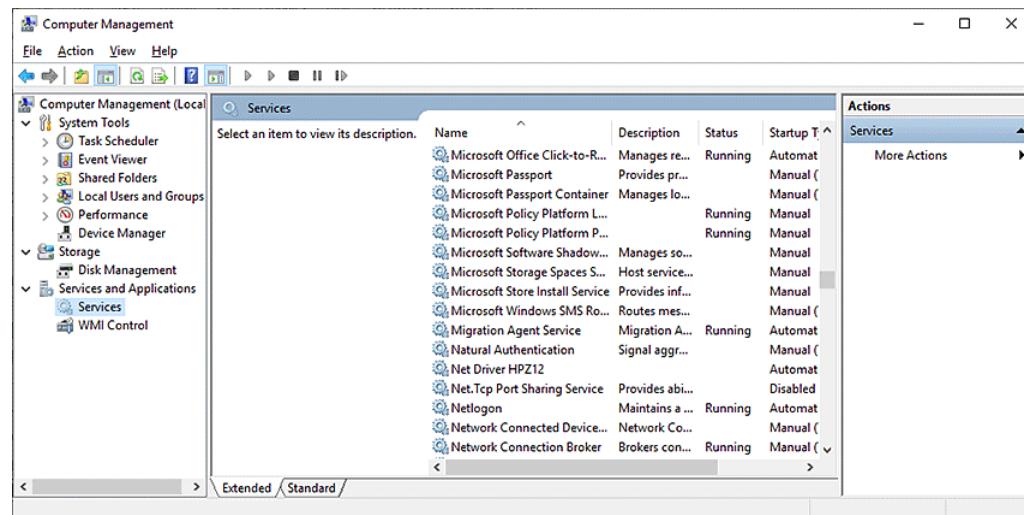
Before you *uninstall*:

Make a backup copy of your existing database before uninstalling it. To back up the:

- Inventory database (velocity11) only, see ["Exporting and importing the inventory data" on page 125](#).
- Inventory database (velocity11), labware definitions, liquid classes, and pipetting techniques, see the [VWorks Automation Control User Guide](#).
- Experiments database (vworksexperiments), export all the experiment IDs, and make a backup copy of the files (.expTags) containing the exported experiment IDs and archived experiment IDs.

To *uninstall* MySQL:

- 1 Log on to the computer as an administrator.
- 2 In the Microsoft Windows desktop, go to **Settings > Apps & features**, and uninstall the following:
 - a MySQL Server
 - b MySQL Connector/ODBC
- 3 Restart the computer.
- 4 Verify that the MySQL service is completely removed:
 - a In Microsoft Windows Explorer, right-click the **This PC** icon. In the shortcut menu, click **Manage**. The Computer Management window opens.
 - b In the **Computer Management** window, click **Services and Applications > Services**.
 - c In the list of **Services**, ensure MySQL does not appear:
 - If MySQL does not appear, go to [step 8](#).
 - If MySQL appears in the list, continue to step 5.

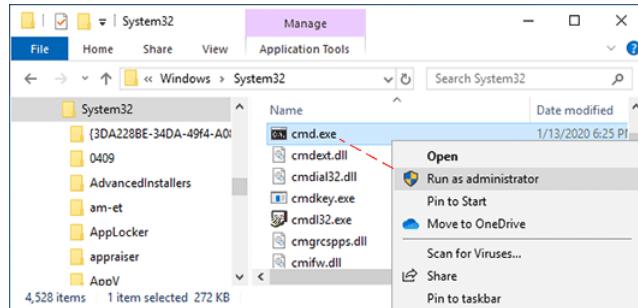


- 5 In the list of **Services**, right-click **MySQL** and click **Stop**.
Note: If an error message appears and states that it is unable to stop, ignore the message.
- 6 Open the Command Prompt window, as follows:

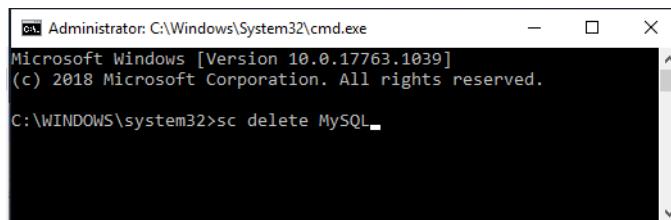
A Setting up and connecting to a MySQL database

Installing MySQL

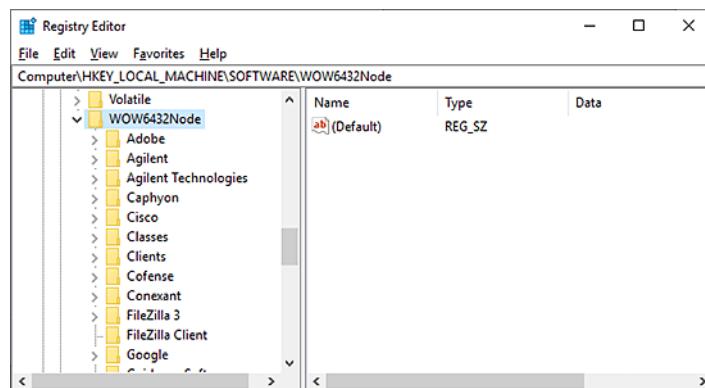
- a In the **C:\Windows\System32** folder, right-click **cmd.exe**, and then select **Run as administrator**.
- b Click **Yes** in the **User Account Control** dialog box that opens.



- c Execute the following line in the Command Prompt window:
`sc delete MySQL <enter>`



- 7 Check the registry keys for any references to old versions of MySQL as follows:
 - a Open the Registry Editor.
 - b Navigate to **HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\MySQL AB**
 - c If present, delete MySQL Server 5.1 or MySQL Server 5.0.



- 8 Restart the computer.

IMPORTANT

Ensure that you restart the computer after uninstalling the MySQL Server and MySQL Connector/ODBC.

Installing MySQL 8.0.18

Before installing MySQL 8.0.18, install the Microsoft Visual C++ redistributable package.

To install the Microsoft Visual C++ redistributable package:

- 1 Run the vc_redist.x64.exe file.
- 2 Follow the Setup Wizard instructions.
- 3 Run the vc_redist.x86.exe file.
- 4 Follow the Setup Wizard instructions.

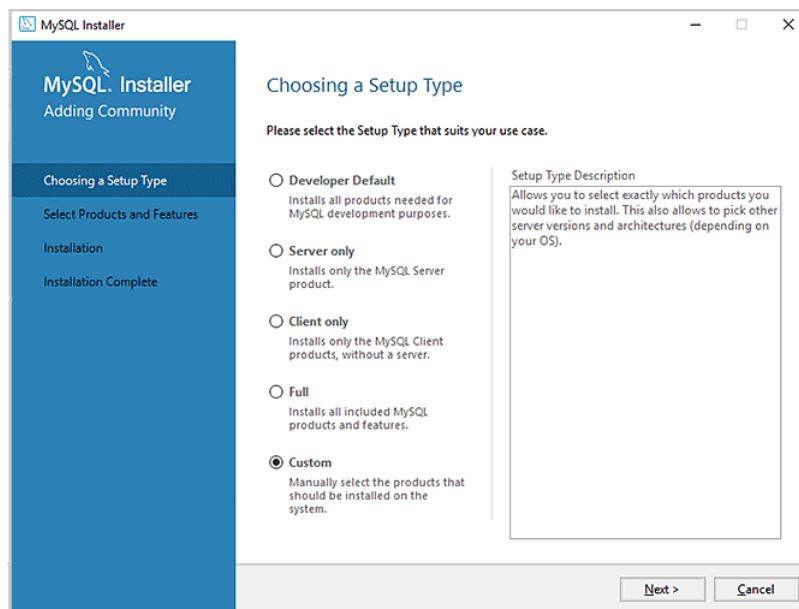
Note: If the computer already has Microsoft Visual Studio 2017 or Microsoft Visual C++ 2017 Redistributable installed, the MySQL installer might not recognize that the VC 2015 Redistributable is installed even if it is. To fix this issue, go to Settings > Apps. In the Apps & features window, locate Microsoft Visual C++ 201, right-click, and then choose Modify, Click Repair when the installer window opens.

To install MySQL 8.0.18:

- 1 Run the mysql-installer-community-8.0.18.0.msi. The MySQL Installer setup wizard opens.

Note: If Visual Studio 2017 or the Visual C++ 2017 redistributable package is installed on the computer, the MySQL installer might display an error message stating that Visual C++ redistributable is not installed even if it is. To fix this, go to Apps and Features, select Microsoft C++ Redistributable, right-click and then select Modify. In the Microsoft C++ Redistributable Setup screen, click Repair.

- 2 In the **Choosing a Setup Type** page, select **Custom**, and then click **Next**.



A Setting up and connecting to a MySQL database

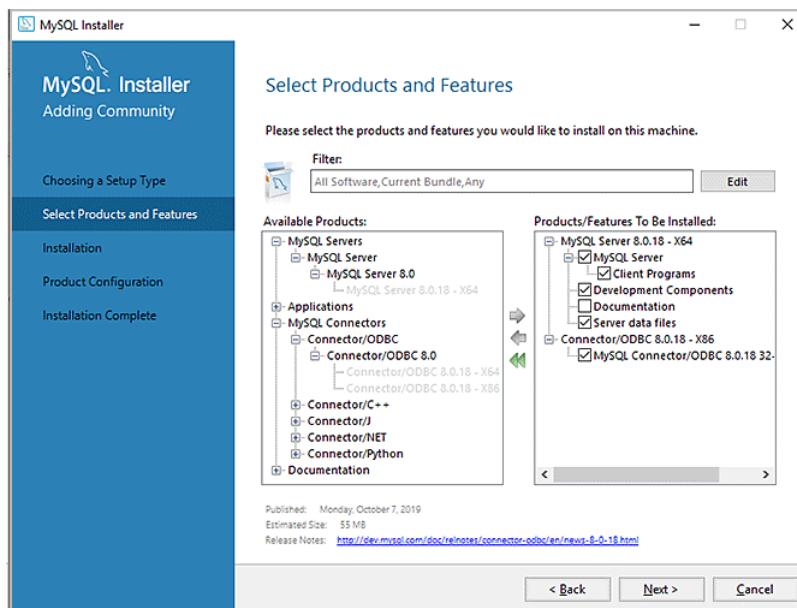
Installing MySQL

- 3 In the **Select Products and Features** page, select the following **Available Products** and then click the right arrow to move each selection to **Products/Features To Be Installed**:

MySQL Servers > MySQL Server > MySQL Server 8.0 > MySQL Server 8.0.0.18- X64

MySQL Connectors > Connector/ODBC > Connector ODBC 8.0.18 -X86

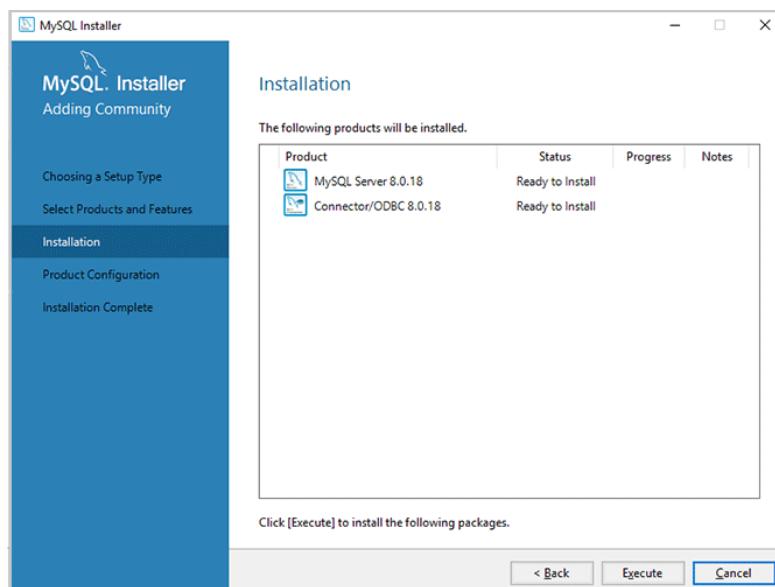
Click **Next**.



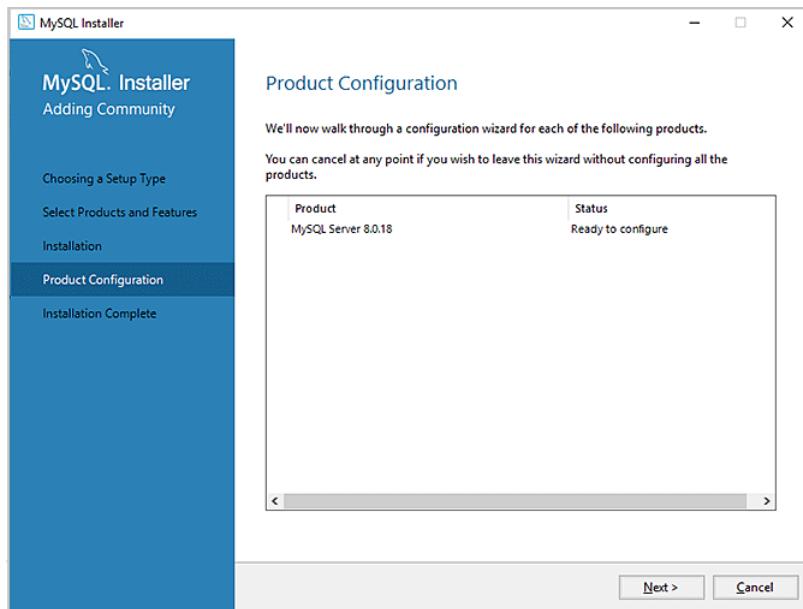
- 4 In the **Installation** page:

a Make sure that MySQL Server 8.0.18 and Connector/ODBC 8.0.18 are **Ready to Install**, and then click **Execute**.

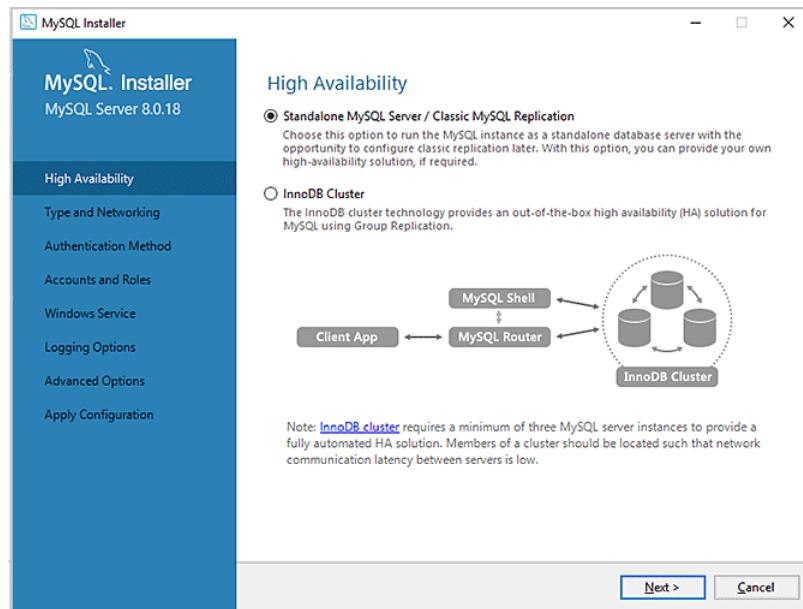
b When the installation is finished, click **Next**.



- 5 In the **Product Configuration** page, click **Next**.



- 6 In the **High Availability** page, select **Standalone MySQL Server / Classic MySQL Replication**, and then click **Next**.

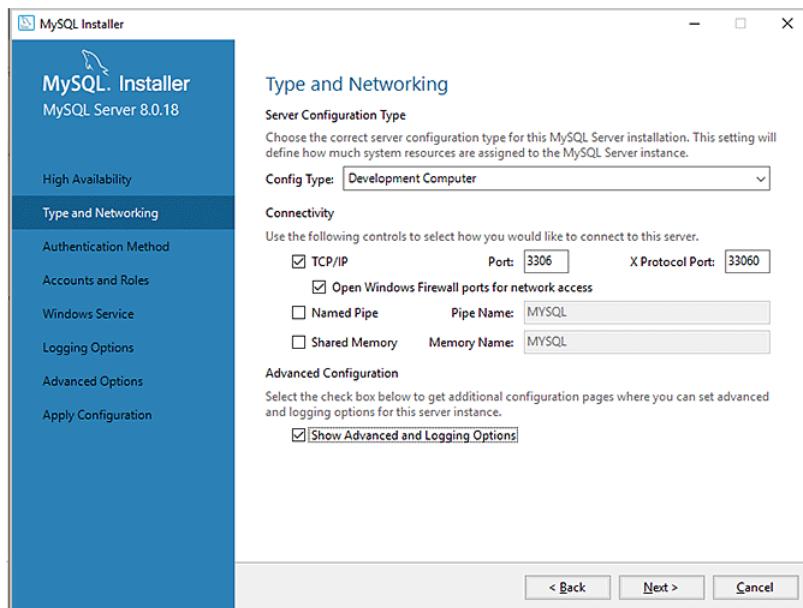


A Setting up and connecting to a MySQL database

Installing MySQL

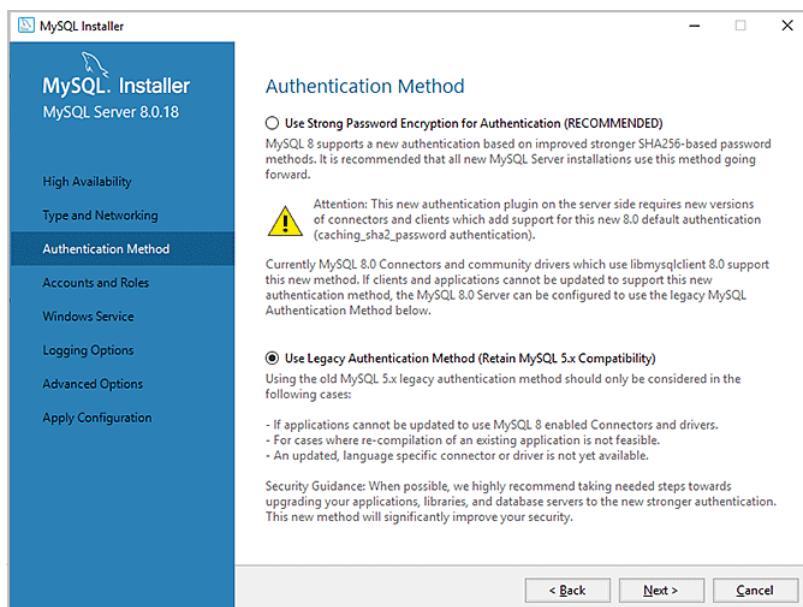
- 7 In the **Type and Networking** page, specify the following:
 - **Config Type > Development Computer**
 - **TCIP/IP > Open Windows Firewall ports for network access**
 - **Show Advanced and Logging Options**

Click **Next**.



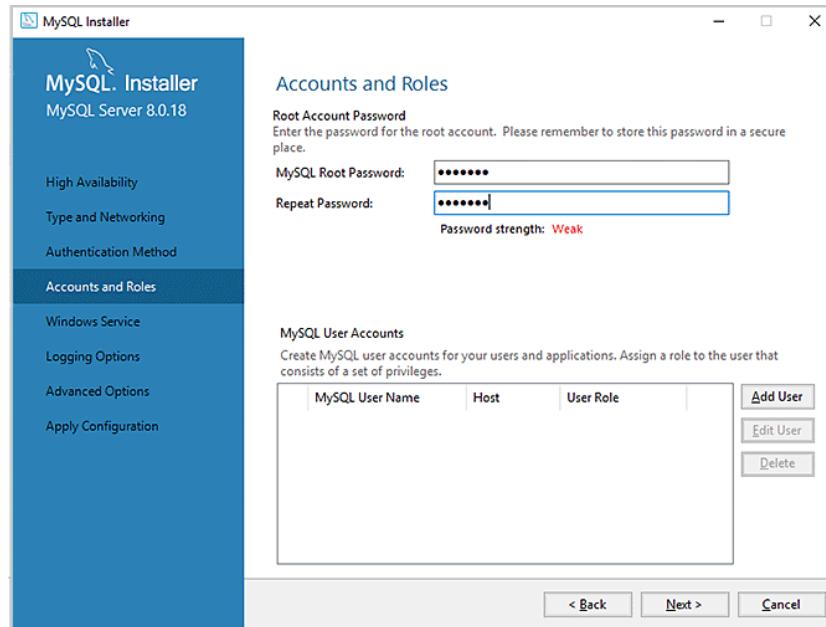
- 8 In the **Authentication Method** page, select **Use Legacy Authentication Method (Retain MySQL 5.x Compatibility)**.

Click **Next**.



- 9 In the **Accounts and Roles** page, type `agilent` for **MySQL Root Password** and **Repeat Password** fields.

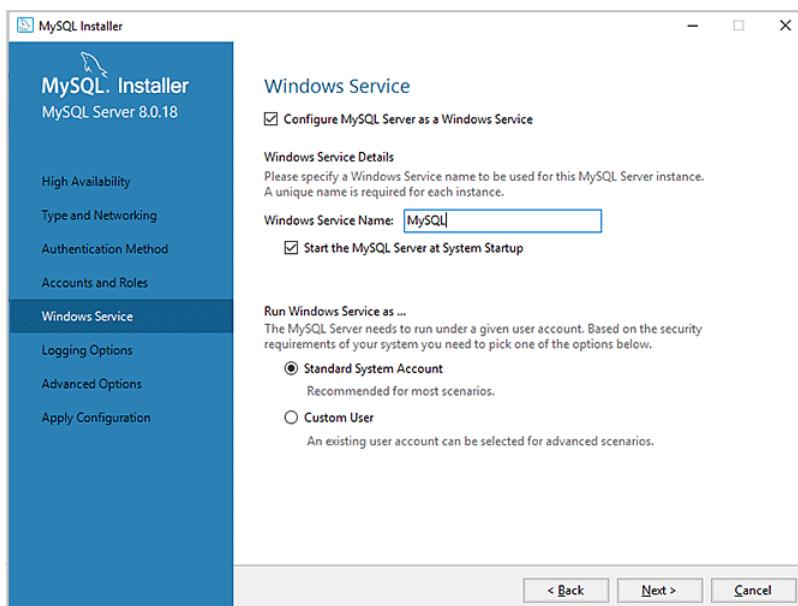
Click **Next**.



- 10 In the **Windows Service** page, specify the following:

- **Configure MySQL Server as a Windows Service**
- Make sure you specify the following:
 - **Windows Service Name** > MySQL
 - **Start the MySQL server at System Startup**
 - **Run Windows Service as** > **Standard System Account**

Click **Next**.

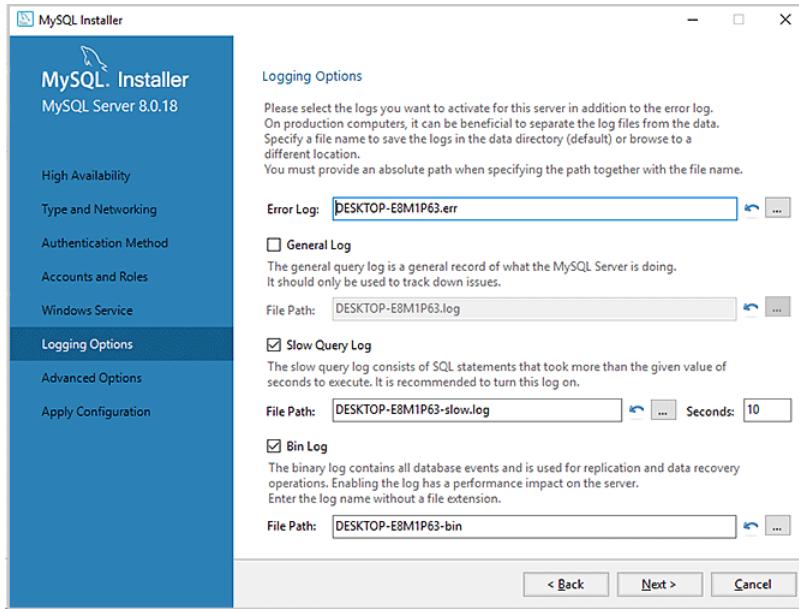


A Setting up and connecting to a MySQL database

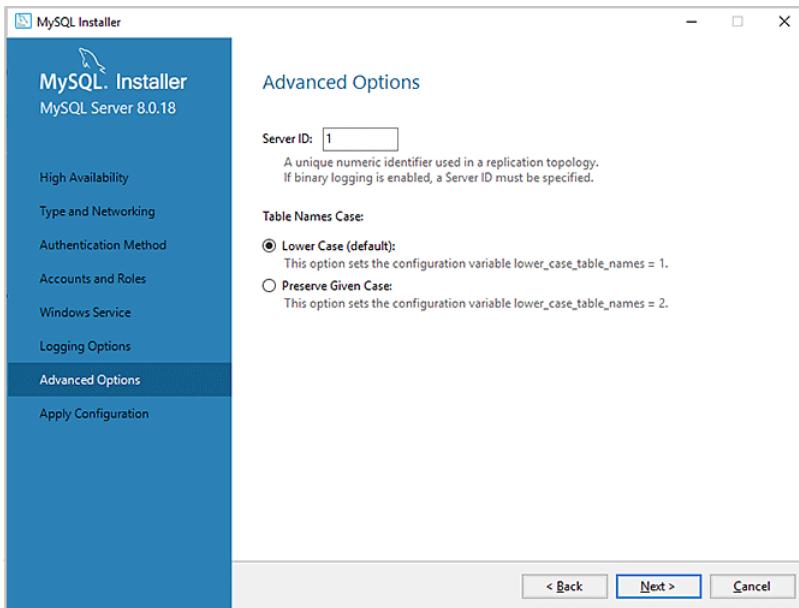
Installing MySQL

- 11 In the **Logging Options** page, accept the default settings. Click **Next**.

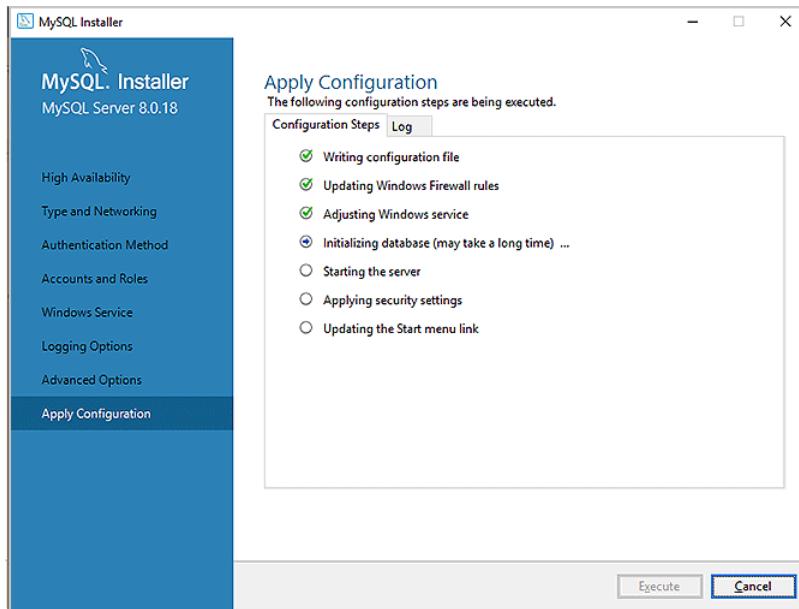
Note: The file paths are based on the computer name.



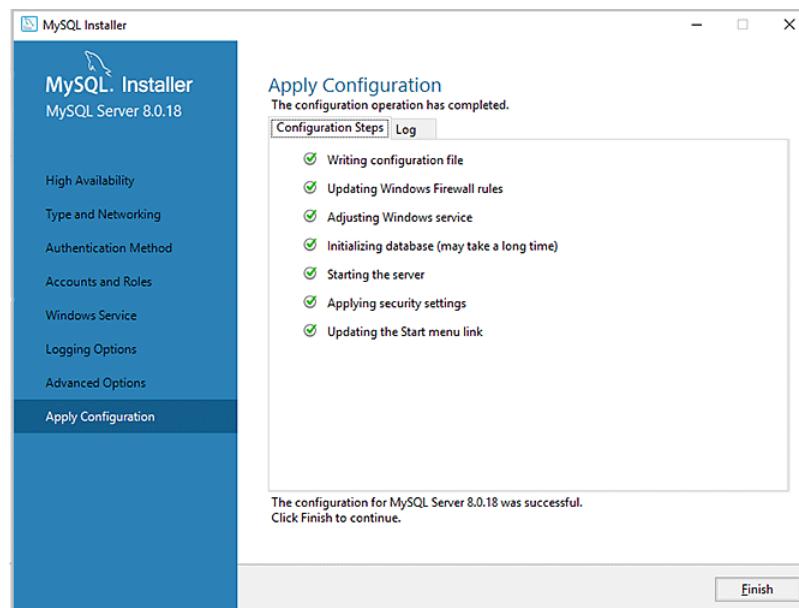
- 12 In the **Advanced Options** page, accept the default settings. Click **Next**.



13 In the **Apply Configuration** page, click **Execute**.



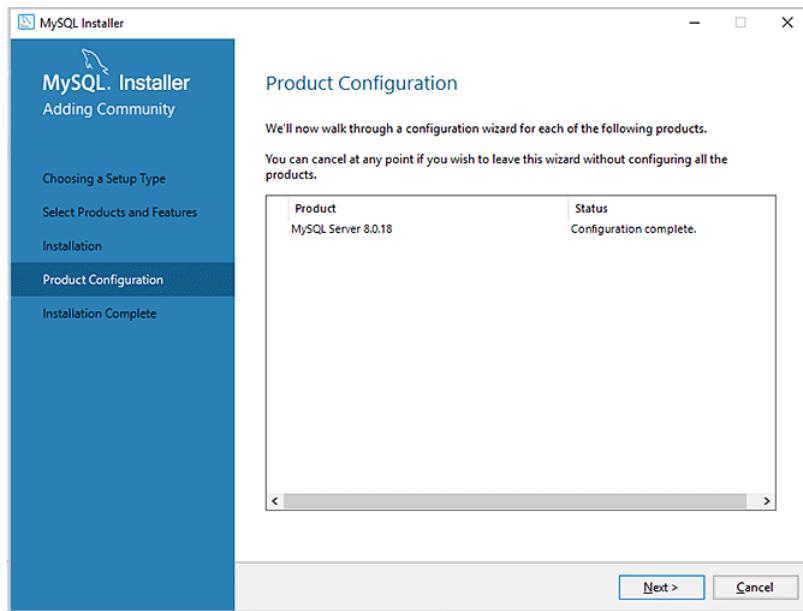
14 When the screen displays the configuration was successful text, click **Finish**.



A Setting up and connecting to a MySQL database

Installing MySQL

15 In the **Product Configuration** page, click **Next**.



16 Click **Finish** in the **Installation Complete** page.

Related information

For information about...	See...
Setting up the ODBC data source	"Installing and setting up a MySQL ODBC" on page 167
VWorks Inventory Editor	"About labware inventory management" on page 80
VWorks Experiments Editor	"About tracking data from experiments" on page 136

Installing and setting up a MySQL ODBC

About this topic

This topic describes how to install and set up data sources in MySQL ODBC (open database connectivity) for the following:

- VWorks Inventory Editor
- VWorks Experiments Editor

Note: If the computer was provided by Agilent Technologies, the inventory and experiments databases may be set up already. In this case, see ["Connecting to Inventory and Experiments databases" on page 175](#).

During the MySQL ODBC connection setup you will:

- Import the VWorks database schema into MySQL. This sets up the database table structures for use by the VWorks Inventory Editor and Experiments Editor.
- Create, define, and configure new ODBC data sources so that MySQL can access data in the VWorks databases.

Importing the database schema

To import the database schema:

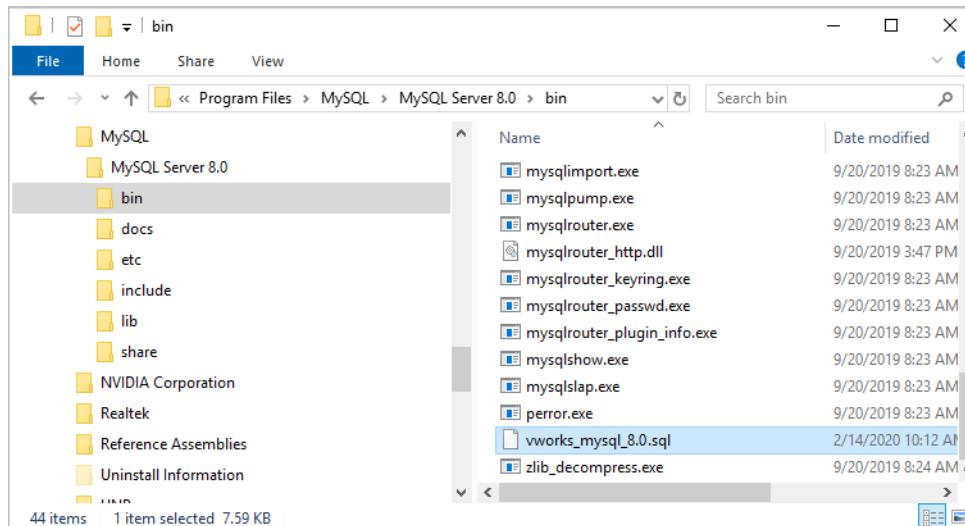
- 1 Copy the following database schema file:

`vworks_mysql_8.0.sql`

Note: This file is installed with the VWorks software in the folder:
C:\\Program Files (x86)\\Agilent Technologies\\VWorks\\Schema\\

Paste the copy into the following folder:

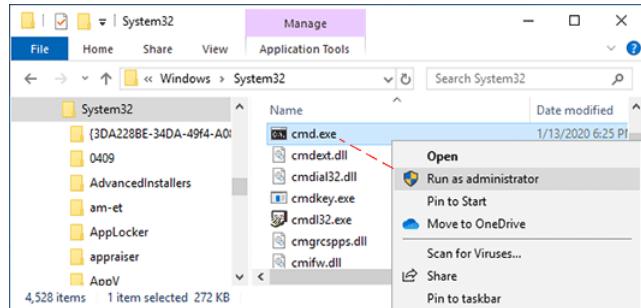
C:\\Program Files\\MySQL\\MySQL Server 8.0\\bin\\



A Setting up and connecting to a MySQL database

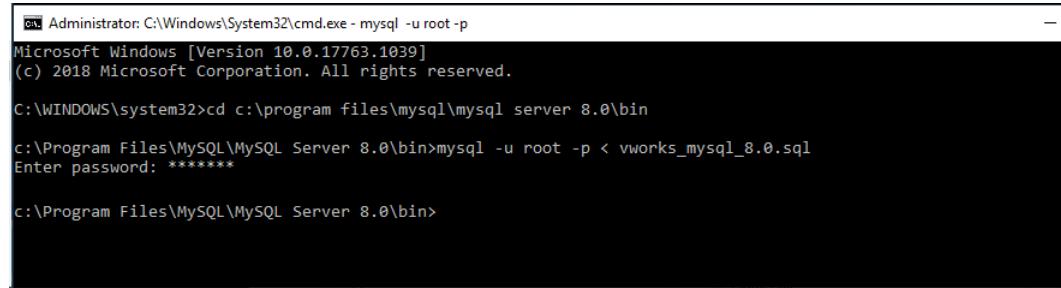
Installing and setting up a MySQL ODBC

- 2 Open a Command Prompt window, as follows:
 - a In the C:\Windows\System32 folder, right-click cmd.exe, and then select **Run as administrator**.
 - b Click **Yes** in the **User Account Control** dialog box that opens.



- 3 Execute the following lines in the Command Prompt window:

```
cd c:\program files\mysql\mysql server 8.0\bin <enter>
mysql -u root -p < vworks_mysql_8.0.sql <enter>
```



```
Administrator: C:\Windows\System32\cmd.exe - mysql -u root -p
Microsoft Windows [Version 10.0.17763.1039]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>cd c:\program files\mysql\mysql server 8.0\bin

c:\Program Files\MySQL\MySQL Server 8.0\bin>mysql -u root -p < vworks_mysql_8.0.sql
Enter password: *****

c:\Program Files\MySQL\MySQL Server 8.0\bin>
```

When prompted for password, enter **agilent**.

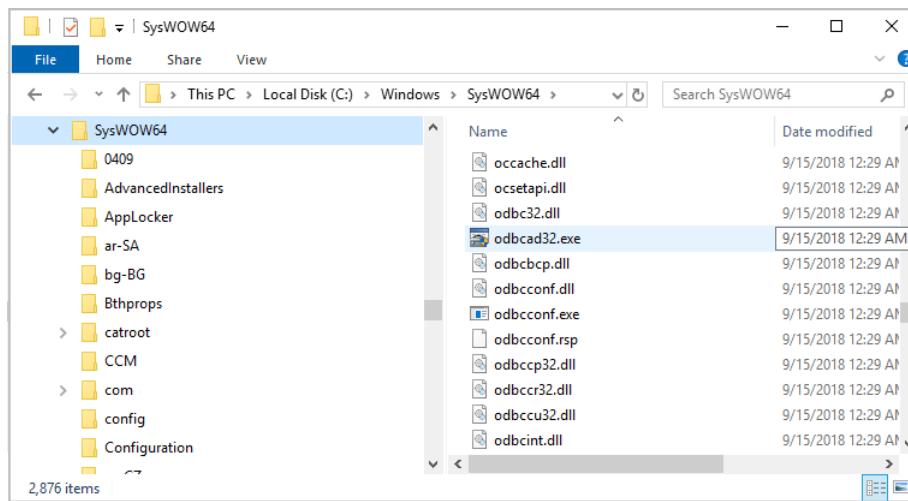
Make sure no errors occur while executing this command.

Creating ODBC connections

To create ODBC connections:

- 1 Open the ODBC Data Source Administrator to create ODBC connections, as follows:

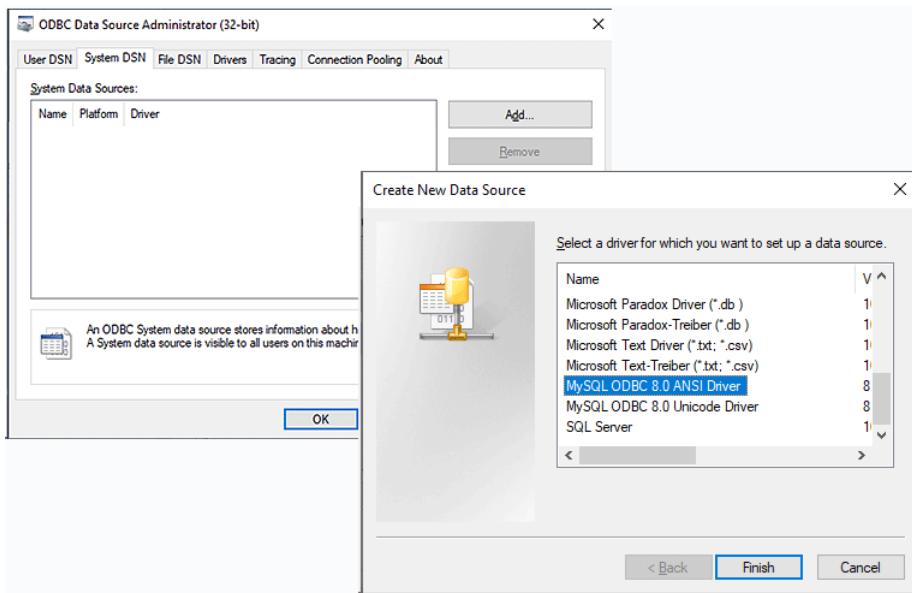
In the C:\Windows\SysWOW64 folder, right-click **odbcad32.exe**, and then select **Run as administrator**. The ODBC Data Source Administrator (64-bit) dialog box opens.



- 2 In the **ODBC Data Source Administrator** dialog box:
 - a Remove any previously defined MySQL ODBC Driver Sources as follows:
 - Click the **User DSN** tab, select any predefined MySQL ODBC Driver Sources named velocity11, and click **Remove**.
 - Click the **System DSN** tab, select any predefined MySQL ODBC Driver Sources named velocity11, and click **Remove**.
 - b In the **System DSN** tab, click **Add** to create a new data source.
 - c In the **Create New Data Source** dialog box, select **MySQL ODBC 8.0 ANSI Driver**, and then click **Finish**.

A Setting up and connecting to a MySQL database

Installing and setting up a MySQL ODBC



- 3 In the **MySQL Connector/ODBC Data Source Configuration** dialog box that opens, define your data source as follows:

- To set up the VWorks Inventory database, proceed to step 4.
- To set up the VWorks Experiments database skip to [step 8](#).

- 4 For the VWorks Inventory database, set the following parameters:

Note: You do not have to provide a port number. Use the default number displayed.

Settings for VWorks Inventory database

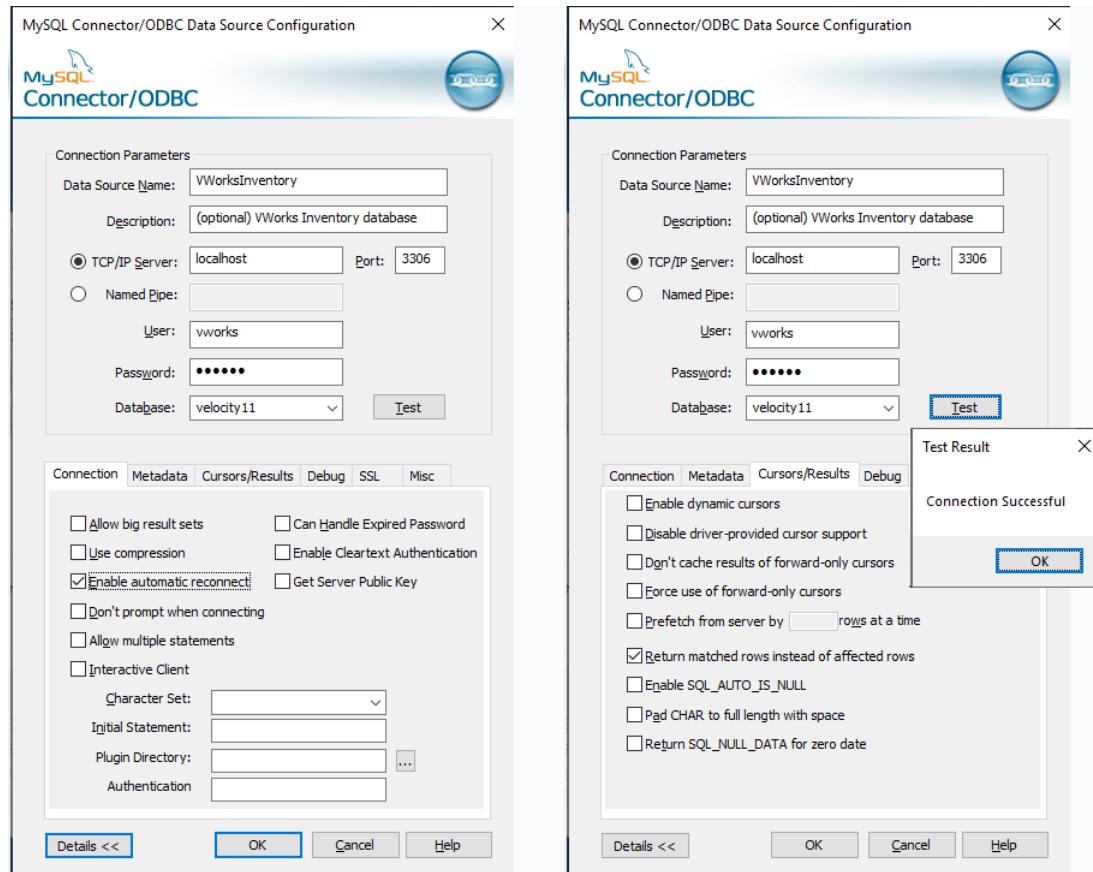
Connection Parameters	Settings
Data Source Name	VWorksInventory
Description	(optional) VWorks Inventory database
TCP/IP Server	localhost
User	vworks
Password	vworks
Database	velocity11

- Click **Details** to expand the dialog box.
- In the **Connection** tab, select the **Enable automatic reconnect** check box.
- In the **Cursors/Results** tab, select the **Return matched rows instead of affected rows** check box.

- 5 Click **Test**. When the **Connection Successful** message appears, click **OK**.

A Setting up and connecting to a MySQL database

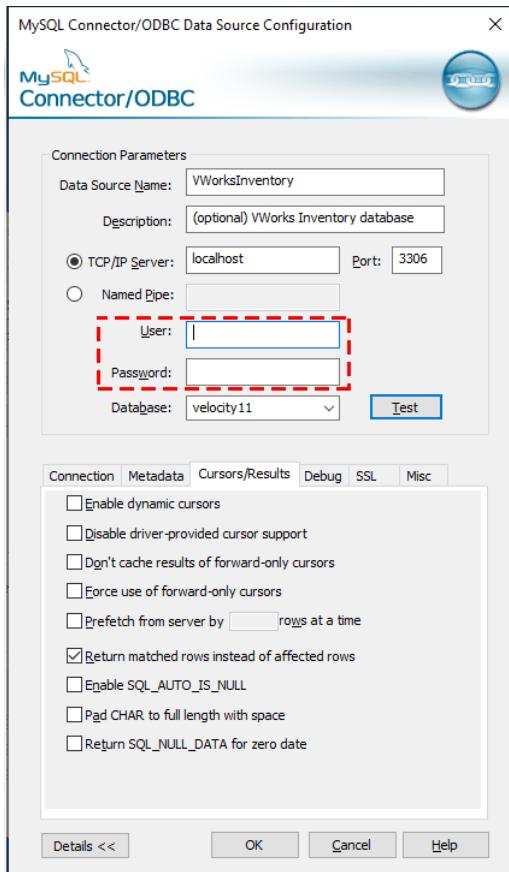
Installing and setting up a MySQL ODBC



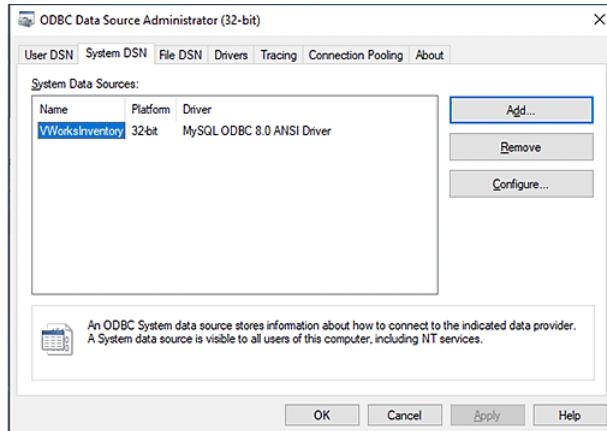
- 6 In the **Connection Parameters** area, clear the **User** and **Password** fields, as the following figure shows, and then click **OK** to close the Connector/ODBC dialog box.
- Note: The VWorks software will specify the user name and password, so, you must clear the User and Password fields after testing the connection.

A Setting up and connecting to a MySQL database

Installing and setting up a MySQL ODBC



- 7 In the **System DSN** tab, verify that the VWorksInventory data source appears.



- If you are finished configuring data sources, click **OK** to close the dialog box.
- If you are also setting up the VWorks Experiments database, click **Add**, and then continue to step 8.

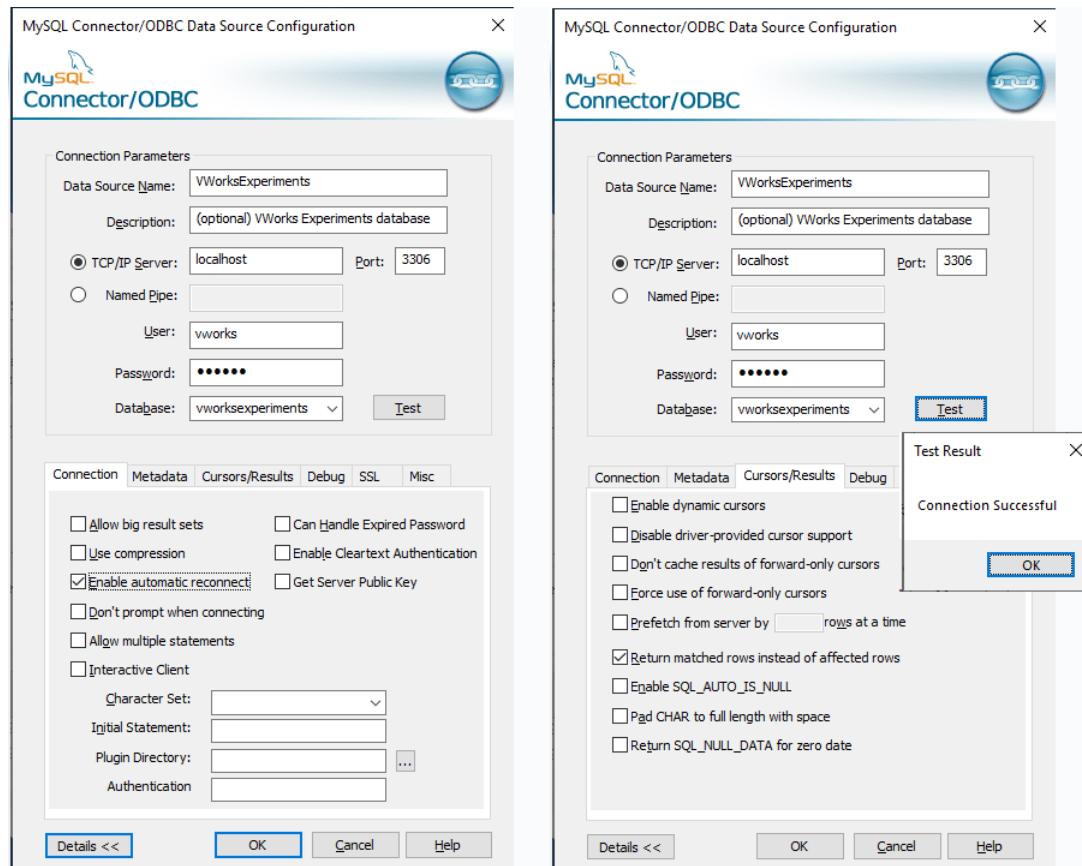
- 8** For the VWorks Experiments database, set the following parameters:
Note: You do not have to provide a port number. Use the default number displayed.

Settings for VWorks Experiments database

Connection Parameters	Settings
Data Source Name	VWorksExperiments
Description	(optional) VWorks Experiments database
TCP/IP Server	localhost
User	vworks
Password	vworks
Database	vworksexperiments

- Click **Details** to expand the dialog box.
- In the **Connection** tab, select the **Enable automatic reconnect** check box.
- In the **Cursors/Results** tab, select the **Return matched rows instead of affected rows** check box.

- 9** Click **Test**. When the **Connection Successful** message appears, click **OK**.

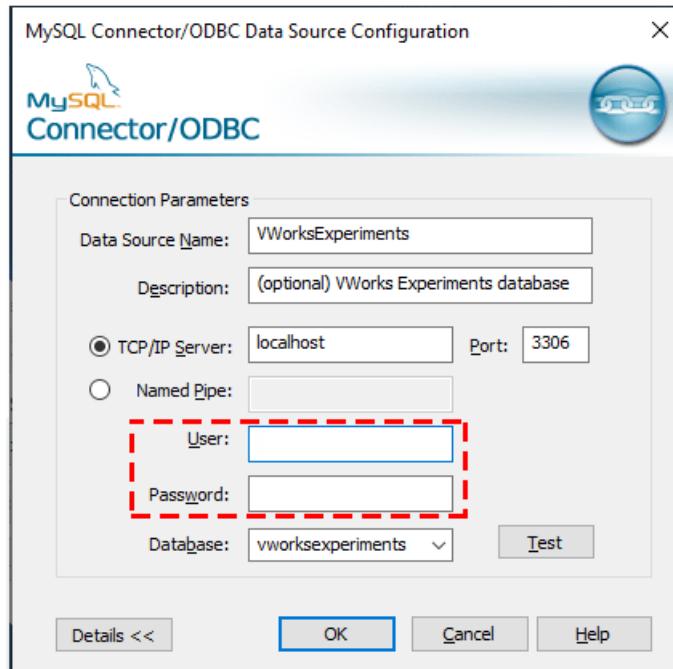


A Setting up and connecting to a MySQL database

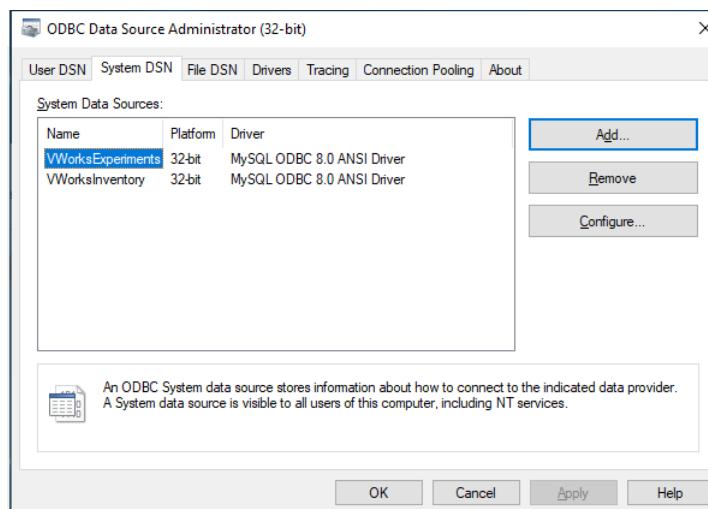
Installing and setting up a MySQL ODBC

- 10 In the **Connection Parameters** area, clear the **User** and **Password** fields, as the following figure shows, and then click **OK** to close the Connector/ODBC dialog box.

Note: The VWorks software will specify the user name and password, so, you must clear the User and Password fields after testing the connection.



- 11 In the **System DSN** tab, verify that the VWorksExperiments data source appears.



Click **OK** to close the dialog box.

To establish a database connection in the VWorks software, see ["Connecting to Inventory and Experiments databases" on page 175](#).

Related information

For information about...	See...
VWorks Inventory Editor	"About labware inventory management" on page 80
VWorks Experiments Editor	"About tracking data from experiments" on page 136

Connecting to Inventory and Experiments databases

About this topic

This topic describes how to connect to the databases for the following:

- Inventory Editor
- Experiments Editor

After establishing a connection to the given database, you can open the corresponding feature from the VWorks Tools menu.

Prerequisites

For each database, a corresponding data source must be configured in the MySQL ODBC:

- The Inventory Editor requires the VWorksInventory data source.
- The Experiments Editor requires the VWorksExperiments data source.

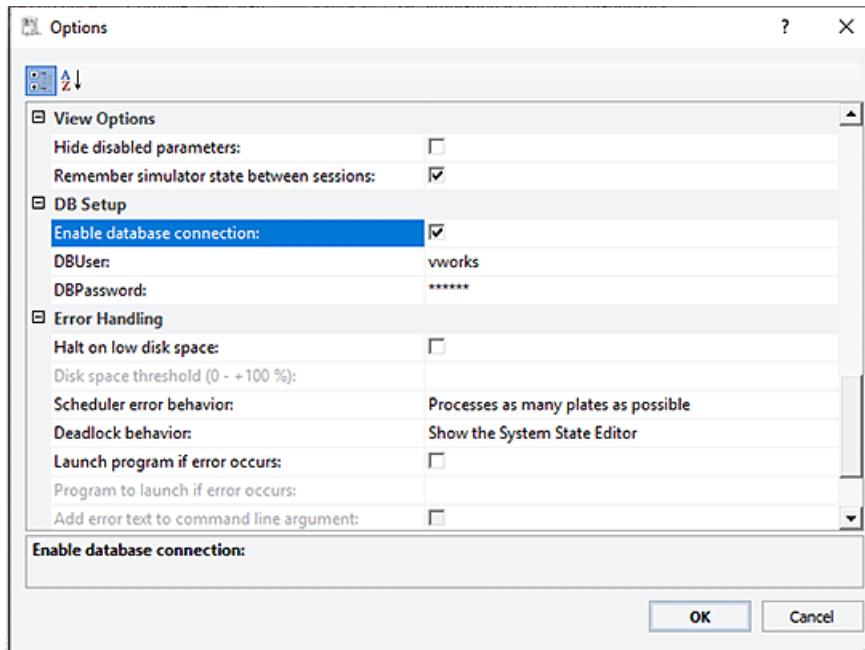
Use the following procedure to connect to the database for either or both of these features.

If you are using a computer that was not provided by Agilent, see "[Installing and setting up a MySQL ODBC](#)" on page 167 for instructions on how to install MySQL and set up the ODBC data sources.

Procedure

To connect to the inventory or experiments databases:

- 1 In the VWorks window, click **Tools > Options**. The Options dialog box appears.
- 2 Under **DB Setup**, verify the following, and then click **OK**.
 - **Enable database connection** is selected.
 - **DBUser** is **vworks**
 - **DBPassword** is **vworks**



- 3 VWorks Plus. The Audit Comment dialog box opens. An audit comment is required any time you save a change to the VWorks global options. For details on audit trails and records of interest, see ["Using compliance features" on page 5](#).

Related information

For information about...	See...
VWorks Inventory Editor	"About labware inventory management" on page 80
VWorks Experiments Editor	"About tracking data from experiments" on page 136

B Migrating files from previous VWorks versions

This chapter contains the following topics:

- ["About migration" on page 50](#)
- ["Migrating files from VWorks v12.3–13.1x" on page 53](#)

About migration

About this topic

This topic describes how to migrate your protocols and other files from these earlier versions.

When to use the Migration Wizard

You can use the Migration Wizard for the following:

- VWorks Plus or VWorks Standard is installed on a computer where you uninstalled a previous version of the VWorks software, including VWorks 12.3, 13.0, or 13.1.x.
Note: Even though you must uninstall any previous VWorks versions before installing VWorks Plus or VWorks Standard, the files and records created by the previous version remain on the hard drive of the computer and are accessible by the Migration Wizard.
- You want to migrate all the files and records to the new VWorks version at one time.

After you select a runset or protocol to migrate in the Migration Wizard, the wizard automatically selects all VWorks records found on the computer by default, including device files, labware entries, liquid classes, and so forth.

If the computer did not have a previous VWorks version installed or you want to transfer only a few records, you can use the VWorks Export (.vzp file) and Import features instead of the Migration Wizard to transfer any protocols and their associated files created in an earlier VWorks version.

How the Migration Wizard works

In the wizard, you select the runset, protocol, or form files you want to migrate, and the software automatically locates any additional records associated with the selected files (dependencies). For example, if you migrate a protocol, the wizard looks for a device file, form file, inventory file, and so forth. If any of these records are missing, the protocol will not be migrated.

Previous versions of the VWorks software stored some records in the Windows Registry. The migration process copies these records from the Windows Registry into files in the Shared Services storage repository.

The following table shows all the files types that are migrated and their associated records.

Table VWorks records and record dependencies

File or record type	Associated records (dependencies)
Protocol file (.pro)	Device file (.dev) Form file Device profile Inventory file Labware entry Labware class Liquid class Pipetting technique HitPick format file
Form file (.VWForm)	Protocol file Runset file Device file Form file Form icon and image files
Device file (.dev)	Device profile
Device profile	Teach point file (BenchCel Microplate Handler only)
Runset file (.rst)	Protocol files
Labware entries	Labware image
Labware classes	Labware entries
Liquid classes	none
Pipetting techniques	none
Macro library (.mlb)	none
Error library (.elb)	none
External files (.js, .sql, .xls, .xlsx, .xlsm, HitPick format files)	none
Global options	none

Devices supported in migration

IMPORTANT

If your device files contain profiles for an unsupported device, the profile for that device will not be migrated in the migration process.

Device type	Description
Labware-handling devices	<ul style="list-style-type: none">• Agilent Benchcel• Agilent Centrifuge• Agilent Centrifuge Loader• Agilent Labware Minihub• Agilent Microplate Labeler• Agilent Microscan Barcode Reader• Agilent PlateLoc
Liquid-handling devices	Agilent Bravo
Phantom devices	Virtual devices that permit the manual movement of labware during a protocol run: <ul style="list-style-type: none">• Agilent Phantom Human Robot• Agilent Phantom Stacker
Location devices	Devices where you can place a piece of labware: <ul style="list-style-type: none">• Platepad (installed outside of Bravo Platform)• Waste Bin
Devices for manufacturing use only	Agilent Generic I/O Module Agilent Generic RS-232 Device

Related information

For information about...	See...
Exporting and importing protocols files	<i>VWorks Automation Control User Guide</i>
Backing up and restoring	<i>VWorks Automation Control User Guide</i>
Setting up the VWorks software	"VWorks setup workflow" on page 2

Migrating files from VWorks v12.3–13.1x

Before you start

Ensure the following on the computer where you want to use the Migration Wizard:

- A previous version of the VWorks software (version 12.3, 13.0, or 13.1.x) was uninstalled.
- VWorks Plus or VWorks Standard is installed and configured.
- You are logged in as an Administrator.

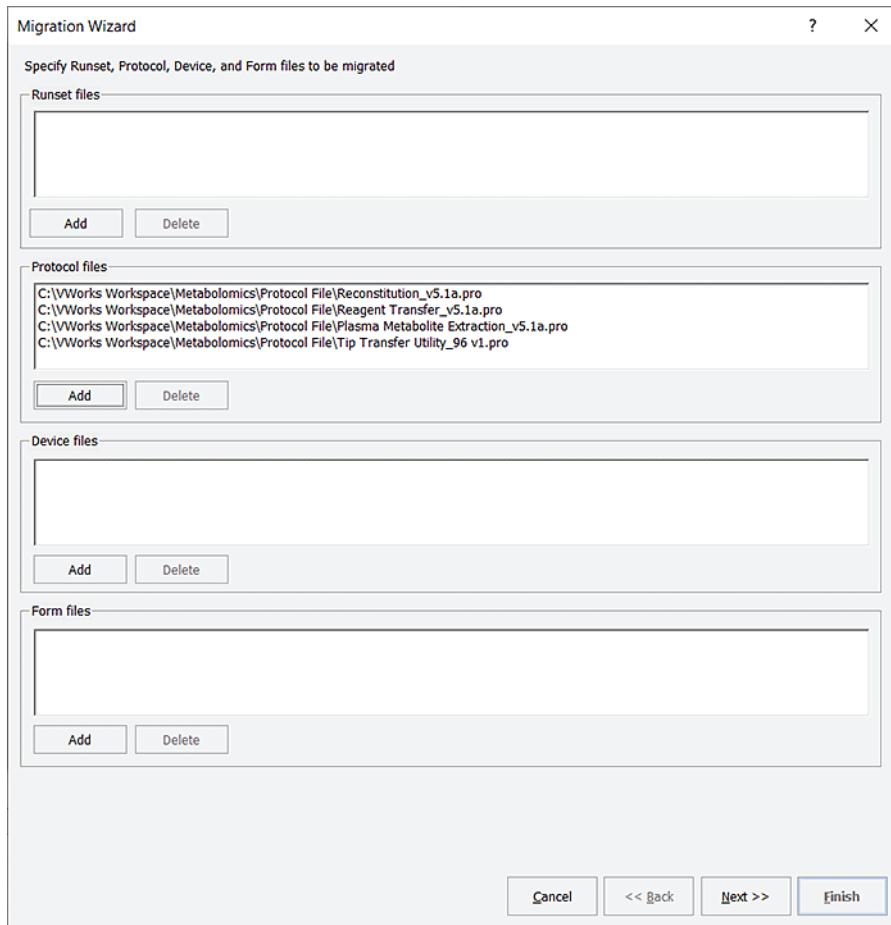
Note: When you select the files to be migrated, the wizard will display a message if any of the file names contain invalid characters. Before migrating these files, the software will rename them using a hyphen (-) to replace any invalid characters.

Note: The Migration Wizard does not migrate a file if any dependencies are missing. For example, the wizard does not migrate a protocol if the associated device file cannot be found.

Migrating files procedure

To migrate files:

- 1 In the VWorks window, choose **Tools > Migration**. The Migration Wizard opens.



B Migrating files from previous VWorks versions

Migrating files from VWorks v12.3–13.1x

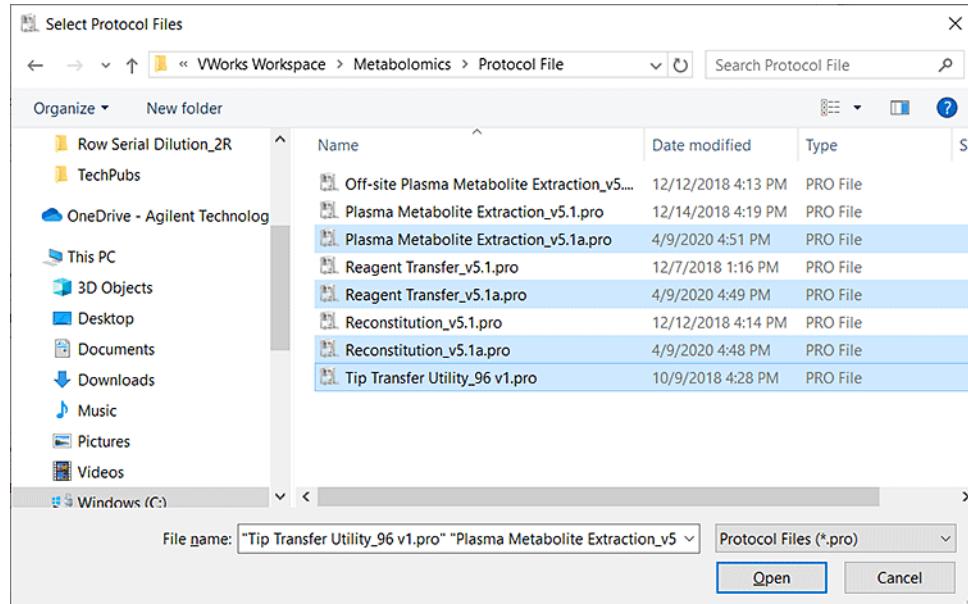
- 2 In the **Specify Runset, Protocol, Device, and Form files** page, do the following:

- a Click **Add** for the file type you want to migrate:

File type	The wizard automatically locates associated ...
Runset files	Protocol files, device files, and form files. You do not need to add these files in the wizard.
Protocol files	Device files and form files. You do not need to add these files in the wizard.
Device files	Device profiles
Form files	Protocol files, device files, and image files. You do not need to add these files in the wizard.

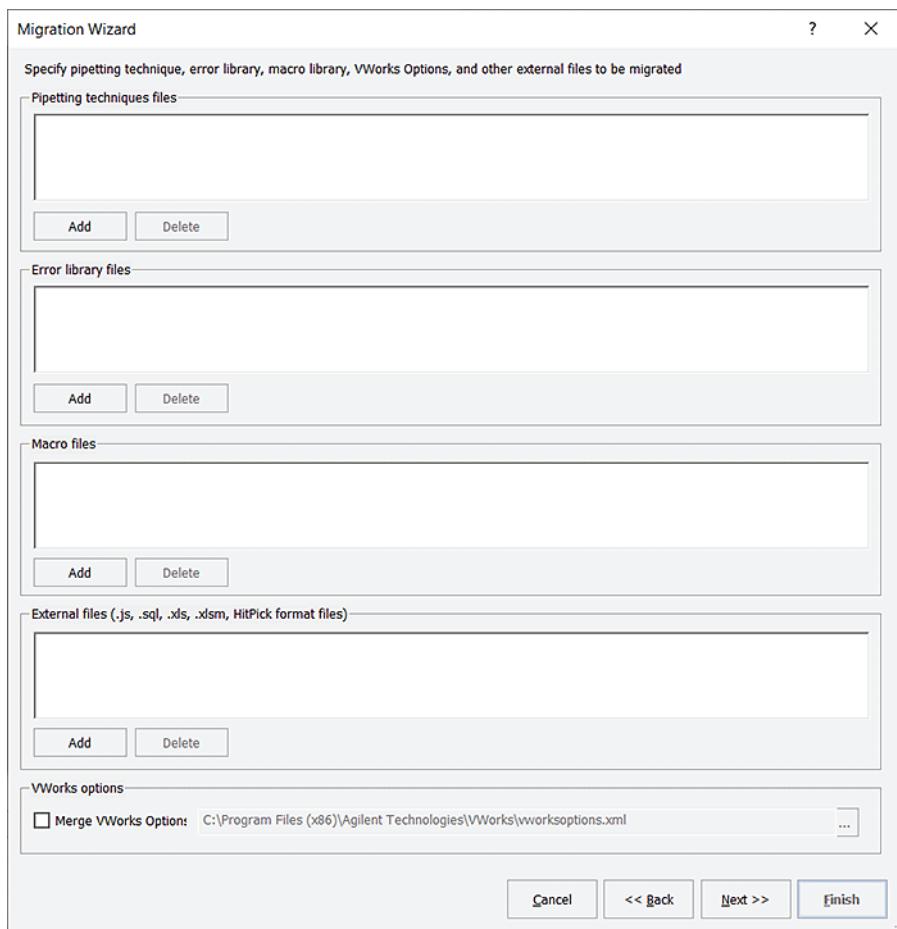
- b In the **Select Files** dialog box, select the files you want to migrate and click **Open**.

Note: You can press SHIFT+click or CTRL+click to select multiple files.



- c Repeat steps a and b to add any additional files. Verify the list of files to be migrated. When you have added all the files you want to migrate, click **Next**.

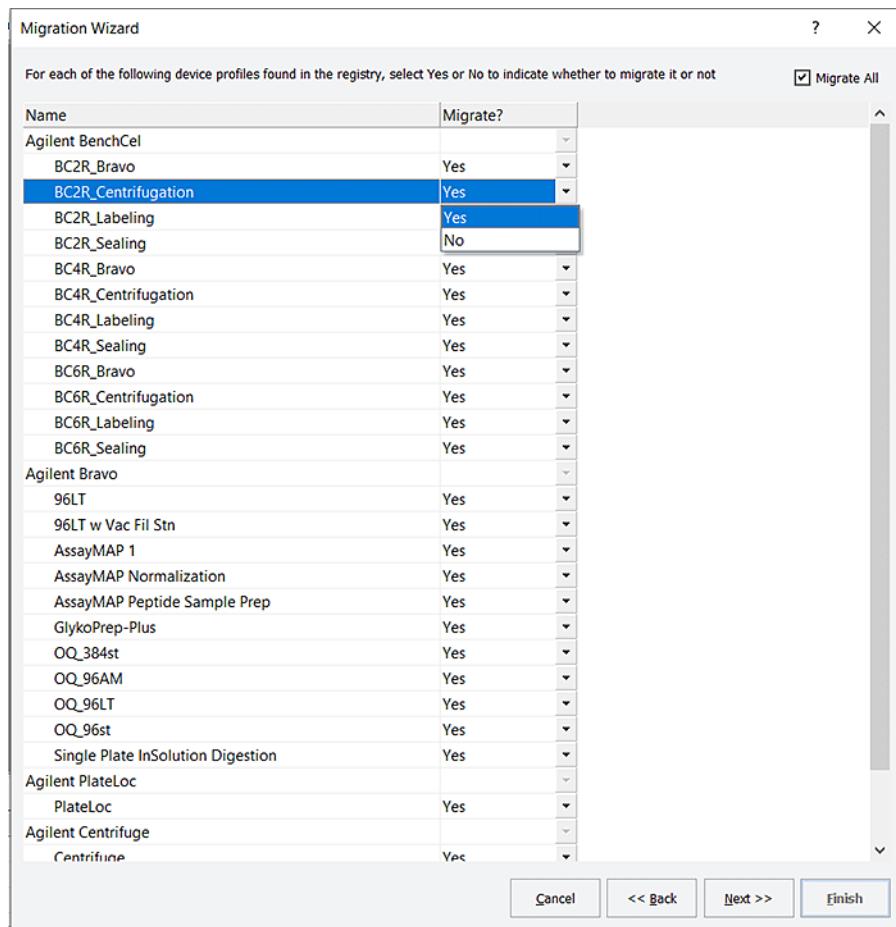
- 3 In the **Specify pipetting techniques, error library, macro library, VWorks Options and external files** page of the wizard, do the following:
- a Click **Add** to add any of these file types not already associated with the runsets, protocols, and forms you added on the previous page.
Note: The wizard automatically locates the pipetting techniques, error library and macro library files, and external files associated with the runsets, protocols, and forms you added on the previous page.
 - b In the **Select Files** dialog box, select the files you want to migrate and click **Open**.
 - c Repeat steps a and b to add any additional files.
 - d Under **VWorks Options**, select the check box if you want to merge the global option settings.
 - e Click **Next**.



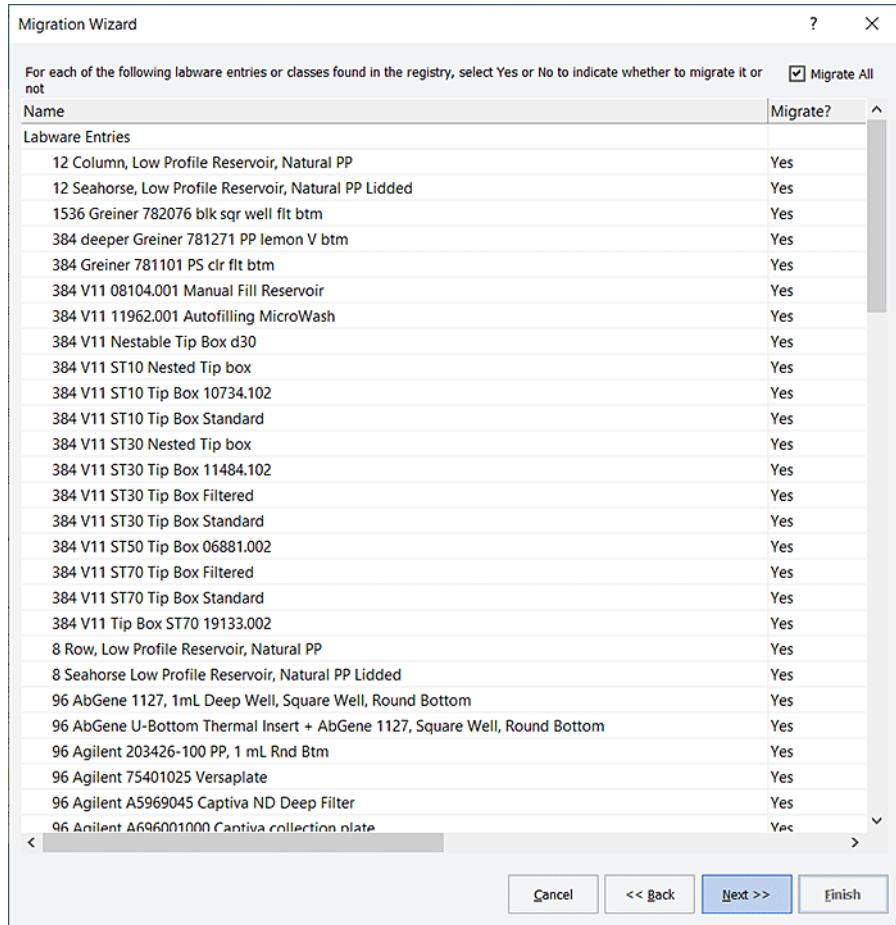
B Migrating files from previous VWorks versions

Migrating files from VWorks v12.3–13.1x

- 4 In the **device profiles found** page, do one of the following, and then click **Next**.
- If you want to migrate all the profiles, select the **Migrate All** check box (default).
 - If you want to migrate all but a few of the profiles listed, select **No** from the **Migrate?** column for each profile you do not want to migrate.
 - If you want to migrate only a few of the profiles listed, clear the **Migrate All** check box. Individually select **Yes** from the **Migrate?** column for each profile you want to migrate.



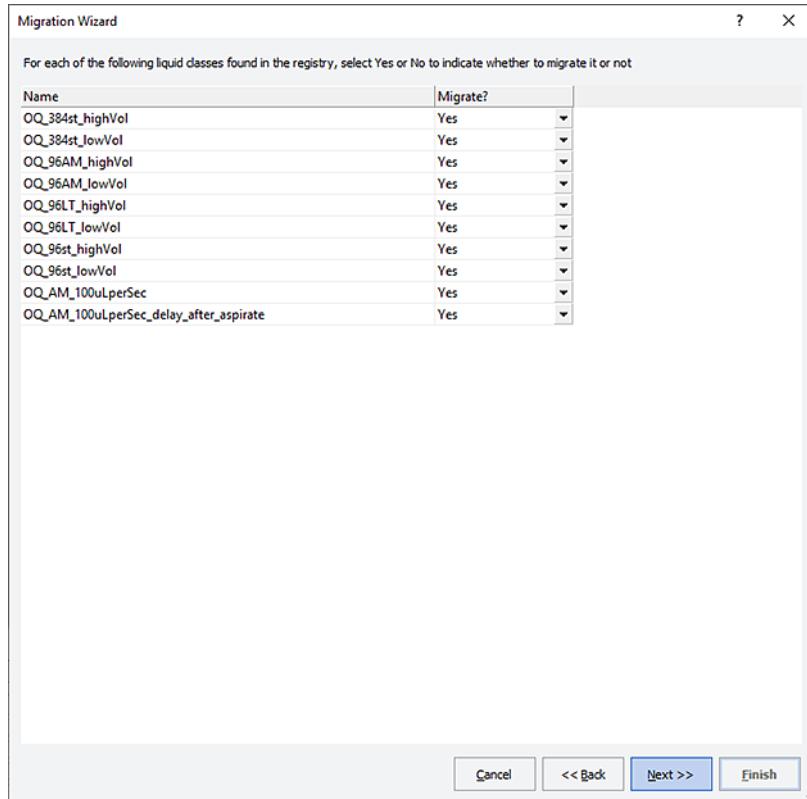
- 5 In the **Labware classes and entries** page, do one of the following, and then click **Next**.
- If you want to migrate all the labware entries and classes, select the **Migrate All** check box (default).
 - If you want to migrate all but a few of those listed, select **No** from the **Migrate?** column for each labware entry and class you do not want to migrate.
 - If you want to migrate only a few of the ones listed, clear the **Migrate All** check box. Individually select **Yes** from the **Migrate?** column for each labware entry and labware class you want to migrate.



B Migrating files from previous VWorks versions

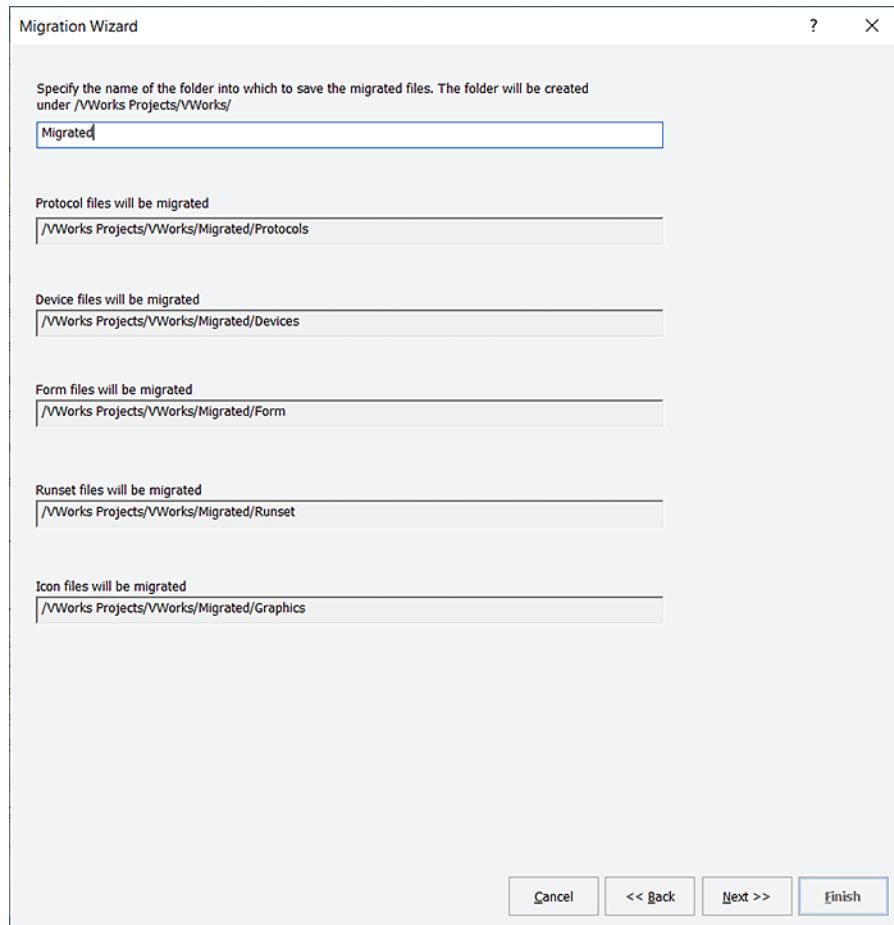
Migrating files from VWorks v12.3–13.1x

- 6 In the **liquid classes found** page, do one of the following, and then click **Next**.
- If you want to migrate all the liquid classes, select the **Migrate All** check box (default).
 - If you want to migrate all but a few of the liquid classes listed, select **No** from the **Migrate?** column for each one you do not want to migrate.
 - If you want to migrate only a few of the liquid classes listed, clear the **Migrate All** check box. Individually select **Yes** from the **Migrate?** column for each liquid class that you want to migrate.



If any file names contain invalid characters, a message opens and lists the new file names. The software uses a hyphen (-) to replace any invalid characters in the file names.

- 7 In the **Specify the name of the folder** page, type the name of the folder where the migrated files will be stored, and then click **Next**.



If any record dependencies cannot be found, a Records not found message opens and displays the list of records that cannot be migrated.

B Migrating files from previous VWorks versions

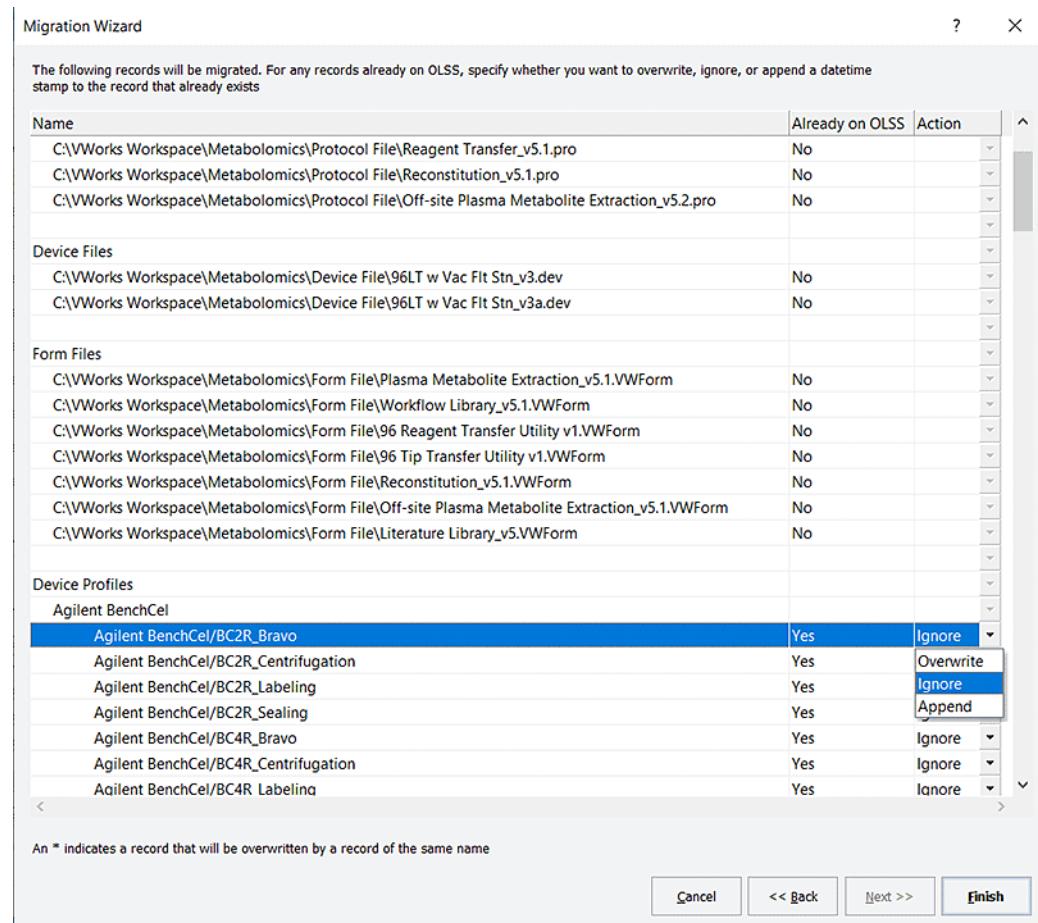
Migrating files from VWorks v12.3–13.1x

- 8 When the page appears that lists the records to be migrated, review the list to see if any files have a **Yes** in the **Already on OLSS** column.

A Yes appears for any record if the same file name already exists in the Shared Services (OLSS) database.

For each Yes, select the corresponding **Action** from the list:

- **Ignore** (default). Does not migrate the current record.
- **Overwrite**. Overwrites the existing record with the one you are migrating.
- **Append**. Migrates the record with the current date appended to the file name.

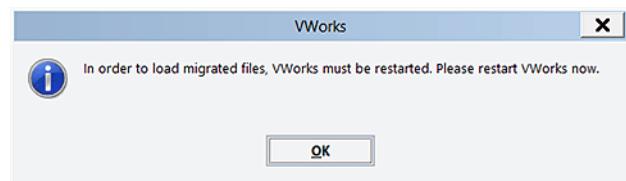


Name	Already on OLSS	Action
C:\VWorks Workspace\Metabolomics\Protocol File\Reagent Transfer_v5.1.pro	No	
C:\VWorks Workspace\Metabolomics\Protocol File\Reconstitution_v5.1.pro	No	
C:\VWorks Workspace\Metabolomics\Protocol File\Off-site Plasma Metabolite Extraction_v5.2.pro	No	
Device Files		
C:\VWorks Workspace\Metabolomics\Device File\96LT w Vac Flt Stn_v3.dev	No	
C:\VWorks Workspace\Metabolomics\Device File\96LT w Vac Flt Stn_v3a.dev	No	
Form Files		
C:\VWorks Workspace\Metabolomics\Form File\Plasma Metabolite Extraction_v5.1.VWForm	No	
C:\VWorks Workspace\Metabolomics\Form File\Workflow Library_v5.1.VWForm	No	
C:\VWorks Workspace\Metabolomics\Form File\96 Reagent Transfer Utility v1.VWForm	No	
C:\VWorks Workspace\Metabolomics\Form File\96 Tip Transfer Utility v1.VWForm	No	
C:\VWorks Workspace\Metabolomics\Form File\Reconstitution_v5.1.VWForm	No	
C:\VWorks Workspace\Metabolomics\Form File\Off-site Plasma Metabolite Extraction_v5.1.VWForm	No	
C:\VWorks Workspace\Metabolomics\Form File\Literature Library_v5.VWForm	No	
Device Profiles		
Agilent BenchCel		
Agilent BenchCel/BC2R_Bravo	Yes	Ignore
Agilent BenchCel/BC2R_Centrifugation	Yes	Overwrite
Agilent BenchCel/BC2R_Labeling	Yes	Ignore
Agilent BenchCel/BC2R_Sealing	Yes	Append
Agilent BenchCel/BC4R_Bravo	Yes	Ignore
Agilent BenchCel/BC4R_Centrifugation	Yes	Ignore
Agilent BenchCel/BC4R_Labeling	Yes	Ignore

An * indicates a record that will be overwritten by a record of the same name

Cancel **<< back** **Next >>** **Finish**

- 9 Click **Finish**. A message opens and states that VWorks must be restarted to load the migrated files.



Related information

For information about...	See...
Preparing for migration	"About migration" on page 50
Exporting and importing protocols files	<i>VWorks Automation Control User Guide</i>
Backing up and restoring	<i>VWorks Automation Control User Guide</i>
Setting up the VWorks software	"VWorks setup workflow" on page 2

In this guide

This guide describes:

- Setting up the VWorks software
- Compliance features
- How to create and manage labware definitions and liquid classes
- Creating a labware inventory database
- Creating an experiments database
- How to migrate protocols from previous versions

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November 2020



D000477 Revision A

