Multimek

Device Driver User Guide

Agilent Technologies

Notices

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Contact Information

Agilent Technologies Inc.
Automation Solutions
5301 Stevens Creek Blvd.
Santa Clara, CA 95051
USA

Technical Support: 1.800.979.4811
or +1.408.345.8011
service.automation@agilent.com

Customer Service: 1.866.428.9811
or +1.408.345.8356
orders.automation@agilent.com

European Service: +44 12081443513
euroservice.automation@agilent.com

Documentation feedback:
documentation.automation@agilent.com

Web: http://www.agilent.com

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Agilent Technologies

Letter to our Customers

Dear Customer,

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

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

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

Velocity11 product name changes

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

New contact information

Documentation feedback: documentation.automation@agilent.com

Technical Support: 1.800.979.4811 or +1.408.345.8011
service.automation@agilent.com

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Contents

Introduction 1

This chapter introduces Velocity11 device drivers and provides some basic procedures that are needed to use them.

A Velocity11 device driver is software that plugs into VWorks or BenchWorks software to allow them to control a specific device.

Before reading this guide, you should be familiar with the VWorks or BenchWorks software user interface. Information about using VWorks or BenchWorks software can be found in the *VWorks Version 3 Automation Control User Guide* or *BenchWorks Automation Control User Guide*.

To set up and use Velocity11 device drivers, become familiar with the content in this guide as well as the guides for the devices that use VWorks or BenchWorks software.

This chapter contains the following topics:

Who should read this guide

Job roles

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

Job role	Responsibilities
Integrator	Someone who writes software and configures hardware controlled by device drivers.
Lab manager, administrator, or technician	Someone who is responsible for: ❑ Installing device drivers ❑ Managing device drivers ❑ Developing the applications that are run using device drivers ❑ Solving the more challenging problems that might arise ❑ Developing training materials and standard operating procedures for operators
Operator	Someone who performs the daily production work using the device driver and solves routine problems. Your organization may choose to create its own procedures for operators including the procedures in this guide.

Related topics

For information about...	See...
Contacting Velocity11	http://www.velocity11.com/contact.html
Accessing online help	"About Velocity11 user guides" on page 3
Device drivers	"About device drivers" on page 7

About Velocity11 user guides

About this topic

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

Formats available

Velocity11 user information is provided to you as:

- ❑ Online help
- ❑ A PDF file
- ❑ A printed book

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

Where to find user information

Online help

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

PDF file

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

Velocity11 website

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

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

Online help

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

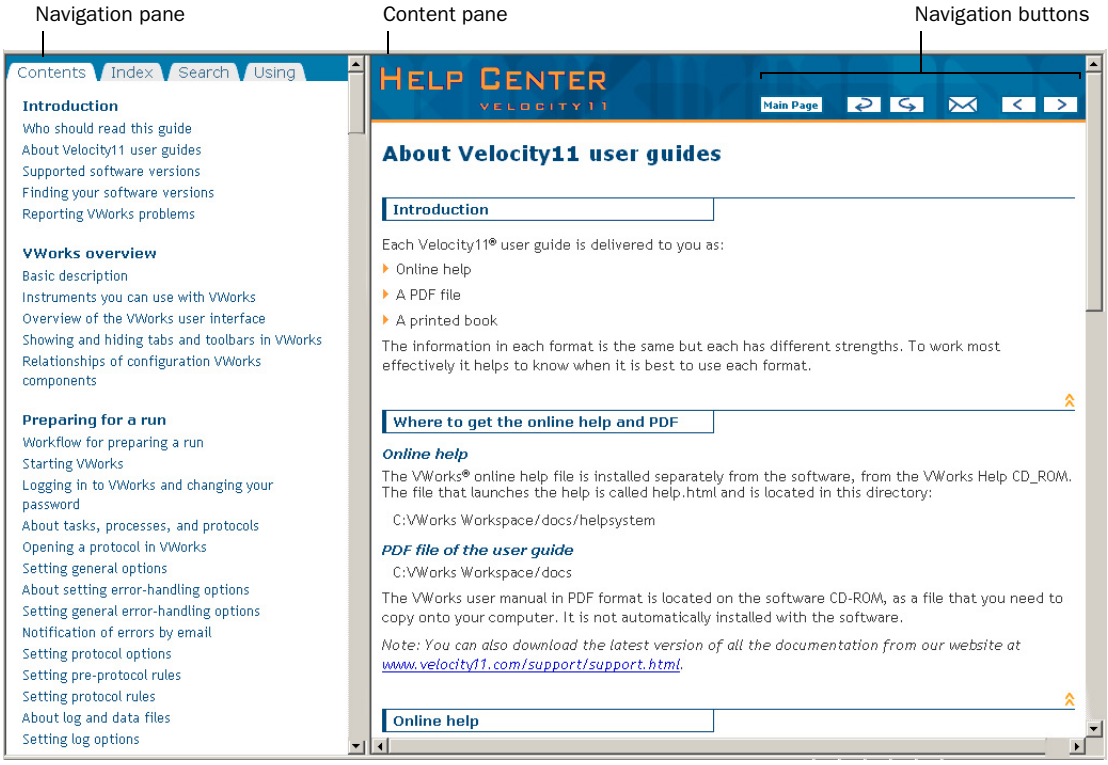
To open the online help:

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

Main features

The online help window contains the following:

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



PDF user guides

Computer requirements

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

Printing and searching

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

More information

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

Related topics

For information about...	See...
Who this guide is for	“Who should read this guide” on page 2
What’s in this guide	“What this guide covers” on page 5
Device driver plug-ins	“About device drivers” on page 7

What this guide covers

About this topic

This topic presents an overview of what procedures and information are provided in this user guide.

This guide explains how to:

- ❑ Install the driver for the device
- ❑ Configure the device in the device manager
- ❑ Set and use the tasks associated with the device
- ❑ Use *Device* Diagnostics

Also read

Information about device drivers not covered in this guide and about running VWorks or BenchWorks software can be found in the *VWorks Version 3 Automation Control User Guide* or the *BenchWorks Automation Control User Guide*.

Driver version

To find version information for a driver in VWorks:

1. Start VWorks.
2. Click **Help** and select **About VWorks**.

   The **About VWorks** dialog box lists the version numbers of all the current software for all the devices and plug-ins.

To find version information for a driver in BenchWorks:

1. Start BenchWorks.
2. Click **Help** and select **About BenchWorks**.

   The **About BenchWorks** dialog box lists the version numbers of all the current software for all the devices and plug-ins.

Firmware version

Some devices have firmware installed on them. Because each device is different, the version number may not be the same for all devices.

To find version information for device firmware:

1. Open ***Device* Diagnostics** dialog box.
2. Click **About**.

   The **About *Device* Control** message box appears displaying the current version of firmware.

What this guide does not cover

This guide does not cover the following:

- ❑ The operation of the device
- ❑ The operation of VWorks or BenchWorks software
- ❑ Velocity11 devices, such as the PlateLoc Sealer, VCode Microplate Labeler, and VPrep Pipettor when used in stand-alone mode

VWorks or BenchWorks compatibility

If you have purchased a device driver plug-in and are installing it yourself, check with the Velocity11 Technical Support to be sure your version of VWorks or BenchWorks software and the device driver plug-in are using the same version of IWorks software.

BenchWorks versions

Device driver plug-ins used with BenchWorks software may not include some newer features that were specifically added for use with VWorks software and that are described in this manual.

Related topics

For information about...	See...
Who this guide is for	"Who should read this guide" on page 2
User documentation	"About Velocity11 user guides" on page 3
Device driver plug-ins	"About device drivers" on page 7

About devices

About this topic

This topic presents a definition of a Velocity11 device and the device file.

Read this topic if you are unfamiliar with Velocity11 devices and VWorks or BenchWorks software.

Device defined

A device is an item on your lab automation system that has an entry in the device manager. A device can be a robot, an instrument, or a location on the lab automation system that can hold a piece of labware.

Examples of devices:

- ❑ Velocity11 robot
- ❑ Human robot
- ❑ PlateLoc Thermal Plate Sealer
- ❑ Labcyte Echo550
- ❑ Platepad
- ❑ VPrep shelf
- ❑ Waste

Device file defined

The data entered into the device manager and saved as a device file contains the configuration information for your devices.

Device file location

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

Related topics

For information about...	See...
Device diagnostics	"About diagnostics" on page 11
Device profiles	"About profiles" on page 15
Adding a device to the device manager	"Adding devices" on page 10

About device drivers

About this topic

This topic describes what device drivers are and what they do.

Velocity11 device drivers enable mechanical devices or software programs to work with VWorks or BenchWorks software.

Read this topic if you are:

- ❑ An administrator in charge of installing device drivers and managing Velocity11 devices
- ❑ A lab automation system integrator who writes software and configures hardware controlled by VWorks or BenchWorks software

Device driver defined

A Velocity11 device driver enables VWorks or BenchWorks software to control and communicate with the specific type of device. Each type of device that you operate with VWorks or BenchWorks software requires a device driver.

For example, VWorks software uses the:

- ❑ VPrep Pipettor device driver to communicate with the Velocity11 VPrep Pipettor device
- ❑ Softmax Reader device driver to communicate with Molecular Devices readers

Plug-in defined

A plug-in is a software program that when added to another program extends it.

Plug-in device drivers

Some device drivers are incorporated directly into the VWorks or BenchWorks software application. Other device drivers are distributed as plug-ins. All the device drivers covered in this guide are the plug-in type.

Advantages of distributing device drivers as plug-ins are:

- ❑ You only need to install the plug-ins for the devices you use
- ❑ When new plug-ins become available, they can be easily added. There is no need to re-install the VWorks or BenchWorks software application

IWorks interface

The device driver plug-ins and VWorks or BenchWorks software use IWorks software as a common interface to communicate with each other. Using a common interface allows the creation of a device driver plug-in without the necessity of changing the software.

!! IMPORTANT !! Both VWorks or BenchWorks software and the device driver must be using the same version of IWorks to work properly.

Writing your own device driver

If you are a lab automation system integrator who writes software and configures hardware controlled by VWorks or BenchWorks software, you can write your own driver plug-in for a new device. Contact the Velocity11 Technical Support for information about how to do this.

What functions do the device drivers provide?

Once installed, the following items are enabled:

- ❑ Tasks associated with the device.

  Device-specific tasks appear in the Protocol Tasks list and are available for use in protocol editor processes.
- ❑ Task parameters associated with the device.

  Device-specific task parameters appear in the Protocol Task Parameters toolbar. These determine the conditions with which to execute the tasks of the device.
- ❑ Diagnostic commands specific to the device.

  Device-specific diagnostic commands and options appear in the *Device* Diagnostics dialog box. These commands enable direct control of the device.

Related topics

For information about...	See...
Adding a device to the device manager	“Adding devices” on page 10
Opening diagnostics	“Opening diagnostics” on page 12
Installing a device driver	“Installing device drivers” on page 9
Devices	“About devices” on page 6

Installing device drivers

About this topic

Devices are integrated into VWorks or BenchWorks software using device driver plug-ins. Plug-ins need to be installed before the device can be configured and used.

This topic describes how to install device drivers if they are not already installed on your system. Read this topic if you are an administrator in charge of managing Velocity11 devices.

Procedure

To install device drivers:

1. Insert the device driver installation disc into the CD-ROM of the computer running VWorks or BenchWorks software.
2. Follow the on-screen instructions for installation, selecting the default values when available.
3. When finished, exit VWorks or BenchWorks software.
4. Log off Windows and restart your computer.
5. Start VWorks or BenchWorks software.

For this application...	The default location for the device driver is...
VWorks software	C:\VWorks Workspace\bin\plugins
BenchWorks software	C:\Program Files\Velocity11\BenchWorks\plugins

Related topics

For information about...	See...
Device drivers	“About device drivers” on page 7
Opening diagnostics	“Opening diagnostics” on page 12

Adding devices

About this topic

To configure your lab automation system to use a device, you need to add it to a device file in VWorks or BenchWorks software. The VWorks or BenchWorks software device manager uses the information in the device file to communicate and operate the device within the automation system.

This topic describes how to:

- ❑ Create a new device file (if one does not already exist)
- ❑ Add devices
- ❑ Save the device file

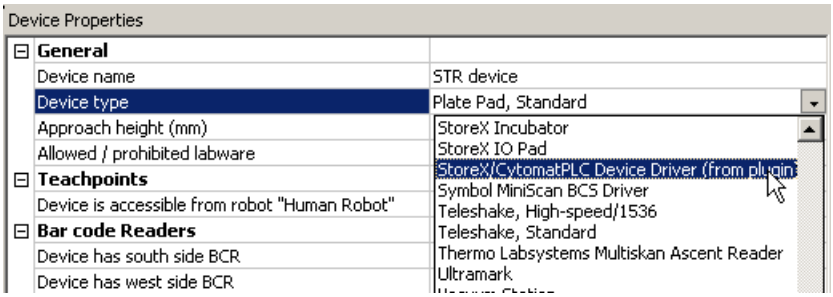
Read this topic if you are an administrator in charge of managing Velocity11 devices.

Procedure

To add devices to a device file:

1. Make sure that the devices are physically networked to the VWorks or BenchWorks software computer and turned on.
2. Start VWorks or BenchWorks software and login as an Administrator.
3. Do one of the following:
   - ◆ If you have an existing device file that you want to add to, select **File** > **Device File**, click **Open,** and select your device file.
   - ◆ If you are creating a new device file, select **File** > **Device File** and click **New**.
4. Click the **Device Manager** tab.
5. Click **New device** in the **Device List** toolbar and enter a name for the device you are adding.
6. In the device manager, set the **Device type**.

   The default type is **Plate Pad, Standard**.



7. Repeat step 5 and step 6 for each device.

8. Select **File** > **Device File** > **Save**.

   If you are creating a new device file, you are prompted to enter a name for your device file.

   Alternatively, you can select **File** > **Save All**. This saves the device file and the current protocol file at the same time.

Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Setting generic device properties	"Setting the properties for a device" on page 16
Adding a sub-process to a protocol	"Adding and linking Sub Process tasks" on page 19
Opening diagnostics	"Opening diagnostics" on page 12

About diagnostics

About this topic

This topic presents an overview of diagnostics software.

Read this topic if you need to set up or troubleshoot a device running VWorks or BenchWorks software.

Background

Devices can be controlled in real time directly through the VWorks or BenchWorks software Diagnostics using simple commands.

Diagnostics software is used for:

- ❑ Troubleshooting
- ❑ Setting teachpoints
- ❑ Performing manual operations outside a protocol
- ❑ Creating and editing profiles

For example, if an error occurs during a run that leaves a plate and the robot where they should not be, you can use robot diagnostics to move the plate and return the robot to its home position.

Types of diagnostics software

Devices and robots manufactured by Velocity11 include their own diagnostics software. You can find instructions for using this software in the relevant user guide.

Related topics

For information about...	See...
Opening diagnostics	"Opening diagnostics" on page 12
Adding a device to the device manager	"Adding devices" on page 10
Device drivers	"About device drivers" on page 7
The definition of devices	"About devices" on page 6

Opening diagnostics

About this topic

Every device has diagnostics software to assist you with troubleshooting and setting up the device. This topic describes how to open a device's diagnostics in VWorks or BenchWorks software.

Read this topic if you need to access a device's diagnostics to perform a device setup task or manually operate a device.

Procedure 1

If you are using VWorks4 software

To open Diagnostics:

1. Click **Diagnostics** on the Control toolbar.

2. In the device file's window, select the device. Expand the general name of the device, if necessary.

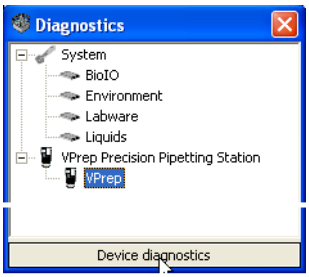
3. Click **Device diagnostics** located at the bottom of the window. The device's diagnostics dialog box opens.

If you are using VWorks3 or BenchWorks software

To open Diagnostics:

1. Click **Diagnostics** on the Control toolbar.

2. In the **Diagnostics** window, select thedevice. Expand the general name of the device, if necessary.



3. Click **Device diagnostics**. The device's diagnostics dialog box opens.

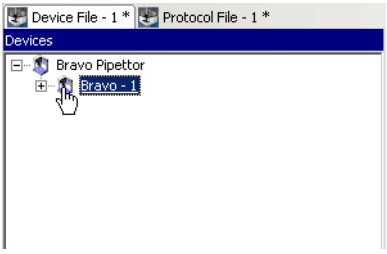
Procedure 2

If you are using VWorks4 software

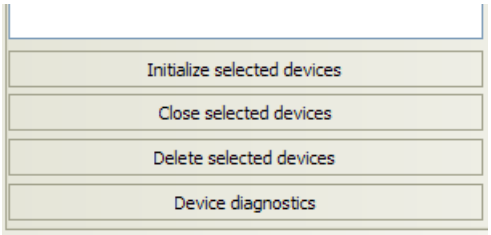
To open Diagnostics:

1. Click the **Device File** tab.
2. Select the device from the **Devices** toolbar.

   Expand the general name of the device, if necessary.



3. Click **Device diagnostics** located at the bottom of the **Devices** toolbar.

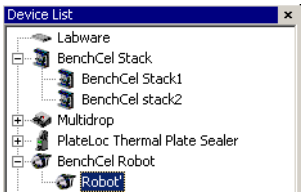


   The device's diagnostics dialog box opens.

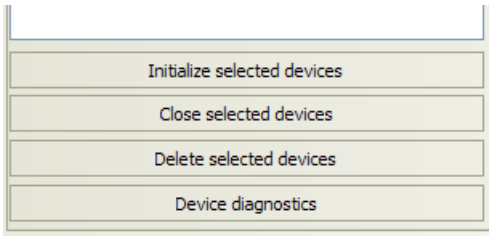
If you are using VWork3 or BenchWorks software

To open Diagnostics:

1. Click the **Device Manager** tab.
2. Select the device from the **Device List** toolbar. Expand the general name of the device, if necessary.



3. Click **Device diagnostics** located at the bottom of the **Device List** toolbar.



The device's diagnostics dialog box opens.

Related topics

For information about...	See...
Diagnostics	"About diagnostics" on page 11
About device drivers	"About device drivers" on page 7
Adding a device to the device manager	"Adding devices" on page 10
Setting generic device properties	"Setting the properties for a device" on page 16

About profiles

About this topic

This topic describes what profiles are and what they do.

Read this topic if you are an administrator in charge of managing Velocity11 devices.

Profiles defined

A profile contains the initialization settings needed for communication between a device and device driver. The data in a profile is used by VWorks or BenchWorks software to identify each device on the network.

A profile can also contain other basic settings that you are unlikely to change once set up.

Because profiles identify device driver devices on the network, each device driver device must have its own profile.

You can create, modify, and delete profiles as needed.

Stored settings

Profiles are stored in the Windows registry.

The settings stored in a device driver profile include:

- ❑ Whether the device is connected using serial or Ethernet
- ❑ If the device is connected using Ethernet, the Device ID of the device on the network
- ❑ If the device is connected using serial, the COM port that the controlling computer uses for communication
- ❑ Configuration of accessories

Related topics

For information about...	See...
Device drivers	“About device drivers” on page 7
Adding a device to the device manager	“Adding devices” on page 10
Opening device diagnostics	“Opening diagnostics” on page 12

Setting the properties for a device

About this topic

The device properties provide VWorks or BenchWorks software with additional information about the device's current configuration, such as which profile to use, and stores the information in the device file. The device file is automatically loaded when you open a protocol.

The device properties need to be set when configuring the device. Typically, these properties only need to be set once. This topic describes how to set the following device properties:

- ❑ General
- ❑ Teachpoint
- ❑ Barcode
- ❑ Location (for devices with multiple teachpoints)
- ❑ *Device* Properties

Read this topic if you are an administrator in charge of managing Velocity11 devices.

Before you start

Make sure that you have installed the device driver plug-in and have added the device to the device manager.

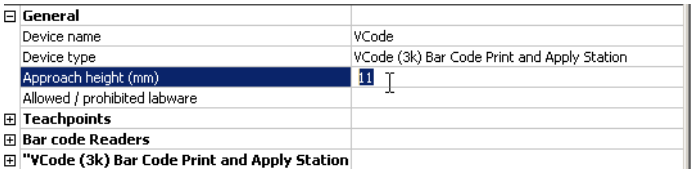
See "Related information" for procedures on how to do these tasks.

Setting general properties

To set the general properties for a device:

1. Click the **Device Manager** tab.
2. Select the device from the **Device List** toolbar. (Expand the device name, if necessary.)

   Note: For devices with **Locations**, see "Setting location properties" on page 17. If no Locations, continue with step 3.
3. In the **General** group, set the following:
   a. **Approach height**. This is the height to raise the robot gripper above the teachpoint when the robot moves the plate horizontally towards or away from it.



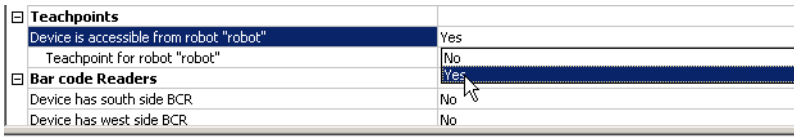
   b. **Allowed/prohibited labware**. Click the adjacent field to open the dialog box. Move the labware classes by selecting them and clicking one of the arrow buttons.
4. In the ***Device* Properties**, select the desired profile if it is not already selected.
5. Select **File** > **Device File** > **Save** to save the changes to the device file.

Setting teachpoints

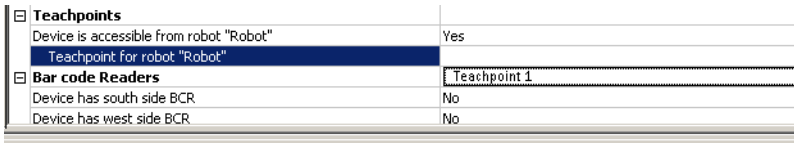
Teachpoints are the coordinates in space that a robot travels to in order to interact with a device. Only the devices that are accessible by robots are able to have teachpoints.

To set the teachpoint properties:

1. Open the **Device Properties** page.
2. In the **Teachpoints** property group, set the following:
   a. **Device is accessible from robot *robot's name***. Choose **Yes** or **No**.



   b. **Teachpoint for robot *robot's name***. Choose a file.



Setting barcode location

If your device has a barcode reader, indicate where the reader is located.

To set the barcode readers property:

1. In the **Barcode Readers** property group, set the side that has the barcode to **Yes**.

2. Enter the number of the COM port to which the device is connected.

Setting location properties

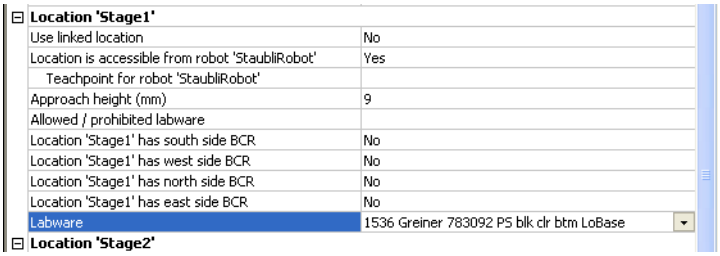
Note: The options available under Location groups might differ for software and hardware device drivers. Software devices do not have robot-accessible labware positions.

For hardware devices that have more than one robot-accessible labware position, the approach height, allowable/prohibited labware, teachpoint, and barcode properties are located under Location groups.

To set the Location properties:

1. *Hardware device drivers only.* Set the **Use linked location**. Follow the procedure in "Setting the Use linked location" on page 18.
2. *Hardware device drivers only* Set the **Teachpoints**. Follow the procedure in "Setting teachpoints" on page 17.

3. *Some software device drivers only.* Set the **Approach height** and **Allowed/prohibited labware**. Follow the procedure in "Setting general properties" on page 16.
4. Set the **Barcode Readers** location. Follow the procedure in "Setting barcode location" on page 17.
5. Assign the **Labware** used by the location by selecting the correct labware type from the list.



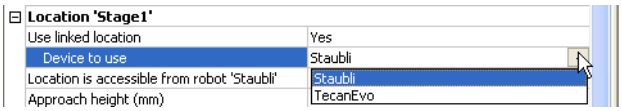
6. In the ***Device* Properties**, select the desired profile if it is not already selected.
7. Select **File** > **Device File** > **Save** to save the changes to the device file.

Setting the Use linked location

Currently, this feature is enabled for the special situations in which there is a storage device such as a PlateHub Carousel, StoreX, or Cytomat and a robot, such as the Velocity11 Translator robot that is shuttling plates between systems.

To use this feature, select yes and then select the device location to which you want to link. This tells the software that the current device location is the same physical location as the device selected from the Device to use list.

Note: Selecting this option when it is not enabled will have no effect on the system.



Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Installing a device driver plug-in	"Installing device drivers" on page 9
Profiles	"About profiles" on page 15
Adding a device to the device manager	"Adding devices" on page 10
Opening diagnostics	"Opening diagnostics" on page 12

Adding and linking Sub Process tasks

About this topic

This topic describes how to add a sub-process to a protocol and configure it. Read this topic if you are an administrator or technician and are responsible for creating protocols in VWorks or BenchWorks software.

Before you read this

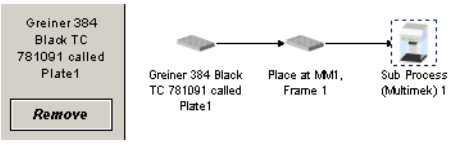
Before you read this topic, become familiar with the topics in the *VWorks Version 3 Automation Control User Guide* or *BenchWorks Automation Control User Guide* describing what a protocol is and how it is created.

Sub Process task defined

Sub Process tasks indicate the existence of a subroutine within a protocol. Sub-processes typically contain a series of liquid handling tasks used by devices such as the VPrep Pipettor or Multimek dispenser.

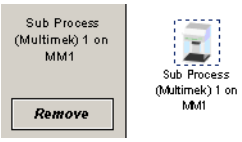
Adding a Sub Process task

The first step in creating a pipette process is to add a Sub Process task to the protocol editor. Drag the Sub Process icon into the process.



Setting Sub Process task parameters

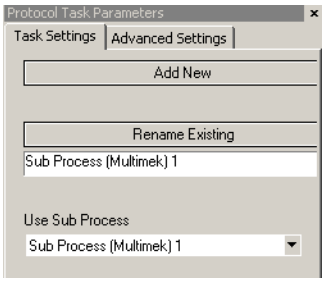
When you add the Sub Process task, a new sub-process is started in the pipette process editor. This process is identified by its sub-process link icon.



Because you can have more than one sub-process in a protocol, you must link the Sub Process task to the correct sub-process.

To link the Sub Process task to the correct sub-process:

1. In the **Protocol Editor**, add a Sub Process task to the protocol and then select it in the protocol sequence.
2. In the **Protocol Task Parameters** toolbar, select the sub-process that you want to use for this pipetting task from the **Use Sub Process** list.



3. If there is only one sub-process and you need to create a second one, click **Add New**.

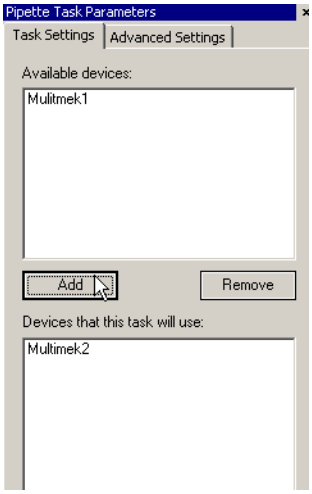
Associating the sub-process to a device

Because you can have more than one device that uses sub-processes on a lab automation system, you must link each sub-process link icon with one or more devices that you want the sub-process to be able to use. You do this by setting the parameter for the sub-process link icon.

To link a Sub Process task to a device:

1. In the **Pipette Process Editor**, select the **Sub Process** link icon.

2. In the **Available devices** list of the **Pipette Task Parameters** toolbar, select one or more pipettors to link to and click **Add**.



The selected pipettors move to the lower box and become available for use.

Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Setting common device properties	"Setting the properties for a device" on page 16
Adding a device to the device manager	"Adding devices" on page 10
Creating protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*

Using JavaScript to set task parameters

About this topic

JavaScript programs (scripts) can be used to change the parameters of a protocol task immediately before it is scheduled. This extends the capability of VWorks or BenchWorks software because the parameters can be changed dynamically during a run, based on the following:

- ❑ Information passed from an external source, such as a database
- ❑ The number of times the protocol has cycled
- ❑ Feedback on changing conditions during the run

This topic describes the use of JavaScript to set task parameters in a protocol.

Read this topic if you are an administrator or technician responsible for creating VWorks or BenchWorks software protocols and want to add functionality to a task using JavaScript.

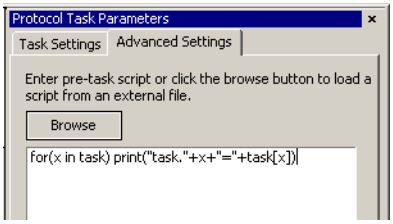
Where scripts are written

Scripts can be written in two ways:

- ❑ Directly into the box in the Advanced Settings tab of the Task Parameters toolbar
- ❑ As an external file that is located by clicking Browse in the Advanced Settings tab and navigating to its location on the hard drive

Note: You can also call an external file by embedding the "`open()`" function in the box.

The following screenshot displays a short script that prints the parameters of a task to the log toolbar, just before the task runs. In this case, the script is written directly in the Advanced Settings box.



For more information about using JavaScript, refer to the *VWorks Version 3 Automation Control User Guide* or the *BenchWorks Automation Control User Guide*.

Related topics

For information about...	See...
Using JavaScript in protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*

About reader output files

About this topic

Plug-in device drivers that are written for plate readers have a common way of naming their output files. This topic explains the concepts related to output file naming. By reading this topic, you will learn how to prevent data in the reader output files from being overwritten by newer data.

Read this topic if you are an operator who wants to make changes to the task parameters for one of these readers:

- ❑ VR4000
- ❑ Analyst GT
- ❑ Fusion
- ❑ Viewlux
- ❑ Tecan readers

Plug-in default output file

When you first install a reader device driver plug-in, all data recorded during a protocol or by a manual read using diagnostics software is written to a single file stored in the C: drive.

The exact name of the file is specific to the device. For example, the RVSI VR4000 device driver creates a file with the name vialreaderresults.txt.

This file can only store data for one read, which means that the set of data for each read overwrites the last set in the file. To avoid this problem you must set up an output file naming convention.

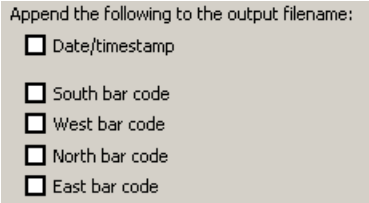
Profile default output file name

Some device drivers allow more than one device of that type to be used in the lab automation system. In this case, each device must have its own profile. Even if you have only one device, you can still set up multiple profiles for it, with each storing different settings.

In these cases, you probably want each profile to have a separate default output filename to prevent the data from runs using one profile overwriting those of another.

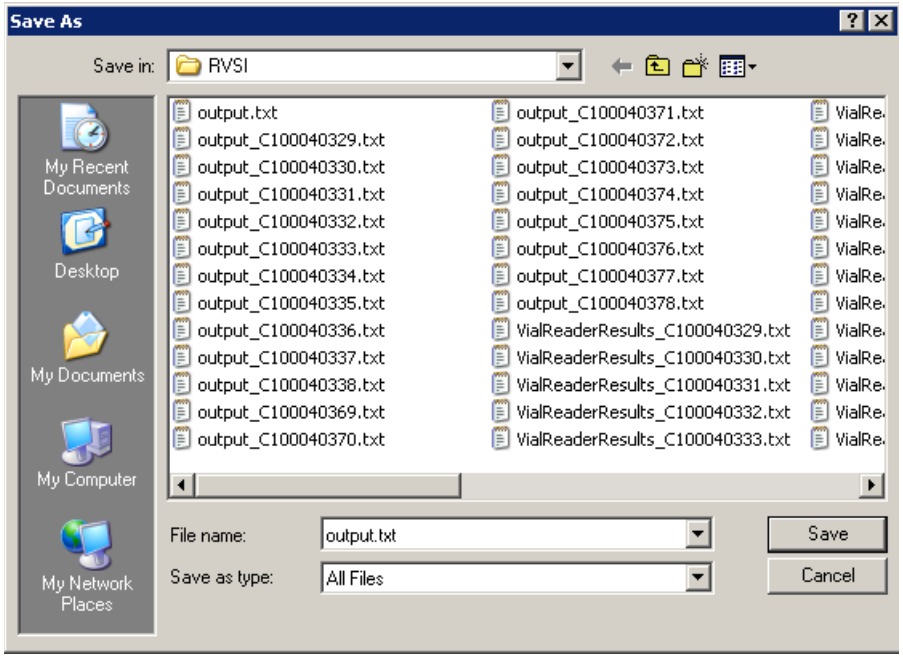
Filename suffixes

To prevent the data from one read overwriting the data from another, you need to append a variable suffix to the file name. You can append a date/time stamp and one or more bar codes on the rack or plate.



Example

The example output file folder below shows that a profile default file name of output.txt was created at one time. At another time, a suffix was appended in the profile for the device driver, which added a barcode identifier to the file name (for example output_C100040329.txt).



Overriding output file names with tasks

You can override the default output file name that is set in the profile using the Output filename property of the Read task parameters.

"Read tubes" properties	
Use tubes expected parameter	No
Tubes expected (0-96)	96
Output filename	

This allows you to use different output file names for every task.

The suffix used for the file name that you set in the task parameters is taken from the suffix specified in the device diagnostics profile. So if you select date/time stamp in the profile, the date/time stamp will also be appended during a run in which you have specified a different file name.

Related topics

For more information about...	See...
Opening diagnostics	“Opening diagnostics” on page 12
Profiles	“About profiles” on page 15

About device initialization

About this topic

When working in device diagnostics software, you are often required to initialize the device. This topic explains why device initialization is necessary.

Opening communications

Initializing a device opens communications with it. For example, if the device is connected with a serial cable, the COM port is opened, and if the device is connected with an Ethernet cable, the TCP/IP socket is connected.

Homing motors

Initializing a device homes motors that do not track their position along their line of travel. Homing a motor moves it until it triggers an event, called a home flag. This tells the motor its location.

The motors on some devices automatically move to their home positions when the device is turned on. The motors on other devices must be initialized to be homed.

Setting profile parameters

Initializing a device applies relevant parameters set in the device's profile.

Setting state and memory variables

Most devices store variables in software or firmware. Initializing a device sets these variables to their initial values.

Related topics

For information about...	See...
Using Diagnostics	❑ "About diagnostics" on page 11 ❑ "Opening diagnostics" on page 12
Workflow for configuring devices	"Adding devices" on page 10

Multimek 2

The Beckman Multimek Pipettor Pipettor is a liquid dispensing device that can be configured to work in a lab automation system using VWorks or BenchWorks software.

This chapter contains the following topics:

Workflow for configuring the Multimek Pipettor

About this topic

Before you can use the Multimek Pipettor tasks in protocols, the Multimek Pipettor needs to be configured in VWorks or BenchWorks software.

This topic provides the workflow for configuring the Multimek Pipettor device in VWorks or BenchWorks software. Read this topic if you are an administrator who is responsible for setting up a Multimek Pipettor device.

Before you start

Before you can configure the Multimek Pipettor device driver you must have installed it. For installation instructions, see "Setting the properties for a device" on page 16.

Workflow

Step	Topic
1	"Adding devices" on page 10
2	"Creating and Managing Multimek Pipettor profiles" on page 29
3	"Setting the properties for a device" on page 16

Related topics

For information about...	See...
Device drivers	"About device drivers" on page 7
Setting Multimek Pipettor task parameters	"About the high-level Multimek Pipettor tasks" on page 33
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55

Creating and Managing Multimek Pipettor profiles

About this topic

This topic describes how to create a profile for the Multimek Pipettor.

Read this topic if you are an administrator who is responsible for setting up a Multimek Pipettor.

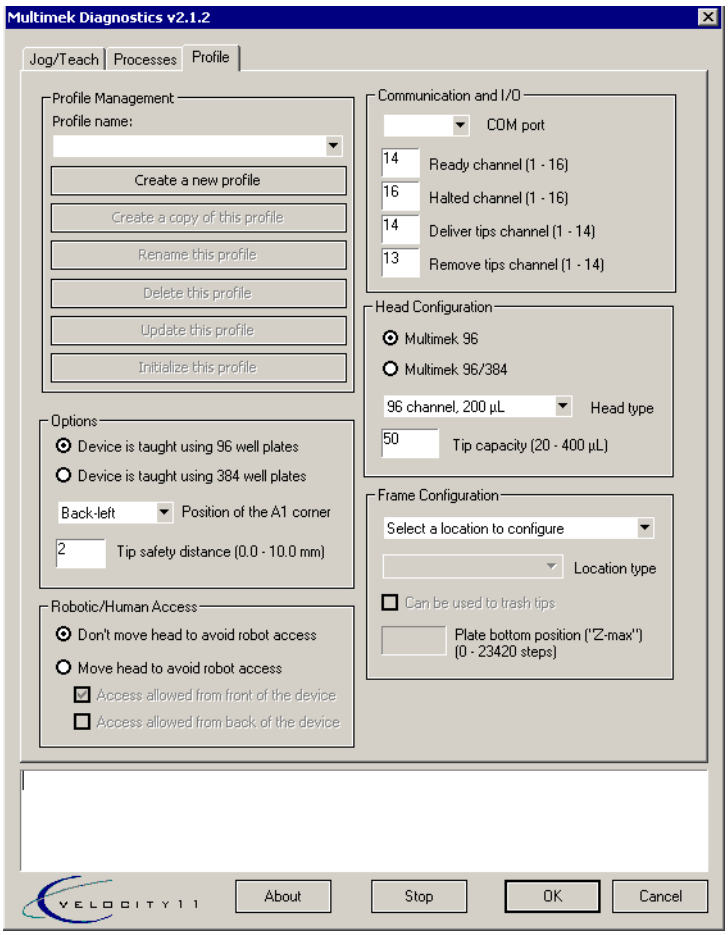
Before you start

Before you create a profile, you need to install the Multimek Pipettor device driver plug-in and add the Multimek Pipettor to the device manager.

Procedures

To create a profile for the Multimek Pipettor:

1. Open **Multimek Diagnostics**.
2. Click the **Profile** tab.



3. Click **Create a new profile**.
4. Enter a name for the profile and click **OK**.
5. In the **Communication and I/O** area, set the following:

Setting	Comments
COM port	The number of the computer port that is connected to the Multimek Pipettor
Ready channel	The digital input channel which signals the tip-loading robot is ready to perform an operation
Halted channel	The digital input channel which signals the tip-loading robot is in a halted state
Deliver tips channel	The digital output channel which signals the tip-loading robot to deliver new tip tray to the depot
Remove tips channel	The digital output channel which signals the tip-loading robot to remove the tip tray from the depot

6. In the **Head Configuration** area, set the following:

Setting	Comments
❑ Multimek 96 ❑ Multimek 96/384	The head on the Multimek Pipettor
Head type	Specifies the number of channels in the head and the volume capacity of the head
Tip capacity	The maximum volume for the tips attached to the pipette head

7. In the **Frame Configuration** area, set the following:

Setting	Comments
Select a location to configure	From the list, select the location for which you are configuring the Multimek Pipettor
Location type	Select either: ❑ Available for plates A location to which the robot can place a plate ❑ Not available for plates A location that is not available for placing plates or for pipetting operations for example, a tip depot
Can be used to trash tips	Select if this frame can be used to discard tips
Plate bottom position	The distance is the *z*-axis position at which the tips and the bottom of the labware are at the same height

8. In the **Options** area, set the following:

Setting	Comments
❑ Device is taught using 96 well plates ❑ Device is taught using 384 well plates	Select the 96-well or 384-well option for the frame teachpoints set at the center of the A1 well
Position of the A1 corner	*Front* is defined as the side of the frame closest to the manual-entry keypad
Top safety distance	The height above the labware at which tips approach before dipping into the set of wells and, similarly, the height above the labware that the tips rise to before leaving the set of wells

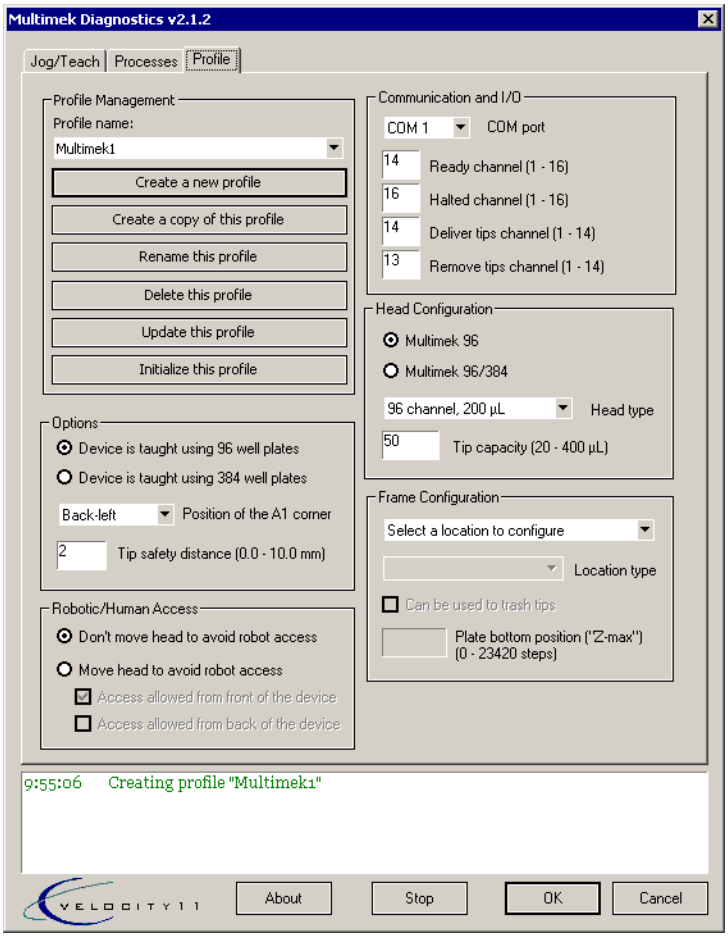
9. In the **Robotic/Human Access** area, set the following:

Setting	Comments
Don't move head to avoid robot access	May keep the head within the robot's working envelope
Move head to avoid robot access	If selected, allows the head to be moved out of the robot's working envelope with the option of allowing access to the head from one direction

10. Click **OK** to save the profile and close the dialog box.

To manage Multimek Pipettor profiles:

1. Open **Multimek Diagnostics**.
2. Click the **Profile** tab.
3. Select a profile from the **Profiles name** list.



4. Perform the management task.

   Management tasks include the following:

   - Updating the profile. Use this command to save edits to an existing profile.
   - Copying a profile.
   - Renaming a profile.
   - Deleting a profile.
   - Initializing a profile. Use this command to reset the device with the selected profile.

Related topics

For information about...	See...
The next step	“Setting the properties for a device” on page 16
The workflow this procedure belongs to	“Workflow for configuring the Multimek Pipettor” on page 28

For information about...	See...
Adding the Multimek Pipettor to the device manager	"Adding devices" on page 10
Profiles	"About profiles" on page 15
Setting Multimek Pipettor task parameters	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "Setting high-level Multimek Pipettor Aspirate task parameters" on page 38 ❑ "Setting low-level (simple) Multimek Pipettor task parameters" on page 50
Opening Multimek Pipettor Diagnostics	"Opening diagnostics" on page 12
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55

About the high-level Multimek Pipettor tasks

About this topic

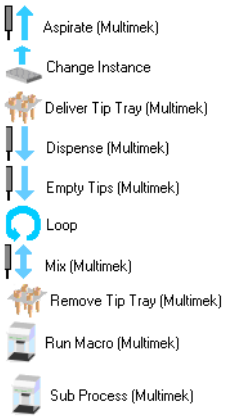
The Multimek Pipettor driver adds 17 tasks to VWorks or BenchWorks software. These tasks are used to deliver commands to the Multimek Pipettor during the execution of a pre-protocol, pipette or post-protocol process within a protocol. These tasks are further divided into:

- ❑ High level
- ❑ Low level

This topic lists the Multimek Pipettor high-level tasks and describes what they do. Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Multimek Pipettor
- ❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

The Multimek Pipettor high-level tasks are represented by the following icons.



Multimek Pipettor high-level tasks defined

High-level tasks are made up of a series of commands that when executed, perform a single operation. Most of the time you will be using these tasks to execute a protocol. The following table describes the functions of the high-level tasks and the protocol processes for which they are available.

High-level task	Function	Available in this editor	Setting task parameter procedure
Aspirate	Draws a volume according to all the conditions specified in the task parameters toolbar.	Pipette	"Setting high-level Multimek Pipettor Aspirate task parameters" on page 38
Change Instance	Instructs VWorks or BenchWorks software to perform subsequent operations using a new plate.	Pipette	"Setting Multimek Pipettor Change Instance task parameters" on page 40
Dispense	Dispenses a volume according to all the conditions specified in the task parameters toolbar.	Pipette	"Setting high-level Multimek Pipettor Dispense task parameters" on page 41
Deliver Tip Tray	Instructs the tip-loader to deliver a tray of tips to a designated location.	Pre-, pipette, and post-protocol	"About the Deliver Tip Trays task" on page 35
Empty Tips	Dispense the entire volume of the pipette tip according to the conditions specified in the task parameter toolbar.	Pre-, pipette, and post-protocol	"Setting high-level Multimek Pipettor Empty Tips task parameters" on page 44

High-level task	Function	Available in this editor	Setting task parameter procedure
Loop	Instructs VWorks or BenchWorks software to repeat all enclosed tasks in the pipette process for the number of times and according to the conditions entered in the task parameter toolbar.	Pipette and protocol	"Setting Multimek Pipettor Loop task parameters" on page 46
Mix	Instructs the pipette head to aspirate and dispense into the same well for the number of times and according to the conditions entered in the task parameters toolbar.	Pipette	"Setting high-level Multimek Pipettor Mix task parameters" on page 47
Remove Tip Tray	Instructs the tip-loader to remove a tray of tips from one location and place it in another location.	Pre-, pipette, and post-protocol	"About the Remove Tip Tray task" on page 35
Run Macro	Instructs the pipette head to execute the named script contained in the Multimek Pipettor's memory.	Pre-, pipette, and post-protocol	"Setting high-level Multimek Pipettor Run Macro task parameters" on page 49
Sub Process	Adds a pipette process to the protocol process.	Protocol	"About the Sub Process task" on page 35

About the Deliver Tip Trays task

There are no task parameters for this task. This is a task that is executed by the tip-loader and is configured in the Multimek Pipettor profile.

If necessary, use the commands in the Jog/Teach page of the Multimek Pipettor Diagnostics dialog box to troubleshoot this task.

About the Remove Tip Tray task

There are no task parameters for this task because the Multimek Pipettor plate handler knows that tips are always placed on Frame 5.

About the Sub Process task

This task is used to add a sub-routine of a series of pipette tasks to a protocol. See "Related topics" on page 35 for a procedure on how to set up a Multimek Pipettor Sub Process task.

Related topics

For information about...	See...
Multimek Pipettor low-level tasks	"About the low-level Multimek Pipettor tasks" on page 36

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Adding and configuring a sub-process	"Adding and linking Sub Process tasks" on page 19
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55

About the low-level Multimek Pipettor tasks

About this topic

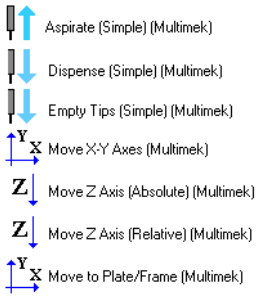
The Multimek Pipettor driver adds 17 tasks to VWorks or BenchWorks software. These tasks are used to deliver commands to the Multimek Pipettor during the execution of a pre-protocol, pipette or post-protocol process within a protocol. These tasks are further divided into:

- ❑ High level
- ❑ Low level

This topic lists the Multimek Pipettor low-level tasks and describes what they do. Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Multimek Pipettor
- ❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

The Multimek Pipettor low-level tasks are represented by the following icons.



Multimek Pipettor low-level tasks defined

Low-level tasks are single commands that when executed perform a single operation. Typically, these tasks are only used in the lab automation setup and not required for most applications.

The following table describes the functions of the low-level tasks and the protocol processes for which they are available.

Low-level task	Function	Available in this editor	Setting task parameter procedure
Aspirate (simple)	Draws a specified volume from its current position.	Pipette	"Setting low-level (simple) Multimek Pipettor task parameters" on page 50
Dispense (simple)	Dispenses a specified volume to a specified plate position.	Pipette	"Setting low-level (simple) Multimek Pipettor task parameters" on page 50
Empty Tips (simple)	Dispenses a specified volume at its current position.	Pre-, pipette, and post-protocol	"Setting low-level (simple) Multimek Pipettor task parameters" on page 50
Move X-Y Axes	Moves the pipette head relative to its current position in the X (left/right) and Y (forward/backward) directions as specified in the task.	Pipette	"Setting low-level Multimek Pipettor Move Axes task parameters" on page 52
Move Z Axis (absolute)	Moves the pipette head relative to its zero position in the Z direction (up/down) as specified in the task.	Pipette	"Setting low-level Multimek Pipettor Move Axes task parameters" on page 52
Move Z Axis (relative)	Moves the pipette head in the Z (up/down) direction, relative to its current position as specified in the task.	Pipette	"Setting low-level Multimek Pipettor Move Axes task parameters" on page 52
Move to Plate/Frame	Moves to the teachpoint of the selected frame/position.	Pipette	"Setting low-level Multimek Pipettor Move Axes task parameters" on page 52

Related topics

For information about...	See...
Multimek Pipettor high-level tasks	"About the high-level Multimek Pipettor tasks" on page 33
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Configuring a sub-process	"Adding and linking Sub Process tasks" on page 19
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55

Setting high-level Multimek Pipettor Aspirate task parameters

About this topic

When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you need to set the parameters for it. This topic describes how to set the parameters for the high-level Multimek Pipettor Aspirate task.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Multimek Pipettor
- ❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

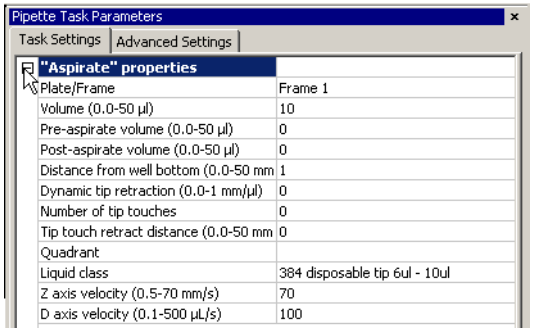
Before you start

To make pipette tasks available, you first need to add and configure a Sub Process task.

Setting Aspirate tasks parameters

To set the Aspirate task parameters:

1. Add the Aspirate task to a protocol.
2. In the **Pipette Task Parameters** toolbar, make sure the **Task Settings** tab is displayed and **Aspirate Properties** is expanded.



3. Double-click in the box next to **Plate/Frame** and select the position from which to aspirate from the list.
4. Enter the **Volume** to aspirate from each quadrant.
5. Enter the **Pre-aspirate volume**.

   This is the volume to aspirate before the tips enter the wells, to create an air gap.
6. Enter the **Post-aspirate volume.**

   This is the volume to aspirate after the tips leave the wells, to create a second air gap.
7. Enter the **Distance from well bottom** (in millimeters), you want the tip to be from the bottom of the well at the start of aspiration.

8. Enter the **Dynamic tip retraction** rate (mm/µL).

   This is the speed at which the tips need to move into the well during aspiration in order to maintain the tips at the same relative position to the liquid.

9. From the **Number of tip touches** list, select the number of times you want the tips to touch the well after aspiration and withdrawal from the liquid.

   The maximum number of tip touches is four, one for each side of the well. At the end of each touch, the tip returns to the center of the well.

10. Enter the **Tip touch retract distance** (in millimeters) you want the tips to pull back away from the well before it executes the tip touch command.

11. Double-click in the box next to **Quadrants** to open the **Well Selection** dialog box.

    Note: Quadrants may be selected only when you are using a 384-well plate with a 96-tip pipette head.

    Click on one of the four upper-left corner wells to select a quadrant. Selected wells are displayed as filled.

    Quadrants are represented as follows:

Selecting well...	Selects quadrant...
A1	1
B1	3
A2	2
B2	4

12. From the **Liquid class** list, select the appropriate liquid type.

    Choosing a liquid type tells the software how you want to handle the liquid. If you select **<none>**, then proceed to the next two steps to set the pipette head travel and aspiration velocity.

13. If you selected **<none>** for the **Liquid class**, then enter the **Z axis velocity**.

    This is the speed you want the pipette head to move up and down (into and out of the plate).

14. If you selected **<none>** for the **Liquid class**, then enter the **D axis velocity**.

    This is the speed you want the internal pipettor to aspirate.

Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
Adding the Multimek Pipettor to the device manager	"Adding devices" on page 10
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Creating a profile	"Creating and Managing Multimek Pipettor profiles" on page 29

Setting Multimek Pipettor Change Instance task parameters

About this topic

When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you need to set the parameters for it. This topic describes how to set the parameters for the high-level Multimek Pipettor Change Instance task.

Typically the Change Instance task is used in conjunction with the Loop task to perform the same operation on different plates.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Multimek Pipettor
- ❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

Before you start

To make pipette tasks available, you first need to add and configure a Sub Process task.

Setting Change Instance task parameters

To set the Change Instance task parameters:

1. Add the Change Instance task to a protocol.

2. In the **Protocol Task Parameters** toolbar, select the plate to change instance on from the list.
3. Select the **Spawn control** check box to force VWorks or BenchWorks software to only bring in the next plate when the **Change Instance** task is reached.

Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
Adding the Multimek Pipettor to the device manager	"Adding devices" on page 10
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Creating a profile	"Creating and Managing Multimek Pipettor profiles" on page 29

Setting high-level Multimek Pipettor Dispense task parameters

About this topic

When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you need to set the parameters for it. This topic describes how to set the parameters for the high-level Multimek Pipettor Dispense task.

Read this topic if you are:

❑ An administrator or technician who writes protocols using the Multimek Pipettor

❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

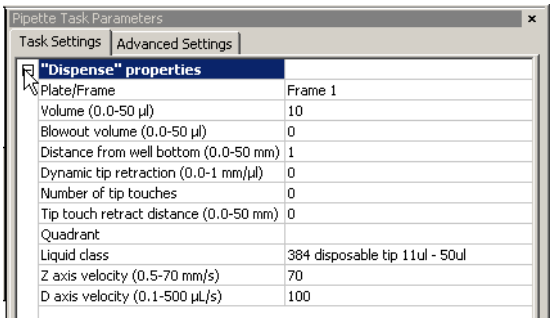
Before you start

To make pipette tasks available, you first need to add and configure a Sub Process task.

Setting Dispense task parameters

To set the Dispense task parameters:

1. Add the Dispense task to a protocol.
2. In the **Pipette Task Parameters** toolbar, make sure the **Task Settings** tab is displayed and **Dispense Properties** is expanded.



3. From the **Plate/Frame** list, select the position to dispense to.
4. Enter the **Volume** to dispense.
5. Enter the **Blowout volume** to expel in the last dispense.

   The actual volume used for blowout equals the value entered for the dispense **Volume** plus the value entered for the **Blowout volume**.
6. Enter the **Distance from well bottom** (in millimeters) you want the tip to be from the bottom of the well at the start of dispensing.
7. Enter the **Dynamic tip retraction** rate (mm/µL) at which you want the tips to move out of the well during the dispense in order to maintain the tips at the same relative position to the liquid.
8. From the **Number of tip touches** list, select the number of times you want the tips to touch the well after dispensing and withdrawing from the liquid.

   The maximum number of tip touches is four, one for each side of the well. At the end of each tip touch, the tip returns to the center of the well.
9. Enter the **Tip touch retract distance** (in millimeters) you want the tips to pull back away from the well before it executes the tip touch command.
10. Double-click in the box adjacent to **Quadrants** to open the **Well Selection** dialog box.

    Note: Quadrants may be selected only when you are using a 384-well plate with a 96-tip pipette head.

    Click on one of the four upper-left corner wells to select a quadrant. Selected wells are displayed as filled.

    Quadrants are represented as follows:

Selecting well...	Selects quadrant...
A1	1
B1	3

Selecting well...	Selects quadrant...
A2	2
B2	4

11. Select the appropriate liquid type from the **Liquid class** list.

    Choosing a liquid type tells the software how you want to handle the liquid. If you select **<none>**, then proceed to the next two steps to set the pipette head travel and dispense velocity.

12. If you selected **<none>** for the **Liquid class**, then enter the **Z axis velocity** you want the pipette head to move up and down (into and out of the plate).

13. If you selected **<none>** for the **Liquid class**, then enter the **D axis velocity** you want the internal pipettor to dispense at.

Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
Adding the Multimek Pipettor to the device manager	"Adding devices" on page 10
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Creating a profile	"Creating and Managing Multimek Pipettor profiles" on page 29

Setting high-level Multimek Pipettor Empty Tips task parameters

About this topic

When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you need to set the parameters for it. This topic describes how to set the parameters for the high-level Multimek Pipettor Empty Tips task.

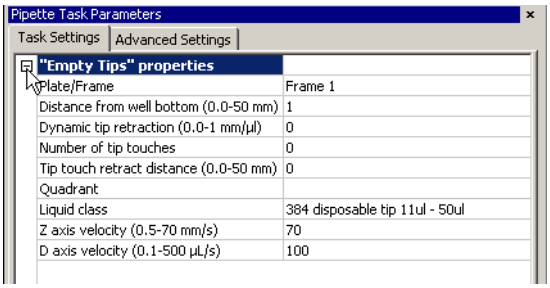
Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Multimek Pipettor
- ❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

Setting Empty Tips task parameters

To set the Empty Tips task parameters:

1. Add the Empty Tips task to a protocol.
2. In the **Pipette Task Parameters** toolbar, make sure the **Task Settings** tab is displayed and **Empty Tips Properties** is expanded.



3. From the **Plate/Frame** list, select the position to which to empty tips.
4. Enter the **Distance from well bottom** (in millimeters) you want the tip to be from the bottom of the well at the start of emptying.
5. Enter the **Dynamic tip retraction** rate (mm/µL) at which you want the tips to move out of the well during the emptying in order to maintain the tips at the same relative position to the liquid.
6. From the **Number of tip touches** list, select the number of times you want the tips to touch the well after emptying and withdrawing from the liquid.

   The maximum number of tip touches is four, one for each side of the well. At the end of each tip touch, the tip returns to the center of the well.
7. Enter the **Tip touch retract distance** (in millimeters) you want the tips to pull back away from the well before it executes the tip touch command.
8. Double-click in the box next to **Quadrants** to open the **Well Selection** dialog box.

Note: Quadrants may be selected only when you are using a 384-well plate with a 96-tip pipette head.

Click on one of the four upper-left corner wells to select a quadrant. Selected wells are displayed as filled.

Quadrants are represented as follows:

Selecting well...	Selects quadrant...
A1	1
B1	2
A2	3
B2	4

9. From the **Liquid class** list, select the appropriate liquid type.

   Choosing a liquid type tells the software how you want to handle the liquid. If you select **<none>**, then proceed to the next two steps to set the pipette head travel and emptying velocity.

10. If you selected **<none>** for the **Liquid class**, then enter the **Z axis velocity** you want the pipette head to move up and down (into and out of the plate).

11. If you selected **<none>** for the **Liquid class**, then enter the **D axis velocity** you want the internal pipettor to empty.

Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
Adding the Multimek Pipettor to the device manager	"Setting the properties for a device" on page 16
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Creating a profile	"Creating and Managing Multimek Pipettor profiles" on page 29

Setting Multimek Pipettor Loop task parameters

About this topic

When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you need to set the parameters for it. This topic describes how to set the parameters for the Multimek Pipettor Loop task.

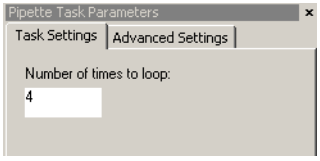
Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Multimek Pipettor
- ❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

Setting Loop task parameters

To set the Loop task parameters:

1. Add the Loop task to a protocol.
2. In the **Pipette Task Parameters** toolbar, make sure the **Task Settings** tab is displayed and **Loop Properties** is expanded.
3. Enter the number of times you want the task or tasks repeated in the **Number of times to loop** box.



Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
Adding the Multimek Pipettor to the device driver	"Setting the properties for a device" on page 16
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Creating a profile	"Creating and Managing Multimek Pipettor profiles" on page 29

Setting high-level Multimek Pipettor Mix task parameters

About this topic

When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you need to set the parameters for it. This topic describes how to set the parameters for the high-level Multimek Pipettor Mix task.

Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Multimek Pipettor
- ❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

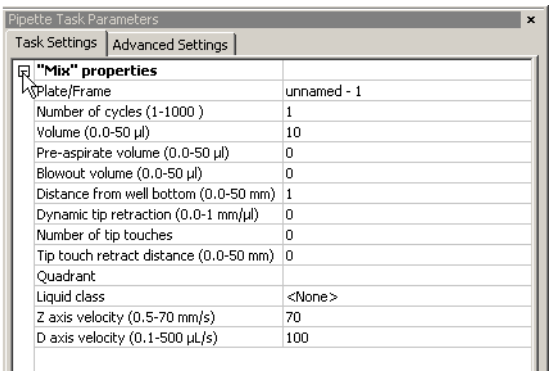
Before you start

To make pipette tasks available, you first need to add and configure a Sub Process task.

Setting Mix task parameters

To set the Mix task parameters:

1. Add the Mix task to a protocol.
2. In the **Pipette Task Parameters** toolbar, make sure the **Task Settings** tab is displayed and **Mix Properties** is expanded.



3. From the **Plate/Frame** list, select the position at which to mix.
4. Enter the **Number of cycles** where one cycle = one aspiration + one dispense.
5. Enter the **Volume** you want to mix.
6. Enter the **Pre-aspirate volume** to aspirate before the tips enter the wells, to create an air gap.
7. Enter the **Blowout volume** to expel in the last dispense.

   The **Blowout volume** equals the value entered for the dispense **Volume** plus the value entered for the **Blowout volume**.
8. Enter the **Distance from well bottom** (in millimeters) you want the tip to be from the bottom of the well at the start of dispensing.

9. Enter the **Dynamic tip retraction** rate (mm/µL) at which you want the tips to move out of the well during the mix in order to maintain the tips at the same relative position to the liquid.
10. From the **Number of tip touches** list, select the number of times you want the tips to touch the well after mixing and withdrawing from the liquid.

    The maximum number of tip touches is four, one for each side of the well. At the end of each tip touch, the tip returns to the center of the well.
11. Enter the **Tip touch retract distance** (in millimeters) you want the tips to pull back away from the well before it executes the tip touch command.
12. Double-click in the box next to **Quadrants** to open the **Well Selection** dialog box.

    Note: Quadrants may be selected only when you are using a 384-well plate with a 96-tip pipette head.

    Click on one of the four upper-left corner wells to select a quadrant. Selected wells are displayed as filled.

    Quadrants are represented as follows:

Selecting well...	Selects quadrant...
A1	1
B1	2
A2	3
B2	4

13. From the **Liquid class** list, select the appropriate liquid type.

    Choosing a liquid type tells the software how you want to handle the liquid. If you select **<none>**, then proceed to the next two steps to set the pipette head travel and emptying velocity.
14. If you selected **<none>** for the **Liquid class**, then enter the **Z axis velocity** you want the pipette head to move up and down (into and out of the plate).
15. If you selected **<none>** for the **Liquid class**, then enter the **D axis velocity** you want the internal pipettor to aspirate and dispense.

Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*

For information about...	See...
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
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Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Creating a profile	"Creating and Managing Multimek Pipettor profiles" on page 29

Setting high-level Multimek Pipettor Run Macro task parameters

About this topic

When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you need to set the parameters for it. This topic describes how to set the parameters for the high-level Multimek Pipettor Run Macro task.

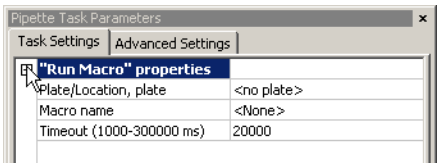
Read this topic if you are:

- ❑ An administrator or technician who writes protocols using the Multimek Pipettor
- ❑ An operator who needs to edit Multimek Pipettor tasks in a protocol

Setting Run Macro task parameters

To set Run Macro task parameters:

1. Add the Run Macro task to a protocol.
2. Expand **Run Macro properties** group.



3. If the macro is associated with a plate or location, select it from the **Plate/Location, plate** list.

   This instructs VWorks or BenchWorks software to leave the plate at the position.

4. Enter the **Macro name**.

   Macros are created in the Multimek Pipettor software and then are called up by VWorks or BenchWorks software.

5. Enter a **Timeout** value.

   This is the length of time VWorks or BenchWorks software waits for the macro to complete before displaying an error message.

Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
Adding the Multimek Pipettor to the device driver	"Setting the properties for a device" on page 16
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Creating a profile	"Creating and Managing Multimek Pipettor profiles" on page 29

Setting low-level (simple) Multimek Pipettor task parameters

About this topic

When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you set the parameters for it. This topic describes the parameters for the low-level (simple) Multimek Pipettor tasks, Aspirate, Dispense, and Empty Tips.

Read this topic if you are an administrator or technician who is using low-level Multimek Pipettor tasks to develop a protocol.

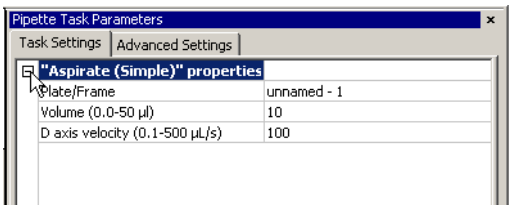
Before you start

To make pipette tasks available, you first need to add and configure a Sub Process task.

Setting Aspirate (Simple) task parameters

To set the Aspirate (Simple) task parameters:

1. Add the Aspirate (Simple) task to a protocol.
2. In the **Pipette Task Parameters** toolbar, make sure the **Task Settings** tab is displayed and **Aspirate (Simple) Properties** is expanded.

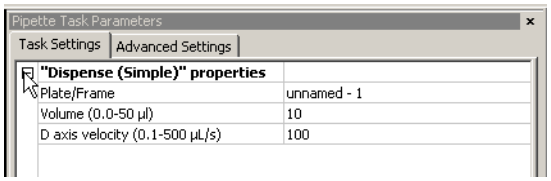


3. From the **Plate/Frame** list, select the position from which to aspirate.
4. Enter the **Volume** to aspirate.
5. Enter the **D axis velocity** at which you want the internal pipettor to aspirate.

Setting Dispense (Simple) task parameters

To set the Dispense (Simple) task parameters:

1. Add the Dispense (Simple) task to a protocol.
2. In the **Pipette Task Parameters** toolbar, make sure the **Task Settings** tab is displayed and **Dispense (Simple) Properties** is expanded.

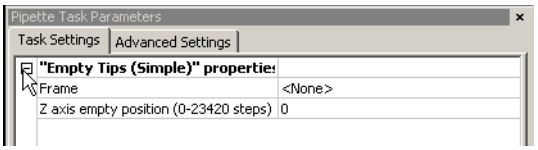


3. From the **Plate/Frame** list, select the position from which to dispense.
4. Enter the **Volume** to dispense.
5. Enter the **D axis velocity** at which you want the internal pipettor to dispense.

Setting Empty Tips (Simple) task parameters

To set the Empty Tips (Simple) task parameters:

1. Add the Empty Tips (Simple) task to a protocol.
2. In the **Pipette Task Parameters** toolbar, make sure the **Task Settings** tab is displayed and **Empty Tips Properties** is expanded.



3. From the **Plate/Frame** list, select the position to which to empty the tips.

4. Enter the **Z Axis empty position.**

   This is the number of steps you want the internal pipettor to move to empty the tips.

Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
Adding the Multimek Pipettor to the device driver	"Adding devices" on page 10
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Creating a profile	"Creating and Managing Multimek Pipettor profiles" on page 29

Setting low-level Multimek Pipettor Move Axes task parameters

About this topic

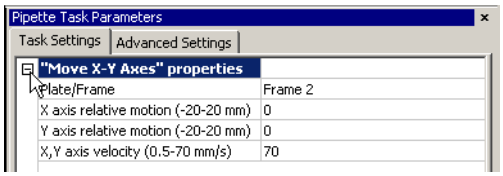
When a task is added to a pre-protocol, pipette (sub-process), or post-protocol process, you set the parameters for it. This topic describes the parameters for the low-level Multimek Pipettor Move Axes tasks.

Read this topic if you are an administrator or technician who is using low-level Multimek Pipettor tasks to develop a protocol.

Setting Move X-Y Axes task parameters

To set the Move X-Y Axes task parameters:

1. Add the Move X-Y Axes task to a protocol.
2. Expand the **Move X-Y Axes Properties** group.



3. From the **Plate/Frame** list, select the plate for which you are creating the Move X-Y task.
4. Enter the **X axis relative motion**.

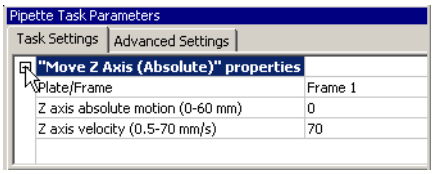
   This is the distance (in millimeters) that you want the pipette head to move in the x (left/right) direction relative to its current position.
5. Enter the **Y axis relative motion**.

   This is the distance (in millimeters) that you want the pipette head to move in the y (right/left) direction relative to its current position.
6. Enter the **X,Y axis velocity** you want the head to move in the X and Y directions.

Setting Move Z Axis (Absolute) task parameters

To set the Move Z Axis (Absolute) task parameters:

1. Add the Move Z Axis (Absolute) task to a protocol.
2. Expand the **Move Z Axis (Absolute) properties** group.



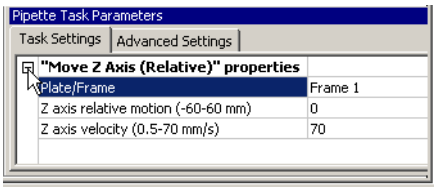
3. From the **Plate/Frame** list, select the plate for which you are creating the Move Z task.
4. Enter the **Z axis absolute motion**.

   This is the distance (in millimeters) that you want the pipette head to move in the Z (up/down) direction relative to its zero position in the Z direction.
5. Enter the **Z axis velocity** at which the head will move when going to the frame.

Setting Move Z Axis (Relative) task parameters

To set the Move Z Axis (Relative) task parameters:

1. Add the Move Z Axis (Relative) task to a protocol.
2. Expand the **Move Z Axis (Relative) properties** group.

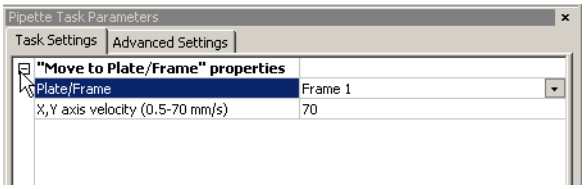


3. Enter the **Z axis relative motion**.
4. This is the distance (in millimeters) that you want the pipette head to move in the Z (up/down) direction relative to its current position.
5. Enter the **Z axis velocity** you want the head to move in the Z direction.

Setting Move to Plate/Frame task parameters

To set the Move to Plate/Frame task parameters:

1. Add the Move to Plate/Frame task to a protocol.
2. Expand the **Move to Plate/Frame properties** group.



3. From the **Plate/Frame** list, select the frame that has the plate you want to move to.
4. Enter the **X,Y axis velocity** you want the head to move to the selected frame.

Related topics

For information about...	See...
Advanced settings	"Using JavaScript to set task parameters" on page 21
Multimek Pipettor tasks	❑ "About the high-level Multimek Pipettor tasks" on page 33 ❑ "About the low-level Multimek Pipettor tasks" on page 36
Configuring a Sub Process task	"Adding and linking Sub Process tasks" on page 19
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55

About Multimek Pipettor Diagnostics

About this topic

Use Multimek Pipettor Diagnostics to:

- ❑ Move the pipette head
- ❑ Home the pipette head
- ❑ Edit teachpoints
- ❑ Monitor tip loader activity and head position
- ❑ Execute pipetting commands

This topic presents an overview of these tasks. Read this topic if you are an operator who wants to troubleshoot or operate the Multimek Pipettor using direct commands.

About the Jog/Teach page

Use the Jog/Teach page of Multimek Pipettor Diagnostics to control and monitor the pipette head's movements. This includes the following:

This action	Enables you to...
Moving incrementally in the X, Y, and Z directions	Fine-tune existing teachpoints
Moving to selected teachpoints	Quickly move the head to a plate stage
Homing the pipette head	Reset the head by re-homing to the X,Y or Z directions
Monitoring the input and output channels assigned to the tip loader	Test and troubleshoot the connection to the tip loader
Monitoring head position	Know the current coordinates of the pipette head
Switching to computer control	Re-gain remote control of the pipette head

A log window at the bottom of the dialog box records all movement events.

About the Processes page

Use the Processes page of the Multimek Pipettor Diagnostics to execute pipette head commands. This includes the following:

This action	Enables you to...
Executing all pipette tasks	Modify and test each pipette function
Editing labware parameters	Access the labware database editor so you can edit the labware database
Editing liquid handling parameters	Access the liquid library editor so you can edit liquid-handling parameters

A log window at the bottom of the dialog box records all executed processes.

Related topics

For information about...	See...
Advanced settings	"Using JavaScript to set task parameters" on page 21
Opening the Diagnostics	"Opening diagnostics" on page 12

Jogging and teaching the Multimek Pipettor

About this topic

This topic describes how to use the commands on the Jog/Teach page of Multimek Pipettor Diagnostics to monitor and control the movements of the pipette head.

Read this topic if you want to monitor or move the Multimek Pipettor for diagnostic purposes.

Before you start

Before you can send commands to the Multimek Pipettor, or receive status information from the Multimek Pipettor, you need to initialize it.

To initialize the Multimek Pipettor:

1. Open **Multimek Pipettor Diagnostics**.
2. Click the **Profiles** tab.
3. Select a profile from the **Profile name** list.
4. Click **Initialize this profile**.

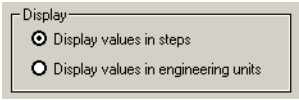
Choosing display units

About unit display

You can choose whether to display the measurement values of this page in steps (a defined number of steps equals one motor revolution) or in engineering units (millimeters). Since the Multimek Pipettor software uses steps to describe its position, you may also want to use these units here. However, if you prefer standard units, you may want to use engineering units.

To choose diagnostics display units:

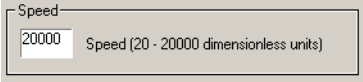
1. Open **Multimek Diagnostics**.
2. Click the **Jog/Teach** tab.
3. Select a **Display** option.



Setting the head speed

Optionally, change the speed the head moves by entering a different value in the **Speed** box.

This speed applies to all moves.

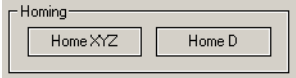


Homing the pipette head

Use these commands to reset the pipette head.

To home the pipettor:

1. Click **Home XYZ** to reset the pipette head in the X, Y, and Z axes.



2. Click **Home D** to reset the pipette head in the D axis.

Moving the pipette head

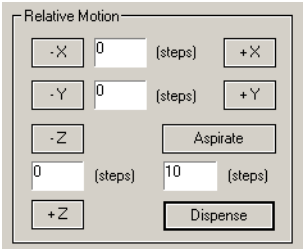
About moving the pipette head

You can move the head in increments relative to its current position or its zero position. Depending on circumstances, one way may be more convenient than the other.

To move the head in relative motion:

1. Enter the number of steps (or millimeters) you want to move in the appropriate boxes.

   Values entered are relative to the zero position at that axis.



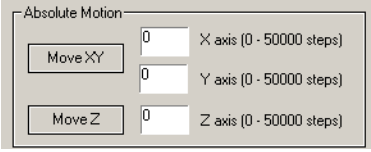
2. Click one of the +/- **X**, **Y**, **Z**, **Aspirate**, or **Dispense** buttons to jog the pipette head.

   The aspirate and dispense buttons correspond to +/- D axis.

To move the head in absolute motion:

1. Enter the number of steps (or millimeters) you want to move in the appropriate box.

   Values entered are relative to the zero position at that axis. The range for these values is set when the device is initialized.



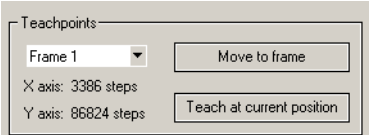
2. Click **Move XY** to move the head the specified distance in the X,Y direction.
3. Click **Move Z** to move the head the specified distance in the Z direction.

Modifying teachpoints

The Multimek Pipettor has built-in teachpoints for each frame position. These can be fine-tuned in VWorks or BenchWorks software, if necessary.

To move to and modify a teachpoint:

1. Select the frame you want to move to and adjust from the list.



2. Click **Move to frame**.
3. If adjustments are necessary, use the commands in the **Relative Motion** or **Absolute Motion** areas to move the head to a more optimal position.
4. Click **Teach at current position**.

Monitoring the tip loader

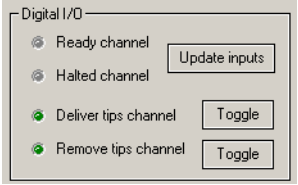
About the tip loader

When there is a tip loader connected to the Multimek Pipettor, you can monitor the connection in the Digital I/O area. This box displays the two input and two output channels that were assigned to it in the Multimek Pipettor profile. The activity of these inputs can be monitored in Multimek Pipettor Diagnostics.

To monitor the tip loader:

1. To check the status of the **Ready** and **Halted** input channels, click **Update inputs**.

   A lit indicator means the channel is active.



2. To check the status of the output channels, click the appropriate **Toggle** button.

   This action switches the active/inactive status of the output.

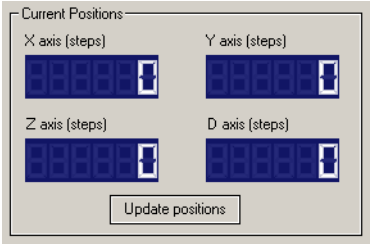
   A lit indicator means the channel is active.

Monitoring the head position

To monitor the position of the pipette head:

1. In the **Current Positions** area, click **Update positions**.

   The position in steps (or millimeters) is displayed in the readouts.



Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Creating a Multimek Pipettor profile	"Creating and Managing Multimek Pipettor profiles" on page 29
Configuring a Sub Process task	❑ "Adding and linking Sub Process tasks" on page 19 ❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Setting Multimek Pipettor task parameters	"Setting high-level Multimek Pipettor Aspirate task parameters" on page 38
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55
Initializing a device	"About device initialization" on page 25

Executing Multimek Pipettor tasks

About this topic

This topic describes how to execute a Multimek Pipettor task using the commands on the Processes page.

Read this topic if you want to troubleshoot the device or develop task parameters.

Before you start

Before you can send commands to the Multimek Pipettor, or receive status information from the Multimek Pipettor, you need to initialize it.

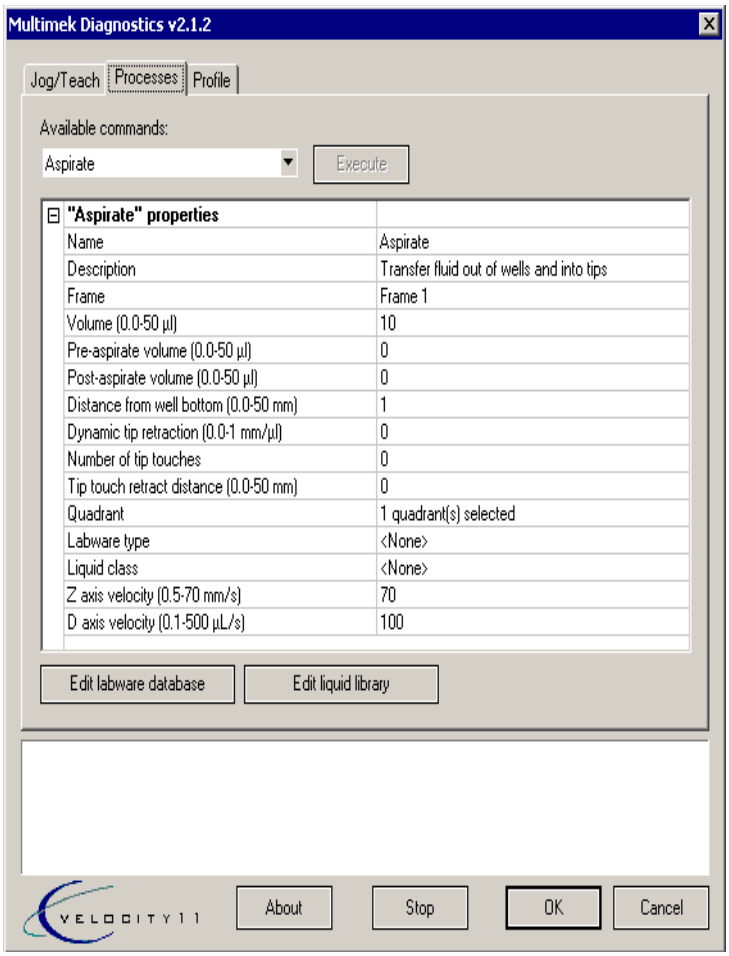
To initialize the Multimek Pipettor:

1. Open **Multimek Pipettor Diagnostics**.
2. Click the **Profiles** tab.
3. Select a profile from the **Profile name** list.
4. Click **Initialize this profile**.

Procedure

To execute a Multimek Pipettor task:

1. Open **Multimek Diagnostics**.
2. Click the **Processes** tab.



3. Select the operation you want to perform from the **Available commands** list.
4. Expand the ***Command* properties**.
5. Optionally, change property values.
6. When ready, click **Execute**.

   All task executions are recorded and shown in the log window at the bottom of the dialog box.

Making database changes

If, after performing commands, you find you need to make changes to one of the databases, you can access them from Multimek Pipettor Diagnostics.

- ❑ Click **Edit labware database** to open the labware editor to make changes to or add labware definitions
- ❑ Click **Edit liquid library** to open the liquid library editor to make changes to or add liquid handling definitions

Related topics

For information about...	See...
Adding tasks to protocols	❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Configuring a Sub Process task	❑ "Adding and linking Sub Process tasks" on page 19 ❑ *VWorks Version 3 Automation Control User Guide* ❑ *BenchWorks Automation Control User Guide*
Setting Multimek Pipettor task parameters	"Setting high-level Multimek Pipettor Aspirate task parameters" on page 38
Using Multimek Pipettor Diagnostics	"About Multimek Pipettor Diagnostics" on page 55

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