Microplate Exchanger

User Guide

Original instructions

Agilent Technologies

Notices

User Guide Part Number

G5478-90004

Edition

Revision B, March 2014

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A **CAUTION** notice 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.

Agilent Technologies	**DECLARATION OF INCORPORATION** According to Directive 2006/42/EC, Annex II, part B

Manufacturer's Name: Agilent Technologies, Inc.
Automation Solutions Division

Manufacturer's Address: 5301 Stevens Creek Boulevard
Santa Clara, California 95051
USA

Declares under sole responsibility that the product as originally delivered

Type of Equipment: microplate storage or rotator
Product Name: Labware MiniHub or Microplate Exchanger
Model Numbers: G5508-60009, G5508-60010, G5508-60030, or G5508-60011
Product Options: all
Serial Number: all (see serial numbers on product)

is incomplete machinery and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/EC. This equipment complies with all applicable EHSRs in Annex I, but cannot in itself perform a specific application and is intended to be installed and used only as part of a complete system.

Agilent Technologies also hereby declares that these models comply with the essential requirements of the following European Directives and bear the CE Marking accordingly:

EMC Directive 2004/108/EC

and conform with the following product standards:

IEC 61326-1:2005 / EN 61326-1:2006 (EMC)
IEC 61010-1:2001 / EN 61010-1:2001 (safety)

Relevant technical documentation is compiled in accordance with part B of Annex VII of the Machinery Directive. We undertake to transmit, via email, relevant information on the partly completed machinery in response to a reasoned request by national authorities.

Name and address of the person established in the Community authorized to compile the technical file or the relevant technical documents:

Agilent Technologies Deutschland GmbH
Herrenbergerstrasse 130
71034 Boblingen
Germany

Supplementary Information:
The products were tested in a typical configuration with Agilent Technologies test systems.

This Declaration of Incorporation applies to above-listed products placed on the EU market after:

15 December 2010

Agilent Technologies	**EC DECLARATION OF CONFORMITY** **in accordance with EN ISO 17050-1:2004**	CE

Manufacturer's Name: Agilent Technologies, Inc.,
Automation Solutions Division

Manufacturer's Address: 5301 Stevens Creek Boulevard
Santa Clara, California 95051
USA

hereby declares that:
equipment model: G5473A 24VDC Power supply (G5508-60008)

complies with the essential requirements of the following European Directives and bears the CE Marking accordingly:

EMC Directive 2004/108/EC
Low Voltage Directive 2006/95/EC

and conforms with the following product standards:

EMC: IEC 61326-1:2005 / EN 61326-1:2006
Safety: IEC 61010-1:2001 / EN 61010-1:2001

15 December 2010

Contents

Preface

This preface contains the following topics:

About this guide

Who should read this guide

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

Job role	Responsibilities
Installer	Unpacks, installs, and tests the Microplate Exchanger before it is used.
Integrator	Writes the automation control software and configures hardware.
Lab manager, administrator, or technician	• Manages the automation system that contains the Microplate Exchanger • Develops the applications that are run on the system • Develops training materials and standard operating procedures for operators
Operator	Performs the daily production work on the Microplate Exchanger and solves routine problems.

Installers, integrations, lab managers, and administrators are users who must have technical expertise. In addition, lab managers and administrators are individuals or groups responsible for the use and maintenance of the Microplate Exchanger and for ensuring that operators are adequately trained.

What this guide covers

This guide describes the Microplate Exchanger, the operation of the hardware components, and the use of the diagnostics software.

This guide does not provide instructions for the following:

- VWorks software or third-party software
- Agilent Technologies products, such as the BioCel System.
- Third-party devices

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

Software version

This guide documents Microplate Exchanger Diagnostics version 1.0.0 or later.

Related guides

The *Microplate Exchanger User Guide* should be used in conjunction with the following documents (if applicable):

- *Automation system user guide*. Explains how to set up the system and set teachpoints at integrated devices. If you are using the BioCel System, see the *BioCel System User Guide*.
- *Automation system software user guide*. Explains how to create and run protocols. If you are using the VWorks software, see the *VWorks Automation Control Setup Guide* and *VWorks Automation Control User Guide*.

Related information

For information about...	See...
Accessing related user guides	"Accessing Automation Solutions user guides" on page x
Reporting problems	"Reporting problems" on page 101

Accessing Automation Solutions user guides

About this topic

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

Where to find user information

The Automation Solutions user information is available in the following locations:

- *Knowledge base*. The help system that contains information about all of the Automation Solutions products is available from the Help menu within the VWorks software.
- *PDF files*. The PDF files of the user guides are installed with the VWorks software and are on the software CD that is supplied with the product. A PDF viewer is required to open a user guide in PDF format. You can download a free PDF viewer from the internet. For information about using PDF documents, see the user documentation for the PDF viewer.
- *Agilent Technologies website*. You can search the online knowledge base or download the latest version of any PDF file from the Agilent Technologies website at www.agilent.com/lifesciences/automation.

Accessing safety information

Safety information for the Agilent Technologies devices appears 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 in the VWorks software

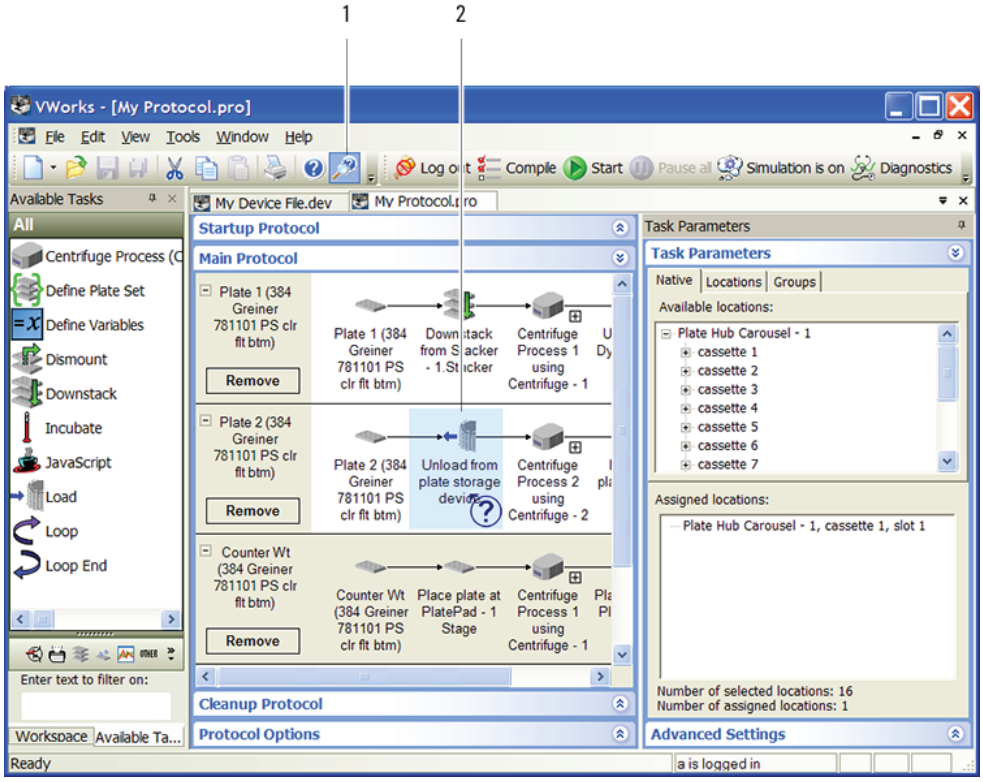
Knowledge base topics are displayed using web browser software such as Microsoft Internet Explorer and Mozilla Firefox.

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.**

To open the knowledge base in the VWorks software, do one of the following:

- From within VWorks software, select **Help** > **Knowledge Base** or press F1.
- From the Windows desktop, select **Start** > **All Programs > Agilent Technologies > VWorks** > **User Guides** > **Knowledge Base.**

Opening the help topic for an area in the VWorks window



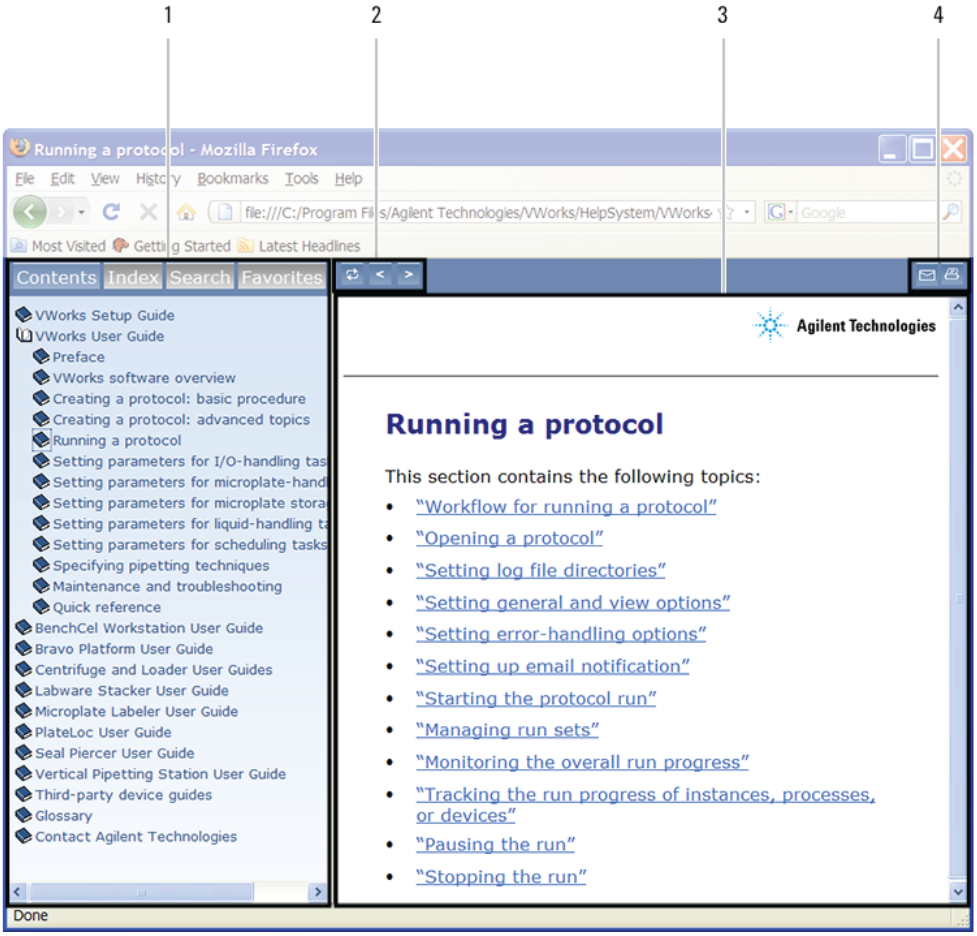
To access the context-sensitive help feature in the VWorks software:

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



Item	Feature
1	*Navigation area.* Consists of four tabs: • *Contents.* Lists all the books and the table of contents of the books. • *Index.* Displays the index entries of all of the books. • *Search.* Allows you to search the Knowledge Base (all products) using keywords. You can narrow the search by product. • *Favorites.* Contains bookmarks you have created.
2	*Navigation buttons.* Enable you to navigate through the next or previous topics listed in the Contents tab.
3	*Content area.* Displays the selected online help topic.
4	*Toolbar buttons.* Enable you to print the topic or send documentation feedback by email.

Related information

For information about...	See...
Who should read this guide	“About this guide” on page viii
What this guide covers	“About this guide” on page viii
Reporting problems	“Reporting problems” on page 101

1 Safety information

This chapter contains the following topics:

General safety information

Before installing and using the Microplate Exchanger

Before installing and using the Microplate Exchanger, make sure you are aware of the potential hazards and understand how to avoid being exposed to them. You must be properly trained in the correct and safe installation and operation of the device.

Intended product use

WARNING **Do not remove the Microplate Exchanger exterior covers or otherwise disassemble the system or device. Doing so can cause injuries and damage the Microplate Exchanger.**

WARNING **Using controls, making adjustments, or performing procedures other than those specified in the user guide can expose you to moving parts and hazardous voltage.**

Agilent Technologies products must only be used in the manner described in the Agilent Technologies product user guides. Any other use may result in damage to the product or personal injury. Agilent Technologies is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent Technologies product user guides, or use of the products in violation of applicable laws, rules or regulations. Except as otherwise expressly provided in Agilent Technologies product user guides, any alteration, adjustment or modification to the products will void the product warranty and may invalidate the safety compliance certification.

EU installations only. The Microplate Exchanger is intended to be installed in a laboratory automation system or workstation (completed system). The manufacturer of the completed system containing the Microplate Exchanger is responsible for compliance with the provisions of the Machinery Directive 2006/42/EC. See “Mechanical hazards” on page 9. See also Annex I of the Machinery Directive for the list of the Essential Health and Safety Requirements (EHSR) that must be met.

The Microplate Exchanger is not intended or approved for diagnosis of disease in humans or animals. You assume full responsibility for obtaining any regulatory approvals required for such use and assume all liability in connection therewith.

Safety labels

Warnings in the user documentation or on the device must be observed during all phases of operation, service, and repair of this device. Failure to comply with these precautions violates safety standards of design and the intended use of the product. Agilent Technologies assumes no liability for the customer’s failure to comply with these requirements.

The following table lists the common symbols you might find on the device. The symbol on the label indicates the risk of danger. A description of the warning and information that will help you avoid the safety hazard are provided in this guide.

Symbol	Description
	Indicates that you must read the accompanying instructions (for example, the safety chapter) for more information.
	Indicates hazardous voltages.
	Indicates pinch, crush, and cut hazard.
	Indicates laser hazard.
	Indicates hot surface hazard.
	Indicates protective conductor terminal.
	Indicates that you must not discard this electrical/ electronic product in domestic household waste.

Related information

For information about...	See...
Safety and regulatory certifications	“Safety and regulatory compliance” on page 4
Emergency stop	“Emergency stop” on page 6
Safety enclosure and interlock	“Safety enclosure and interlock” on page 9
Electrical hazards	“Electrical hazards” on page 8
Mechanical hazards	“Mechanical hazards” on page 9

Safety and regulatory compliance

The Microplate Exchanger complies with the applicable EU Directives and bears the CE marking. The following table describes important aspects of Regulatory Compliance for this product. See the Declaration of Conformity or Declaration of Incorporation, as applicable, for details.

Regulatory Complicance	Standard
EMC	
European Union	EMC Directive 2004/108/EC
	IEC 61326-1:2005 / EN 61326-1:2006
Canada	ICES/NMB-001:2004
Australia/New Zealand	AS/NZS CISPR 11:2004
Safety	
European Union	Machinery Directive 2006/42/EC
	Low Voltage Directive 2006/95/EC
	IEC 61010-1:2001 / EN61010-1:2001
Canada	CAN/CSA-C22.2 No. 61010-1-04
USA	ANSI/UL 61010-1:2004

Electromagnetic compatibility

If the Microplate Exchanger causes interference with radio or television reception, which can be determined by turning the device off and on, try one or more of the following measures:

- Relocate the radio or television antenna.
- Move the device away from the radio or television.
- Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
- Make sure that all peripheral devices are also certified.
- Make sure that appropriate cables are used to connect the device to peripheral equipment.
- Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.

Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

Sound emission declaration

Sound pressure: Lp < 70 dB according to EN 27779:1991.

Schalldruckpegel: LP < 70 dB nach EN 27779:1991.

Related information

For information about...	See...
General safety information	“General safety information” on page 2
Safety symbols and labels	“Safety labels” on page 2
Emergency stop	“Emergency stop” on page 6
Safety enclosure and interlock	“Safety enclosure and interlock” on page 9
Electrical hazards	“Electrical hazards” on page 8
Mechanical hazards	“Mechanical hazards” on page 9

Emergency stop

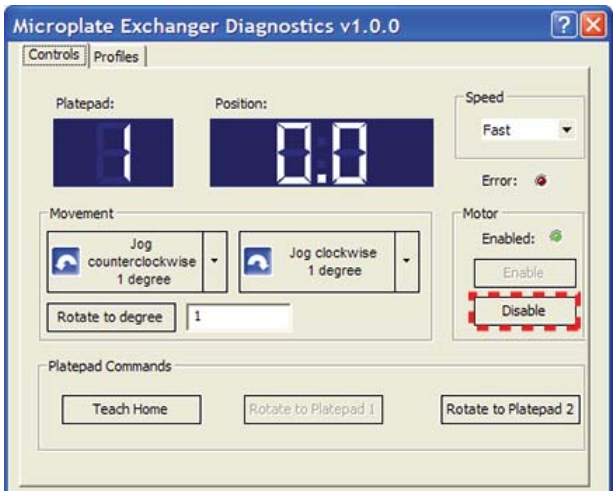
Emergency stop mechanisms

In an emergency, you can press the power switch on the front of the Microplate Exchanger power supply to turn it off (1) or disconnect the AC power cord from the power source. Turning off the Microplate Exchanger stops the motor immediately.

If the Microplate Exchanger is integrated in an automation system, Agilent Technologies recommends that you install a system-wide emergency stop button to cut power to the Microplate Exchanger and all devices simultaneously. You can connect the Microplate Exchanger power supply to a power source that is controlled by the system-wide emergency-stop circuit.

Disabling the motor using software controls

When using the VWorks software under normal operating conditions, the Microplate Exchanger motor is disabled automatically when a collision occurs or when the emergency-stop or interlock circuitry is triggered. You can also use the Disable command in the Microplate Exchanger Diagnostics to stop the motor when setting the Microplate Exchanger home position or when retrieving labware after a run error occurs. For information, see "Using Microplate Exchanger Diagnostics" on page 73.



If you are using third-party automation software instead of the VWorks software, call the DisableMotor ActiveX method to disable the Microplate Exchanger motor. For more information about the Exchanger ActiveX interface, see "Microplate Exchanger ActiveX control" on page 109.

Related information

For information about...	See...
General safety information	"General safety information" on page 2
Safety and regulatory certifications	"Safety and regulatory compliance" on page 4
Symbols and labels	"Safety labels" on page 2
Safety enclosure and interlock	"Safety enclosure and interlock" on page 9
Electrical hazards	"Electrical hazards" on page 8
Mechanical hazards	"Mechanical hazards" on page 9

Electrical hazards

Hazardous-voltage electronics

Hazardous-voltage electronics can be found within the Microplate Exchanger 24VDC power supply. Under normal operating conditions, you are protected from exposure to the hazardous voltage if you follow installation and operating instructions and do not remove the protective covers.

Hazardous-voltage electronics can also be found in the computer that is controlling the Microplate Exchanger. See the computer manufacturer documentation for the hazard warnings. Make sure you follow the instructions on the safe operation of the computer.

WARNING **Ensure that the power cords are in good condition and are not frayed. Use of frayed or damaged power cords can cause injury. Use of incorrect power cords can cause damage to the device.**

Related information

For information about...	See...
General safety information	“General safety information” on page 2
Safety and regulatory certifications	“Safety and regulatory compliance” on page 4
Safety enclosure and interlock	“Safety enclosure and interlock” on page 9
Symbols and labels	“Safety labels” on page 2
Emergency stop	“Emergency stop” on page 6
Mechanical hazards	“Mechanical hazards” on page 9

Mechanical hazards

Safety enclosure and interlock

Although the Microplate Exchanger has speed and energy limited to avoid creating a hazard, Agilent Technologies recommends that you install the system that contains the Microplate Exchanger inside an enclosure or behind a safety shield. Safety-interlocked doors or light curtains that stop the system when opened or interrupted can be used to further mitigate system risk. Make sure the safety-interlocked enclosure complies with your country's safety regulations.

EU installations only. The manufacturer of the completed system containing the Microplate Exchanger is responsible for compliance with the provisions of the Machinery Directive 2006/42/EC. See Annex I of the Machinery Directive for the list of the Essential Health and Safety Requirements (EHSR) that must be met by the complete system.

WARNING **System administrators. If you override the system safety interlock, be sure to keep out of the system while it is starting up or in operation. Wear protective eyewear when entering the system if other devices or chemicals being used present a hazard.**

Moving parts and pinch hazards

The Microplate Exchanger is an automated device that can rotate left or right unexpectedly. You cannot anticipate the movement of the device with certainty, because the software determines when to move the device to achieve the highest throughput.

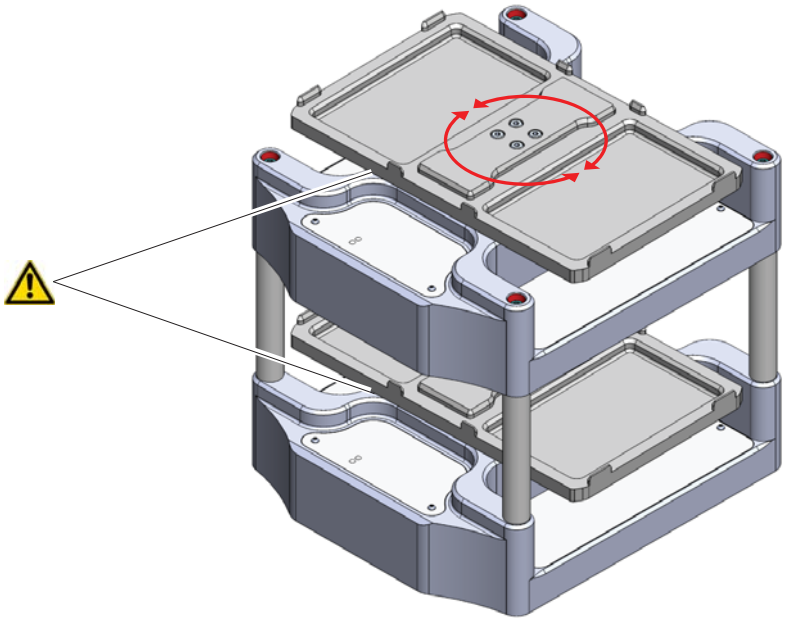
The Microplate Exchanger is designed with many safety features. The stage on the device has blunt edges, and the rotation speed and force are inherently limited. In addition, the Microplate Exchanger is designed to stop its movement when it comes in contact with an obstacle. Because of these safety features, moving parts are not able to crush, cut, pierce, or severely pinch operators, and you are very unlikely to be injured if you obstruct the Microplate Exchanger while it is in motion.

CAUTION Obstructing the Exchanger will cause an error that requires operator attention. Do not touch any of the moving parts or attempt to move labware from the Microplate Exchanger while it is in operation.

CAUTION Always close the system doors or enclosure windows, and make sure the interlock is on before initializing the Microplate Exchanger to allow proper function.

WARNING **Pinch hazard! Keep your fingers out of the area between the stage and the base.**

Figure Microplate Exchanger moving parts and potential pinch hazards



Related information

For information about...	See...
General safety information	“General safety information” on page 2
Safety and regulatory certifications	“Safety and regulatory compliance” on page 4
Symbols and labels	“Safety labels” on page 2
Safety enclosure and interlock	“Safety enclosure and interlock” on page 9
Emergency stop	“Emergency stop” on page 6
Electrical hazards	“Electrical hazards” on page 8

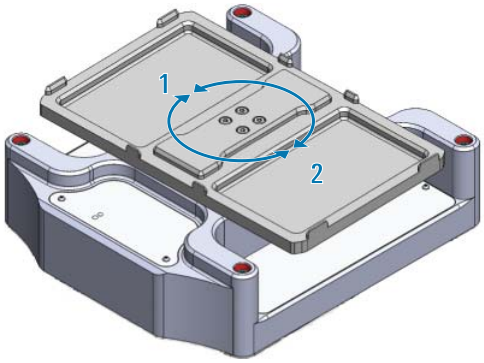
2 Introduction

This chapter contains the following topics:

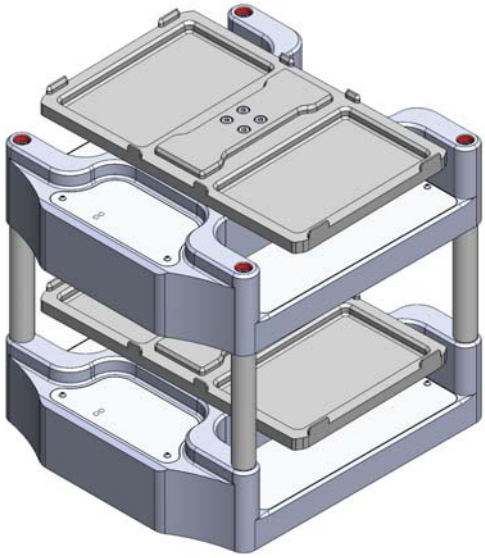
About the Microplate Exchanger

Description

The Microplate Exchanger is a device that passes microplates between two automation robots. The Microplate Exchanger has a rotating stage that consists of two platepads (1 and 2). One robot places a microplate at platepad 1. The stage rotates so that the other robot can pick up the microplate. Note that the microplate maintains the same orientation as it passes from one robot to another.



To increase throughput, two Microplate Exchanger devices can be stacked so that two microplates can be passed in opposite directions concurrently. The stacked-exchanger configuration is called the Dual-Stage Microplate Exchanger.



Related information

For information about...	See...
Microplate Exchanger safety	"Before you operate the Microplate Exchanger" on page 13
Hardware components	"Hardware overview" on page 14
Software overview	"Software overview" on page 17
Basic setup overview	"Quick start" on page 20

Before you operate the Microplate Exchanger

WARNING **For safe operation, it is imperative that you follow the precautions in "Safety information" on page 1.**

Related information

For information about...	See...
Microplate Exchanger description	"About the Microplate Exchanger" on page 12
Hardware components	"Hardware overview" on page 14
Software overview	"Software overview" on page 17
Basic setup overview	"Quick start" on page 20

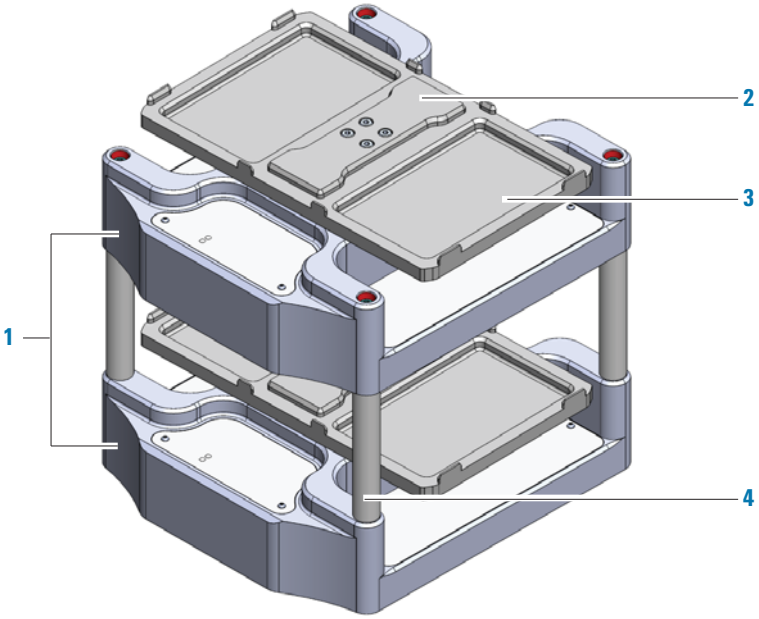
Hardware overview

This topic describes the following Microplate Exchanger features:

- Main components
- Power supply
- Indicator lights

Main components

The following diagram shows the main components of the Microplate Exchanger:



Item	Name	Description
1	Base	The gray structure at the bottom of the exchanger that attaches the exchanger to the target surface or the support posts of a second exchanger. The base contains some electronics and hosts the indicator lights.
2	Stage	The rotating deck that consists of two platepads.
3	Platepad	The area on the stage that holds a microplate.
4	Support posts (Dual-Stage Microplate Exchanger only)	The four columns that hold the second exchanger on top of the first exchanger.

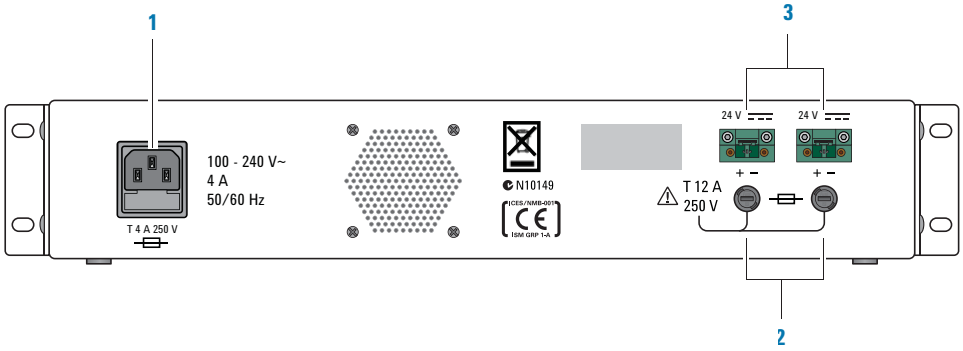
Power supply

The power supply is the component that supplies electrical power to the Microplate Exchanger.

Front

Item	Name	Description
1	Power switch	To turn on the power, press the on (**I**) end of the switch. To turn off the power, press the off (**O**) end of the switch.

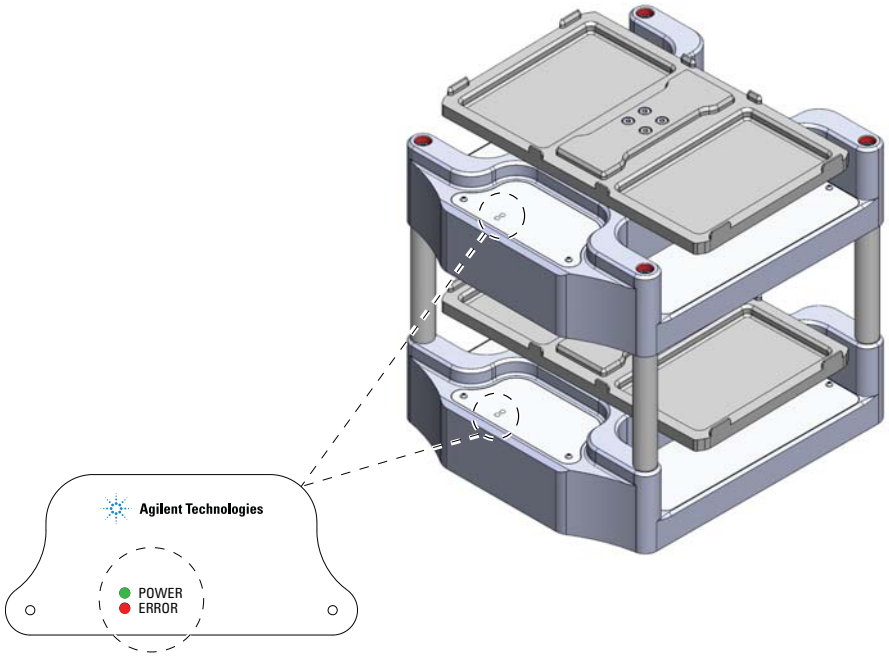
Back



Item	Name	Description
1	Power inlet and fuse housing	Connects the power supply unit to the power source. Use only the supplied power cord. The small compartment immediately below the inlet contains two fuses for power inlet.
2	Fuse housings	Holds fuses for power outlet.
3	Microplate Exchanger cable connector	Connects the Microplate Exchanger to the power supply unit. Use only the supplied Microplate Exchanger cable. *Note:* Only one connector is required. The second connector can be used to connect another device, such as a second Microplate Exchanger.

Indicator lights

At the base of the Microplate Exchanger are two indicator lights. One light indicates power status, the other light indicates error conditions.



Name	Description
Power	Indicates whether the power is on or off. When the green light is on, the power is on. When the green light is off, the power is off.
Error	Indicates whether an error is encountered. When the red light flashes, an error has occurred. When the red light is off, the Microplate Exchanger is operating normally.

Related information

For information about...	See...
Microplate Exchanger description	“About the Microplate Exchanger” on page 12
Microplate Exchanger safety	“Before you operate the Microplate Exchanger” on page 13
Software overview	“Software overview” on page 17
Basic setup overview	“Quick start” on page 20

Software overview

About this topic

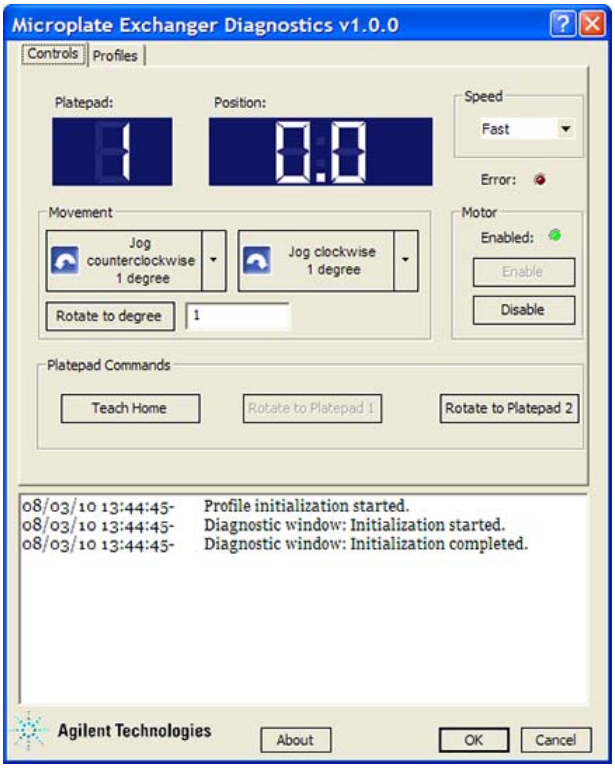
This topic describes the software components you use to operate the Microplate Exchanger:

- "Microplate Exchanger Diagnostics" on page 17
- "Laboratory automation software" on page 18

Microplate Exchanger Diagnostics

The Microplate Exchanger Diagnostics software allows you to:

- *Create and manage profiles.* A profile allows you to set up communication between the Microplate Exchanger and the controlling computer and set the rotation speed to use during protocol runs. For instructions, see "Creating Microplate Exchanger profiles" on page 64.
- *Set the home position.* The home position is the position at which the automation system robots access the two platepads on the stage. For instructions, see "Setting the home position" on page 68.
- *Diagnose problems.* Moving and adjusting the Microplate Exchanger allow you to diagnose and troubleshoot problems. For information on diagnosing and troubleshooting problems, see "Using Microplate Exchanger Diagnostics" on page 73 and "Troubleshooting" on page 95.



Access to Microplate Exchanger Diagnostics depends on the automation software you are using. For more information, see "Using Microplate Exchanger Diagnostics" on page 73.

Laboratory automation software

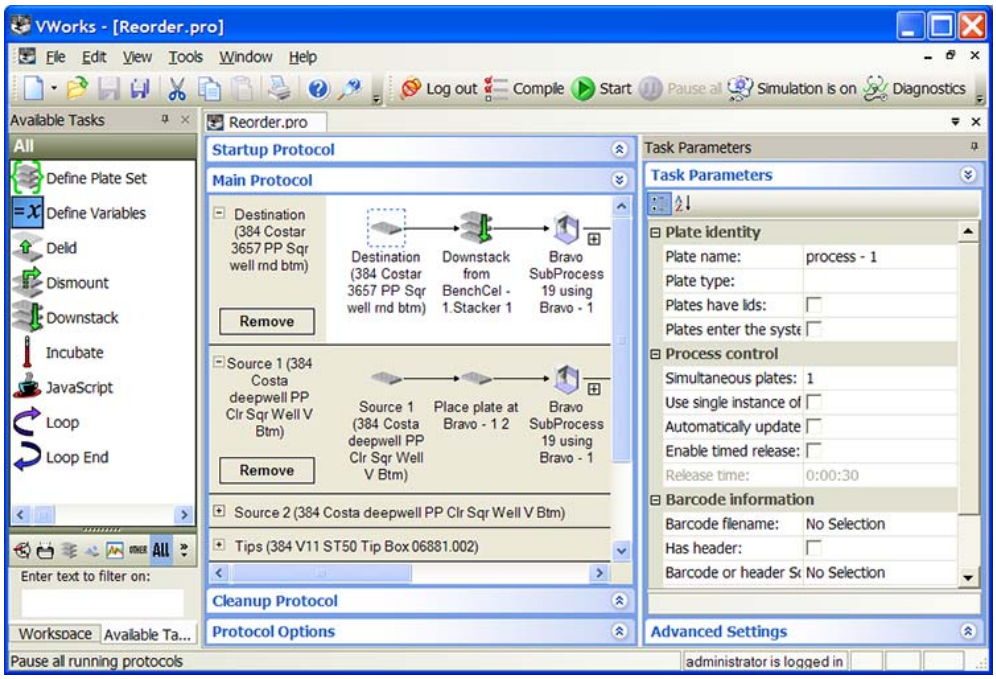
You can use either the VWorks software or third-party automation software to operate the exchanger in protocol runs. If you plan to use third-party automation software, you will need to use Microplate Exchanger ActiveX control to permit the software to interface with the exchanger.

VWorks software

The VWorks software allows you to:

- *Set up the Microplate Exchanger*. During setup, you need to create a device file for the Microplate Exchanger. For setup information, see "Setting up the Microplate Exchanger in the VWorks software" on page 53.
- *Set up user accounts and privileges*. You can set up different user accounts to enforce access policies. For instructions, see the *VWorks Automation Control Setup Guide*.
- *Define labware*. Labware definitions describe the labware you will use during protocol runs. For instructions, see the *VWorks Automation Control Setup Guide*.
- *Create protocols*. Protocols determine the sequence of tasks you want to automate in a run. For protocol-writing instructions, see the *VWorks Automation Control User Guide*.
- *Run, pause, monitor, and stop protocols*. You can start, pause, monitor, and stop a protocol run from the controlling computer. For instructions, see the *VWorks Automation Control User Guide*.

For a full description and instructions on how to use the VWorks software, see the *VWorks Automation Control User Guide*.



Microplate Exchanger ActiveX control

Instead of using the VWorks software, you can use another automation control software to operate the Microplate Exchanger in protocol runs. The Microplate Exchanger ActiveX control allows the automation software to interface with the device. For more information, see "Microplate Exchanger ActiveX control" on page 109.

Related information

For information about...	See...
Microplate Exchanger description	"About the Microplate Exchanger" on page 12
Microplate Exchanger safety	"Before you operate the Microplate Exchanger" on page 13
Hardware components	"Hardware overview" on page 14
Basic setup overview	"Quick start" on page 20

Quick start

Overall setup workflow

The following table presents the basic steps for setting up the Microplate Exchanger for operation.

Step	For this task...	See...
1	Unpack the Microplate Exchanger.	"Unpacking and packing the Microplate Exchanger" on page 37
2	Install the Microplate Exchanger.	"Installing and removing the Microplate Exchanger in an automation system" on page 41
3	Turning on the Microplate Exchanger.	"Turning on and turning off the Microplate Exchanger" on page 51
4	Install the VWorks software, or integrate the Microplate Exchanger ActiveX control.	One of the following: • *VWorks Automation Control Setup Guide* • "Microplate Exchanger ActiveX control" on page 109
5	*VWorks software only*. Create a new device file (if not already done).	"Creating a device file" on page 55
6	*VWorks software only*. Add the Microplate Exchanger in the device file.	"Adding and deleting a Microplate Exchanger in the device file" on page 57
7	Create a Microplate Exchanger profile and set the profile parameters.	"Setting Microplate Exchanger properties" on page 59
8	Set the exchanger home position.	"Setting the home position" on page 68
9	Set robot teachpoints.	Both of the following: • "Setting robot teachpoints" on page 71 • Automation system or robot user documentation
10	*VWorks software only*. Set the Microplate Exchanger device properties.	"Setting Microplate Exchanger properties" on page 59
11	Write and run protocols.	One of the following: • *VWorks Automation Control User Guide* • Automation software user documentation

Related information

For information about...	See...
Microplate Exchanger description	“About the Microplate Exchanger” on page 12
Microplate Exchanger safety	“Before you operate the Microplate Exchanger” on page 13
Hardware components	“Hardware overview” on page 14

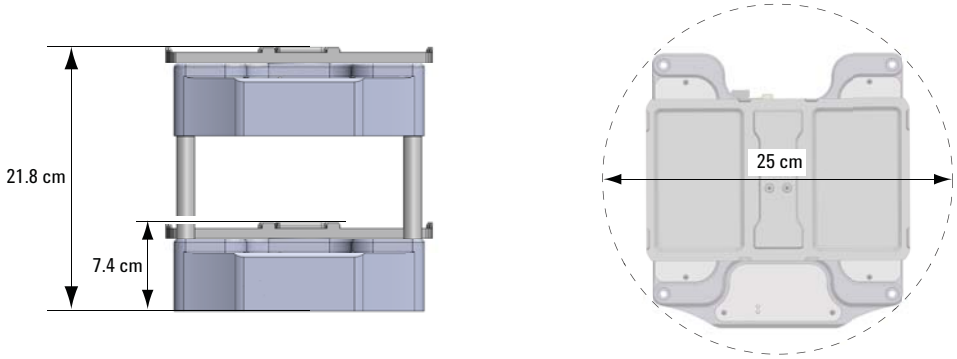
3 Specifications

This chapter contains the following topics:

Physical dimensions

Microplate Exchanger

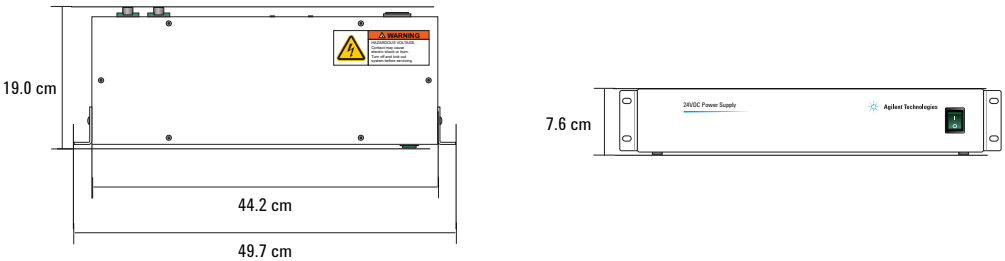
Figure Microplate Exchanger side view (left) and top view (right)



Dimension	Value
Height	
Single-Stage	7.4 cm (2.9 in)
Dual-Stage	21.8 cm (8.6 in)
Diameter	25.0 cm (9.8 in)
Weight	
Single-Stage	3.2 kg (7 lb)
Dual-Stage	6.6 kg (14.5 lb)

Power supply

Figure Power supply top view (left) and front view (right)



Dimension	Value
Width:	
Without mounting bracket	44.2 cm (17.4 in)
With mounting bracket	49.7 cm (19.6 in)
Depth	19.0 cm (7.5 in)
Height	7.6 cm (3.0 in)
Weight	3.8 kg (8.4 lb)

Power cord: 2.7 m (9.0 ft)
Microplate Exchanger cable: 3.0 m (10.0 ft)
Ethernet cable with serial adaptor: 4.3 m (14.0 ft)

Related information

For information about...	See...
Labware specifications	“Labware specifications” on page 26
Mounting specifications	“Mounting specifications” on page 27
Performance specifications	“Performance specifications” on page 30
Electrical requirements	“Electrical requirements” on page 31
Environmental requirements	“Environmental requirements” on page 32
Computer requirements	“Computer requirements” on page 33

Labware specifications

Specification	
Labware types	ANSI-compliant labware, for example: • 2-, 12-, 24-, 96-, 384-well, and deep-well microplates • Tipboxes • Tube racks
Labware orientation	Landscape

Related information

For information about...	See...
Physical dimensions	“Physical dimensions” on page 24
Mounting specifications	“Mounting specifications” on page 27
Performance specifications	“Performance specifications” on page 30
Electrical requirements	“Electrical requirements” on page 31
Environmental requirements	“Environmental requirements” on page 32
Computer requirements	“Computer requirements” on page 33

Mounting specifications

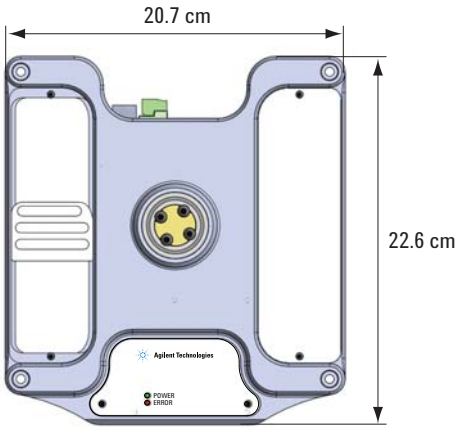
Attachment surface

The Microplate Exchanger must be installed vertically on a flat stiff surface that is stable. A deformable and non-stable support will greatly reduce the Microplate Exchanger's speed and accuracy, and possibly cause errors.

EU installations only. The stable surface recommendation is required so that the Microplate Exchanger installation is compliant with the provisions of the Machinery Directive 2006/42/EC. See Annex 1 of the Machinery Directive for the list of the Essential Health and Safety Requirements (EHSR) that must be met.

Base dimensions

The following diagram shows the overall dimensions of the base.



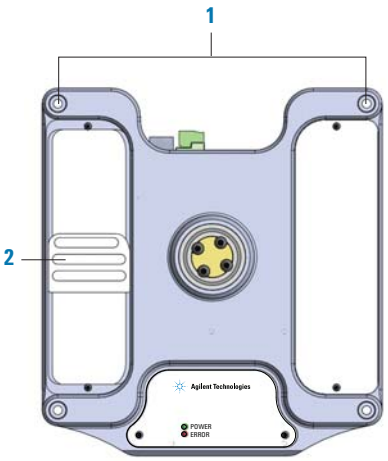
Base mounting specifications

You can mount the base of the Microplate Exchanger using one of the following methods:

- Insert four 5-mm socket-head cap screws (supplied) in the holes at the corners of the base (1).
- If the mounting holes in the attachment surface do not align with the four corner holes of the Microplate Exchanger base, insert two 6-mm socket-head cap screws (supplied) in the sliding brackets (2). To access the sliding brackets, remove the screws and lift the white cover plates on the top of the base.

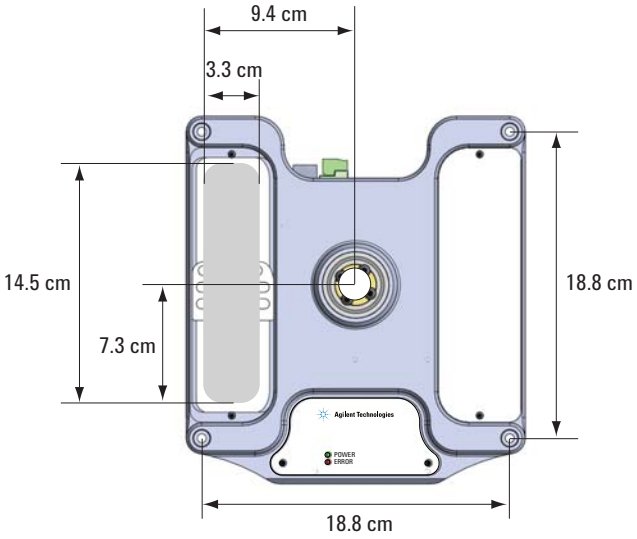
  The following diagram shows the sliding bracket on the left side of the base. The bracket on the right side is concealed by the white cover plate.

Figure Microplate Exchanger base (top view) with cover plate removed on the left



Mounting requirement	Measurement
Screw type	M5 x 60 (corners), or M6 x 25 (sliding brackets)
Number of screws	4 (corners), or 2 (sliding brackets)

The following diagram shows the base of the Exchanger and the spacing of the holes for the screws. The shaded region in the sliding-bracket area indicates the zone within which you can insert mounting screws.



Power supply

The power supply can be installed in one of two ways:

- Set on a stable, flat surface.
- Mount it in a standard 19-in rack. The power supply has two mounting brackets as the following diagram shows. The brackets are 2 rack units (or 2U) in overall height.

Figure Microplate Exchanger power supply (front view) with mounting brackets

CAUTION Air vents are on the left and right sides of the power supply. Be sure to provide at least 1.3 cm (0.5 in) of clearance on both sides.

Related information

For information about...	See...
Physical dimensions	“Physical dimensions” on page 24
Labware specifications	“Labware specifications” on page 26
Performance specifications	“Performance specifications” on page 30
Electrical requirements	“Electrical requirements” on page 31
Environmental requirements	“Environmental requirements” on page 32
Computer requirements	“Computer requirements” on page 33

Performance specifications

Performance	Value
Turn 180° any direction	< 2 s
Payload (one microplate maximum)	500 g
Accuracy of position after turn or when stationary	±0.5 mm

Related information

For information about...	See...
Physical dimensions	“Physical dimensions” on page 24
Labware specifications	“Labware specifications” on page 26
Mounting specifications	“Mounting specifications” on page 27
Electrical requirements	“Electrical requirements” on page 31
Environmental requirements	“Environmental requirements” on page 32
Computer requirements	“Computer requirements” on page 33

Electrical requirements

Requirement	Value
Voltage	100–240 V~
Frequency	50/60 Hz
Current	3 A
Maximum power consumption	360 W typical
Fuses	*AC power input.* 2 x 4 A, 250 V, time delay *24 V DC power output.* 2 x 12 A, 250 V, time delay *Note:* Only one of the 12-A fuses is required. The second fuse and power output is optional and can be used to support another device, such as a second Microplate Exchanger.
Chassis plug	IEC 60320 C14

Related information

For information about...	See...
Physical dimensions	“Physical dimensions” on page 24
Labware specifications	“Labware specifications” on page 26
Mounting specifications	“Mounting specifications” on page 27
Performance specifications	“Performance specifications” on page 30
Environmental requirements	“Environmental requirements” on page 32
Computer requirements	“Computer requirements” on page 33

Environmental requirements

IMPORTANT The Microplate Exchanger must operate within the temperature and humidity specifications stated in the following table.

Operating	Recommended range
Temperature	4–40 °C
Humidity	20–90% RH, non-condensing
Altitude	0–9.2 km
Storage (non-operating)	**Recommended range**
Temperature	-40–70 °C
Humidity	0–90% RH, non-condensing
Altitude	0–4.6 km

Related information

For information about...	See...
Physical dimensions	“Physical dimensions” on page 24
Labware specifications	“Labware specifications” on page 26
Mounting specifications	“Mounting specifications” on page 27
Performance specifications	“Performance specifications” on page 30
Electrical requirements	“Electrical requirements” on page 31
Computer requirements	“Computer requirements” on page 33

Computer requirements

About computer requirements

The requirements of the controlling computer depend on the lab automation software you are using. For VWorks software computer requirements, see the VWorks software release notes or the Automation Solutions Knowledge Base at www.agilent.com/lifesciences/automation. For third-party automation software, see the user documentation supplied with the product.

Related information

For information about...	See...
Physical dimensions	“Physical dimensions” on page 24
Labware specifications	“Labware specifications” on page 26
Mounting specifications	“Mounting specifications” on page 27
Performance specifications	“Performance specifications” on page 30
Electrical requirements	“Electrical requirements” on page 31
Environmental requirements	“Environmental requirements” on page 32

4 Unpacking and installing the Microplate Exchanger

This chapter contains the following topics:

Installation workflow

Workflow

The following table presents the steps for unpacking and installing the Microplate Exchanger.

Step	For this task...	See...
1	Unpack the Microplate Exchanger.	"Unpacking and packing the Microplate Exchanger" on page 37
2	Install the Microplate Exchanger.	"Installing and removing the Microplate Exchanger in an automation system" on page 41
3	Mount the power supply and connect the cables.	"Mounting the power supply and connecting the cables" on page 47
4	Turning on the Microplate Exchanger.	"Turning on and turning off the Microplate Exchanger" on page 51
5	Install the VWorks software or integrate the Microplate Exchanger ActiveX control.	One of the following: • *VWorks Automation Control Setup Guide* • "Microplate Exchanger ActiveX control" on page 109

Unpacking and packing the Microplate Exchanger

Before you start

The Microplate Exchanger is shipped in three cardboard boxes. The largest box contains the Microplate Exchanger, the medium-sized box contains the power supply, and the small box contains the power cord.

WARNING **The shipping box containing the Microplate Exchanger weighs 18 kg (39 lb). Make sure at least two people are available to lift and move the box. Attempting to move the box without assistance could cause personal injury. Use proper techniques when lifting the box.**

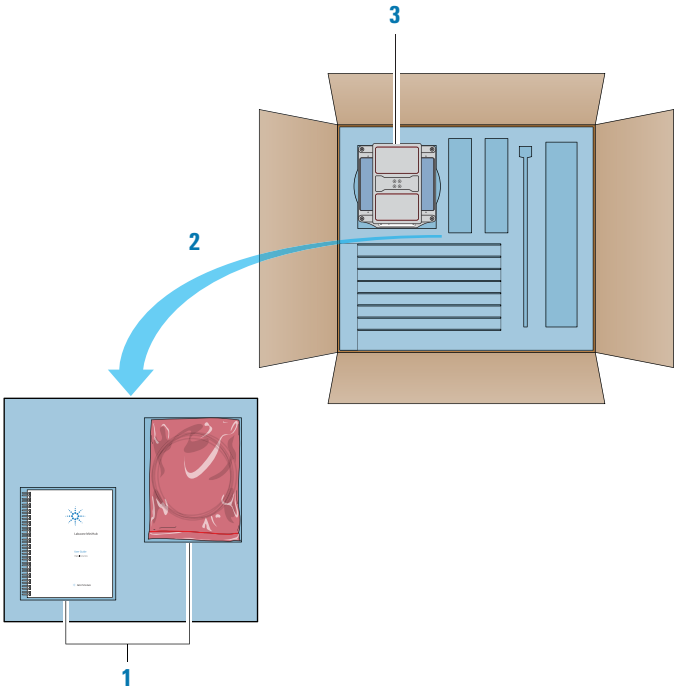
Move the shipping boxes to the area where you will be installing the device. Leave the boxes on the ground to facilitate the unpacking process.

Make sure the installation site meets the requirements described in "Specifications" on page 23.

Unpacking the shipping box

IMPORTANT Save the packaging materials in case you need to move or store the Microplate Exchanger.

To unpack the Microplate Exchanger:



1. Open the largest box, and then remove the user documentation and the plastic bag containing cables and screws from the foam block.
2. Remove the foam block.

3 Lift the Microplate Exchanger out of the box as follows:

   a Insert both hands into the curved cutouts on both sides of the exchanger.

   b With both hands supporting the bottom of the base, carefully lift the exchanger out of the box.

4 Open the medium-sized shipping box and remove the power supply from the box.

5 Open the small shipping box and remove the power cord from the box.

Inspecting the contents

Inspect all items for completeness and potential shipping damage. If an item is defective on arrival, contact the Automation Solutions Business Center as soon as possible.

- In North America, call 1.800.227.9770.
- For other locations, contact your region's Agilent Technologies office: http://www.chem.agilent.com/en-US/ContactUS/Pages/ContactUs.aspx.

Note: The contents of the shipping box depends on what you ordered.

Microplate Exchanger or Dual-Stage Microplate Exchanger

If you ordered the Microplate Exchanger or the Dual-Stage Microplate Exchanger, make sure you have the following:

Part name	Part number
G5478A Microplate Exchanger (single- or dual-stage)	G5508-60011
G5473A Power supply	G5508-60008
Base mounting screws:	
M5 socket-head cap screws (4)	G5550-02377
M6 socket-head cap screws (2)	G5550-02412
Power supply mounting:	
Pan-head Phillips machine screws (4)	G5550-09078
M5 split lock washer (4)	G5550-02453
M5 flat washer (4)	G5550-02439
Power cable	Varies by country
Microplate Exchanger base power cable	G5508-60005
Serial connection:	
Ethernet cable	G5550-22527
Serial adaptor	G5550-21721
Microplate Exchanger User Guide	G5478-90004

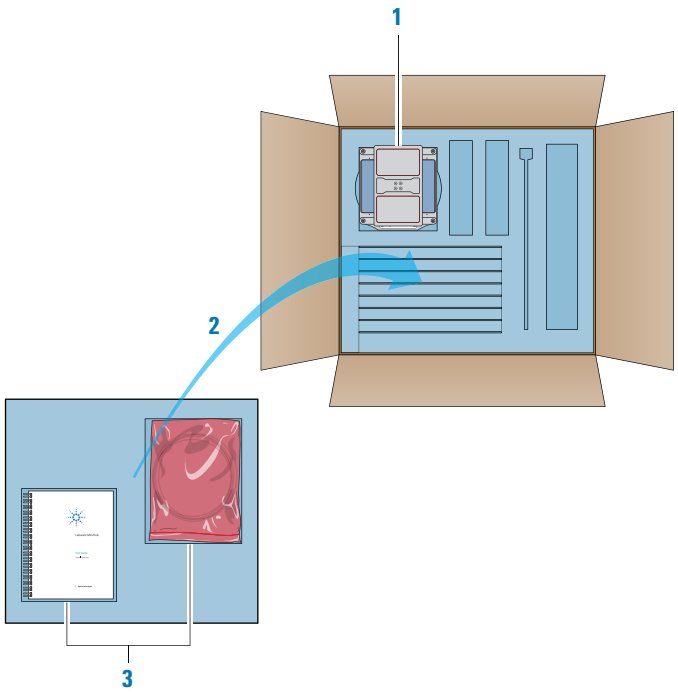
Dual-Stage Microplate Exchanger upgrade

If you already have a Microplate Exchanger and you ordered the kit to upgrade the device to a Dual-Stage Microplate Exchanger, make sure you have the following:

Part name	Part number
G5478A Microplate Exchanger (single-stage)	G5508-60011
Microplate Exchanger base power cable	G5508-60005
Serial connection:	
Ethernet cable	G5550-22527
Serial adaptor	G5550-21721
Support posts (4)	5023-1665
M5 socket-head cap screws (8) for the posts	G5550-08530

Packing the Microplate Exchanger

To pack the Microplate Exchanger:



1. Leaving the packing box on the ground, carefully place the Microplate Exchanger or Dual-Stage Microplate Exchanger in its foam cutout. Make sure it is seated securely.
2. Place the remaining foam block on top of the box contents.
3. Place all screws, washers, and cables in a plastic bag. Place the user documentation and the plastic bag of screws and cables in their cutouts in the foam block.
4. Close the box.

5 Carefully place the power supply in its shipping box.

6 Close the box.

Related information

For information about...	See...
Installing the Microplate Exchanger	“Installing and removing the Microplate Exchanger in an automation system” on page 41
Reconfiguring the Microplate Exchanger shelves	“Adding or removing a second exchanger” on page 43
Turning on the Microplate Exchanger	“Turning on and turning off the Microplate Exchanger” on page 51
Packing the Microplate Exchanger	“Packing the Microplate Exchanger” on page 39

Installing and removing the Microplate Exchanger in an automation system

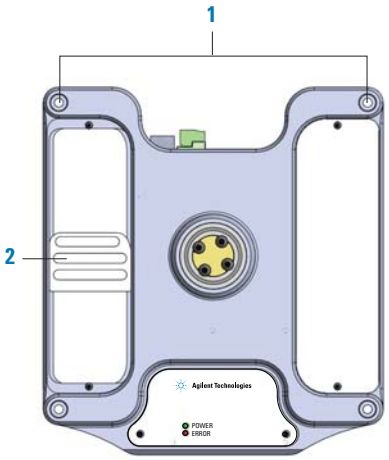
Materials and tools

If you are attaching the Microplate Exchanger base using the four corner screw holes (1), make sure you have the following:

- M5 Socket-head cap screws, 4 (supplied with product, G5550-02377)
- 4-mm hex wrench (not supplied)

If you are attaching the Microplate Exchanger base using the sliding brackets (2) under the white cover plates, make sure you have the following:

- M6 socket-head cap screws, 2 (supplied with product, G5550-02412)
- 1.5-mm hex wrench (not supplied)
- 5-mm hex wrench (not supplied)



Installing the Microplate Exchanger base

When you install the Microplate Exchanger, you first attach the Microplate Exchanger base to a stable and flat surface, mount the power supply (if desired), then connect the power and communication cables.

Attaching the Microplate Exchanger base

To attach the base:

1. Position the Microplate Exchanger base on the attachment surface so that the screw holes at the four corners align over the mounting holes in the attachment surface.

   Alternatively, use the 1.5-mm hex wrench to remove the white covers on the base. Move each slider such that at least one screw slot aligns over a mounting hole in the attachment surface.
2. Insert the screws in the holes or adjustable slots.
3. Use the 4-mm hex wrench to tighten the corner screws, or use the 5-mm hex wrench to tighten the screws in the adjustable slots.

Removing the Microplate Exchanger base

To remove the Microplate Exchanger base:

1. Detach the Microplate Exchanger base from the table. Using the 4-mm or 5-mm hex wrench, remove the screws that are holding the base to the attachment surface.
2. Save all screws for reinstallation.

Related information

For information about...	See...
Adding or removing a second exchanger	"Adding or removing a second exchanger" on page 43
Turning on the Microplate Exchanger	"Turning on and turning off the Microplate Exchanger" on page 51
Packing the Microplate Exchanger	"Packing the Microplate Exchanger" on page 39

Adding or removing a second exchanger

About this topic

The Microplate Exchanger and the Dual-Stage Microplate Exchanger are shipped to your laboratory fully assembled. If you have the Microplate Exchanger, you have the option of adding a second exchanger at any time to increase throughput. If you have a Dual-Stage Microplate Exchanger, you can remove one of the exchangers to meet your application needs.

This topic explains how to add and remove the second exchanger.

Materials and tools

Make sure you have a 4-mm hex wrench (not supplied).

If you will be adding an exchanger, make sure you have the following:

- Microplate Exchanger (G5508-20008)
- Dual-Stage Microplate Exchanger Support Posts, 4 (5023-1665)
- M5 socket-head cap screws x 50, 8 (G5550-08530)

Before you start

If you are adding or removing the second exchanger after the device has already been in operation:

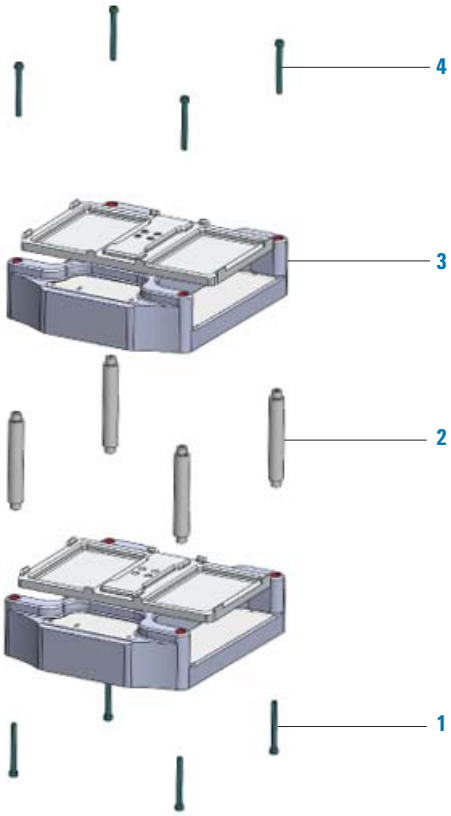
1. Turn off the automation system. See the automation system user guide for instructions.
2. Turn off the Microplate Exchanger or the Dual-Stage Microplate Exchanger. See “Turning on and turning off the Microplate Exchanger” on page 51.
3. Disconnect the power cord from the Microplate Exchanger power supply.
4. Remove the Microplate Exchanger or Dual-Stage Microplate Exchanger from its attachment surface. See “Installing and removing the Microplate Exchanger in an automation system” on page 41. You must remove the device to access the bottom of the base.

Adding a second exchanger

WARNING **Always turn off the Microplate Exchanger and shut down the system before adding or removing a stage.**

WARNING **Always disconnect the power cord from the Microplate Exchanger power supply before adding or removing a stage.**

To add a second stage:



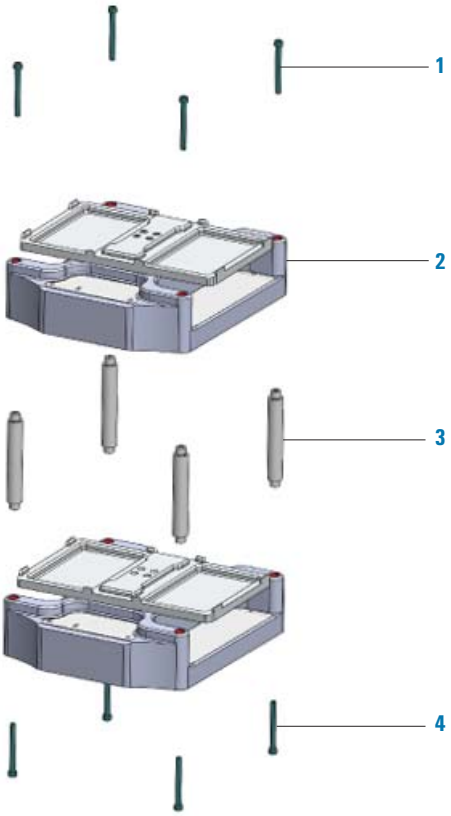
1. Insert four M5 socket-head cap screws into the corner screw holes at the bottom of the base. With the screws inserted, place the base on a table to prevent the screws from falling out.
2. Insert the support posts into the corner screw holes, and then:
   a. Turn the posts clockwise a number of times so that the screws beneath will not fall.
   b. Use the 4-mm hex wrench to tighten the screws from under the base.
3. Place the second exchanger on the support posts, making sure the posts insert into the screw holes at the bottom of the base.
4. Insert four M5 socket-head cap screws into the corner screw holes from the top of the base, and tighten the screws using the 4-mm hex wrench.
5. Attach the Dual-Stage Microplate Exchanger to the attachment surface. See “Installing and removing the Microplate Exchanger in an automation system” on page 41.

Removing the second stage

WARNING **Always turn off the Microplate Exchanger and shut down the system before adding or removing a stage.**

WARNING **Always disconnect the power cord from the Microplate Exchanger power supply before adding or removing a stage.**

To remove a second stage:



1. Using the 4-mm hex wrench, unscrew and remove the M5 socket-head cap screws.
2. Lift up and remove the exchanger.
3. Turn the posts counterclockwise to loosen them.
4. Using the 4-mm hex wrench, unscrew the M5 socket-head cap screws from the bottom of the base to remove the posts and screws.
5. Attach the single Microplate Exchanger to the attachment surface. See "Installing and removing the Microplate Exchanger in an automation system" on page 41.

Related information

For information about...	See...
Turning on the Microplate Exchanger	"Turning on and turning off the Microplate Exchanger" on page 51
Starting up the automation system	Automation system user documentation
Setting the home position	"Setting the home position" on page 68
Setting the robot teachpoints	"Setting robot teachpoints" on page 71

For information about...	See...
Packing the Microplate Exchanger	"Packing the Microplate Exchanger" on page 39
Using the Microplate Exchanger ActiveX control	"Microplate Exchanger ActiveX control" on page 109
Setting up the Microplate Exchanger in the VWorks software	"Setting up the Microplate Exchanger in the VWorks software" on page 53
Configuring the Microplate Exchanger in Microplate Exchanger Diagnostics	"Configuring the Microplate Exchanger" on page 63

Mounting the power supply and connecting the cables

Materials and tools

Make sure you have the following supplied materials and tools:

- 18-8 SS pan-head cross-recess machine screws, 4 (G5550-09078)
- M05 split lock washers, 4 (G5550-02453)
- M05 flat washers, 4 (G5550-02439)
- Power supply power cord (part number varies by country)
- Microplate Exchanger base power cable (G5508-60005)
- Ethernet cable with serial adaptor (G5550-22527, G5550-21721)
- ESD grounding strap (G5508-60028)

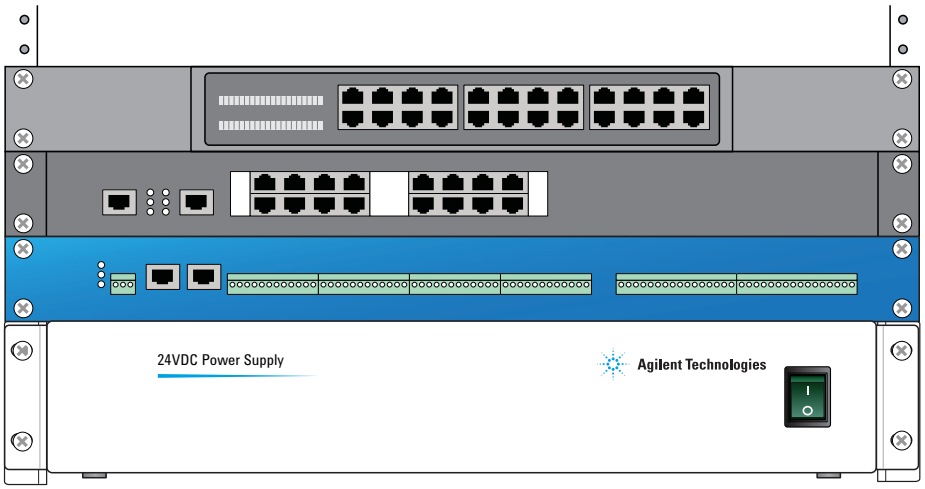
In addition, make sure you have a #2 cross-head screw driver (not supplied).

Mounting the power supply

WARNING **Use only the supplied power cord to connect the Microplate Exchanger to the power source. Using other power cords can cause damage to the device or injury to the user during operation.**

You can set the power supply on a stable, flat surface. Alternatively, you can use the supplied mounting brackets to mount the power supply on a standard 19-inch rack. The following diagram shows an example of how you can mount the power supply in a system.

Note: The mounting brackets are installed on the power supply.

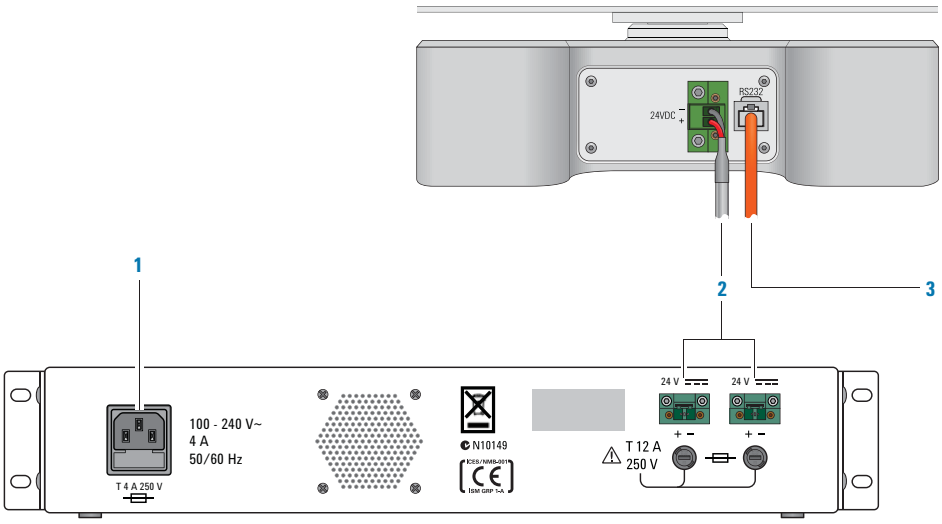


To mount the power supply on a standard mounting rack:

1. Insert each pan-head screw through a split-lock washer first, and then through a flat washer.
2. Align two holes in each mounting bracket with two holes in the rack.
3. Insert the screw-washer assembly into each hole and tighten using the screwdriver.

Connecting the cables

To connect the cables:



1 Use the supplied power cord to connect the Microplate Exchanger power supply to the power source.

2 Use the supplied Exchanger base power cable to connect the Microplate Exchanger to the power supply. Use one of the connectors on the back of the power supply. (The second connector can be used to support another device, such as a second Exchanger.)

3 Use the supplied Ethernet cable to connect the Microplate Exchanger to the controlling computer. Use one of the following methods:

- Connect the Microplate Exchanger to the controlling computer directly. Be sure to connect the serial-adaptor end of the cable to the computer.
- Connect the Microplate Exchanger to a serial communication hub that is connected to the controlling computer.

Connecting the ESD grounding strap

For Electrostatic Discharge (ESD) compliance and protection, the Microplate Exchanger requires either bolting to a grounded, conductive surface (such as a metal workbench or table top) or using the supplied external ESD grounding strap to connect the chassis to a grounded surface.

IMPORTANT Extending the ESD grounding strap by connecting it to another grounding wire may reduce its ESD protection capabilities.

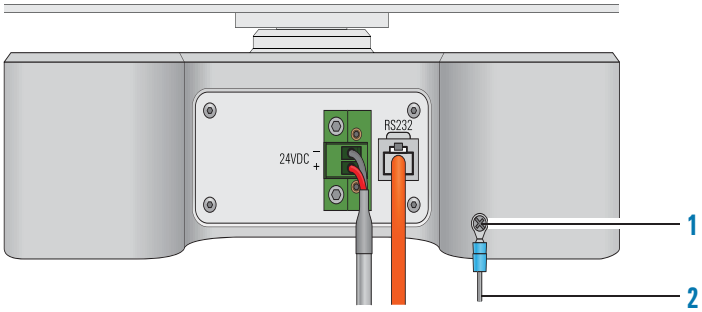
Note: In the case of the Dual-Stage Microplate Exchanger, only one of the exchangers needs to be grounded.

The supplied ESD grounding strap is installed on the Microplate Exchanger base. If, for some reason, it was removed, you must reconnect the strap before operating the Microplate Exchanger. This section describes how to connect the strap.

WARNING To prevent potential injury, always turn off the Microplate Exchanger and shut down the system before connecting or disconnecting the ESD grounding strap.

WARNING **To prevent potential injury, always disconnect the power cord from the Microplate Exchanger power supply before connecting or disconnecting the ESD grounding strap.**

To connect the ESD grounding strap:



1 Using the screw driver, loosen the grounding screw at the base, place the loop at one end of the grounding strap behind the screw, and tighten the screw. The strap should be connected securely.

2 Connect the free end of the grounding strap to a grounded surface or wire.

Connecting to the system-wide emergency-stop circuit

If the Microplate Exchanger is integrated in an automation system, Agilent Technologies recommends that you install a system-wide emergency stop button to cut power to the Microplate Exchanger and all devices simultaneously. You can connect the Microplate Exchanger power supply to the power source that controls the system-wide emergency-stop circuit.

For more safety information, see “Safety information” on page 1.

Removing the power supply

To remove the power supply from the mounting bracket:

1 Disconnect and remove the following:

- Power cable
- Exchanger base power cable
- Ethernet cable with serial adaptor

Be sure to store the cables after you remove them.

2 Leave the ESD grounding strap on the Exchanger base.

3 Using the screw driver, remove the screws that are holding the power supply to the mounting bracket. Be sure to keep all of the screws and washers that were removed.

Related information

For information about...	See...
Turning on the Microplate Exchanger	"Turning on and turning off the Microplate Exchanger" on page 51
Starting up the automation system	Automation system user documentation
Setting the home position	"Setting the home position" on page 68
Setting the robot teachpoints	"Setting robot teachpoints" on page 71
Packing the Microplate Exchanger	"Packing the Microplate Exchanger" on page 39
Using the Microplate Exchanger ActiveX control	"Microplate Exchanger ActiveX control" on page 109
Setting up the Microplate Exchanger in the VWorks software	"Setting up the Microplate Exchanger in the VWorks software" on page 53
Configuring the Microplate Exchanger in Microplate Exchanger Diagnostics	"Configuring the Microplate Exchanger" on page 63

Turning on and turning off the Microplate Exchanger

Turning on the Microplate Exchanger

CAUTION **The Microplate Exchanger will rotate during the startup process. Obstructing the Microplate Exchanger while it is rotating will cause an error.**

To turn on the Microplate Exchanger:

At the front of the Microplate Exchanger power supply, press the on/off switch to the on (**I**) position. The on/off switch light turns on. The Microplate Exchanger rotates slowly to its factory-set home position.

Turning off the Microplate Exchanger

To turn on the Microplate Exchanger:

At the front of the Microplate Exchanger power supply, press the on/off switch to the off (**O**) position. The on/off switch light turns off.

Related information

For information about...	See...
Adding or removing a second exchanger	“Adding or removing a second exchanger” on page 43
Packing the Microplate Exchanger	“Packing the Microplate Exchanger” on page 39

5
Setting up the Microplate Exchanger in the VWorks software

This chapter explains how to set up the Microplate Exchanger in the VWorks software. This chapter contains the following topics:

If you are using some other lab automation software and want to integrate the Microplate Exchanger ActiveX control, see "Microplate Exchanger ActiveX control" on page 109.

Setup workflow

Workflow

The following table presents the steps for setting up the Microplate Exchanger in the VWorks software. After setting up the Microplate Exchanger for the first time, you will not likely change any of the settings in the procedure.

Step	For this task...	See...
1	Create a device file.	"Creating a device file" on page 55
2	Add the Microplate Exchanger in the device file.	"Adding and deleting a Microplate Exchanger in the device file" on page 57.
3	Set the Microplate Exchanger properties in VWorks software.	"Setting Microplate Exchanger properties" on page 59

Related information

For information about...	See...
Profiles	"Creating Microplate Exchanger profiles" on page 64
Setting the home position	"Setting the home position" on page 68
Setting robot teachpoints	"Setting robot teachpoints" on page 71
Verifying robot teachpoints	"About verifying teachpoints" on page 71

Creating a device file

About this topic

This topic explains how to create a device file in the VWorks software. If you have an existing automation system and you already have a device file you want to use, skip this step and proceed to "Adding and deleting a Microplate Exchanger in the device file" on page 57.

Devices and device file defined

What is a device?

A device is an item in your lab automation system that has an entry in the VWorks software device file. A device can be a robot, an instrument, or a location in the system that can hold a piece of labware. The following are some examples of devices:

- Automation system robot, such as the Direct Drive Robot
- Microplate Exchanger
- PlateLoc Thermal Microplate Sealer
- Microplate Labeler
- Vertical Pipetting Station shelf
- Platepad
- All third-party devices integrated in the lab automation system

What is a device file?

To communicate with and to control the robot and integrated devices, the VWorks software uses a device file that contains the following information:

- List of devices the software will communicate with and control
- Profile of each device (communication method, unique device configuration information)
- System-related configuration information of each device (for example, approach height, barcode access, and so on)

You provide the device information in the VWorks software. The device information is stored in a device (.dev) file that is located in a folder you specify when saving the file.

For detailed information about device files and associations with profiles, teachpoint files, and other VWorks components, see the *VWorks Automation Control User Guide*.

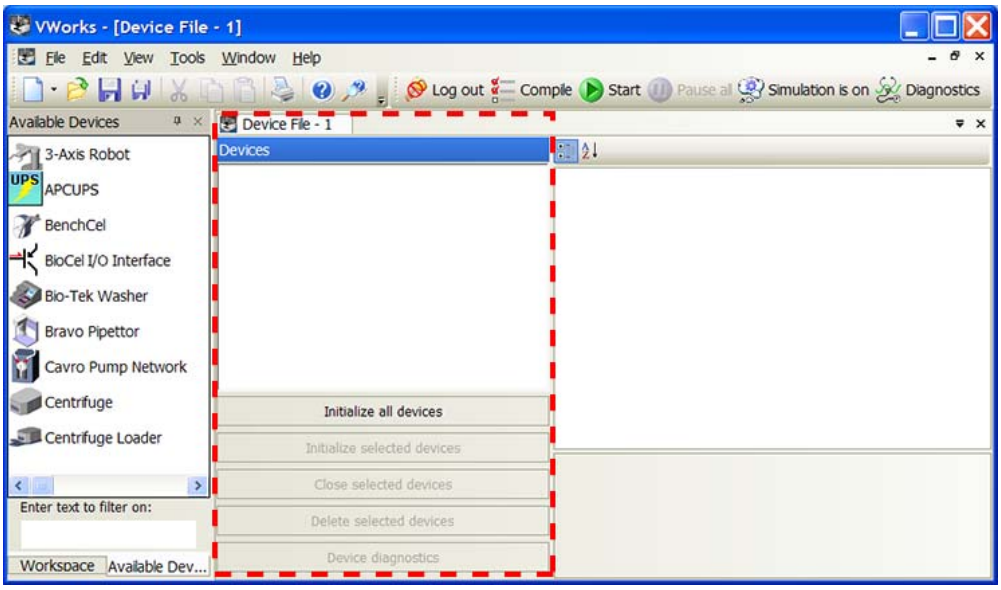
Procedure

If you are setting up a lab automation system such as the BioCel System for the first time, you need to create a new device file, and then add the system robot, the Microplate Exchanger, and integrated devices to this file.

Before you create a device file, start the VWorks software and log in. See the *VWorks Automation Control User Guide* for instructions.

To create a new device file:

1 In the **VWorks** window, select **File > New > Device.** A Device File tab appears.



2 Select **File > Save** to save the device file. The file name appears in the Device File tab.

Related information

For information about...	See...
VWorks software	• *VWorks Automation Control Setup Guide* • *VWorks Automation Control User Guide*
Adding the Microplate Exchanger in the device file	"Adding and deleting a Microplate Exchanger in the device file" on page 57
Creating profiles for the exchanger	"Creating Microplate Exchanger profiles" on page 64
Setting the home position	"Setting the home position" on page 68
Setting robot teachpoints	"Setting robot teachpoints" on page 71

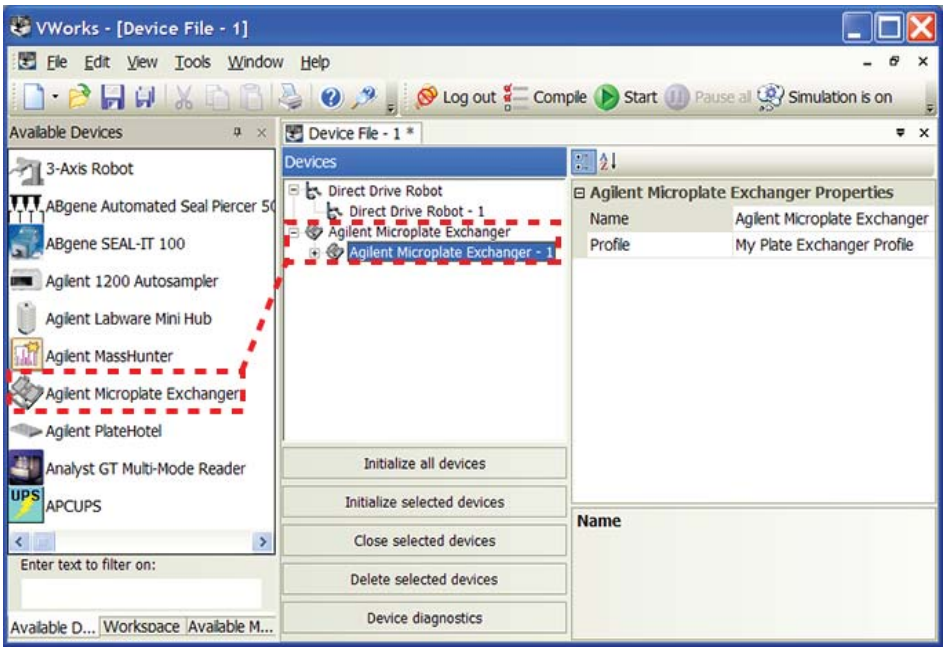
Adding and deleting a Microplate Exchanger in the device file

Adding Microplate Exchangers in the device file

Note: If you have a Dual-Stage Microplate Exchanger, you need to add two Microplate Exchanger devices in the device file. The VWorks software views each stage as an independent exchanger device.

To add a Microplate Exchanger in the device file:

1 In the **Available Devices** area, double-click the Microplate Exchanger device icon. Alternatively, you can drag the icon from the **Available Devices** area into the **Device File** area.



Notice that the first Microplate Exchanger device is labeled Microplate Exchanger-1. If you add a second Microplate Exchanger device, it will appear as Microplate Exchanger-2.

If you do not see the Microplate Exchanger in the **Available Devices** list, check that the Exchanger plugin file (AgilentMicroplateExchanger.dll) is stored in the following folder: ...\Agilent Technologies\VWorks\Plugins.

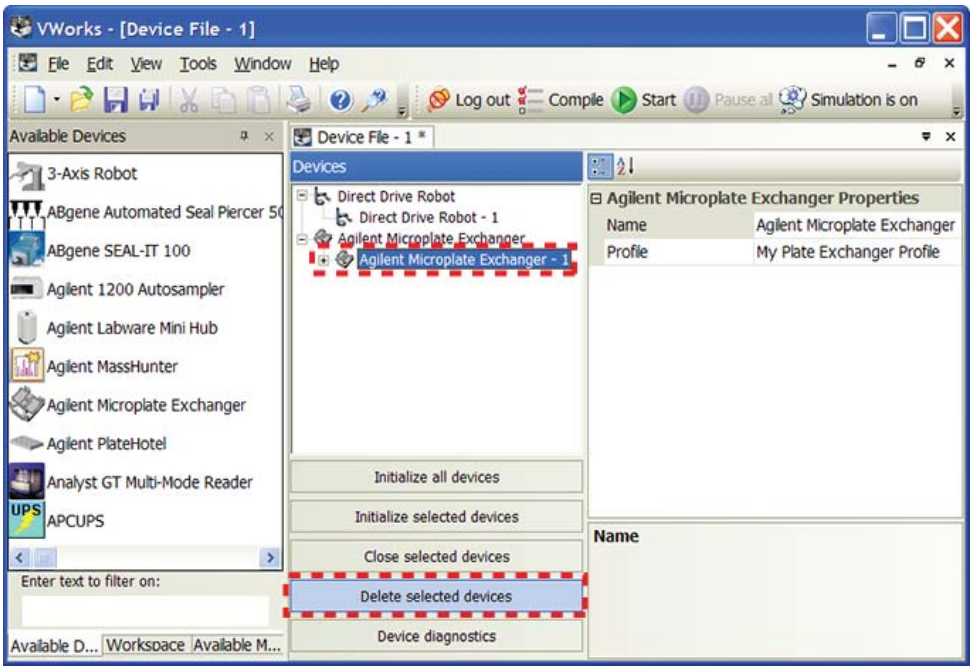
If you added the Microplate Exchanger plugin file in the Plugins folder and you have already started the VWorks software, be sure to reload the plugin. To do this, close any open device files and protocol files, and then select **Tools > Reload Plugins.**

2 If you have a Dual-Stage Microplate Exchanger, repeat step 1 to add a second Microplate Exchanger device.

Deleting a Microplate Exchanger from the device file

To delete a Microplate Exchanger from the device file:

1. In the **VWorks** window, select the Microplate Exchanger you want to delete in the **Devices** area.
2. Click **Delete selected devices.**



Related information

For information about...	See...
Creating profiles for the Microplate Exchanger	"Creating Microplate Exchanger profiles" on page 64
Editing profiles	"Editing and managing profiles" on page 67
Setting up Microplate Exchanger properties in the device file	"Setting Microplate Exchanger properties" on page 59
VWorks software	• *VWorks Automation Control Setup Guide* • *VWorks Automation Control User Guide*
Adding the system or workstation robot and creating profiles for the robot	• *BioCel System User Guide* • *BenchCel Microplate Handling Workstation User Guide*

Setting Microplate Exchanger properties

About the Microplate Exchanger properties

In the device file, you can set properties for each device. For the Microplate Exchanger, you can name the Microplate Exchanger, select the desired profile, and associate the robot teachpoint with each platepad on the rotating stage.

The instructions in this topic assumes that you have already:

- Created a Microplate Exchanger profile.
- Set the Microplate Exchanger home position.
- Set the robot teachpoints for each platepad.

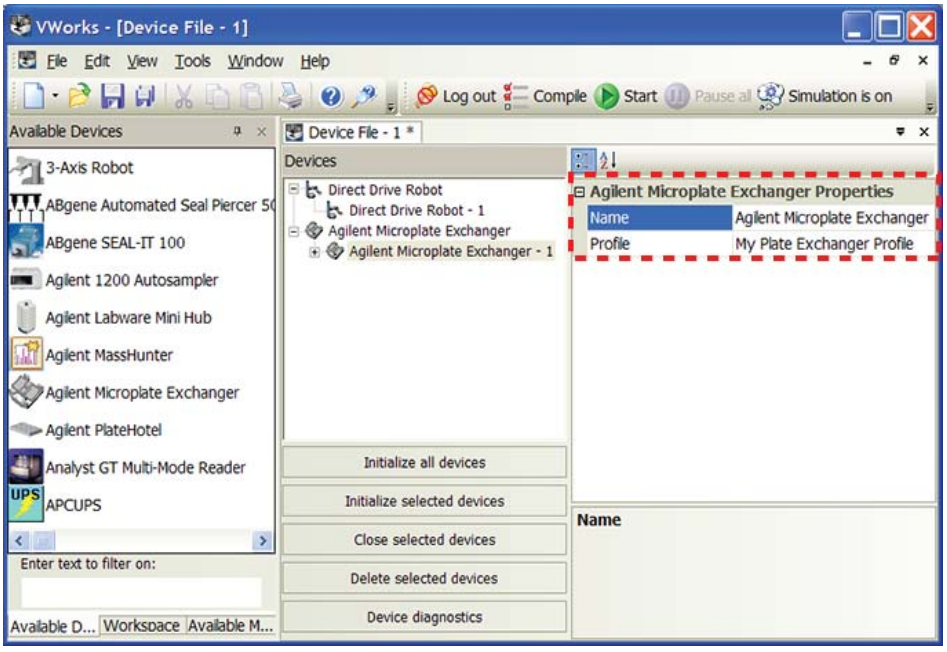
Procedure

Be sure to set the properties for each Microplate Exchanger device you have in the device file.

To set the Microplate Exchanger properties:

1 In the **Devices** area, select the Microplate Exchanger device.

2 In the **Microplate Exchanger Properties** area of the device file, type or select the following:

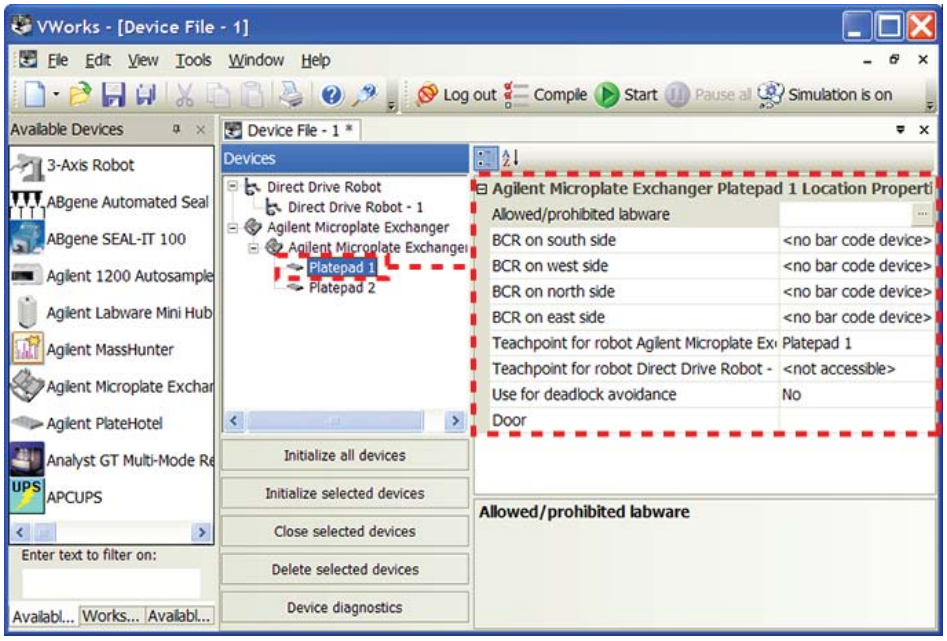


Property	Description
Name	The name of the Microplate Exchanger. Type a name for the Microplate Exchanger. In the following example, the name for the Microplate Exchanger is My Plate Exchanger - 1.

Property	Description
Profile	The profile associated with the device. Select the desired profile from the list. If the profile you want does not appear in the list, or if no profile appears in the list, see "Creating Microplate Exchanger profiles" on page 64, and then return to this step to select the profile. **IMPORTANT** Without the profile, you will not be able to establish communication with the device.

3 In the **Devices** area, expand **Microplate Exchanger**, and then select **Platepad 1.**

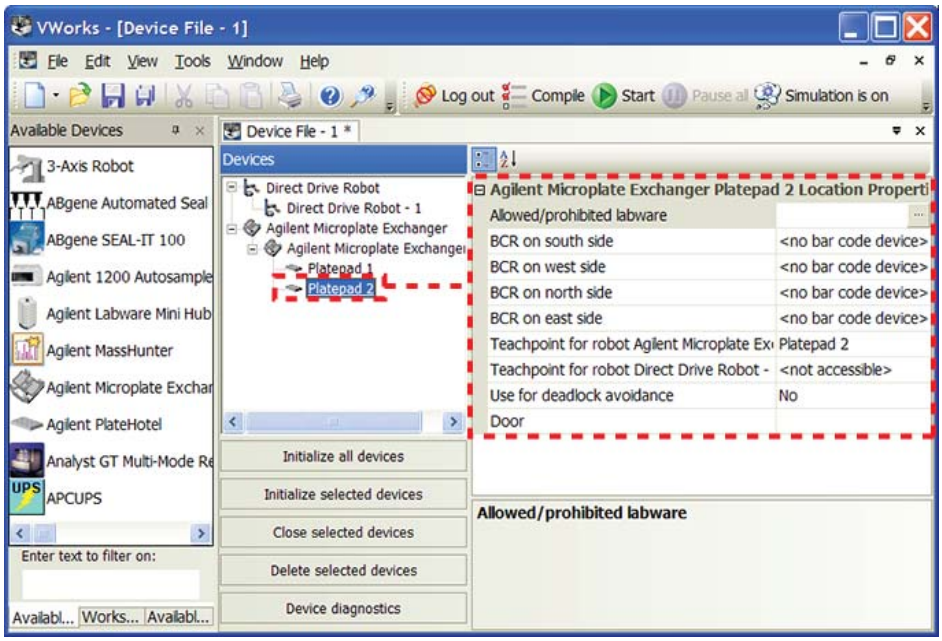
4 In the **Microplate Exchanger Platepad 1 Location Properties** area, set the following parameters:



Parameter	Description
Allow/prohibited labware	Permitted labware class for the selected location. For example, you might specify that only tipboxes are allowed at a given location. For details on labware classes, see the *VWorks Automation Control Setup Guide*.
BCR on south/west/north/east side	The location of the barcode reader and the desired barcode reader device. Use this field only if a barcode reader is installed on the device.

Parameter	Description
Teachpoint for robot <robot_name>	The name of the robot teachpoint at the platepad 1 location. This selection enables the robot to move correctly to and from the platepad during a protocol run. If the robot teachpoint file contains a teachpoint for this platepad, you must select that teachpoint. *Note:* In simulation mode, select **<accessible>**.
Use for deadlock avoidance	The option to permit the location to be used for deadlock avoidance. Select **Yes** to permit labware to be moved to this location to avoid a deadlock in the system. Select **No** if you do not want to move random labware to this location to avoid deadlock. **IMPORTANT** Always select **No** for the Microplate Exchanger.
Door	Not applicable

5 In the **Devices** area, select **Platepad 2.**



6 In the **Microplate Exchanger Platepad 2 Location Properties** area, set the parameters as you did in step 3. However, for the **Teachpoint for robot <robot_name>** parameter, select the name of the robot teachpoint at the platepad 2 location.

7 Select **File > Save** to save the device file.

8 In the **Device File** area, select the Microplate Exchanger, and then click **Initialize selected devices** to establish communication with the device.

9 If you have a Dual-Stage Microplate Exchanger, repeat the steps in this procedure to set the properties of the second exchanger device.

Related information

For information about...	See...
Creating profiles for the Microplate Exchanger	"Creating Microplate Exchanger profiles" on page 64
Editing profiles	"Editing and managing profiles" on page 67
Setting the platepad positions	"Setting the home position" on page 68
Setting robot teachpoints	"Setting robot teachpoints" on page 71
VWorks software	• *VWorks Automation Control Setup Guide* • *VWorks Automation Control User Guide*
Adding the automation system or workstation robot and creating profiles for the robot	• Automation system user documentation, such as the *BioCel System User Guide* • *BenchCel Microplate Handling Workstation User Guide*

6
Configuring the Microplate Exchanger

This chapter contains the following topics:

Configuration workflow

About this topic

This topic presents the workflow for configuring the Microplate Exchanger in Microplate Exchanger Diagnostics. You will need to perform this step whether you are using the VWorks software or a different automation control software with the Microplate Exchanger ActiveX control.

Workflow

The following table presents the steps for setting up the Microplate Exchanger in the Microplate Exchanger Diagnostics.

Step	For this task...	See...
1	Create a profile for the Microplate Exchanger.	"Creating Microplate Exchanger profiles" on page 64
2	Edit or rename the profile.	"Editing and managing profiles" on page 67
3	Set the Microplate Exchanger home position.	"Setting the home position" on page 68
4	Set robot teachpoints.	"Setting robot teachpoints" on page 71

Creating Microplate Exchanger profiles

About profiles

A profile is a collection of settings, stored in the Windows registry, that manages how you connect to a device. A Microplate Exchanger profile specifies the following:

- COM port used to establish communication between the device and the controlling computer.
- The speed at which the device will rotate during protocol runs.

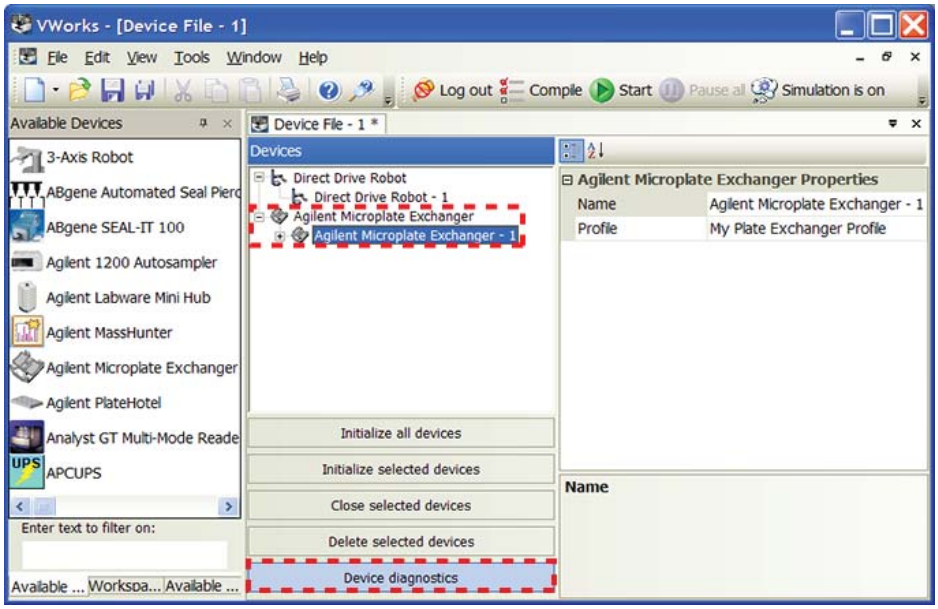
You use the Exchanger Diagnostics software to create and manage Microplate Exchanger profiles.

Note: If you are using the VWorks software, be aware that each device in the device file requires a unique profile. For information about device files, see "Creating a device file" on page 58. For a detailed description of the relationships between the device file and profile, see the *VWorks Automation Control User Guide*.

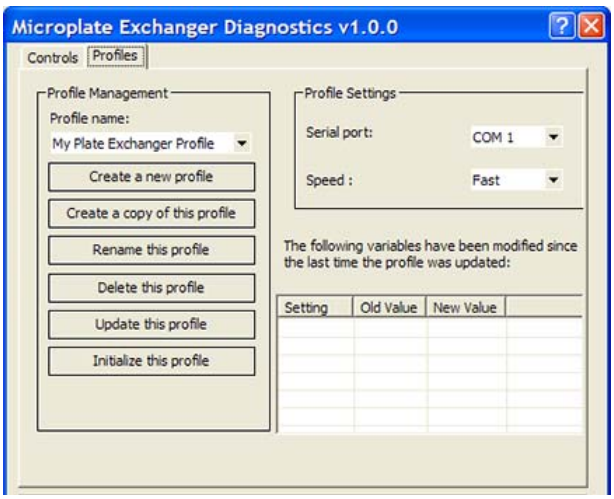
Creating a Microplate Exchanger profile

To create a Microplate Exchanger profile:

1 In the **Devices** area, select the Microplate Exchanger name, and then click **Device diagnostics.**



The Microplate Exchanger Diagnostics dialog box opens.



2 If it is not already displayed, click the **Profiles** tab.

3 In the **Profile Management** area, click **Create a new profile**. The Create Profile dialog box opens.

4 Type a name, and click **OK**. The name appears in the **Profile Management** area.

5 In the **Profile Settings** area, set the following parameters:

Profile parameter	Description
Serial port	The controlling computer COM port that is connected to the Microplate Exchanger.
Speed	The speed at which the stage rotates during protocol runs. The three selections are: • *Slow*. Turns the stage at 25% of the factory-set maximum speed. • *Medium*. Turns the stage at 50% of the factory-set maximum speed. • *Fast*. Turns the stage at 100% of the factory-set maximum speed. To set the speed at which the stage rotates while you are making adjustments in Microplate Exchanger Diagnostics, see "Changing the rotation speed" on page 78.

6 Click **Update this profile** to save the changes.

7 Click **Initialize this profile** to establish communication with the Microplate Exchanger.

WARNING **The Microplate Exchanger will rotate during the initialization process. Obstructing the Exchanger while it is rotating will cause an error.**

Related information

For information about...	See...
Editing and managing profiles	"Editing and managing profiles" on page 67
Setting the home position	"Setting the home position" on page 68
Setting robot teachpoints	"Setting robot teachpoints" on page 71

Editing and managing profiles

Editing profiles

To edit a profile:

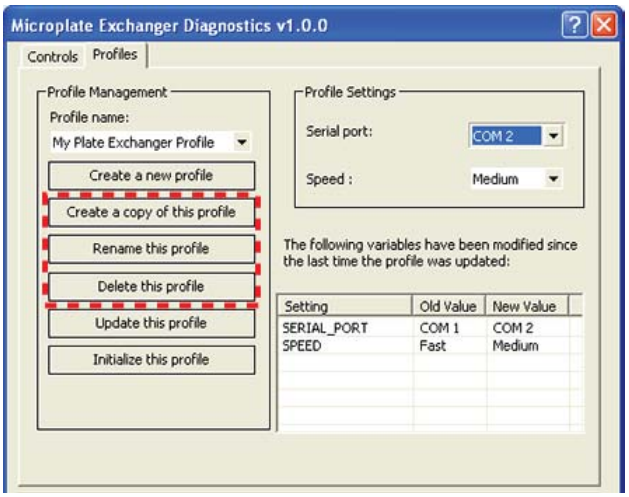
1. In the Microplate Exchanger Diagnostics **Profiles** tab, select the profile you want to edit in the **Profile Management** area.
2. Modify the profile information.

   Note: Changes you make in the profile are shown in the table below the Profile Settings area.
3. When you are finished, click **Update this profile** to save the changes.

Managing profiles

In the Microplate Exchanger Diagnostics **Profiles** tab, you can select an existing profile, and then rename, copy, or delete the profile.

CAUTION A copy of an existing profile references the same home position.



Related information

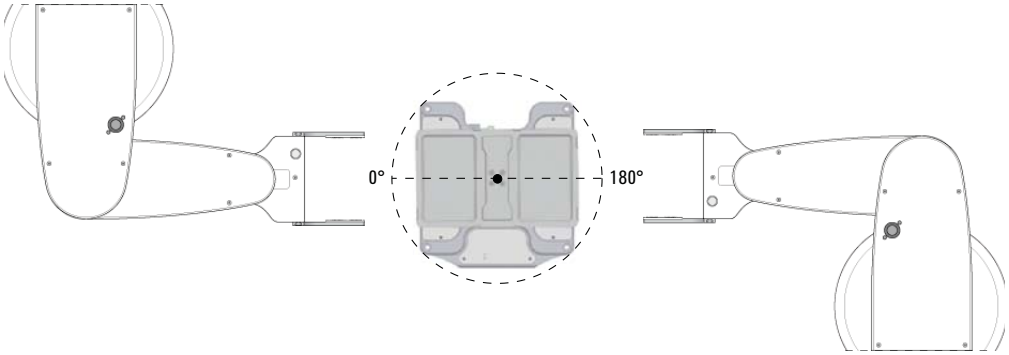
For information about...	See...
Creating profiles	"Creating Microplate Exchanger profiles" on page 64
Setting the home position	"Setting the home position" on page 68
Setting robot teachpoints	"Setting robot teachpoints" on page 71

Setting the home position

About the home position

The Microplate Exchanger home position is the position at which the automation system robots access the two platepads on the stage. One of the platepads (platepad 1) is at 0°, the other platepad (platepad 2) is at 180°.

The home position is also the position at which the Position value in the Controls tab is set at 0.0°.



Before you start

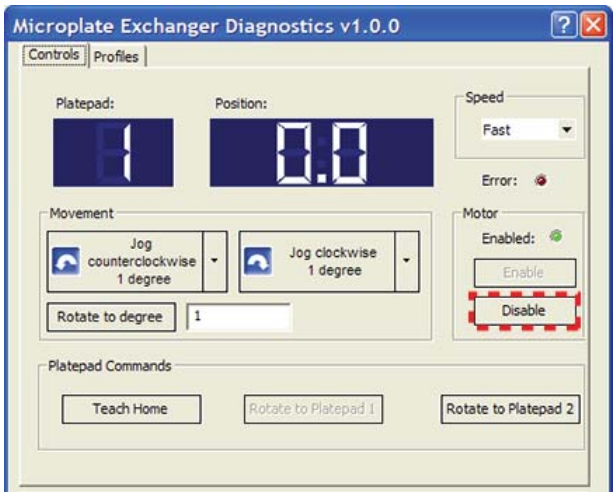
Make sure you:

- Have the robot teaching jigs or two standard microplates you want to use for the procedure.
- Use the robots to pick up the teaching jigs or microplates from a location in the system, such as a reference placepad. Each robot should be holding the teaching jig or microplate.

Procedure

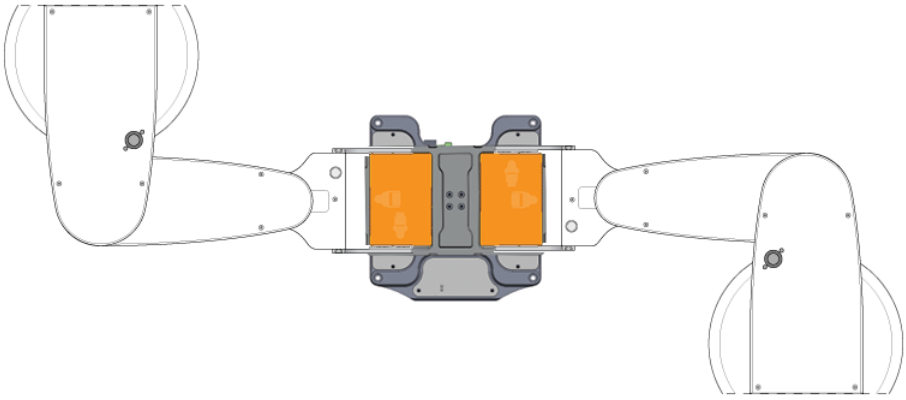
To set the Microplate Exchanger home position:

1. Disable the automation system robots so that you can manually move the robot arms. For instructions, see the automation system robot user guide.
2. In **Microplate Exchanger Diagnostics,** click the **Controls** tab, and then click **Disable** in the **Motor** area. You should be able to manually rotate the exchanger.



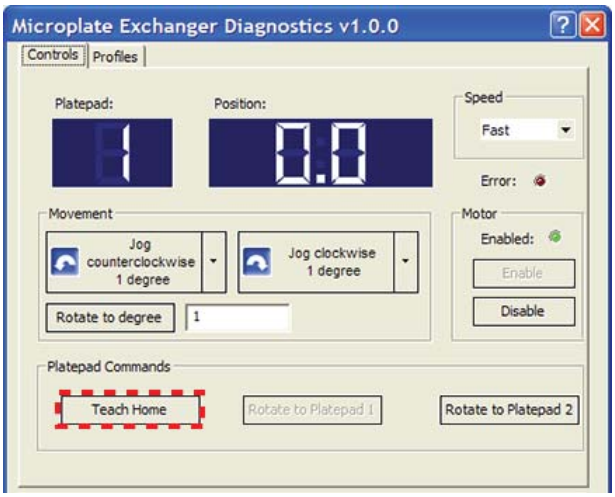
3 Manually rotate the exchanger so that each platepad on the stage faces a robot. This is the approximate home position.

4 Move the robots so that the teaching jigs or microplates sit on the platepads.

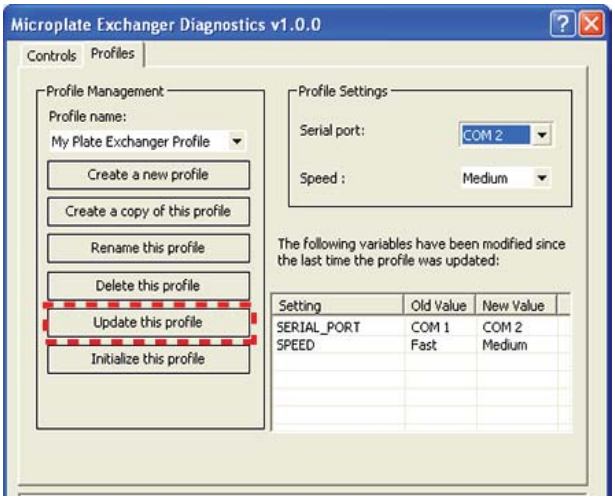


5 Check the position of the teaching jigs or microplates. You might have to make adjustments by rotating the exchanger slightly or moving the robot arms.

6 In the **Microplate Exchanger Diagnostics Controls** tab, click **Teach Home.** Notice that the **Position** value is set at 0.0°.



7 In the **Profiles** tab, click **Update this profile** to save the change.



8 Note the platepad number and the corresponding robot. You will need this information when setting the exchanger device properties.

Related information

For information about...	See...
Creating profiles	"Creating Microplate Exchanger profiles" on page 64
Editing and managing profiles	"Editing and managing profiles" on page 67
Setting robot teachpoints	"Setting robot teachpoints" on page 71
Setting the exchanger device properties	"Setting Microplate Exchanger properties" on page 59

Setting robot teachpoints

About setting robot teachpoints

After teaching the Microplate Exchanger home position, you will need to set a robot teachpoint at each platepad. To set, edit, and verify robot teachpoints, see the automation system robot user documentation.

IMPORTANT Before setting the robot teachpoints, make sure the exchanger's motor is enabled. For instructions, see "Enabling and disabling the motor" on page 80. In addition, make sure the exchanger stage is homed. For instructions, see "Rotating to a specific position" on page 81.

About verifying teachpoints

You must verify robot teachpoints after setting them. For instructions, see the automation system robot user documentation.

Related information

For information about...	See...
Creating profiles	"Creating Microplate Exchanger profiles" on page 64
Editing and managing profiles	"Editing and managing profiles" on page 67
Setting the home position	"Setting the home position" on page 68

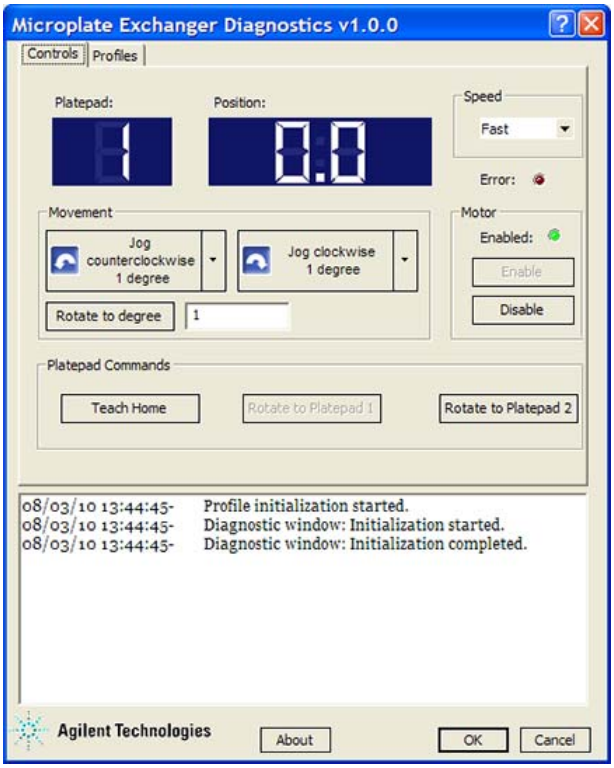
7 Using Microplate Exchanger Diagnostics

This chapter contains the following topics:

About Microplate Exchanger Diagnostics

Microplate Exchanger Diagnostics Controls tab

The Microplate Exchanger Diagnostics software allows you to create profiles and control the motions of the Microplate Exchanger. The software has two tabs: Controls and Profiles. You mainly use the commands and parameters available in the Controls tab to troubleshoot problems.

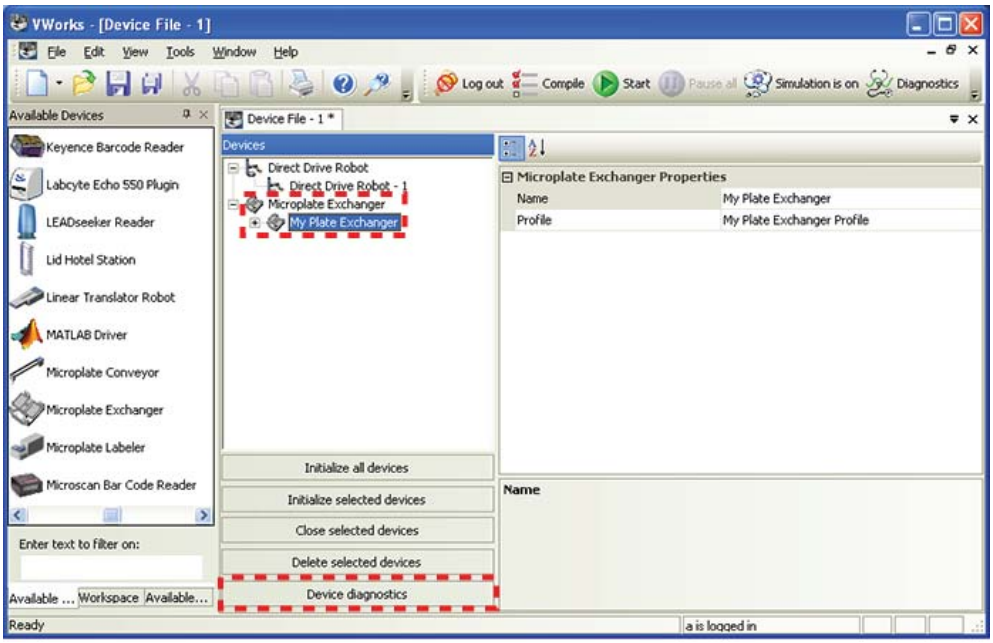


Opening Microplate Exchanger Diagnostics

Access to Microplate Exchanger Diagnostics depends on the automation software you are using: VWorks software or a third-party automation software.

VWorks software

In the VWorks software **Devices** area, select the Microplate Exchanger name, and then click **Device diagnostics.**



Third-party automation software

If you are using a different automation software, call the ShowDiagsDialog method to open Microplate Exchanger Diagnostics. For details, see "Microplate Exchanger ActiveX control" on page 109.

Related information

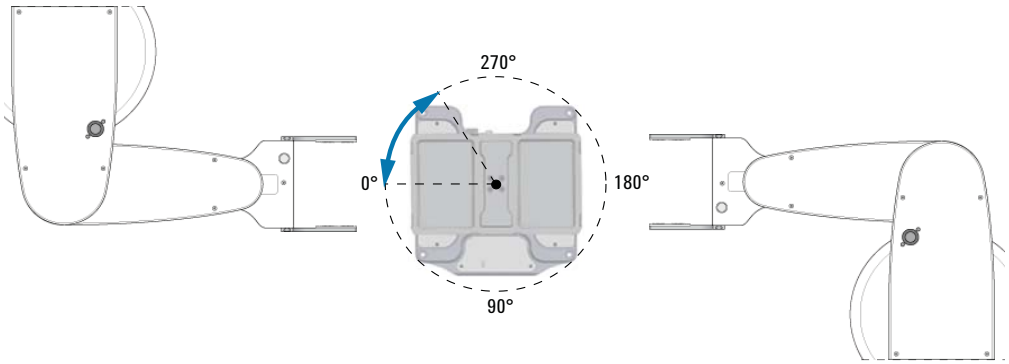
For information about...	See...
Microplate Exchanger ActiveX control	"Microplate Exchanger ActiveX control" on page 109
Checking the exchanger's current position	"Checking the exchanger's current position" on page 76
Changing the rotation speed	"Changing the rotation speed" on page 78
Enabling and disabling the exchanger motor	"Enabling and disabling the motor" on page 80
Rotating to a specific position	"Rotating to a specific position" on page 81
Setting the home position	"Setting the home position" on page 68
Checking the error indicator	"Checking the error indicator" on page 86
Viewing the log area	"Viewing the log area" on page 87
Profiles tab	"Creating Microplate Exchanger profiles" on page 64

Checking the exchanger's current position

About the Position value

The Position value in the Controls tab indicates the position of platepad 1 relative to its home position. Position values range from 0–360°:

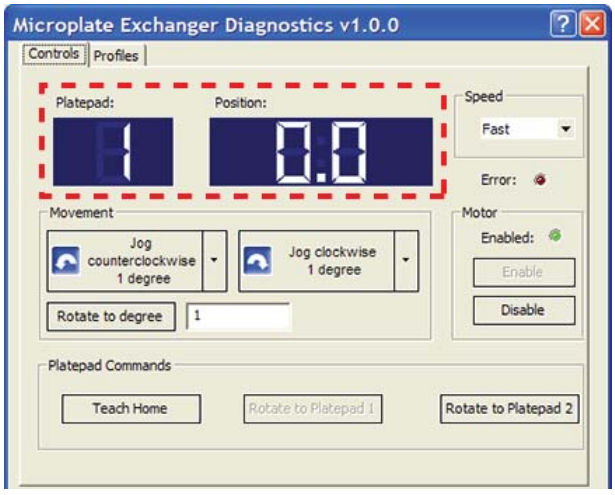
Position value	Description
0°	Platepad 1 is at the home position.
180°	Platepad 2 is at the home position.
Other values	The platepads are between the home and 180° positions.



Procedure

To check the current position of the Microplate Exchanger:

In the **Controls** tab, check the value in the **Position** and **Platepad** boxes. If platepad 1 is at 0°, the Platepad box will display 1. If platepad 2 is at 0°, the Platepad box will display 2. If the Platepad box displays –, the platepads are between 0° and 180°.



Related information

For information about...	See...
Microplate Exchanger ActiveX control	"Microplate Exchanger ActiveX control" on page 109
Changing the rotation speed	"Changing the rotation speed" on page 78
Enabling and disabling the exchanger motor	"Enabling and disabling the motor" on page 80
Rotating to a specific position	"Rotating to a specific position" on page 81
Setting the home position	"Setting the home position" on page 68
Checking the error indicator	"Checking the error indicator" on page 86
Viewing the log area	"Viewing the log area" on page 87
Profiles tab	"Creating Microplate Exchanger profiles" on page 64

Changing the rotation speed

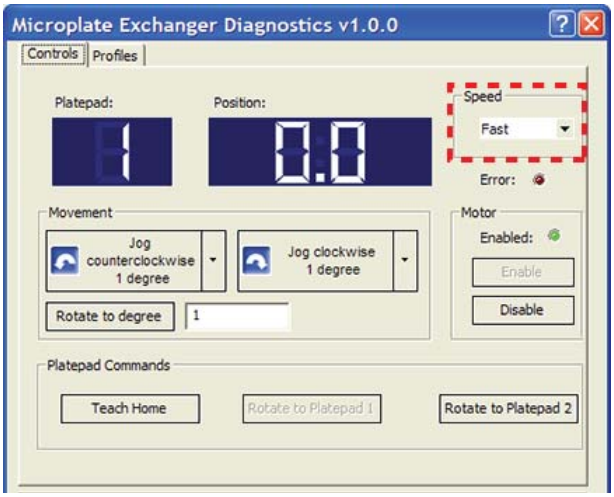
Procedure

You can select the speed at which the stage turns while you are making adjustments in Microplate Exchanger Diagnostics. For example, you can select the Slow speed when you are setting up or troubleshooting the exchanger.

Note: To set the rotation speed for protocol runs, use the Speed selection in the Profiles tab.

To select the diagnostic rotation speed:

In the **Controls** tab, select one of the following speeds from the **Speed** list:



Speed	Description
Slow	Rotates the stage at 25% of the factory-set maximum speed.
Medium	Rotates the stage at 50% of the factory-set maximum speed.
Fast	Rotates the stage at 100% of the factory-set maximum speed.

Related information

For information about...	See...
Microplate Exchanger ActiveX control	"Microplate Exchanger ActiveX control" on page 109
Checking the exchanger's current position	"Checking the exchanger's current position" on page 76

For information about...	See...
Enabling and disabling the exchanger motor	“Enabling and disabling the motor” on page 80
Rotating to a specific position	“Rotating to a specific position” on page 81
Setting the home position	“Setting the home position” on page 68
Checking the error indicator	“Checking the error indicator” on page 86
Viewing the log area	“Viewing the log area” on page 87
Profiles tab	“Creating Microplate Exchanger profiles” on page 64

Enabling and disabling the motor

About this topic

Disabling the Microplate Exchanger motor allows you to rotate the exchanger by hand. You might want to do this when you:

- Set the home position.
- Want to remove labware from the stage after a run error occurs.

After setting the home position or fixing the error, you can enable the exchanger's motor to resume operation.

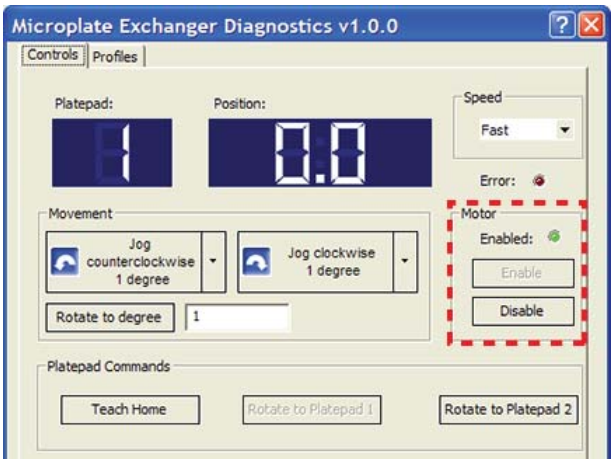
Procedure

CAUTION The Microplate Exchanger might rotate slightly when you enable the motor. Obstructing the Exchanger while it is rotating will cause an error.

To enable or disable the Microplate Exchanger motor:

In the **Controls** tab, click **Enable** or **Disable.**

Note: When the motor is enabled, the green **Enabled** light turns on in the **Motor** area. When the motor is disabled, the Enabled light turns off.



Related information

For information about...	See...
Microplate Exchanger ActiveX control	"Microplate Exchanger ActiveX control" on page 109
Checking the exchanger's current position	"Checking the exchanger's current position" on page 76
Changing the rotation speed	"Changing the rotation speed" on page 78

For information about...	See...
Rotating to a specific position	“Rotating to a specific position” on page 81
Setting the home position	“Setting the home position” on page 68
Checking the error indicator	“Checking the error indicator” on page 86
Viewing the log area	“Viewing the log area” on page 87
Profiles tab	“Creating Microplate Exchanger profiles” on page 64

Rotating to a specific position

Ways to rotate to a specific position

You can rotate the exchanger stage using one of the following methods:

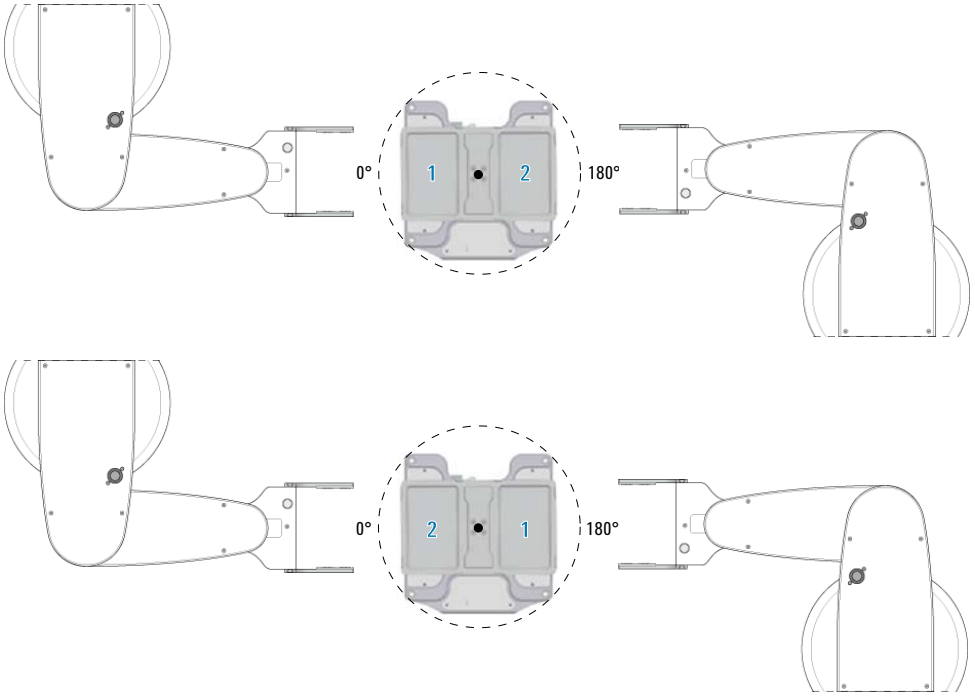
- Rotating to one of the platepads
- Rotating the stage in set increments
- Rotating the stage to a specific position relative to home

CAUTION Obstructing the Exchanger while it is rotating will cause an error.

Rotating to one of the platepads

You can rotate the stage so that:

- The stage is homed (top, where Platepad 1 is at 0°).
- Platepad 2 is at 0° (bottom).

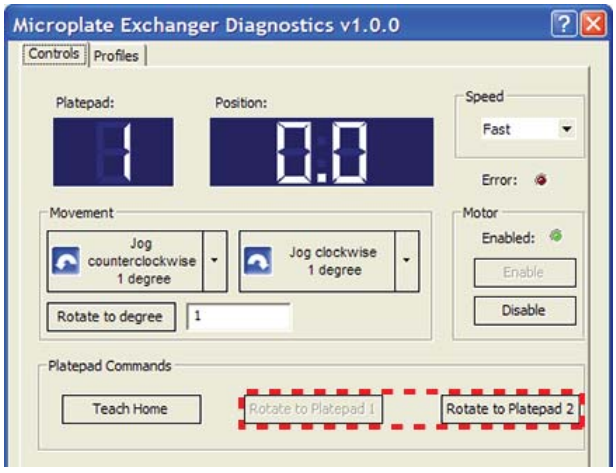


To rotate the stage to a platepad:

1 Move the automation system robot away from the exchanger. See the automation system user documentation for instructions.

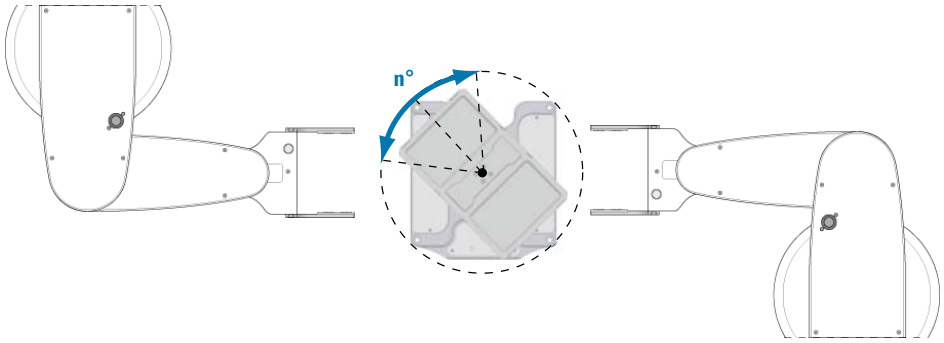
2 In the **Controls** tab, click one of the following in the **Platepad Commands** area:

Command	Description
Rotate to Platepad 1	Rotates the stage to the home position, where platepad 1 is at 0°.
Rotate to Platepad 2	Rotates the stage so that platepad 2 is at 0° and platepad 1 is at 180°.



Rotating the stage in set increments

You can rotate the stage clockwise or counterclockwise in set increments from its current position.

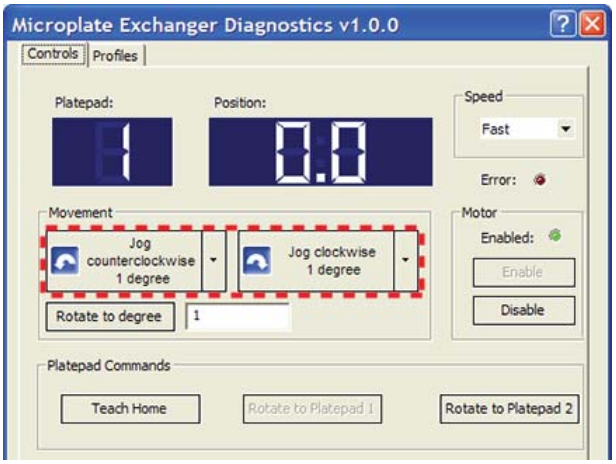


To rotate the exchanger in set increments:

1 Move the automation system robot away from the exchanger. See the automation system user documentation for instructions.

2 In the **Controls** tab, click one of the following buttons to display and select the degree increment:

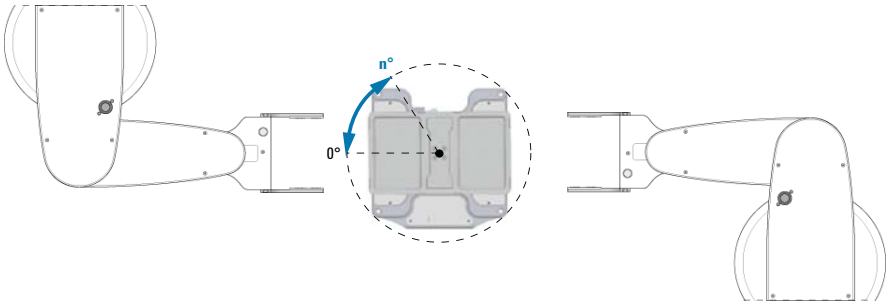
Command	Description
Jog counterclockwise	The number of degrees to rotate counterclockwise, relative to its current position.
Jog clockwise	The number of degrees to rotate clockwise, relative to its current position.



3 Click the **Jog counterclockwise** or **Jog clockwise** button again to rotate the stage the specified number of degrees.

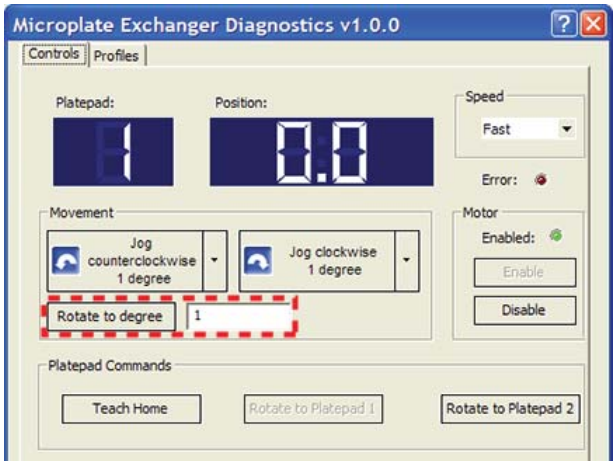
Rotating the stage to a specific position relative to home

You can rotate the stage so that platepad 1 is a specified number of degrees from 0°.



To rotate the exchanger a specified number of degrees:

1. Move the automation system robot away from the exchanger. See the automation system user documentation for instructions.
2. In the **Controls** tab, type the number of degrees in the **Movement** area. You can enter a value between 0° and 360°.



3. Click **Rotate to degree.** The stage rotates until platepad 1 reaches the specified destination.

   If you specified an angle between 1° and 180°, the software will rotate the stage clockwise. If you specified an angle greater 180°, the software will rotate the stage counterclockwise.

Related information

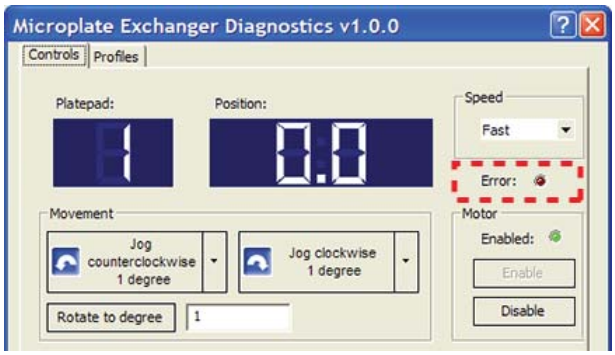
For information about...	See...
Microplate Exchanger ActiveX control	“Microplate Exchanger ActiveX control” on page 109
Checking the exchanger’s current position	“Checking the exchanger’s current position” on page 76

For information about...	See...
Changing the rotation speed	“Changing the rotation speed” on page 78
Enabling and disabling the exchanger motor	“Enabling and disabling the motor” on page 80
Setting the home position	“Setting the home position” on page 68
Checking the error indicator	“Checking the error indicator” on page 86
Viewing the log area	“Viewing the log area” on page 87
Profiles tab	“Creating Microplate Exchanger profiles” on page 64

Checking the error indicator

About controller faults

If an error occurs during operation, the error indicator light at the base turns on and flashes slowly. In Microplate Exchanger Diagnostics, the Error light also turns on.



Read the message in the error dialog box, and then check "Troubleshooting" on page 95 for actions you can take to resolve the errors. After the error is resolved, the Error light at the base and in the dialog box turn off.

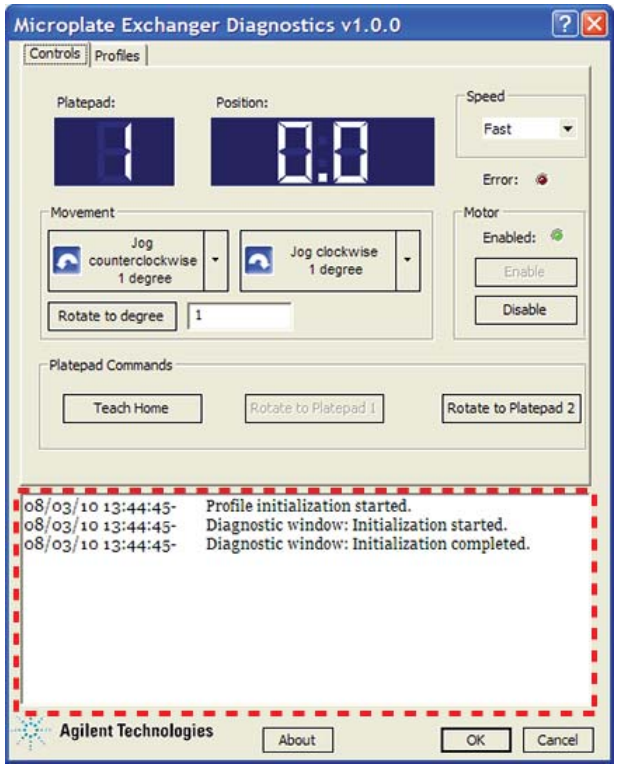
Related information

For information about...	See...
Microplate Exchanger ActiveX control	"Microplate Exchanger ActiveX control" on page 109
Checking the exchanger's current position	"Checking the exchanger's current position" on page 76
Changing the rotation speed	"Changing the rotation speed" on page 78
Enabling and disabling the exchanger motor	"Enabling and disabling the motor" on page 80
Rotating to a specific position	"Rotating to a specific position" on page 81
Setting the home position	"Setting the home position" on page 68
Viewing the log area	"Viewing the log area" on page 87
Profiles tab	"Creating Microplate Exchanger profiles" on page 64

Viewing the log area

About the log area

The log area displays all of the commands issued and the status of the actions while you are working in the dialog box. Error conditions are displayed in red text.



If the Microplate Exchanger is integrated in the VWorks software, the information displayed in the exchanger log area is also written to the VWorks log file.

Related information

For information about...	See...
Microplate Exchanger ActiveX control	"Microplate Exchanger ActiveX control" on page 109
Checking the exchanger's current position	"Checking the exchanger's current position" on page 76
Changing the rotation speed	"Changing the rotation speed" on page 78
Enabling and disabling the exchanger motor	"Enabling and disabling the motor" on page 80

For information about...	See...
Rotating to a specific position	“Rotating to a specific position” on page 81
Setting the home position	“Setting the home position” on page 68
Checking the error indicator	“Checking the error indicator” on page 86
Profiles tab	“Creating Microplate Exchanger profiles” on page 64

8
Maintaining the Microplate Exchanger

This chapter contains the following topics:

Cleaning the Microplate Exchanger

Procedure

WARNING **Always turn off the Microplate Exchanger and shut down the lab automation system before performing any maintenance procedure. See "Turning on and turning off the Microplate Exchanger" on page 51 and the lab automation system user documentation.**

Be sure to clean up spills on any part of the Microplate Exchanger immediately after a protocol run. Use a clean soft cloth to remove the spill. Use clean water or an alcohol-based cleaning solution to remove dirt. Do not use corrosive cleaning solutions.

Related information

For information about...	See...
Safety information	"Safety information" on page 1
Replacing fuses	"Changing fuses" on page 91
Reporting problems	"Reporting problems" on page 108

Changing fuses

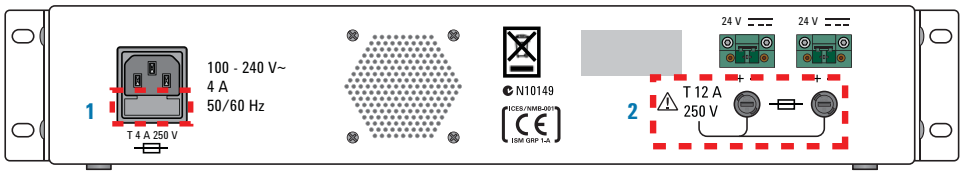
About this topic

This topic explains how to replace fuses in the Microplate Exchanger power supply.

WARNING **Only administrators and experienced personnel should perform the procedure in this topic. Alternatively, contact Automation Solutions Technical Support for assistance.**

Fuse location

The Microplate Exchanger has four fuses that are accessible from the back of the power supply.



Item	Fuse housing label	Function	Rating (time-delayed)
1	T4A 250V	120–240V~ power input	6.3 A, 250 V
2	T12A 250V	24 V DC power output	12 A, 250 V

Materials and tools

Make sure you have the following:

- 1/4-in slotted-blade screwdriver
- Replacement fuse(s)

CAUTION Using an incorrect fuse can damage the Microplate Exchanger.

Before you start

Make sure you:

1. Turn off the Microplate Exchanger and the lab automation system. See "Turning on and turning off the Microplate Exchanger" on page 51 and the lab automation system user documentation.
2. Disconnect the power cord from the Microplate Exchanger power supply. See "Mounting the power supply and connecting the cables" on page 47.

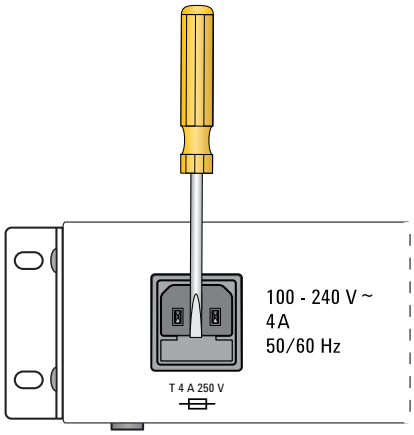
Replacing the 6.3 A fuses

WARNING **Always turn off the Microplate Exchanger and shut down the lab automation system before performing any maintenance procedure.**

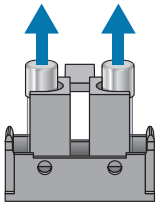
WARNING **Always disconnect the power cord from the power supply before performing any maintenance procedure.**

To replace a 6.3 A fuse:

1 At the power inlet, use the screwdriver to pry open the housing, and then carefully pull out the fuse cartridge by hand. Two fuses sit in the cartridge.



2 Replace the blown fuse in the fuse cartridge. (A blown fuse has a broken filament.)



3 Slide the fuse cartridge back into the fuse housing.

4 Press the cartridge securely into the closed position.

5 Plug in the power cable at the power inlet.

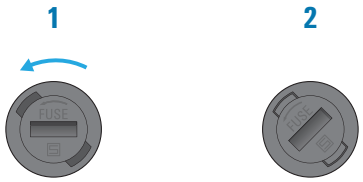
Replacing the 12 A fuses

WARNING **Always turn off the Microplate Exchanger and shut down the lab automation system before performing any maintenance procedure.**

WARNING **Always disconnect the power cord from the power supply before performing any maintenance procedure.**

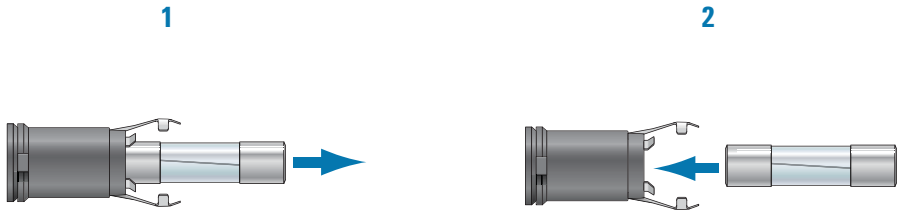
To replace one of the 12 A fuses:

1 Using the screwdriver, turn the fuse holder counterclockwise one-eighth turn (1). The fuse holder moves outward (2).



2 Remove the fuse holder from the housing.

3 Pull out the blown fuse (1) and insert the new fuse (2). (A blown fuse has a broken filament.)



4 Insert the fuse and holder back into the housing.

5 While pressing the fuse holder into the housing, turn the fuse holder clockwise one-eight turn using the screwdriver.

Related information

For information about...	See...
Safety information	“Safety information” on page 1
Cleaning the Microplate Exchanger	“Cleaning the Microplate Exchanger” on page 90
Reporting problems	“Reporting problems” on page 108

9 Troubleshooting

This chapter contains the following topics:

Troubleshooting hardware problems

About this topic

This topic lists commonly encountered hardware problems, the causes of the problems, and ways to resolve the problems:

- "Communication or power problems" on page 96
- "Homing and other problems" on page 97

If you are still experiencing problems with the Microplate Exchanger after trying the solutions, contact Automation Solutions Technical Support.

Communication or power problems

Problem	Cause	Solution
The Microplate Exchanger does not turn on.	The electrical requirements are not met.	Make sure the electrical requirements are met. See "Electrical requirements" on page 31.
	The Microplate Exchanger is not connected to the power supply or the power source.	Connect the Microplate Exchanger to the power supply and power source. See "Connecting the cables" on page 47.
	One or more of the fuses are blown.	Replace the blown fuse(s). See "Changing fuses" on page 91. If the fuses are blown immediately after replacement, stop using the device and contact Automation Solutions Technical Support.
	If sound of the fan in the power supply is audible, and the Microplate Exchanger is working properly, the light in the switch is broken.	Contact Automation Solutions Technical Support to replace the power switch.

Problem	Cause	Solution
The power switch light is on, but the Microplate Exchanger does not rotate.	The Microplate Exchanger is not initialized, or the power supply is not connected to the controlling computer, or an error occurred.	In the Microplate Exchanger Diagnostics **Profiles** tab, make sure the correct profile and COM port are selected, and then click **Initialize this profile.** Make sure the supplied Ethernet cable connects the power supply and the controlling computer. Make sure the serial port selected in diagnostics matches the serial port used for this device. Check the Error light on the base. If the light is on, an error has occurred. To clear the error, in Microplate Exchanger Diagnostics **Controls** tab, click **Clear Fault.**

Homing and other problems

Problem	Cause	Solution
The Microplate Exchanger does not home.	The home position is set incorrectly.	Reset the home position and try again. See "Setting the home position" on page 68.
	The encoder might be dirty or damaged.	Contact Automation Solutions Technical Support.
The robot does not place or pick labware correctly at the Microplate Exchanger.	The robot teachpoints might be set incorrectly, or the Microplate Exchanger has moved after the teachpoints were set.	Check and reset the robot teachpoints. See "Setting robot teachpoints" on page 71. See also the automation system robot user documentation or the *BenchCel Microplate Handling Workstation User Guide* for instructions.
The Microplate Exchanger has stopped and the Error light at the base is on.	An obstacle prevented the Microplate Exchanger from rotating, or a computer error prevented communication with the device.	Remove the obstacle, click Retry, and resume operation. Re-initialize the Microplate Exchanger. If the problem persists, try to power cycle the device.

Related information

For information about...	See...
Safety	*Direct Drive Robot Site Preparation and Safety Guide*
Microplate Exchanger component names	"Hardware components" on page 4

For information about...	See...
Diagnosing problems	"Troubleshooting error messages" on page 98
Reporting problems	"Reporting problems" on page 101

Troubleshooting error messages

About this topic

The following tables list commonly encountered error messages, the causes of the errors, and ways to resolve the errors. The error messages are listed by the following categories:

- Communication errors
- Fatal errors
- Non-fatal errors
- Warnings

If you are still experiencing problems with the Microplate Exchanger after trying the solutions, or if an error not on the list is displayed, contact Automation Solutions Technical Support.

For protocol-related errors, see the automation system software user guide, such as the *VWorks Automation Control User Guide*.

Communication errors

The following error messages are caused by communication problems:

- Bad CRC8 in receive packet
- Connection not open
- Error access critical section creation failed
- Event queue is full
- Event thread creation failed
- Log access critical section or log timer creation failed
- Receive packet timed out
- Reply list critical section creation failed
- Synchronization failed
- Unable to open connection
- Unable to send packet

Check the following causes and try the corresponding solutions:

Cause	Solution
The Microplate Exchanger is connected to the incorrect serial port.	Check and make sure the correct serial port is used at the controlling computer.
The Microplate Exchanger is disconnected from serial port.	Check the Ethernet cable connection at the power supply and at the controller computer.
The serial port is already in use by another device.	Check and make sure the correct serial port is used at the controlling computer.
The Microplate Exchanger is not turned on.	Turn on the Microplate Exchanger.

Fatal errors

The following fatal error messages are typically caused by hardware errors or problems in the controller. If one of the messages is displayed, contact Automation Solutions Technical Support.

- Amplifier Not Responding
- Register File Checksum Error
- Register File Version Error

Non-fatal errors

The following non-fatal error messages are typically caused by an obstruction or damage to the device.

- Amplifier Short Circuit Error
- Average Current Error
- Excessive Following Error
- Profile Queue Overflow Error
- Stator Alignment Error

Check the following causes and try the corresponding solutions:

Cause	Solution
An obstacle prevented the Microplate Exchanger from rotating.	Remove the obstacle, and then try rotating the Microplate Exchanger again.
Hardware components in the Microplate Exchanger are damaged.	Contact Automation Solutions Technical Support.

Warnings

The following warning messages are displayed if electrical fluctuations occur in the current or voltage.

- Communication Queue Full
- Done Zone Timeout
- Over Current
- Over Voltage
- Profile Queue Overflow
- Profile Queue Underflow
- Under Voltage

Check the following causes and try the corresponding solutions:

Cause	Solution
The electrical requirements are not met.	Make sure the electrical requirements are met. See “Electrical requirements” on page 31.
The circuit to which the Microplate Exchanger is connected is noisy or overloaded.	Check for noise or overloading in the electrical circuit. Install a UPS as a power backup.
The power supply is failing.	Replace the power supply. Contact Automation Solutions Technical Support.

Related information

For information about...	See...
Microplate Exchanger component names	“Hardware components” on page 4
Hardware problems	“Troubleshooting hardware problems” on page 96
Safety	“Safety information” on page 1
Reporting problems to Agilent Technologies	“Reporting problems” on page 101

Reporting problems

Contacting Automation Solutions Technical Support

If you find a problem with the Microplate Exchanger, contact Automation Solutions Technical Support at one of the following:

Europe

Phone: +44 (0)1763850230

email: euroservice.automation@agilent.com

US and rest of world

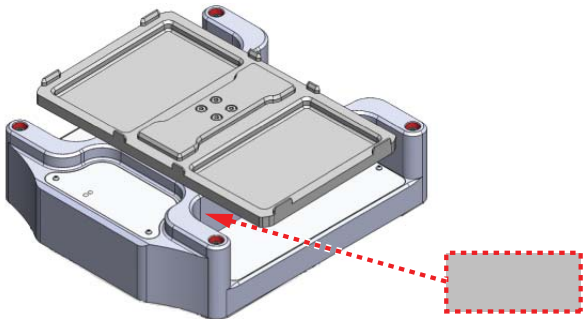
Phone: 1.800.979.4811 (US only) or +1.408.345.8011

email: service.automation@agilent.com

Reporting hardware problems

When contacting Agilent Technologies, make sure you have the serial number of the device ready. You can locate the serial number on the side of the base, as shown.

Figure Exchanger device serial number label location



Reporting software problems

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

- Short description of the problem
- Relevant software version number (for example, automation control software, diagnostics software, ActiveX control software, and firmware)
- Error message text (or screen capture of the error message dialog box)
- Relevant files, such as log files

Reporting user guide problems

If you find a problem with this user guide or have suggestions for improvement, send your comments in an email to documentation.automation@agilent.com.

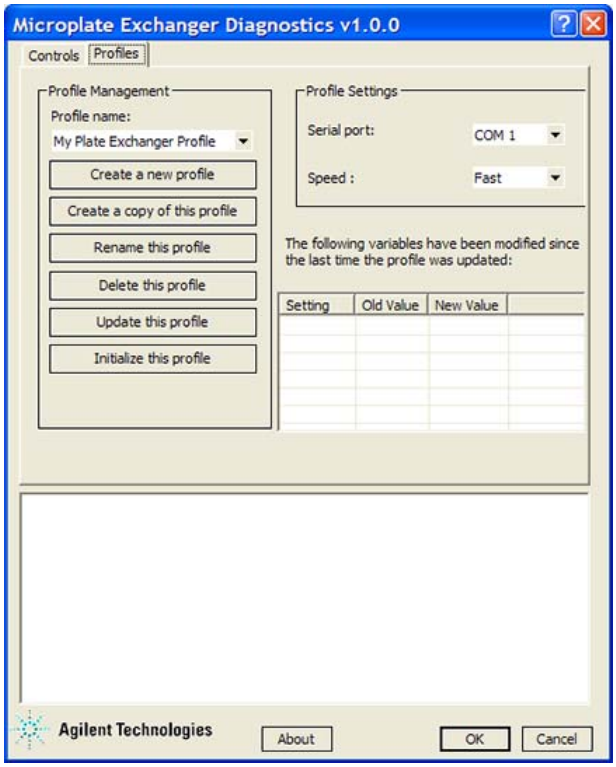
Related information

For information about...	See...
Hardware problems	“Troubleshooting hardware problems” on page 96
Software error messages	“Troubleshooting error messages” on page 98
Safety	“Safety information” on page 1

A
Quick reference

This appendix contains the following topics:

Profiles tab



Profile Management area

Selection or command	Description
Profile name	Displays the selected profile. Also allows you to select from the list of available profiles.
Create a new profile	Creates a new profile.
Create a copy of this profile	Creates a duplicate copy of the selected profile.
Rename this profile	Renames the selected profile.
Delete this profile	Deletes the selected profile.
Update this profile	Saves changes to the selected profile.
Initialize this profile	Initiates communication with the device using the selected profile.

Profile Settings area

Selection or parameter	Description
Serial port	The COM port of the computer that is connected to the Microplate Exchanger.
Speed	The rotational speed of the stage during protocol runs. The selections are: • *Slow*. Turns the stage at 25% of the factory-set maximum speed. • *Medium*. Turns the stage at 50% of the factory-set maximum speed. • *Fast*. Turns the stage at 100% of the factory-set maximum speed.

Log table and log area

The table below the Profile Settings area lists all of the changes you have made in the Profiles Settings area.

The log area displays all commands and actions issued in the Microplate Exchanger Diagnostics dialog box. The area is visible in the Profiles tab and the Controls tab.

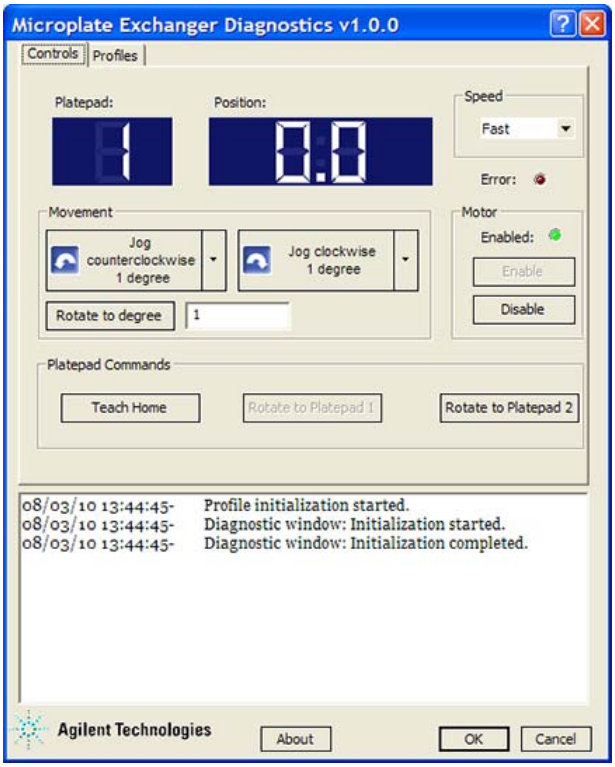
Commands

Command	Description
About	Displays the Microplate Exchanger Diagnostics version number and copyright information.

Related information

For information about...	See...
Profiles	“About profiles” on page 64
Creating a profile	“Creating a Microplate Exchanger profile” on page 65
Editing profiles	“Editing profiles” on page 67
Managing profiles	“Managing profiles” on page 67
Controls tab	“Controls tab” on page 106

Controls tab



Status area and commands

Box name or command	Description
Platepad	The platepad that is at 0°. If neither platepad is at 0°, the box displays a dash symbol (–).
Position	The current position of the stage, in degrees.
Speed	The rotational speed of the stage while you are in diagnostics. The selections are: • *Slow*. Turns the stage at 25% of the factory-set maximum speed. • *Medium*. Turns the stage at 50% of the factory-set maximum speed. • *Fast*. Turns the stage at 100% of the factory-set maximum speed. To set the rotation speed for protocol runs, go to the Profiles tab.
Error	The light that indicates whether the exchanger has encountered an error. If the light is on, an error has occurred.

Movement area

Selection, parameter, or command	Description
Jog counterclockwise	Turns the stage counterclockwise by the selected degree increment.
Jog clockwise	Turns the stage clockwise by the selected degree increment.
Rotate to degrees	Turns the stage so that platepad 1 is at the specified number of degrees from the home position.

Motor area

Command	Description
Enable	Turns on the exchanger motor.
Disable	Turns off the exchanger motor.

Platepad Commands area

Parameter or command	Description
Teach Home	Sets the home position.
Rotate to Platepad 1	Rotates the stage so that platepad 1 is at the home position.
Rotate to Platepad 2	Rotates the stage so that platepad 2 is at the home position.

Related information

For information about...	See...
Checking the exchanger's current position	"Checking the exchanger's current position" on page 76
Enabling and disabling the exchanger motor	"Enabling and disabling the motor" on page 80
Rotating the exchanger to a specific position	"Rotating to a specific position" on page 81
Clearing controller faults	"Checking the error indicator" on page 86
Changing the rotation speed	"Changing the rotation speed" on page 78

For information about...	See...
Setting the home position	“Setting the home position” on page 68
Profiles tab	“Profiles tab” on page 104

B
Microplate Exchanger ActiveX control

This chapter contains the following topics:

The Exchanger ActiveX has been verified to work with both Visual C++ and Visual Studio .NET in Visual Studio 2008.

About the Microplate Exchanger ActiveX control

What is the Exchanger ActiveX control

The Exchanger ActiveX control is the software component that allows third-party lab automation systems to interact with the Microplate Exchanger.

How the Exchanger ActiveX control is used

In an Agilent Technologies automation system that is running the VWorks software, ActiveX interfaces are not used to communicate with devices. However, some integrations, such as those with LIMS, require that a third-party application control the Microplate Exchanger. The Exchanger ActiveX control enables third-party applications to interface with the Microplate Exchanger.

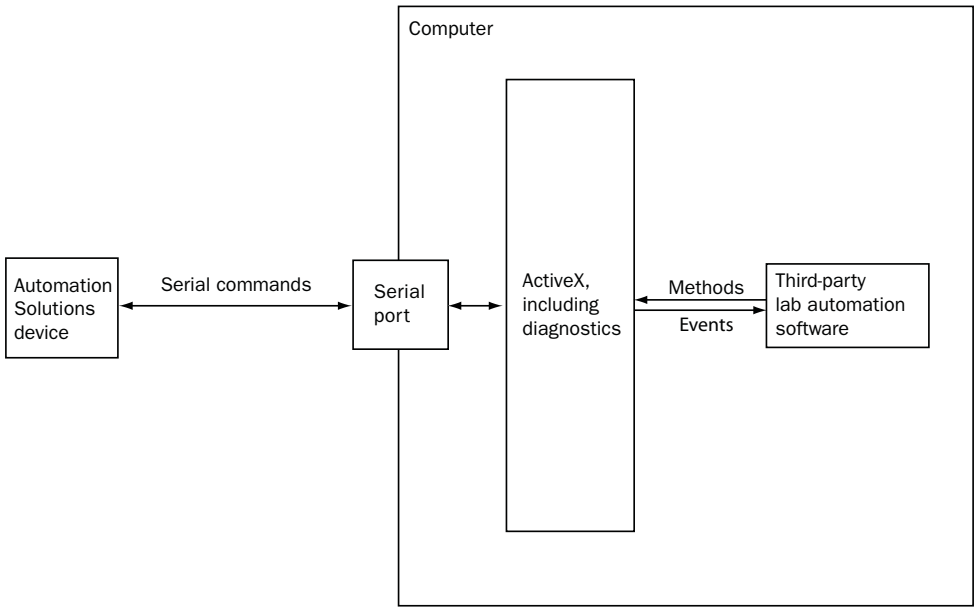
Each ActiveX control consists of a collection of the following:

- *Methods*. Functions that can be called to invoke individual operations
- *Properties*. Attributes or features of the ActiveX control
- *Events*. Notifications that methods have completed or resulted in errors

To ensure proper integration, you must know the available methods and properties for the ActiveX control.

The following diagram illustrates the use of the Exchanger ActiveX control in a lab automation system environment. Actions you perform are conducted through ActiveX methods. System responses are relayed back through ActiveX events or through return values and variables passed to methods.

Note: Although the Exchanger ActiveX control generates events, the third-party application must implement handlers for them.



Related information

For information about...	See...
Integrating the Microplate Exchanger ActiveX control	Exchanger ActiveX release notes
Microplate Exchanger ActiveX properties	“Properties” on page 112
Microplate Exchanger ActiveX methods	“Methods” on page 115
Microplate Exchanger ActiveX events	“Events” on page 127

Properties

About this topic

This topic describes the following properties:

Blocking

Description

Determines whether methods should block until completion or return immediately for asynchronous operation.

Acceptable values

- *VARIANT_TRUE (C++) or True (Visual Basic .NET).* The ActiveX is forced to block or wait until a method completes before it returns control to the caller.
- *VARIANT_FALSE* (C++) *or False (Visual Basic .NET).* Returns control to the application immediately, and the caller should handle the events accordingly.

Default value

VARIANT_FALSE or False

Blocking affects some methods differently. See each method's description for the effect. Unless otherwise noted:

- In non-blocking mode (Block = False), a method:
  - Starts another thread of execution to perform the given method, returning control to the application immediately.
  - Returns 0 on launching new thread successfully; otherwise returns nonzero, and an Error event is fired.
  - If the method is successful, an event indicating completion is fired; if unsuccessful, an Error event is fired.
- In blocking mode (Block = True), a method:
  - Is executed.
  - Returns 0 if it completes successfully; returns nonzero otherwise
- Error message can be reviewed by calling GetLastError().

Visual C++ Example

```
// set the Exchanger in blocking mode
VARIANT_BOOL blocking=VARIANT_TRUE;
m_Exchanger.PutBlocking (blocking);
// set the Exchanger in non-blocking mode
blocking=VARIANT_FALSE;
m_Exchanger.PutBlocking (blocking);
// returns the blocking value
blocking = m_Exchanger.GetBlocking ( );
// user should handle events if non-blocking!
```

Visual Basic .NET Example

```
'set the Exchanger in blocking mode
Exchanger1.Blocking=True
'set Exchanger in non-blocking mode
Exchanger1.Blocking=False
'returns the blocking value
Dim bMode as Boolean
bMode = Exchanger1.Blocking
'user should handle events if non-blocking!
```

ControlPicture

IPictureDisp*ControlPicture

Description

A read-only picture of the Microplate Exchanger that can be used in the container's application.

Parameters

None

Visual C++ Example

```
/* the CPicture class will be imported into your project
when the ActiveX is installed */
CButton button;
// create a button
CPicture ExchangerPic;
// retrieve the picture
ExchangerPic = m_Exchanger.GetControlPicture();
// paint the bitmap onto the button
button.SetBitmap((HBITMAP) ExchangerPic.GetHandle());
```

Visual Basic .NET Example

```
Dim iPicture As System.Drawing.Image =
Exchanger1.ControlPicture()
button.BackgroundImage = iPicture
```

Related information

For information about...	See...
Microplate Exchanger ActiveX control	“About the Microplate Exchanger ActiveX control” on page 110
Integrating the Microplate Exchanger ActiveX control	Exchanger ActiveX release notes
Microplate Exchanger ActiveX methods	“Methods” on page 115
Microplate Exchanger ActiveX events	“Events” on page 127

Methods

About this topic

This topic describes the following methods:

Abort

long Abort(void)

Description

Aborts a current task that is in the error state and clears the error.

Parameters

None.

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.Abort();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.Abort()
```

AboutBox

void AboutBox(void)

Description

Displays the Microplate Exchanger About dialog box that contains the ActiveX version number.

Parameters

None

Return

None

Visual C++ example

```
m_Exchanger.AboutBox();
```

Visual Basic .NET example

```
Exchanger1.AboutBox()
```

Close

long Close(void)

Description

Disconnects from the Microplate Exchanger.

Parameters

None

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.Close();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.Close()
```

DisableMotor

long DisableMotor(void)

Description

Turns off the exchanger's motor.

Parameters

None

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.DisableMotor();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.DisableMotor()
```

EnableMotor

long EnableMotor(void)

Description

Turns on the exchanger's motor.

Parameters

None

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.EnableMotor();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.EnableMotor()
```

EnumerateProfiles

VARIANT EnumerateProfiles(void)

Description

Retrieves a list of defined profiles. The strings in this array are the profile names that should be used for the Initialize method.

Parameters

None

Return

An array of profile names

Visual C++ example

```
VARIANT vProfiles = m_Exchanger.EnumerateProfiles();
SAFEARRAY *psa = vProfiles.parray;
BSTR* bstrArray;
if
(FAILED(SafeArrayAccessData(psa,reinterpret_cast<void**>(
&bstrArray))))
{
    VariantClear(&vProfiles);
    return;
}
for (ULONG i = 0; i < psa->rgsabound[0].cElements; i++)
{
    MessageBox(CString(bstrArray[i]));
}
SafeArrayUnaccessData(psa);
VaraintClear(&vProfiles);
```

Visual Basic .NET example

```
Dim i as Integer
Dim profileNames() As String
profileNames = Exchanger1.EnumerateProfiles()
For i = 0 To profileNames.GetLength(0) - 1
MsgBox profileNames(i)
Next
```

GetActiveXVersion

BSTR GetActiveXVersion(void)

Description

Retrieves the Microplate Exchanger ActiveX version number.

Parameters

None

Return

ActiveX version number (string)

Visual C++ example

```
CString ActiveXVer = m_Exchanger.GetActiveXVersion();
```

Visual Basic .NET example

```
Dim sVersion As String
sVersion = Exchanger1.GetActiveXVersion()
```

GetCurrentPosition

long GetCurrentPosition(float* fPositionInDegree)

Description

Retrieves the exchanger's current platepad 1 position relative to the home position.

Parameters

FLOAT* fPositionInDegree

The current position (0–360) in degrees

Return

0 if successful

Other value if there was an error

Visual C++ example

```
short  curpos;
long lres = m_Exchanger.GetCurrentPosition(&curpos);
```

Visual Basic .NET example

```
Dim ires as Integer
Dim siPos As Single = 0
ires = Exchanger1.GetCurrentPosition(siPos)
```

GetFirmwareVersion

BSTR GetFirmwareVersion(void)

Description

Retrieves the Agile controller firmware version number.

Parameters

None

Return

Agile controller version number (string)

Visual C++ example

```
CString str = m_Exchanger.GetFirmwareVersion ();
```

Visual Basic .NET example

```
Dim sFirmVer As Strings
sFirmVer = Exchanger1.GetFirmwareVersion()
```

GetLastError

BSTR GetLastError(void)

Description

Retrieves the last known error condition.

Parameters

None

Return

An error string

The hub's current home position offset value

Visual C++ example

```
CString str = m_Exchanger.GetLastError();
```

Visual Basic .NET example

```
Dim sError As String = ""
sError = Exchanger1.GetLastError()
```

GetMotorStatus

long GetMotorStatus(VARIANT_BOOL* bServoStatus)

Description

Checks to see whether the motor is on.

Parameters

VARIANT_BOOL* bServoStatus

The state of the motor:

- VARIANT_TRUE (C++) or TRUE (Visual Basic) if motor is on
- VARIANT_FALSE (C++) or FALSE (Visual Basic) if motor is off

Return

0 if successful

Other value if there was an error

Visual C++ example

```
VARIANT_BOOL ismotoron;
long lres = m_Exchanger.GetMotorStatus(&ismotoron);
```

Visual Basic .NET example

```
Dim ires as Integer
Dim bMotorStatus As Boolean
ires = Exchanger1.GetMotorStatus(bMotorStatus)
```

GetSpeed

long GetSpeed(SHORT* pSpeed);

Description

Retrieves the exchanger's current speed.

Parameters

SHORT* pSpeed

The current speed. 0 is slow, 1 is medium, and 2 is fast.

Return

0 if successful

Other value if there was an error

Visual C++ example

```
short nSpeed;
long lres = m_Exchanger.GetSpeed(&nSpeed);
```

Visual Basic .NET example

```
Dim ires as Integer
Dim shSpeed As Short
ires = Exchanger1.GetSpeed(shSpeed)
```

Ignore

long Ignore(void)

Description

Ignores the previously issued error and moves to the next step in the task. This is not a recommended course of action, as the errors are issued for a reason. However, ignoring some errors can be appropriate if the operator understands the implications.

Parameters

None

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.Ignore();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.Ignore()
```

Initialize

long Initialize(BSTR Profile)

Description

Initializes the profile and starts communication with the Microplate Exchanger using the parameters set in the profile. The profile specifies the serial connection used to communicate with the Microplate Exchanger. The parameters for each profile can be adjusted in the Diagnostics dialog box (by a call to the ShowDiagsDialog method) on the Profiles page.

Parameters

BSTR Profile

The name of the profile to be used for initialization.

Return

0 if successful

Other value if there was an error

Visual C++ example

```
// connect via serial connection specified in the profile
long lres =
m_Exchanger.Initialize(_bstr_t("Exchangerprofile"));
```

Visual Basic .NET example

```
'connect via serial connection specified in the profile
Dim ires as Integer
ires = Exchanger1.Initialize("Exchanger profile")
```

Jog

long Jog(FLOAT fDegree, VARIANT_BOOL bClockwise)

Description

Rotates the exchanger a specified number of degrees from its current position.

Parameters

FLOAT fDegree

The number of degrees relative to the current position.

VARIANT_BOOL bClockwise

The direction of the rotation. Set Clockwise to TRUE to rotate the stage clockwise. Set Clockwise to FALSE to rotate the stage counterclockwise.

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.Jog(30.0, VARIANT_TRUE);
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.Jog(30.0,True)
```

Retry

long Retry(void)

Description

Retries the last action after an error occurred.

Parameters

None

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.Retry();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.Retry()
```

RotateToDegree

long RotateToDegree(FLOAT fDegree)

Description

Rotates the stage a specified number of degrees.

Parameters

FLOAT fDegree

The number of degrees to rotate the stage. A positive value rotates the stage clockwise. A negative value rotates the stage counterclockwise.

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.RotateToDegree(90.0);
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.RotateToCassette(90.0)
```

RotateToPlatepad1

long RotateToPlatepad1(void)

Description

Rotates the exchanger such that platepad 1 will be at the 0° position.

Parameters

None

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.RotateToPlatepad1();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.RotateToPlatepad1()
```

RotateToPlatepad2

long RotateToPlatepad2(void)

Description

Rotates the exchanger such that platepad 2 will be at the 0° position.

Parameters

None

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.RotateToPlatepad2();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.RotateToPlatepad2()
```

SetSpeed

long SetSpeed(SHORT nSpeed)

Description

Sets the exchanger's rotation speed.

Parameters

SHORT nSpeed

The speed value. 0 is slow, 1 is medium, and 2 is fast.

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.SetSpeed(0);
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.SetSpeed(0)
```

ShowDiagsDialog

void ShowDiagsDialog (VARIANT_BOOL modal, SHORT securityLevel)

Description

Displays the Diagnostics dialog box that allows the operator to troubleshoot and correct problems. This method can be called before the Initialize method to create a profile. Contents displayed are based on the operator's access level.

Parameters

VARIANT_BOOL modal

The mode of the dialog box. The dialog box displayed can be modal (does not permit users to access the parent window) or modeless (permits users to access the parent window). If the modal mode is desired, set modal to TRUE. If the modeless mode is desired, set modal to FALSE.

SHORT securityLevel

The security level the operator has in the dialog box:

0 = Administrator

1 = Technician

2 = Operator

3 = Guest

-1 = No access

Return

0 if successful

Other value if there was an error

Visual C++ example

```
m_Exchanger.ShowDiagsDialog(VARIANT_TRUE,0);
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.ShowDiagsDialog(True,0)
```

TeachHome

long TeachHome(void)

Description

Sets the teachpoint at the exchanger's current position.

Parameters

None

Return

0 if successful

Other value if there was an error

Visual C++ example

```
long lres = m_Exchanger.TeachHome();
```

Visual Basic .NET example

```
Dim ires as Integer
ires = Exchanger1.TeachHome()
```

Related information

For information about...	See...
Microplate Exchanger ActiveX control	"About the Microplate Exchanger ActiveX control" on page 110
Integrating the Microplate Exchanger ActiveX control	Exchanger ActiveX release notes
Microplate Exchanger ActiveX properties	"Properties" on page 112
Microplate Exchanger ActiveX events	"Events" on page 127

Events

About this topic

This topic describes the following events:

CloseComplete

void CloseComplete(void)

Description

This event occurs when the Close method is successful.

Parameters

None

Return

None

DisableMotorComplete

void DisableMotorComplete(void)

Description

This event occurs when the DisableMotor method is successful.

Parameters

None

Return

None

EnableMotorComplete

void EnableMotorComplete(void)

Description

This event occurs when the EnableMotor method is successful.

Parameters

None

Return

None

Error

void Error(SHORT Number, BSTR* Description, LONG Scode, BSTR Source, BSTR HelpFile, LONG HelpContext, VARIANT_BOOL* CancelDisplay)

Description

This event fires when an error occurs during any non-blocking method execution.

Parameters

BSTR* Description

The description of the error.

BOOLEAN* CancelDisplay

The option to hide the error message dialog box. Set to VARIANT_TRUE (C++) or TRUE (Visual Basic .NET).

Note: SHORT Number, LONG Scode, BSTR Source, BSTR HelpFile, and LONG HelpContext are not used.

Returns

None

GetCurrentPositionComplete

void GetCurrentPositionComplete(float fPosition)

Description

This event is fired when the GetCurrentPosition method is successful.

Parameters

DOUBLE pPosition

The position value (0–360), in degrees.

Return

None

GetMotorStatusComplete

void GetMotorStatusComplete(VARIANT_BOOL bServoStatus)

Description

This event occurs when the GetMotorStatus method is successful.

Parameters

VARIANT_BOOL bMotorStatus

The status of motor.

Return

None

GetSpeedComplete

void GetSpeedComplete(short pSpeed)

Description

This event occurs when the GetSpeed method is successful.

Syntax: C++

void GetSpeedComplete(void);

Syntax: Visual Basic .NET

void GetSpeedComplete(void)

Parameters

None.

JogComplete

void JogComplete(void)

Description

This event occurs when the Jog method is successful.

Parameters

None

Returns

None

InitializeComplete

void InitializeComplete(void)

Description

This event occurs when the Initialize method is successful.

Parameters

None

Returns

None

RotateToPlatepad1Complete

void RotateToPlatePad1Complete(void)

Description

This event occurs when the RotateToPlatepad1 method is successful.

Parameters

None

Returns

None

RotateToPlatepad2Complete

void RotateToPlatepad2Complete(void)

Description

This event occurs when the RotateToPlatepad2 method is successful.

Parameters

None

Returns

None

RotateToDegreeComplete

void RotateToDegreeComplete(void)

Description

This event occurs when the RotateToDegree method is successful.

Parameters

None

Returns

None

SetSpeedComplete

void SetSpeedComplete(void)

Description

This event occurs when the SetSpeed method is successful.

Parameters

None

Returns

None

TeachHomeComplete

void TeachHomeComplete(void)

Description

This event occurs when the TeachHome method is successful.

Parameters

None

Returns

None

Related information

For information about...	See...
Microplate Exchanger ActiveX control	"About the Microplate Exchanger ActiveX control" on page 110
Integrating the Microplate Exchanger ActiveX control	Exchanger ActiveX release notes
Microplate Exchanger ActiveX properties	"Properties" on page 112
Microplate Exchanger ActiveX methods	"Methods" on page 115

C
Orderable spare parts

This appendix lists the Microplate Exchanger spare parts you can order from Automation Solutions. The topics are:

Ordering information

Contacting Customer Service

To order spare parts, contact Automation Solutions Customer Service using one of the following methods:

Contact method	Information
Telephone	1.866.428.9811 +1.408.345.8356
Email	orders.automation@agilent.com

Related information

For information about...	See...
Reporting problems	“Reporting problems” on page 101
Spare parts list	“Spare parts list” on page 135

Spare parts list

Fuses

Part name	Part number
Fuses	
4 A	5188-8316
12 A	5188-8347

Dual-Stage Microplate Exchanger upgrade kit

If you have a single-stage Microplate Exchanger and would like to upgrade to a Dual-Stage Microplate Exchanger, you need to order the following:

Part name	Part number
Microplate Exchanger (single stage)	G5508-20008
Microplate Exchanger base power cable	G5508-60005
Serial connection:	
Ethernet cable	G5550-22527
Serial adaptor	G5550-21721
Support posts (4)	5023-1665
M5 socket-head cap screws (8) for the posts	G5550-08530

Related information

For information about...	See...
Ordering information	“Ordering information” on page 134
Reporting problems	“Reporting problems” on page 101
Reconfiguring the shelves	“Adding or removing a second exchanger” on page 43
Safety information	“Safety information” on page 1

Glossary

cassette The column of shelves or slots in a Labware MiniHub or the Plate Hub Carousel.

clamps (BenchCel) The components inside of the stacker head that close and open the stacker grippers during the loading, unloading, downstacking, and upstacking processes.

controlling computer The lab automation system computer that controls the devices in the system.

cycle See seal cycle.

deadlock An error that occurs when the number of locations available in the system is less than the number of microplates in the system. Because the microplates cannot move to the expected locations, the protocol pauses.

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

device file A file that contains the configuration information for a device. The device file has the .dev file name extension and is stored in the folder that you specify when saving the file.

downstack The process in which a microplate is moved out of the stack.

error handler The set of conditions that define a specific recovery response to an error.

home position The position where all robot axes are at the 0 position (the robot head is approximately at the center of the x-axis and at 0 of the z-axis, and the robot arms are perpendicular to the x-axis).

homing The process in which the robot is sent to the factory-defined home position for each axis of motion.

hot plate (PlateLoc) A heated metal plate inside the sealing chamber that descends and presses the seal onto the plate.

insert A pad placed under the plate to support the bottom of the wells for uniform sealing.

location group A list of labware that can be moved into or out of particular slots in a storage device.

plate group A list of specific labware that can be moved into or out of a storage device without regard for the slot locations.

plate instance A single labware in a labware group that is represented by the process plate icon.

plate stage The removable metal platform on which you load a plate.

plate-stage support (Centrifuge) The structure on which you load a plate stage. The plate-stage support extends when the door opens.

profile The Microsoft Windows registry entry that contains the communication settings required for communication between a device and the VWorks software.

process A sequence of tasks that are performed on a particular labware or a group of labware.

protocol A schedule of tasks to be performed by a standalone device, or devices in the lab automation system.

regrip station A location that enables the robot to change its grip orientation (landscape or portrait), or adjust its grip at the specified gripping height. Grip height adjustment might be necessary after a robot picks up a labware higher than the specified gripping height because of physical restrictions at a teachpoint.

robot grippers The components that the robot uses to hold labware.

run A process in which one or more microplates are processed. In a standalone device, the run consists of one cycle. In a lab automation system, a run can consist of multiple cycles that are automated.

safe zone The boundary within which the robot is allowed to move without colliding with external devices.

seal cycle The process in which a single plate is sealed on the PlateLoc Sealer.

seal entry slot The narrow entry on the back of the PlateLoc Sealer where the seal is inserted into the device.

seal-loading card A rectangular card that is used to facilitate the seal loading process on the PlateLoc Sealer.

seal-roll support The triangular structures at the top of the PlateLoc Sealer where a roll of seal is mounted.

sealing chamber The area inside of the PlateLoc Sealer where the seal is applied to a plate.

shelves (BenchCel) The components inside of the stacker head that provide leveling surfaces for the microplates, thus ensuring accurate robot gripping, during the downstacking process.

stacker grippers The padding at the bottom of the stacker racks that hold microplates when a microplate is loaded, downstacked, or upstacked.

subprocess A sequence of tasks performed as a subroutine within a protocol. Typically the subprocess is performed by a single device type, such as the Bravo device.

task An operation performed on one or more labware.

task parameters The parameters associated with each task in a protocol. For example, in a labeling task, the parameters include the label value.

teachpoint A set of coordinates that define where the robot can pick up or place labware and the location of a known object.

teachpoint file The XML file that contains the settings for one or more device teachpoints.

touch screen The interface on the front of the PlateLoc Sealer where sealing parameters are set, the seal cycle can be started or stopped, and the seal cycle can be monitored.

upstack The process in which a microplate is moved back into the stack.

waypoint A set of coordinates that define a location the robot passes through on its way to a teachpoint.

workspace The boundary within which the robot can move without limitations.

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Agilent Technologies

User Guide

G5478-90004

Revision B, March 2014