StakMax

Microplate Handling System
User Guide

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MOLECULAR DEVICES

For research use only. Not for use in diagnostic procedures.

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Product manufactured by Molecular Devices, LLC.
3860 N. First Street, San Jose, California, 95134, United States of America.
Molecular Devices, LLC is ISO 9001 registered.

Contents

Safety Information

Information about the safe use of the instrument from Molecular Devices® includes an understanding of the user-attention statements in this guide, the safety labels on the instrument, precautions to follow before you operate the instrument, and precautions to follow while you operate the instrument.

Make sure that everyone involved with the operation of the instrument has:

- Received instruction in general safety practices for laboratories.
- Received instruction in specific safety practices for the instrument.
- Read and understood all Safety Data Sheets (SDS) for all materials being used.

Read and observe all warnings, cautions, and instructions. The most important key to safety is to operate the instrument with care.

WARNING! If the instrument is used in a manner not specified by Molecular Devices, the protection provided by the equipment might be impaired.

Warnings, Cautions, Notes, and Tips

All warning symbols are framed within a yellow triangle. An exclamation mark is used for most warnings. Other symbols can warn of other types of hazards such as biohazard, electrical, or laser safety warnings as are described in the text of the warning. Follow the related safety information.

The following user attention statements might be displayed in the text of Molecular Devices user documentation. Each statement implies the amount of observation or recommended procedure.

WARNING! A warning indicates a situation or operation that could cause personal injury if precautions are not followed.

CAUTION! A caution indicates a situation or operation that could cause damage to the instrument or loss of data if correct procedures are not followed.

Note: A note calls attention to significant information.

Tip: A tip provides useful information or a shortcut, but is not essential to the completion of a procedure.

Symbols on the Instrument

Each safety label found on the instrument contains an alert symbol that indicates the type of potential safety hazard.

Symbol	Indication
	Consult the product documentation.
	Potential laser hazard.
	Potential electrical-shock hazard from a high-voltage source. All safety instructions must be read and understood before you proceed with the installation, maintenance, and service of all modules. Power off the instrument and disconnect the power cord before you do maintenance procedures that require removal of a panel or cover or disassembly of an interior instrument component.
	Potential pinch hazard.
	Required in accordance with the Waste Electrical and Electronic Equipment (WEEE) Directive of the European Union. It indicates that you must not discard this electrical or electronic product or its components in domestic household waste or in the municipal waste collection system. For products under the requirement of the WEEE directive, contact your dealer or local Molecular Devices office for the procedures to facilitate the proper collection, treatment, recovery, recycling, and safe disposal of the device.

- California proposition 65 requires businesses to provide warnings to Californians about significant exposures to chemicals that cause cancer, birth defects, or other reproductive harm.

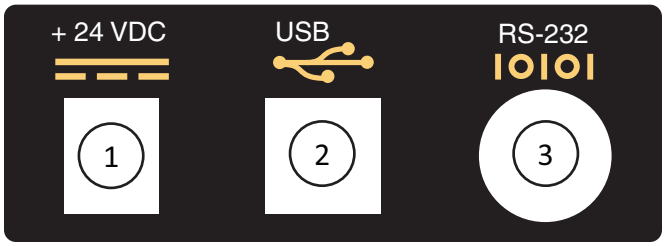
Electrical Safety

To prevent electrical injuries and property damage, inspect all electrical equipment before use and report all electrical deficiencies. Contact Molecular Devices technical support for equipment service that requires the removal of covers or panels.

WARNING! HIGH VOLTAGE. Within the instrument is the potential of an electrical shock hazard existing from a high voltage source. Read and understand all safety instructions before you install, maintain, and service the instrument.

To prevent electrical shock, use the supplied power cord and connect to a properly grounded wall outlet.

The power port is on the right side of the instrument.



Item	Description
1	Power port for connection to the power supply
2	USB port for connection to the computer
3	RS-232 serial port for connection to a microplate washer

To ensure sufficient ventilation and provide access to disconnect power from the instrument, maintain a 20 cm to 30 cm (7.9 in. to 11.8 in.) gap between the rear of the instrument and the wall.

Power off the instrument when not in use.

Laser Safety

WARNING! LASER LIGHT. This symbol indicates that a potential hazard to personal safety exists from a laser source. When this symbol displays in this guide, follow the specific safety information related to the symbol.

The StakMax® Microplate Handling System is rated a Class 2 Laser Product because it can house an optional bar code reader and some bar code readers have an embedded laser module.

WARNING! LASER LIGHT. Operate the instrument only when all the doors and panels of the instrument are in place and closed.

The barcode reader has an embedded Laser Class 2 Laser module and the following specifications.

Item	Description
Laser type	Diode laser
Wavelength	630 nm to 680 nm
Maximum output power	1.0 mW
Laser class	Class 2 (IEC60825-1, ed. 2.0: 2007)

Chemical and Biological Safety

Normal operation of the instrument can involve the use of materials that are toxic, flammable, or otherwise biologically harmful. When you use such materials, observe the following precautions:

- Handle infectious samples based on good laboratory procedures and methods to prevent the spread of disease.
- Observe all cautionary information printed on the original containers of solutions before their use.
- Dispose of all waste solutions based on the waste disposal procedures of your facility.
- Operate the instrument in accordance with the instructions outlined in this guide, and take all the required precautions when using pathological, toxic, or radioactive materials.
- Splashing of liquids can occur. Take applicable safety precautions, such as using safety glasses and wearing protective clothing, when working with potentially hazardous liquids.
- Observe the applicable cautionary procedures as defined by your safety officer when using hazardous materials, flammable solvents, toxic, pathological, or radioactive materials in or near a powered-up instrument.

WARNING! Never use the instrument in an environment where potentially damaging liquids or gases are present.

Moving Parts Safety

The instrument contains moving parts that can cause injury. Under normal conditions, the instrument is designed to protect you from these moving parts.

WARNING! If the instrument is used in a manner not specified by Molecular Devices, the protection provided by the equipment might be impaired.

To prevent injury:

- Never try to exchange labware, reagents, or tools while the instrument is operating.
- Never try to physically restrict the moving components of the instrument.
- Keep the instrument work area clear to prevent obstruction of the movement.

Note: Observe all warnings and cautions listed for all external devices attached to or in use during the operation of the instrument. See the applicable user guide for the operating and safety procedures of that device.

Chapter 1: Introduction

The StakMax Microplate Handling System is an integrated microplate handler for use with Molecular Devices microplate readers and microplate washers to provide simple, powerful, walk-away benchtop automation.

The StakMax Microplate Handling System is compatible with the following instruments:

- Gemini™ EM Dual Scanning Microplate Spectrofluorometer
- Gemini™ XPS Dual Scanning Microplate Spectrofluorometer
- SpectraMax® ABS Microplate Spectrophotometer
- SpectraMax® ABS Plus Microplate Spectrophotometer
- SpectraMax® i3x Multi-Mode Detection Platform
- SpectraMax® iD3 Multi-Mode Microplate Reader
- SpectraMax® iD5 Multi-Mode Microplate Reader
- SpectraMax® L Luminescence Microplate Reader
- SpectraMax® M2 Multi-Mode Microplate Reader
- SpectraMax® M2e Multi-Mode Microplate Reader
- SpectraMax® M3 Multi-Mode Microplate Reader
- SpectraMax® M4 Multi-Mode Microplate Reader
- SpectraMax® M5 Multi-Mode Microplate Reader
- SpectraMax® M5e Multi-Mode Microplate Reader
- SpectraMax® Paradigm® Multi-Mode Microplate Reader

Newer models of the following instruments are compatible with the StakMax Microplate Handling System:

- SpectraMax® 190 Microplate Spectrophotometer (Serial number begins with NNR)
- SpectraMax® 340PC384 Microplate Spectrophotometer (Serial number begins with LNR)
- SpectraMax® Plus 384 Microplate Spectrophotometer (Serial number begins with MNR)
- VersaMax™ Microplate Spectrophotometer (Serial number begins with BNR)

The StakMax Microplate Handling System is compatible with the following microplate washers:

- AquaMax® 2000 Microplate Washer
- AquaMax® 4000 Microplate Washer

Computer Integration

Each Molecular Devices microplate reader is shipped with a license key for the SoftMax® Pro Data Acquisition and Analysis Software. You install the SoftMax Pro Software on the computer that you use to operate the instrument to provide integrated instrument control, data display, and statistical data analysis.

You should install the SoftMax Pro Software on the computer before you set up the instrument. Please be aware that some updates to the SoftMax Pro Software require a purchase. Contact Molecular Devices before you update the software.

For information about the computer specifications required to run the software, the software installation and licensing instructions, and the directions to create the software connection between the computer and the instrument, see:

- *SoftMax Pro Data Acquisition and Analysis Software Standard Edition and MiniMax Imaging Edition Installation Guide*
- *SoftMax Pro Data Acquisition and Analysis Software - GxP Edition - Installation Guide for the Multi Computer Setup*
- *SoftMax Pro Data Acquisition and Analysis Software - GxP Edition - Installation Guide for the Single Computer Setup*

Chapter 2: Setting Up the StakMax Microplate Handler

For most initial StakMax Microplate Handling System implementations, your Molecular Devices Field Representative will set up the instruments. Use the topics in this chapter for future reference when you need to move or disconnect the microplate handler from the microplate reader or microplate washer.

Before you unpack the StakMax Microplate Handler, prepare a dry, flat area with enough space for the microplate handler, the microplate reader or microplate washer, the operating computer, and the cables. See Instrument Specifications and Diagrams on page 77.

CAUTION! Do not use instrument when the room temperature is below 10°C (50°F).

Install the SoftMax Pro Software on the computer that operates the microplate reader. See the *SoftMax Pro Data Acquisition and Analysis Software Installation Guides* and the *SoftMax Pro Data Acquisition and Analysis Software User Guide*.

Package Contents

The StakMax Microplate Handling System package contains the following components.

- StakMax Microplate Handler with optional barcode reader factory installed, if purchased
- 20-plate magazine, if purchased

Note: 40-plate and 50-plate magazines are shipped in a separate box.

Accessory Kit

The contents of the accessory kit are specific to the instrument to which you intend to connect the StakMax Microplate Handler. Each microplate reader and microplate washer has a unique plate drawer height and configuration. There are two methods to connect the microplate handler to an instrument:

- Microplate Handler Mounted Baseplate Connection, see page 17
- Microplate Reader Mounted Baseplate Connection, see page 22

CAUTION! Do not attempt to connect the microplate handler to an instrument other than the model for which the accessory kit is designed.

- USB cable
- 100–240 volt power supply
- Power cable
- Phillips screwdriver and/or hex keys
- Single plate adapter
- 1 package of 5 plates
- Alignment tools
- Baseplate
- 2 screws and washers

For microplate reader mounted baseplate connections, the baseplate and the following additional connection accessories are shipped in a separate box.

- Rail
- Plate drawer protection stand
- 2 spacer bushings
- 8 screws
- 4 rail studs

The accessory kit includes the following for the SpectraMax Paradigm and the SpectraMax i3x with the SpectraMax® MiniMax™ 300 Imaging Cytometer attached.

- Microplate Handler Stand

Unpacking the Microplate Handler

The microplate handler is packed in a specially designed carton. The package consists of an inner box that contains the instrument with an accessories kit for the included parts and an outer box for protection. The inner box is suspended under compression between a pair of trampoline-like lids above and below to protect the instrument.

WARNING! Lifting hazard. The instrument weighs approximately 11.8 kg (26 lbs). Take proper precautions to prevent injury and lift with care.

Note: Retain the shipping box and all packaging materials for future transportation needs. Do not use tools that can damage the packaging or the instrument.

CAUTION! When transporting the instrument, warranty claims are void if damage during transport is caused by improper packaging.

1. Check the box for damage that occurred during transportation. Inform the supplier immediately and keep the damaged packaging.

   CAUTION! Keep the box upright. Do not tip or tilt the box or place it on its side.

2. Open the top of the box and remove the packaging above the inner box.
3. Remove the inner instrument box from the shipping box.
4. Open the top of the inner box.
5. Remove the 20-plate magazines (if included) and remove the magazine packaging. If you order other magazine sizes, they ship in a second box.
6. Remove the accessory kit.
7. Remove the instrument from the box and place it on a flat surface.

8. Remove the foam block from the input stack. Pull the foam block up at a slight angle.

9. Remove the foam block from the plate handler arm. Pull the foam block down and to the left.

Barcode Reader

When you order a barcode reader with the StakMax Microplate Handler, the barcode reader is factory installed. The microplate handler has two barcode reader positions and you can install two barcode readers.

The barcode reader takes an additional 20 seconds to initialize after you power on the instrument and supports barcodes that are up to 22 characters long. Ensure the barcode labels have high quality printing with quiet zones at each end. The barcode reader is centered along the plate and points a few millimeters above the plate skirt. Position the machine-readable part of the label accordingly. If the labels do not read reliably, try a range of sizes to find the optimal size for your format and content. See Barcode Specifications on page 85.

The barcode label position on the plate is dependent on where you install the barcode reader in the microplate handler.

- Place the barcode labels on the long edge of the plate when you install the barcode reader under the front cover of the instrument.
- Place the barcode labels on the short edge of the plate when you install the barcode reader under the left side panel of the instrument.

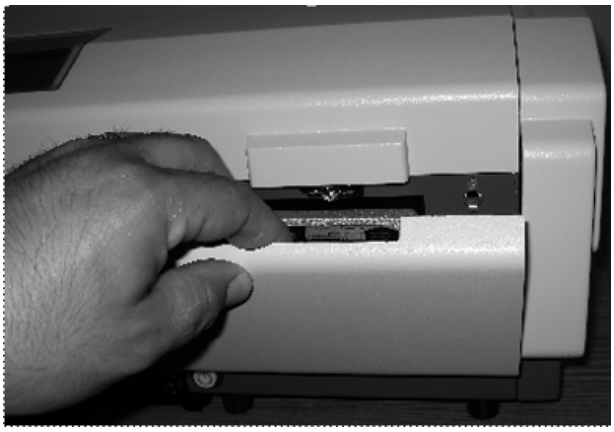
WARNING! Power off the instrument and disconnect the power cord before you do maintenance procedures that require removal of a panel or cover or disassembly of an interior instrument component.

The following is included with the barcode reader or the instrument:

- Barcode reader with cable (visible laser class 2)
- 3 hex screws
- 2 mm hex key
- 3 mm hex key

To install a barcode reader:

1. Power off the microplate handler and the microplate reader, if attached.
2. Remove the access panel on the front or left side of the microplate handler, depending on where you want to install the barcode reader.
   - To remove the front cover, firmly pull the cover down.



   - To remove the left side panel, use the 3 mm hex key to remove the hex screws that hold the cover in place, and then pull the cover down.

The left side of the microplate handler is the side that is adjacent to the connected microplate reader. If you need to access this position, you need to first move the microplate handler away from the microplate reader.

3. Attach the barcode reader with the three provided screws. Use the 2 mm hex key to tighten the screws.

4. Attach the cable on the barcode reader to the connector that protrudes from the gray housing.
5. Reattach the cover. Use the 3 mm hex key to tighten the hex screws on the left side panel.

Note: Do not pinch the wires.

Connecting the Microplate Handler to an Instrument

The StakMax Microplate Handler is physically connected to each compatible instrument to keep the microplate handler and the instrument in the correct orientation and proximity for accurate plate transfers.

The following instruments use a baseplate that is mounted to the StakMax Microplate Handler for this connection: See Microplate Handler Mounted Baseplate Connection on page 17.

- AquaMax2000 microplate washer
- AquaMax4000 microplate washer
- Gemini EM
- Gemini XPS
- SpectraMax 190
- SpectraMax 340PC384
- SpectraMax L
- SpectraMax M2
- SpectraMax M2e
- SpectraMax M3
- SpectraMax M4
- SpectraMax M5
- SpectraMax M5e
- SpectraMax Plus 384
- VersaMax

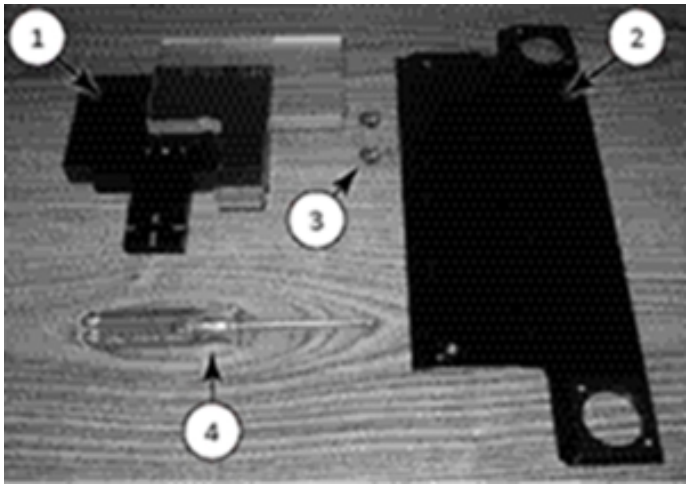
The following instruments use a baseplate that is mounted to the microplate reader: See Microplate Reader Mounted Baseplate Connection on page 22.

- SpectraMax i3x with or without the SpectraMax MiniMax 300 Imaging Cytometer
- SpectraMax iD3
- SpectraMax iD5
- SpectraMax Paradigm

Microplate Handler Mounted Baseplate Connection

This procedure provides instructions to connect the microplate handler to the following instruments:

- AquaMax2000 (see Connect AquaMax Microplate Washer on page 20)
- AquaMax4000 (see Connect AquaMax Microplate Washer on page 20)
- Gemini EM
- Gemini XPS
- SpectraMax 190
- SpectraMax 340PC384
- SpectraMax L (see Connect SpectraMax L on page 19)
- SpectraMax M2
- SpectraMax M2e
- SpectraMax M3
- SpectraMax M4
- SpectraMax M5
- SpectraMax M5e
- SpectraMax Plus 384
- VersaMax

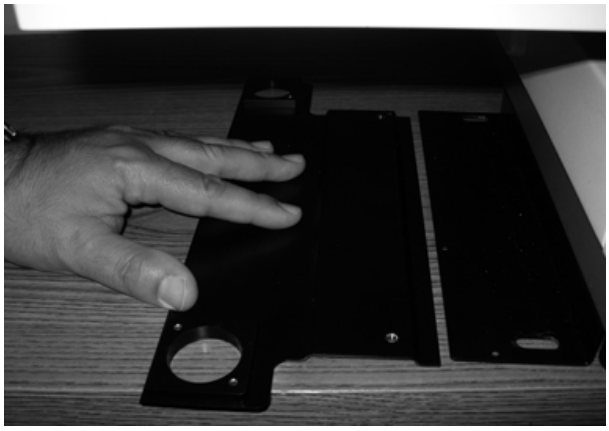


The following are in the accessory kit:

Item	Description
1	2 alignment tools
2	Baseplate
3	2 screws and washers
4	Phillips screwdriver

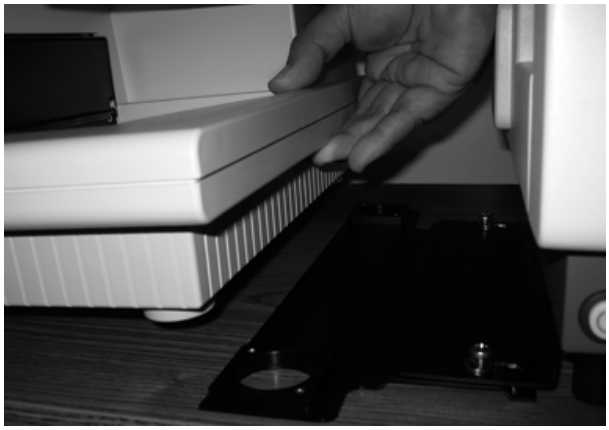
To connect the baseplate:

1. Place the microplate handler and the microplate reader on a level surface.
2. On the left side of the microplate handler, slide the baseplate under the protruding angle bracket that is attached to the microplate handler until the holes in the baseplate align with the holes in the microplate handler angle bracket.



3. Thread the Phillips-head screws (with washers) through the angle bracket into the baseplate and use the Philips head screwdriver to tighten the screws.

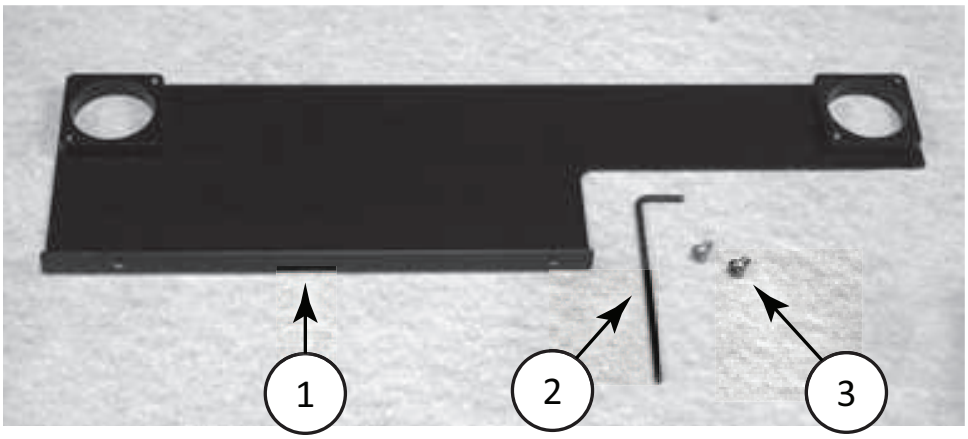
4. Lift the right side of the microplate reader and place the feet into the two mounting cups on the baseplate. Make sure that the microplate reader feet are completely seated in the mounting cups.



Connect SpectraMax L

This procedure provides instructions to connect the microplate handler to the SpectraMax L.

The following are in the accessory kit:



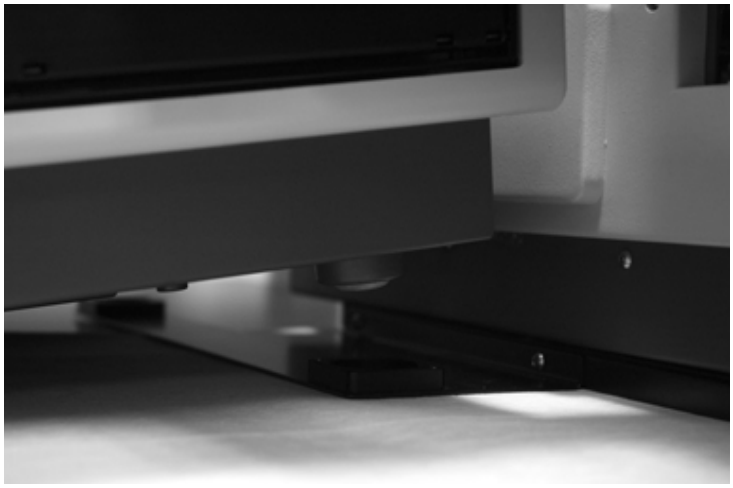
Item	Description
1	Baseplate
2	Hex key
3	2 screws

To connect the baseplate:

1. Place the microplate handler and the SpectraMax L on a level surface.
2. Place the baseplate on the left side of the microplate handler so that the holes on the baseplate align with the two mounting holes towards the rear of the microplate handler “L” bracket.

3. Thread the screws from the accessory kit through the side of the baseplate and into the threads on the microplate handler "L" bracket and use the hex key to tighten the screws.

4. Lift the right side of the microplate reader and place the feet into the two mounting cups on the baseplate. Make sure that the microplate reader feet are completely seated in the mounting cups.



Connect AquaMax Microplate Washer

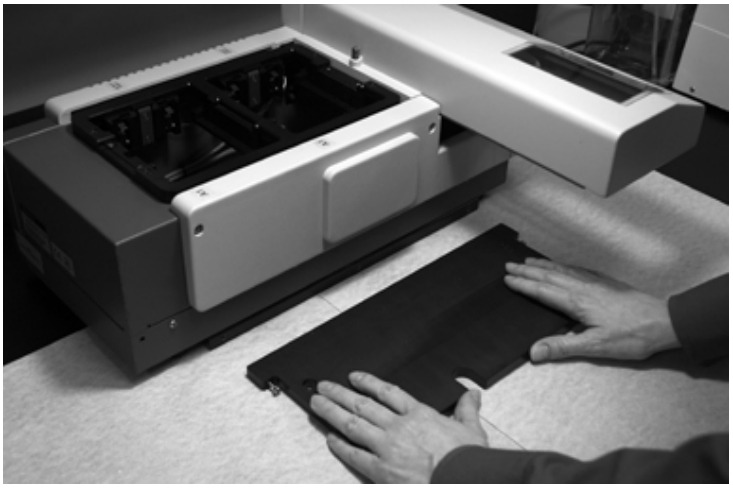
This procedure provides instructions to connect the microplate handler to the AquaMax 2000 and AquaMax 4000 Microplate Washers.

The following are in the accessory kit:

- Baseplate
- Hex key
- 2 screws

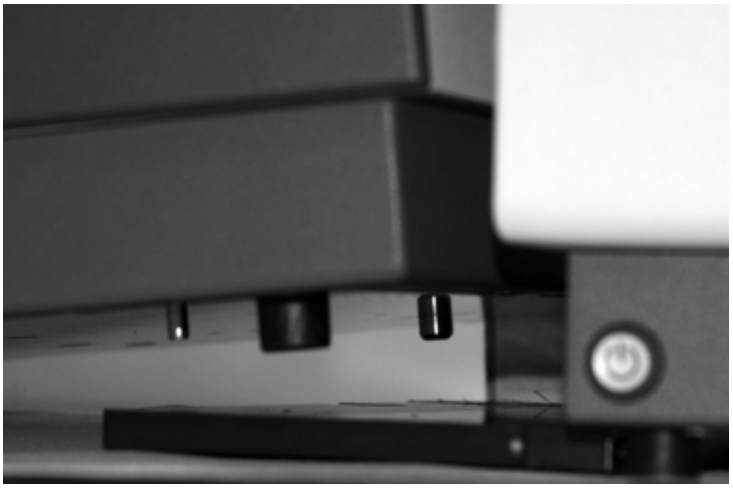
To connect the microplate handler to the microplate washer:

1. Place the microplate handler and the microplate washer on a level surface. Make sure that the power supply and round serial port can be accessed.
2. With the words **This Side Up** visible, place the baseplate on the left side of the microplate handler so that the holes on the baseplate align with the two mounting holes towards the rear of the microplate handler “L” bracket.



3. Thread the two screws through the baseplate to the microplate handler "L" bracket. After both screws are connected, use the hex key to tighten the screws.

4. Lift the right side of the microplate washer and place the positioning pins, on the bottom of the microplate washer, into the corresponding holes in the baseplate. When the microplate washer is positioned correctly over the baseplate, you can hear and feel the pins drop in.



Microplate Reader Mounted Baseplate Connection

This procedure provides partial instructions to connect the microplate handler to the following instruments:

- SpectraMax i3x Multi-Mode Detection Platform (with or without the SpectraMax MiniMax 300 Imaging Cytometer)
- SpectraMax iD3 Multi-Mode Microplate Reader
- SpectraMax iD5 Multi-Mode Microplate Reader
- SpectraMax Paradigm Multi-Mode Microplate Reader

WARNING! Mounting the baseplate to the microplate reader requires turning the microplate reader on its side. This should only be done by your Molecular Devices representative.

The baseplate that your Molecular Devices representative attaches to the microplate reader has a notched rail onto which you slide the rail studs on the microplate handler for the following instruments:

- SpectraMax i3x Multi-Mode Detection Platform (without the SpectraMax MiniMax 300 Imaging Cytometer attached)
- SpectraMax iD3 Multi-Mode Microplate Reader
- SpectraMax iD5 Multi-Mode Microplate Reader

The baseplate for the following instruments has rail studs onto which you install a microplate handler stand. You then place the microplate handler onto the microplate handler stand.

- SpectraMax i3x Multi-Mode Detection Platform (with the SpectraMax MiniMax 300 Imaging Cytometer attached)
- SpectraMax Paradigm Multi-Mode Microplate Reader

When you use the microplate handler with any of these instruments, the microplate handler obstructs the access to the injectors and cartridges. You must separate the microplate handler from the microplate reader to access the injectors and cartridges when you use the microplate handler with these microplate readers for reads with injections or to change cartridges.

Note: Any user who is capable of lifting the microplate handler can separate the microplate handler from the microplate reader to access the injectors and the cartridges. See Separating the Microplate Handler from the Microplate Reader on page 32.

WARNING! Lifting hazard. The instrument weighs approximately 11.8 kg (26 lbs). Take proper precautions to prevent injury and lift with care.

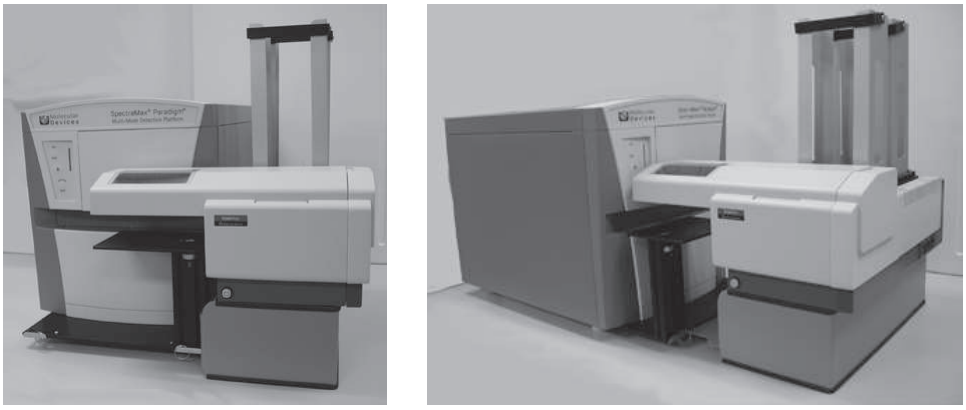
Installing Microplate Handler Stand

When you use the microplate handler with the SpectraMax Paradigm or the SpectraMax i3x that is mounted on the SpectraMax MiniMax 300 Imaging Cytometer, the microplate handler connects to the microplate reader via a microplate handler stand. You install the microplate handler stand onto the baseplate that your Molecular Devices representative installed on the microplate reader.

For the SpectraMax i3x, you install the microplate handler stand in the side-by-side position.

For the SpectraMax Paradigm, there are two options to install the microplate handler stand:

- Side-by-side position to deliver plates in the landscape orientation
- Front position to deliver plates in the portrait orientation.

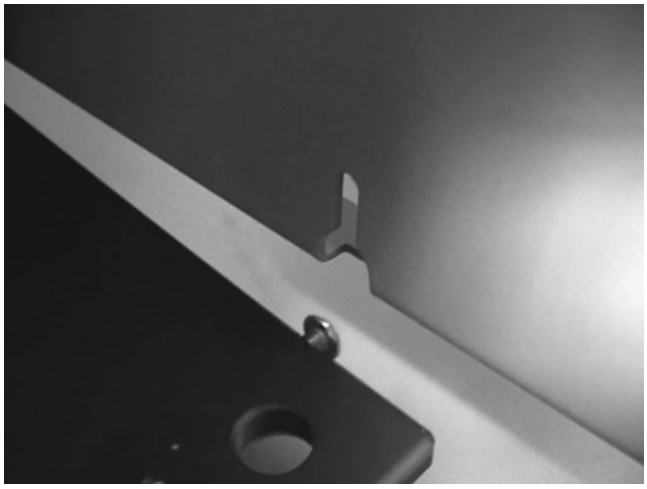


Side-By-Side and Front Installations Microplate Handler on SpectraMax Paradigm

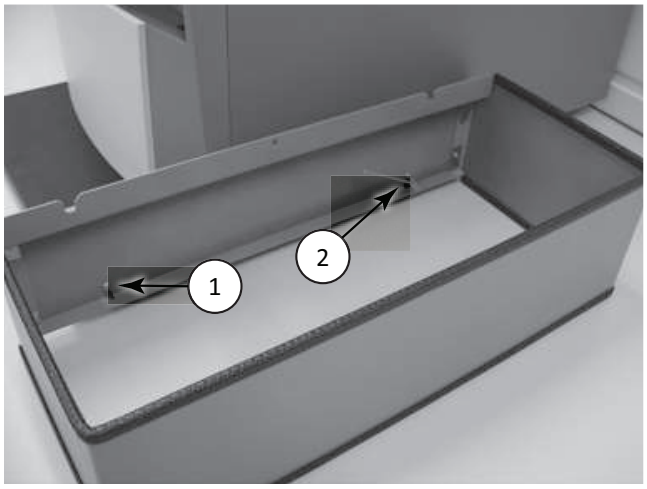
Side-by-Side

Install the microplate handler stand in the side-by-side position for the SpectraMax i3x and to deliver plates to the SpectraMax Paradigm in landscape orientation. If you want to deliver plates to the SpectraMax Paradigm in portrait orientation see the next section to install the microplate handler stand in the front position.

1. With the microplate handler stand to the right of the microplate reader, slide the slots on the microplate handler stand onto the screws at the edge of the baseplate.



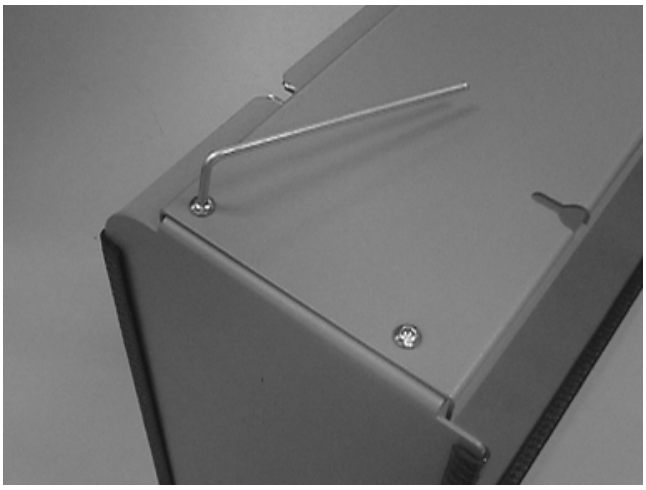
2. Use the 2.5 mm hex key to tighten the baseplate screws on the inside of the microplate handler stand.



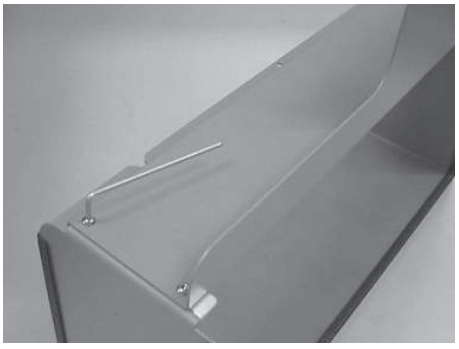
Front

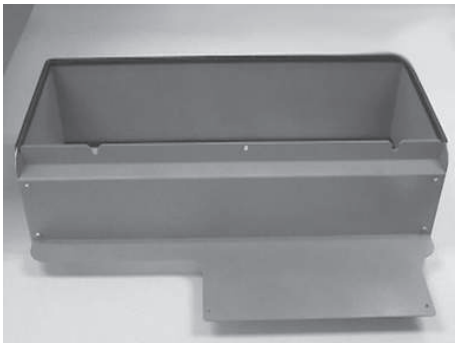
To deliver plates to the SpectraMax Paradigm in portrait orientation, attach the microplate handler stand in the front position.

1. Use the 2.5 mm hex key to remove the four screws from the inner edge of the microplate handler stand and remove the detached side-by-side installation panel.

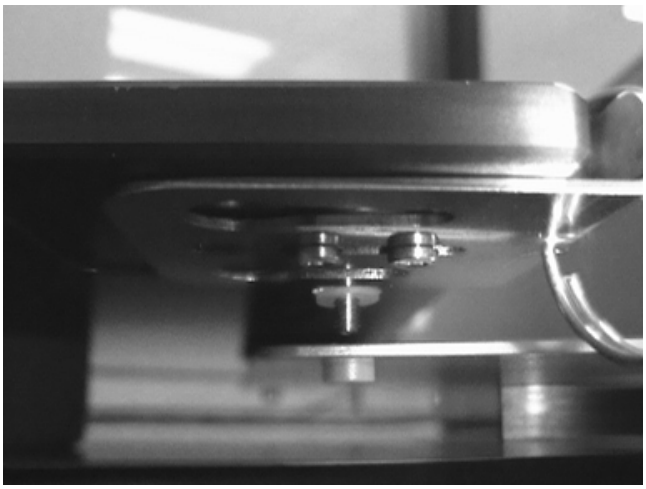


2. Use the 2.5 mm hex key and the same four screws to attach the front installation panel in its place.





3. Align the threaded holes on the front installation panel with the screws on the front of the baseplate.



4. Use the 2.5 mm hex key to tighten the screws.

Installing Plate Drawer Protection Stand

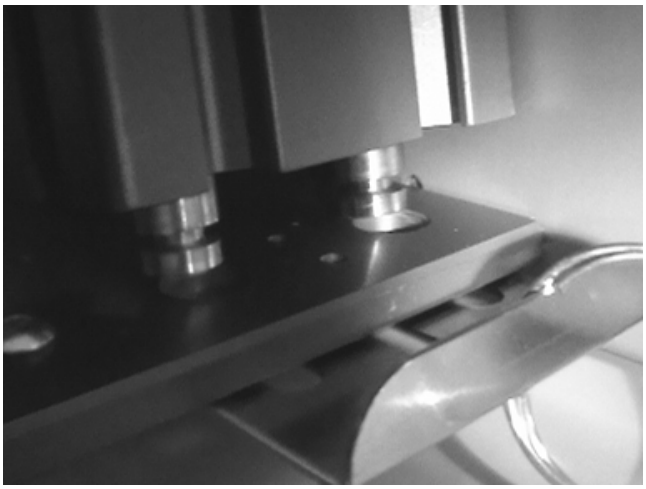
All microplate handler installations that use the microplate reader mounted baseplate include a plate drawer protection stand. You use the clamp on the right side of the baseplate to secure the plate drawer protection stand to the baseplate.

For the SpectraMax Paradigm with the microplate handler stand installed in the front position, install the plate drawer protection stand on the left side of the baseplate.

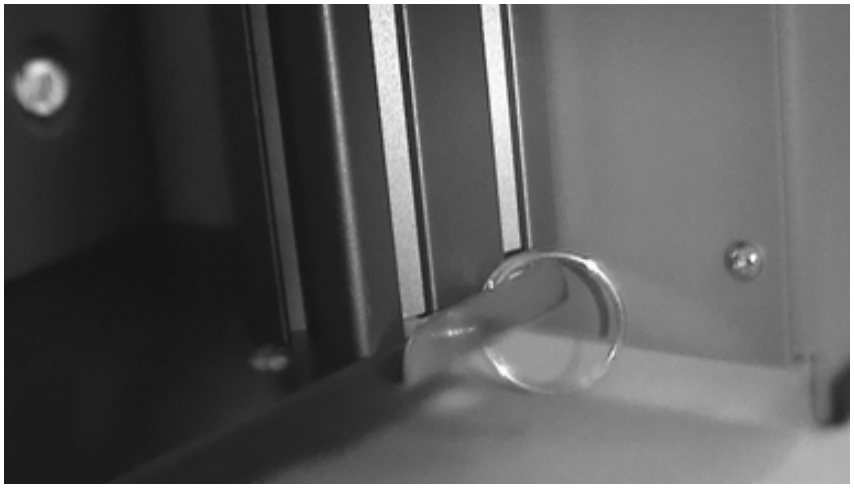
To install the plate drawer protection stand:

1. Slide the lock bracket out from the baseplate until it stops.

2. Place the alignment studs on the bottom of the plate drawer protection stand into the holes on the baseplate.

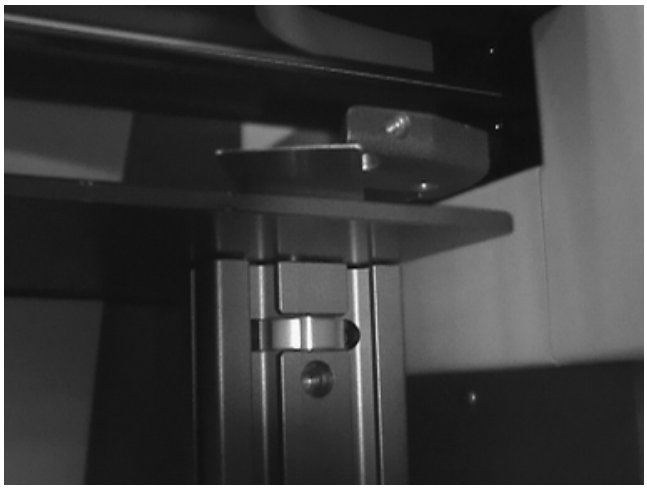


3. Slide the lock bracket into the baseplate to secure the plate drawer protection stand.



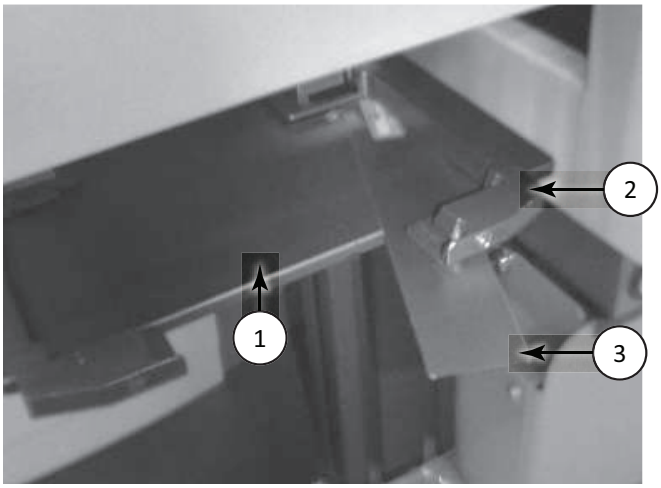
Setting Plate Drawer Protection Stand Height

Set the height of the plate drawer protection stand to a safe distance between the top of the plate drawer protection stand and the bottom of the microplate reader plate drawer.



Adjustment Wheel on Plate Drawer Protection Stand

1. Turn the adjustment wheel on the plate drawer protection stand to the right until the top of the plate is in the fully lowered position.
2. Press the Drawer button on the microplate reader to open the plate drawer. See the microplate reader user guide.
3. If the plate drawer opens on the opposite side from the microplate handler arm, leave the plate drawer open and power off the microplate reader. Then, manually slide the plate drawer to the side until it stops in position under the microplate handler arm. Continue with the microplate reader powered off.
4. Insert the gap distance check tool between the top of the plate drawer protection stand and the bottom of the microplate reader plate drawer.



Item	Description
1	Plate drawer protection stand
2	Microplate reader plate drawer
3	Gap distance check tool

5. Turn the adjustment wheel until the gap distance check tool comes into light contact with the top of the plate protection stand and the bottom of the microplate reader plate drawer.
   - To move the top of the plate drawer protection stand up, turn the adjustment wheel to the left.
   - To move the top of the plate drawer protection stand down, turn the adjustment wheel to the right.

Note: The gap distance check tool should slide easily between the microplate reader plate drawer and the plate drawer protection stand to set the gap properly.

Connecting the Microplate Handler to the Microplate Reader

Before you connect the microplate handler to the microplate reader, note the following:

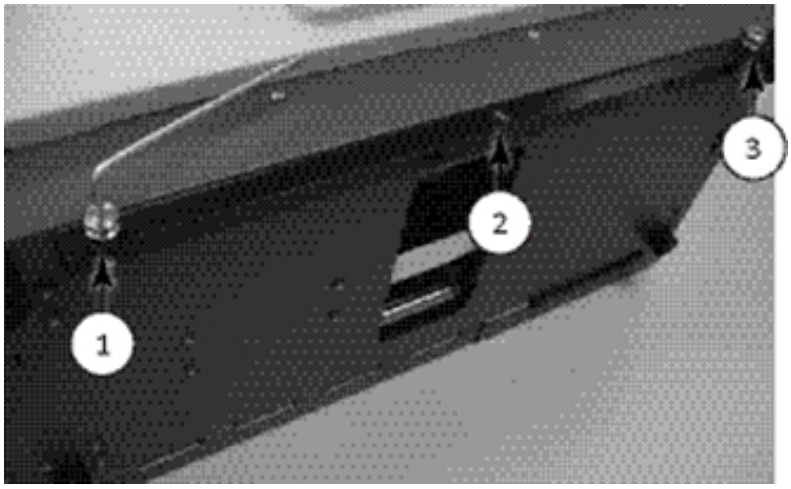
- The injector hood on the SpectraMax iD3 and the SpectraMax iD5 cannot open when the microplate handler is connected.
- The detection cartridge drawers on the SpectraMax i3x and SpectraMax Paradigm cannot open when the microplate handler is connected.

Any user who is capable of lifting the microplate handler can connect the microplate handler to the microplate reader.

WARNING! Lifting hazard. The instrument weighs approximately 11.8 kg (26 lbs). Take proper precautions to prevent injury and lift with care.

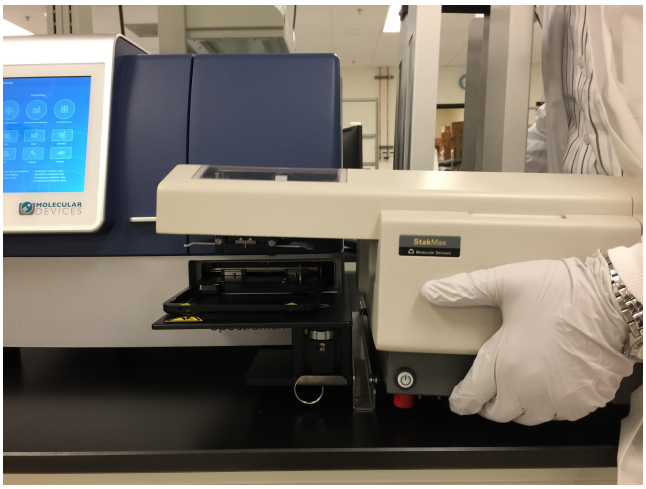
You install rail studs to the microplate handler. The rail studs fit into slots on the baseplate or the microplate handler stand to connect the microplate handler to the microplate reader.

1. Use the 3.0 mm hex key to attach the rail studs to the outermost holes on the mounting bracket on the microplate handler.



Item	Description
1	Installed rail stud
2	Unused hole in bracket
3	Installed rail stud

2. Lift the microplate handler and align the rail studs with the slots on the baseplate rail or on the microplate handler stand. Then slide the rail studs on the microplate handler firmly into the slots on the rail or the inner edge of the microplate handler stand. Make sure that the feet on the microplate handler rest flat on the table.



Rail Mount

Microplate Handler Stand Mount

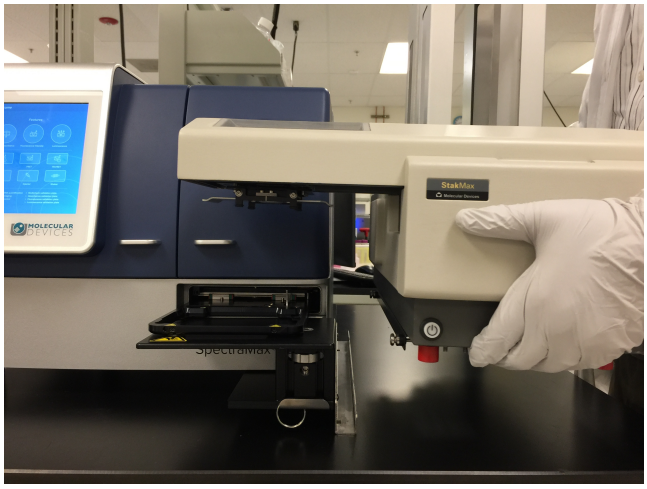
Separating the Microplate Handler from the Microplate Reader

The injector hood on the SpectraMax iD3 and SpectraMax iD5 cannot open when the microplate handler is connected. The detection cartridge drawers on the SpectraMax i3x and SpectraMax Paradigm cannot open when the microplate handler is connected.

Any user who is capable of lifting the microplate handler can separate the microplate handler from the microplate reader to access the injectors and the cartridges.

WARNING! Lifting hazard. The instrument weighs approximately 12 kg (26 lbs). Take proper precautions to prevent injury and lift with care.

1. Power off the microplate handler and disconnect the power supply.
2. Disconnect the USB cable that connects microplate handler to the computer.
3. Tilt the microplate handler to slide the rail studs out of the alignment slots.
4. Lift the microplate handler off the rail or the microplate handler stand.



Rail Mount

Microplate Handler Stand Mount

Accessing Detection Cartridges

For the SpectraMax i3x and SpectraMax Paradigm, the microplate handler blocks access to the microplate reader detection cartridges and the detection cartridge drawers are locked closed when the microplate handler is installed.

Note: You must use the software to lock and unlock the detection cartridge drawer when you use the microplate handler with the SpectraMax i3x for reads with injections.

To access detection cartridges:

1. Remove the microplate handler from the baseplate rail or from the microplate handler stand.
2. For the SpectraMax Paradigm front installation, remove the plate drawer protection stand. See Installing Plate Drawer Protection Stand on page 27.
3. In the SoftMax Pro Software, select the Operations tab and click **Info** to display the Instrument Information dialog.
4. Click **Unlock Drawers for StakMax**.
5. On the instrument control panel, press the button to open the detection cartridge drawer. See the microplate reader user guide.

To close a detection cartridge drawer:

1. On the instrument control panel, press the button to close the detection cartridge drawer. See the user guide for the microplate reader.
2. In the SoftMax Pro Software, select the Operations tab and click **Info** to display the Instrument Information dialog.
3. Click **Lock Drawers for StakMax**.
4. For the SpectraMax Paradigm front installation, reattach the plate drawer protection stand.
5. Place the microplate handler on the baseplate rail or the microplate handler stand.

Connecting the Cables

The microplate handler must be connected to the power supply with the power cable and to the computer with the USB cable.

Note: When you connect the microplate handler to the AquaMax Microplate Washer, use the provided RS-232 serial cable to connect the instruments. See the *AquaMax 2000/4000 Microplate Washer User Guide*.

1. Insert the 1/4-inch metal connector of the power cord into the DC input port on the right side of the microplate handler.

2. Insert the other end of the power cord into the power supply.

3. Insert the power supply power cord into a wall outlet, surge suppressor or UPS, and then wait three seconds.

Note: Connection through a surge suppressor or UPS is preferred.

4. Insert one end of the USB cable into the port on the microplate handler and insert the other end into a USB port on the computer.

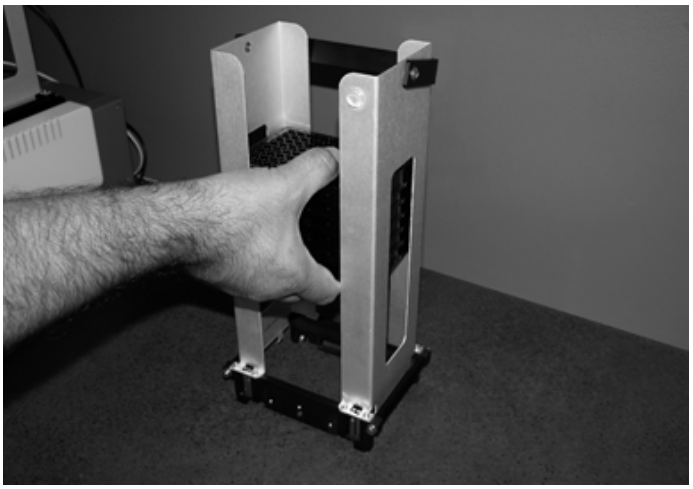
Note: If you connect through a USB hub, use a powered USB hub.

Load plates with well A1 in the top-left when looking at the front of the microplate handler.

Note: Do not use substances that can bond plates together in the microplate handler. Example: Build up of proteins on the plate top or adhesive from plate seals are common substances that can cause plates to bond together.

Load Magazine from the Top

1. Grasp a small stack of plates that you can hold between your thumb and fingers.

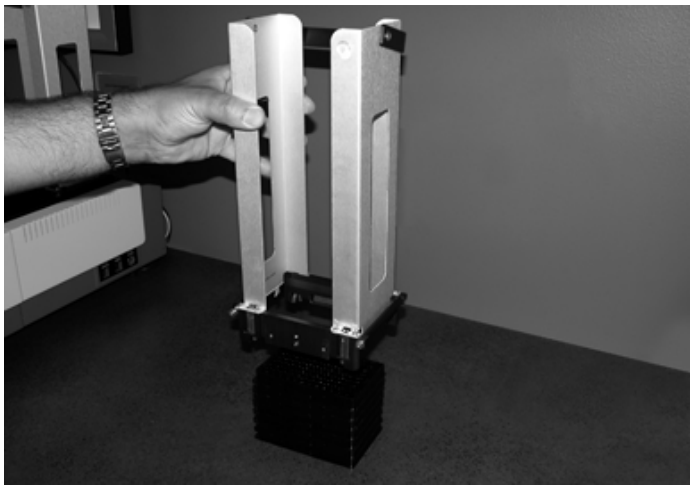


2. Slide the plates through the top of the magazine to the bottom and gently release them.
3. Continue to add small stacks of plates through the top of the magazine as needed.
4. Place the magazine in the Input stack on the microplate handler.
5. Place an empty magazine in the Output stack on the microplate handler.

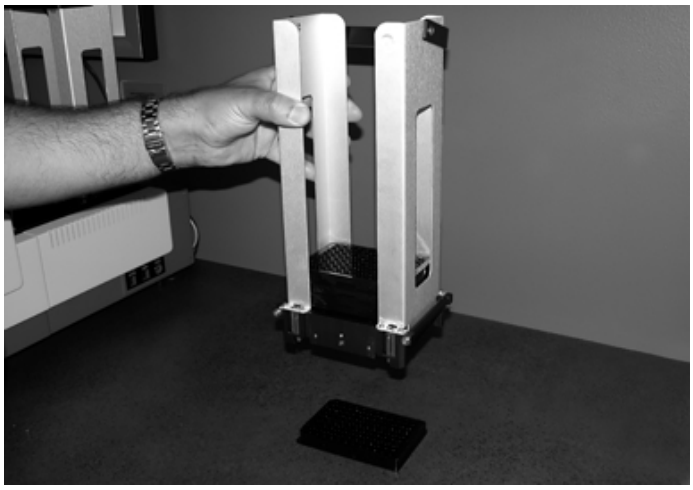
Load Magazine from the Bottom

Stack one extra plate when you load the magazine from the bottom, because the magazine does not pick up the bottom plate.

1. Stack all of the plates on the workbench.
2. Align the magazine over the stacked plates.



3. Carefully lower the magazine over the stacked plates until it contacts the workbench.
4. Lift the magazine from the workbench. The magazine picks up all of the plates in the stack except the bottom plate.



5. Place the magazine in the Input stack on the microplate handler.
6. Place an empty magazine in the Output stack on the microplate handler.

Magazine Load/Unload Tool

The optional StakMax Magazine Load and Unload Tool helps you load and unload a group of plates to and from a magazine.

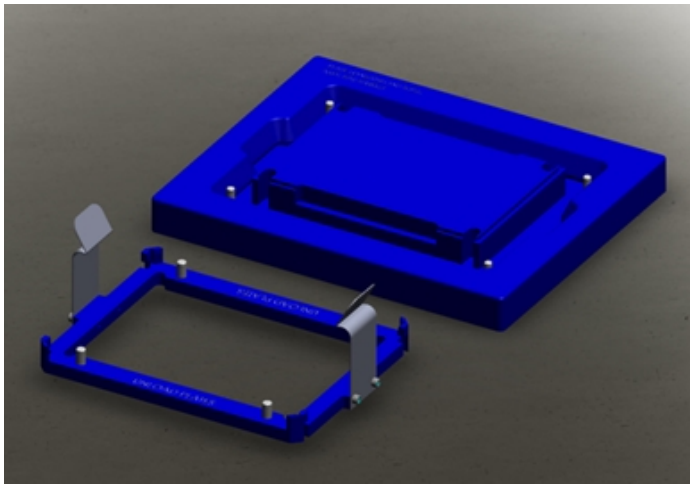
Use the StakMax Magazine Load and Unload tool if:

- You want to load or unload a group of plates, without lifting plates in or out of the top of the magazine.
- You do not want to leave the last plate on the workbench after you load from the bottom.

The tool assembly consists of two parts:

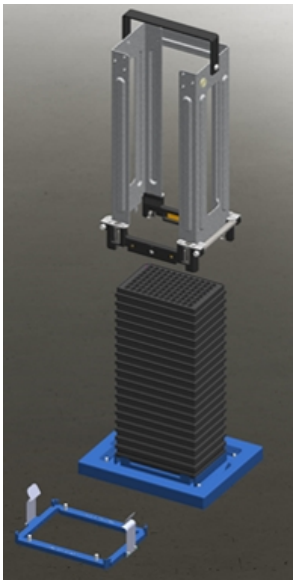
- The plate load base, labeled Load Plates
- The unload plate ring, labeled Unload Plates

The unload plate ring fits in the recessed channel of the plate load base for storage of the tool and to unload plates.

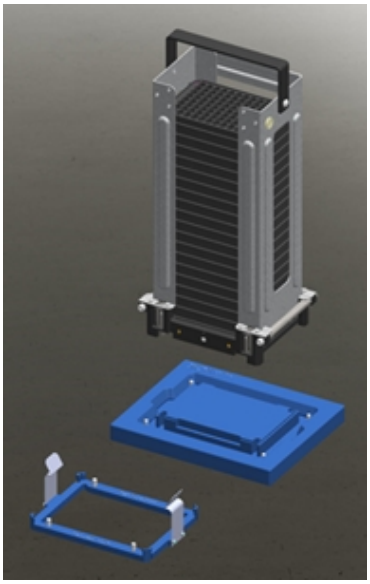


Load Plates into the Magazine

1. Remove the unload plate ring from the plate load base and set the ring aside. Do not use the unload plate ring to load plates.
2. Place the stack of plates to load onto the plate load base.
3. Make sure the stack of plates is stable and seated securely on the central portion of the base.
4. Carefully lower the empty magazine over the top of the stack of plates on the plate load base.



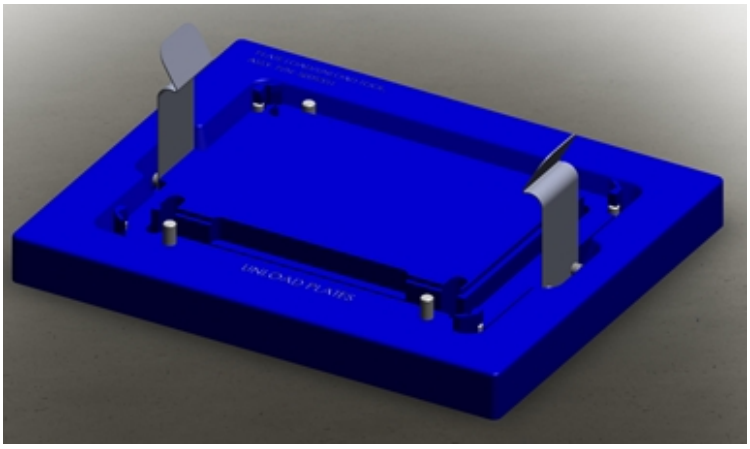
5. Gently press down on the top of the magazine until the black metal base is fully seated in the recessed channel of the plate load base. When the empty magazine is fully seated, the four hooks at the four corners at the bottom of the magazine are released to stop the plates from falling off the magazine.
6. Use the magazine handle to slowly lift the loaded magazine straight up and off the plate load base, and then relocate the magazine and plate stack to a stable location.



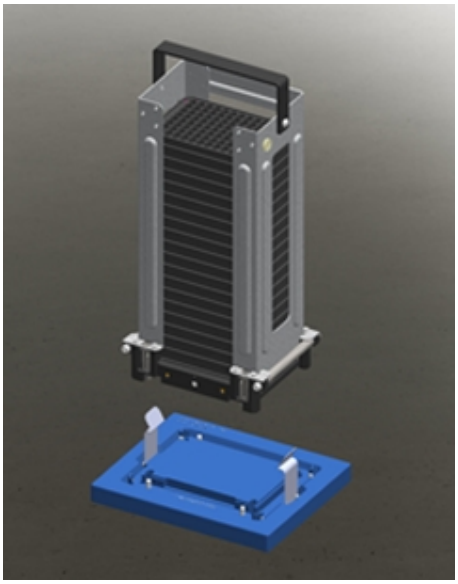
7. Replace the unload plate ring in the recessed channel of the plate load base for storage of the tool and to unload plates.

Unload Plates from the Magazine

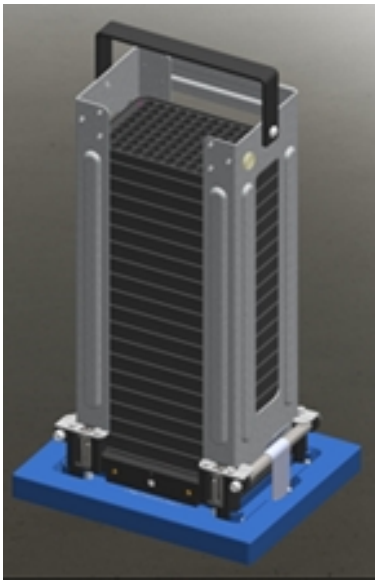
1. Place the unload plate ring onto the plate load base and make sure it is securely seated in the base.



2. Use the magazine handle to pick up the loaded magazine.
3. Carefully lower the loaded magazine over the top of the tool, aligning the corners of the black aluminum magazine base into the blue raised corners of the unload plate ring.

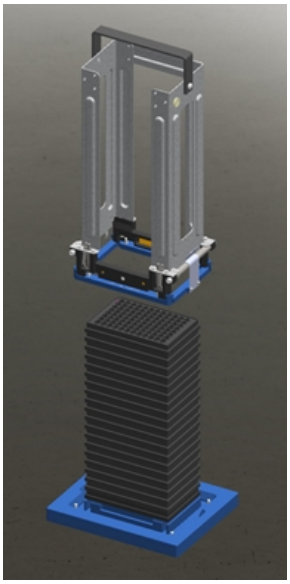


4. Place the loaded magazine on top of the tool, making sure the two spring clips on the unload plate ring are securely clipped on the crossing bars on each side of the magazine. When the magazine is securely seated on the unload plate ring, the four hooks at the four corners on the bottom of the magazine retract to let the plates slide out from the bottom of the magazine.

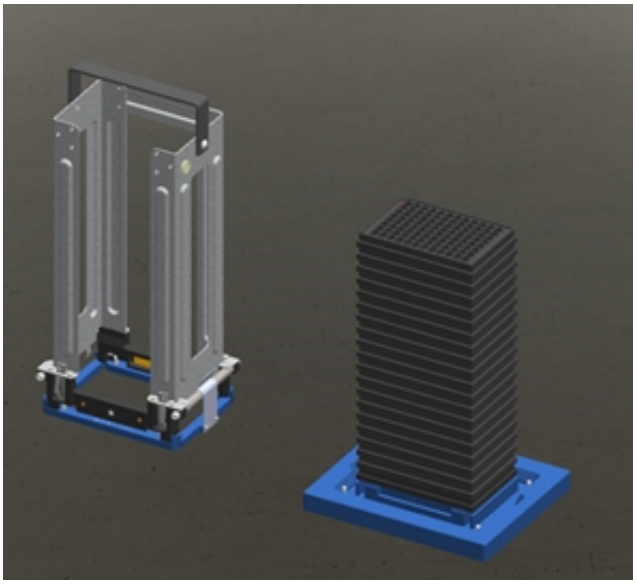


5. Carefully lift up the empty magazine and the unload plate ring until you clear the plate stack.

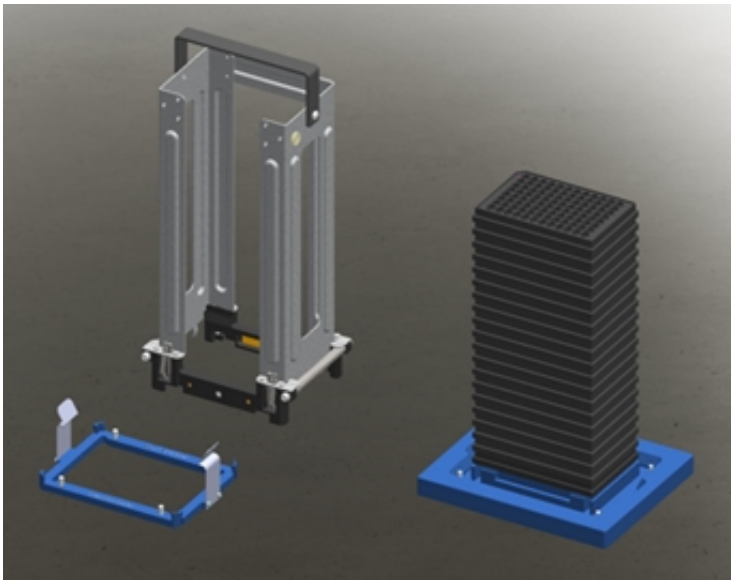
Note: When you remove the empty magazine and the unload plate ring, be careful to not topple the unsupported stack of plates.



6. Place the empty magazine and the unload plate ring in a stable location.



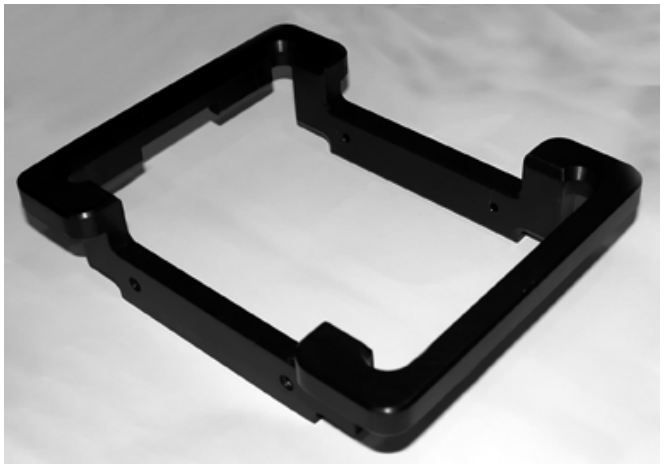
7. Use your thumbs to unclip the unload plate ring from the magazine by pushing the two spring clips on the unload plate ring away from the crossing bars on the sides of the magazine.



8. Remove the unload plate ring from the magazine.
9. Remove the plates from the plate load base.
10. Store the unload plate ring in the recessed channel of the plate load base for storage of the tool.

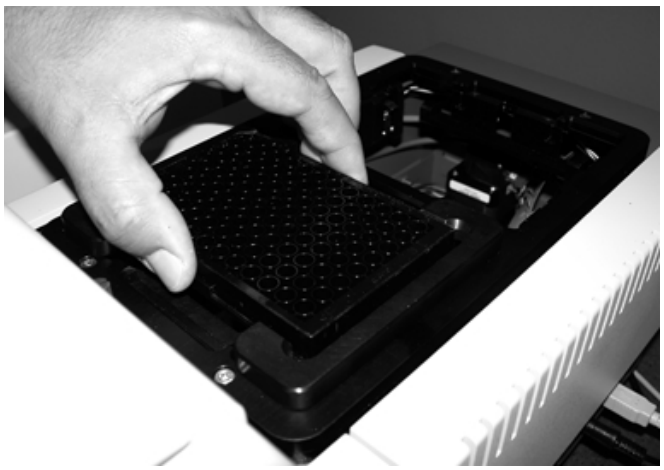
Single Plate Adapter

If you load one plate at a time, use the single plate adapter.



To install the single plate adapter, place it in the input stack on the microplate handler.

To load a plate, grasp the plate by its longer sides and place the plate in the adapter.



Never load more than one plate at a time into the adapter.

Continuously Loading the Microplate Handler

You can continuously feed plates into the microplate handler to permit non-stop automated reads. Before the read, enter the number of plates to read or select the **All of Input Stack** option. Then load new plates as the input magazine or single plate adapter becomes empty.

If you load one plate at a time, use the single plate adapter. Never load more than one plate at a time into the adapter.

Magazines are available in 20-plate, 40-plate, and 50-plate sizes. Never stack more plates in the input magazine than the magazine is specified to hold. Never let the output magazine collect more plates than the magazine is specified to hold.

After you connect the microplate reader or microplate washer to the microplate handler, you are ready to power on the StakMax Microplate Handling System.

Powering On the Microplate Handler

Power on the microplate handler before you start the SoftMax Pro Software. The power interrupt button located on the front side of the microplate handler allows you to power on the microplate handler.

This button also acts as an emergency interrupt button and a reset button. Press the power interrupt button to immediately stop the microplate handler movement and reset the entire StakMax Microplate Handling System.

- To power on the microplate handler, press the power-interrupt button.
- To power off the microplate handler, unplug the power cord.

The rest of this document describes how to set up and operate the StakMax Microplate Handling System using the features of the StakMax Software that is part of the SoftMax Pro Software when you connect the microplate handler to a microplate reader.

Note: When you connect the microplate handler to the AquaMaxMicroplate Washer, the AquaMax Software controls the StakMax Microplate Handling System so you can stop reading this document here and start reading the *AquaMax 2000/4000 Microplate Washer User Guide*.

Starting the SoftMax Pro Software

The first time you connect the microplate handler to the computer, after you power on the microplate handler and then start the SoftMax Pro Software the USB instrument driver automatically installs and activates the StakMax Software that is part of the SoftMax Pro Software.

Aligning the Gripper

The StakMax Software Alignment wizard provides instructions to complete the alignment process. Use the Alignment wizard one time after instrument installation. This process takes approximately 15 minutes.

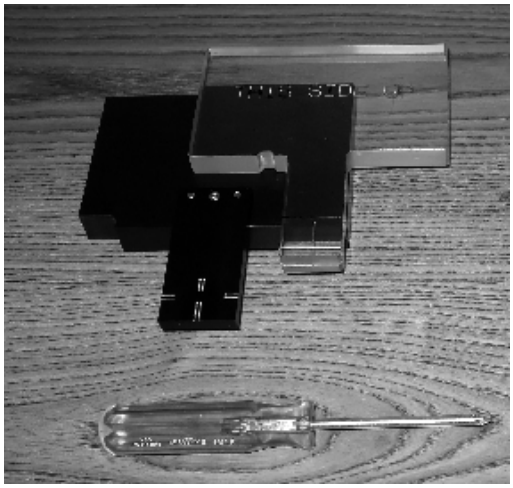
You do not need to align the SpectraMax iD3 and SpectraMax iD5.

Note: Do not use this alignment process for the SpectraMax i3x and SpectraMax Paradigm. See Aligning the Plate Transfer Position: SpectraMax i3x and SpectraMax Paradigm on page 51.

The following are in the accessory kit:

- Clear alignment tool
- Black alignment tool
- Phillips screwdriver
- Plate

Note: Do not use the purple plate adapter when you perform the alignment. Use the purple plate adapter only when you read a plate in the top read mode for specific instruments.



Make sure you have the two alignment tools and other parts available before you start the alignment process.

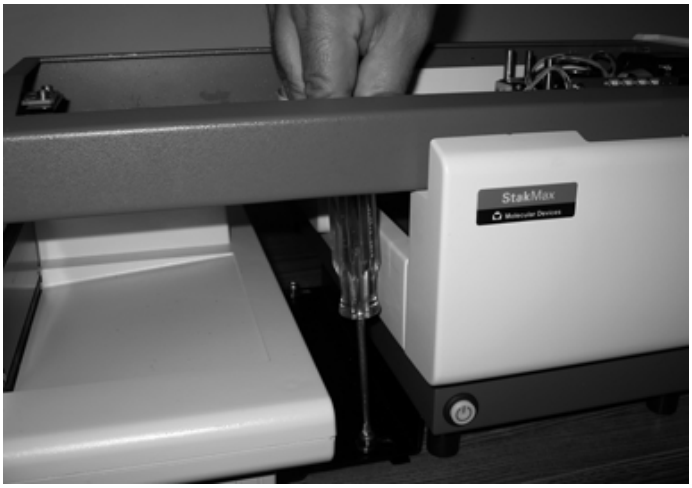
To align the gripper:

1. Start the SoftMax Pro Software.
2. In the SoftMax Pro Software, select the **Operations** tab and click **Plate Stacker**. After a few seconds, the StakMax Software dialog displays. See StakMax Software on page 59.
3. Loosen the silver thumbscrew on the cover that is between the microplate handler arm and the input stack.

4. Lift off the cover from the microplate handler arm.

5. In the StakMax Software dialog, click **Alignment** to start the Alignment wizard.
6. Follow the instructions on the Alignment wizard. This process takes approximately 15 minutes to complete.

7. After you finish the alignment, replace the cover on the microplate handler arm and tighten the thumbscrew.



After you complete the gripper alignment, run a functional check of the gripper. See Checking Gripper Function on page 58.

Aligning the Plate Transfer Position: SpectraMax i3x and SpectraMax Paradigm

When you connect the microplate handler to the SpectraMax i3x and SpectraMax Paradigm, you must adjust the plate transfer position before you use the microplate handler. Use the SoftMax Pro Software Transfer Position Teaching wizard to assist with the alignment process. This process takes approximately 15 minutes.

CAUTION! To prevent damage to the instruments, make sure you properly adjust the height of the plate drawer protection stand before you start the Transfer Position Teaching wizard. See Setting Plate Drawer Protection Stand Height on page 28.

The following are in the accessory kit:

- Top Adjustment Plate
- Bottom Adjustment Plate

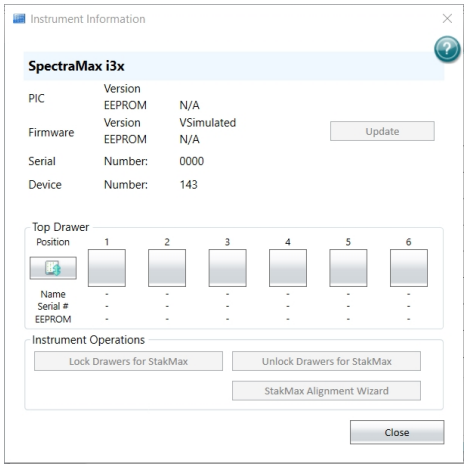
Make sure you have both adjustment plates available before you start. To align and test the plate transfer position:

1. Loosen the silver thumbscrew on the cover that is between the microplate handler arm and the input stack.

2. Lift off the cover from the microplate handler arm.

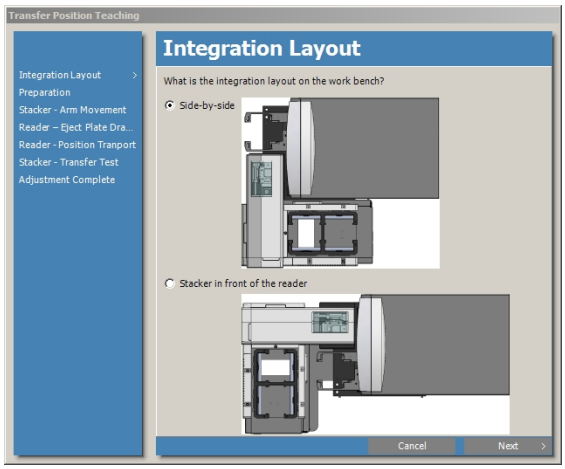
3. Start the SoftMax Pro Software and connect the software to the SpectraMax i3x or SpectraMax Paradigm instrument.
4. In the SoftMax Pro Software, select the **Operations** tab and click **Info**.

5. On the Instrument Information dialog:



Click **StakMax Alignment Wizard** to display the Transfer Position Teaching wizard.

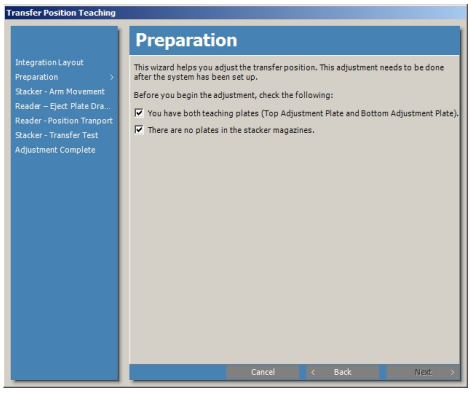
6. On the Integration Layout page:



a. Select an option:
   - Select **Side-By-Side** when you install the microplate handler in the side-by-side position to deliver plates to the SpectraMax Paradigm in the landscape orientation. This is the only option for the SpectraMax i3x.
   - Select **Stacker in Front of the Reader** when you install the microplate handler in the front position to deliver plates to the SpectraMax Paradigm in the portrait orientation. Not available for the SpectraMax i3x.

b. Click **Next**.

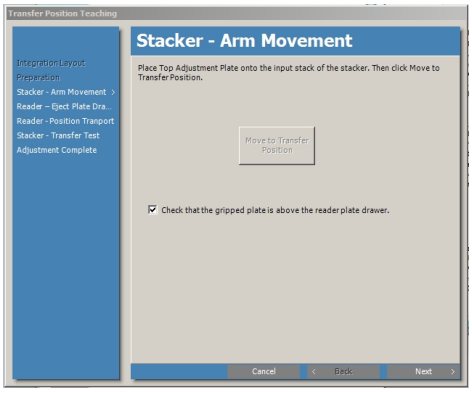
7. On the Preparation page:



   a. Select the **You have both teaching plates (Top Adjustment Plate and Bottom Adjustment Plate).** check box.
   b. Make Sure there is no plate in the microplate reader drawer and select the **There are no plates in the stacker magazines.** check box.
   c. Click **Next**.

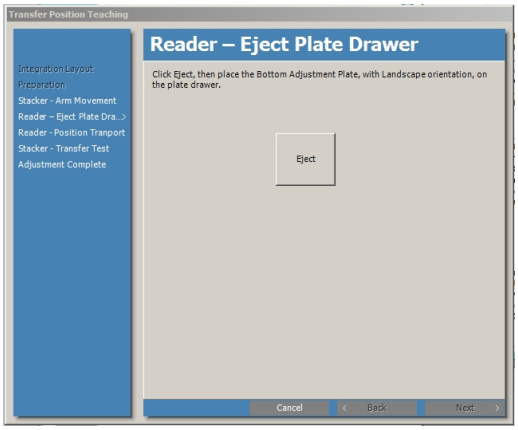
8. Place the Top Adjustment Plate into the microplate handler input stack with the label in the A1 position.

9. On the Stacker - Arm Movement page:

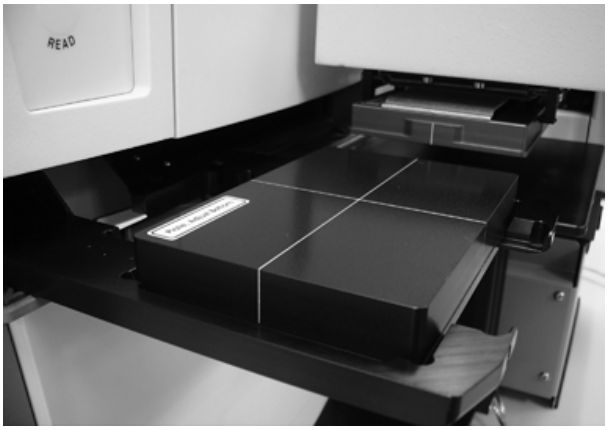


   a. Click **Move to Transfer Position**.
   b. Make sure the gripped plate is above the plate protection stand where the plate drawer opens
   c. Select the **Check that the gripped plate is above the reader plate drawer** check box.
   d. Click **Next**.

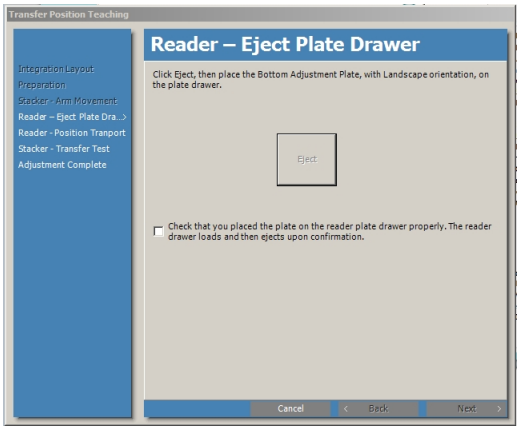
10. On the Reader - Eject Plate Drawer page:



a. Click **Eject**. The plate drawer opens on the opposite side from the microplate handler arm to make it easier to place the Bottom Adjustment Plate on the drawer.
b. Place the Bottom Adjustment Plate in landscape orientation (for side-by-side installation) or portrait orientation (for the SpectraMax Paradigm front installation) on the plate drawer with the label in the A1 position.

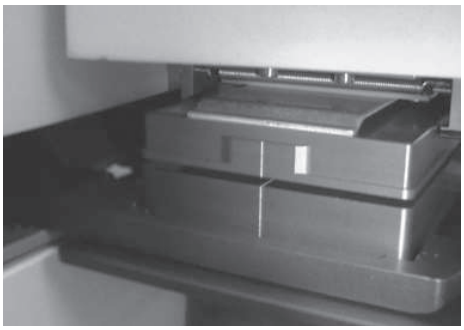


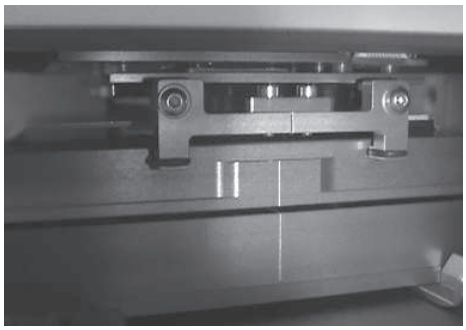
c. Make sure the plate is placed properly on the drawer.



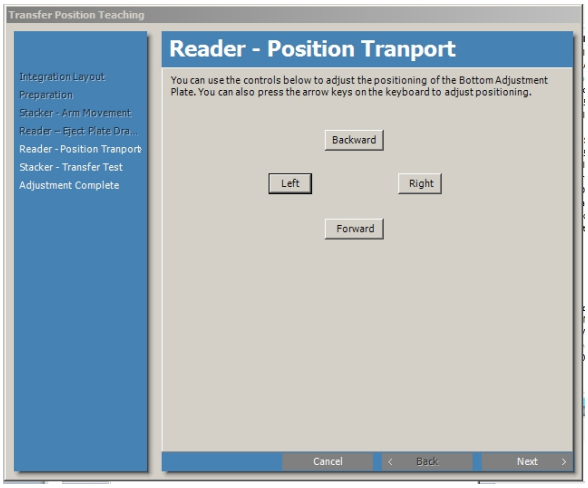
d. Select the **Check that you placed the plate on the reader plate drawer properly. The reader drawer loads and then ejects upon confirmation.** check box.
e. Click **Next**. The plate drawer closes and then ejects directly under the microplate handler arm and Top Adjustment Plate.

11. Observe the alignment marks on the two adjustment plates.



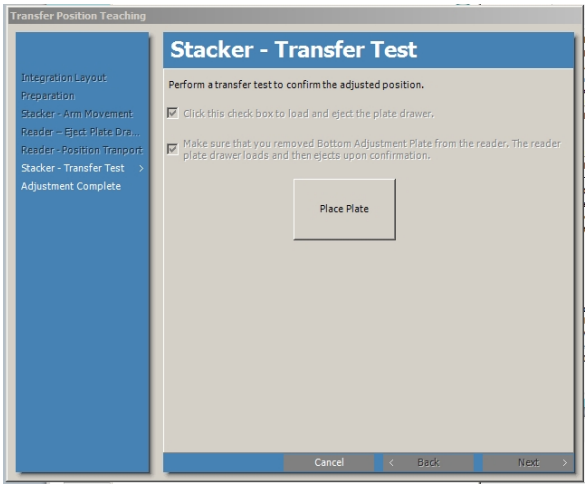


12. On the Reader - Position Transport page:

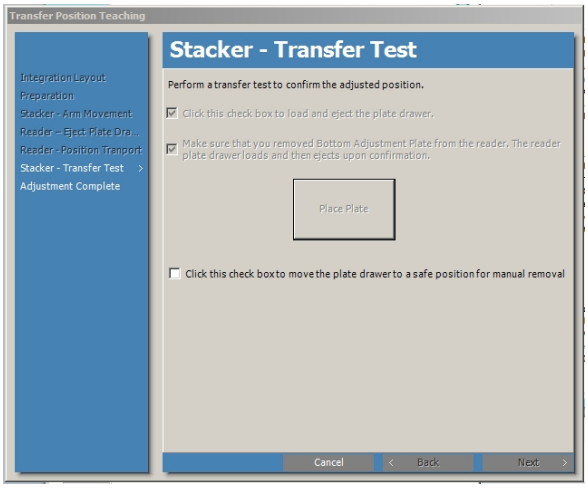


a. Click **Left**, **Right**, **Backward**, or **Forward** (or use the arrow keys on the keyboard) to move the Bottom Adjustment Plate until you align the marks on the two adjustment plates.
b. Click **Next**.

13. On the Stacker - Transfer Test page:



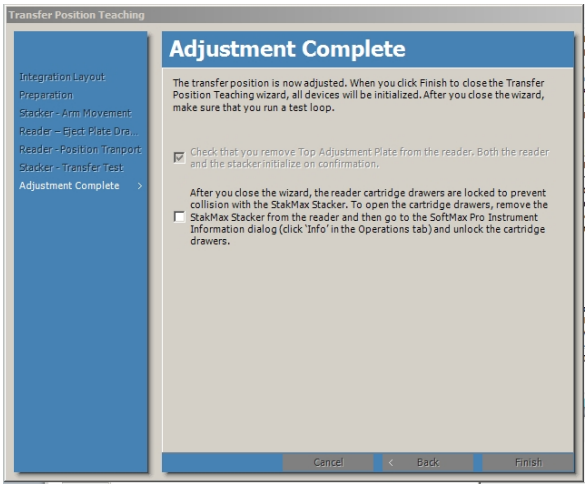
a. Select the **Click this check box to load and eject the plate drawer** check box to have the plate drawer close and then eject on the opposite side from the microplate handler arm to make it easier to remove the Bottom Adjustment Plate from the drawer.
b. Remove the Bottom Adjustment Plate from the drawer.
c. Select the **Make sure that you removed Bottom Adjustment Plate from the reader. The reader plate drawer loads and then ejects upon confirmation.** check box to have the plate drawer close and then eject under the microplate handler arm and the Top Adjustment Plate.
d. Click **Place Plate** and then click **OK** in the confirmation message that displays to place the Top Adjustment Plate in the plate drawer.



e. Select the **Click this check box to move the plate drawer to a safe position for manual removal.** check box.
f. Click **Next** to have the plate drawer close and then eject on the opposite side from the microplate handler arm to make it easier to remove the Top Adjustment Plate from the drawer.

14. Remove the Top Adjustment Plate from the plate drawer.

15. On the Adjustment Complete page:



    a. Select the **Check that you remove Top Adjustment Plate from the reader. Both the reader and the stacker initialize on confirmation.** check box to confirm that you removed the Top Adjustment Plate from the drawer.
    b. Select the **After you close the wizard, the reader cartridge drawers are locked to prevent collision with the StakMax Stacker. To open the cartridge drawers, remove the StakMax Stacker from the reader and then go to the SoftMax Pro Instrument Information dialog (click 'Info' in the Operation tab) and unlock the cartridge drawers.** check box.
    c. Click **Finish**.

16. Replace the cover on the microplate handler arm and tighten the thumbscrew.

Checking Gripper Function

After you align the gripper, do the following functional check to make sure that the microplate handler is operational.

You need the five empty plates.

To do a gripper functional check:

1. Turn on the StakMax Microplate Handler.
2. Start the SoftMax Pro Software.
3. Select the **Operations** tab and click **Plate Stacker**. After a few seconds, the StakMax Software dialog displays.
4. Place five plates in the input stack or the magazine.
5. Click **Scripting** to display the Scripting dialog.
6. Click **Open**.
7. Navigate to and select the **Functional_Check.txt** script in the following location: C:\ProgramData\Molecular Devices\SMP<nnn>\StakMax Scripts and then click **Open**.
8. Click **Run**.

- The microplate handler loads the first of the 5 plates into the plate drawer.
- The drawer closes then re-opens.
- The microplate handler picks up the plate and places it in the output stack.
- This process continues for all 5 plates.
- After the plates are processed, they are moved from the output stack and are re-stacked in the input stack.
- This process repeats 10 times for a total of 50 plate load and unload cycles.

  If the plates transfer and stack properly, the microplate handler passes the functional check.

9. Click **Done**.

Note: When you connect the microplate handler to the AquaMax Microplate Washer, the AquaMax Software controls the StakMax Microplate Handler. See the *AquaMax 2000/4000 Microplate Washer User Guide*.

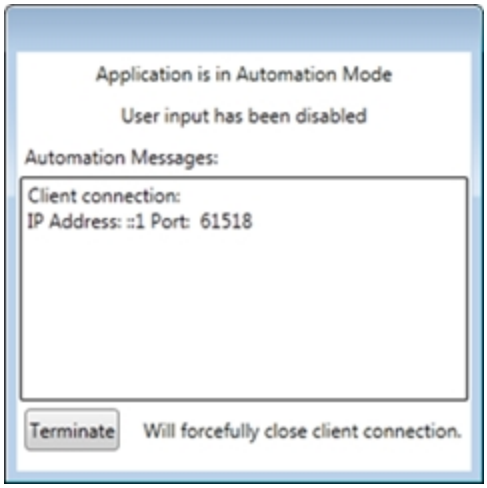
The StakMax Software is included with the SoftMax Pro Software to integrate the StakMax Microplate Handling System with the Molecular Devices microplate reader.

Note: When you use the SoftMax Pro Software - GxP edition, StakMax specific commands and scripts are not tracked in the audit trail and do not have user permission settings. Please implement standard work as required by your organization.

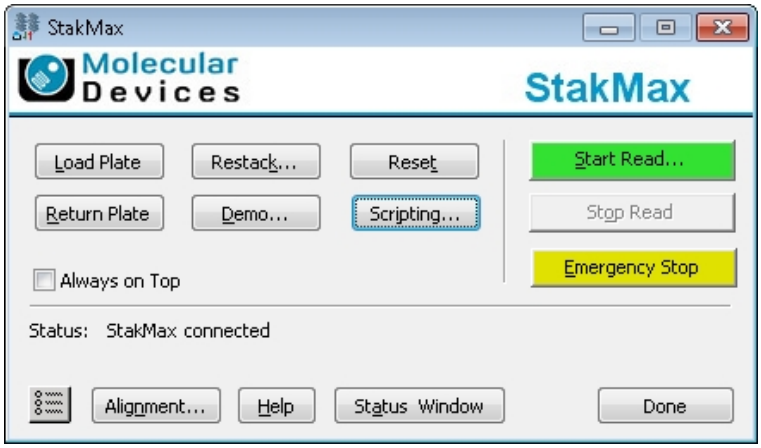
Use the StakMax Software to do the following:

- Start read
- Stop read
- Move plates from the input stack to the microplate reader
- Move plates from the microplate reader to the output stacks
- Move plates between the microplate handler stacks
- Create scripts to automate more complex microplate handler functions. See Scripting on page 66.

To start the StakMax Software from the SoftMax Pro Software, select the **Operations** tab and click **Plate Stacker**. The SoftMax Pro Software goes into Automation mode and prevents user interaction with the SoftMax Pro Software.



The StakMax Software dialog displays on top of the SoftMax Pro Software.



Load Plate

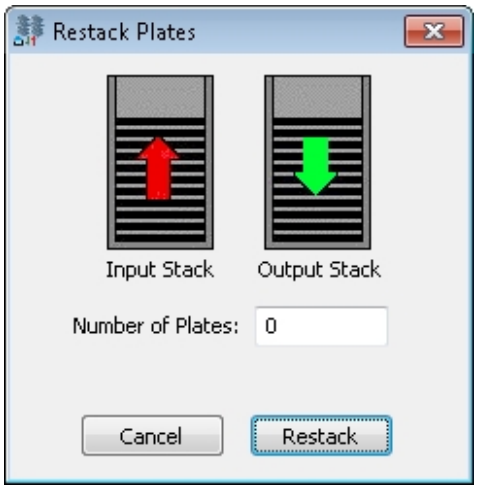
Click **Load Plate** to move one plate from the input stack to the microplate reader. Click this button to confirm that the plate alignment between the input stack and the microplate reader is still accurate.

Return Plate

Click **Return Plate** to move one plate from the microplate reader to the output stack. Click this button to clear a plate that was left in the microplate reader, or to determine if a component is out of sync.

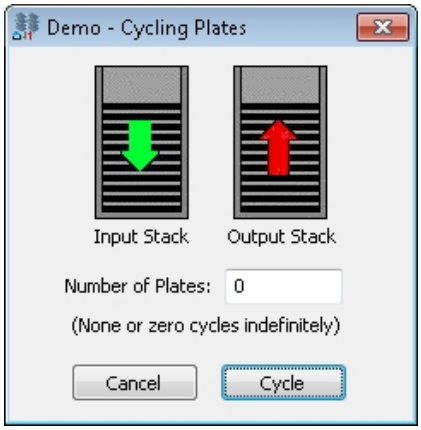
Restack

Click **Restack** to move plates from the output stack to the input stack. Use the Restack Plates dialog to specify the number of plates to restack. To move all plates, leave the **Number of Plates** field blank or enter **0** (zero).



Demo

Click **Demo** to continuously move plates from the microplate handler to the microplate reader and back. This switches the plate source between the input stack and the output stack as they fill and empty. Use Demo mode to test or demonstrate the plate movement. Do not use Demo mode for normal operation. Use the Demo - Cycling Plates dialog to enter the number to move in the **Number of Plates** field. To move all plates, leave the **Number of Plates** field blank or enter **0** (zero).



Reset

Click **Reset** to reset the microplate handler to the initial start-up state. In most cases, the software automatically resets the system if an error occurs. Use the **Reset** button only in rare cases when the microplate handler does not reset itself.

Note: In case of emergency, press the power-interrupt button on the front of the StakMax Microplate Handler to reset the entire system.

Scripting

Click **Scripting** to create and edit scripts to run the microplate handler. The Scripting dialog displays to enable you write scripts that are a series of commands to control and automate more complex runs. See Scripting on page 66.

Start Read

Click **Start Read** to starts a plate read. This button is green when the software and instrument are ready to start a read. The Read Plate dialog displays. See Reading Plates on page 64.

Stop Read

Click **Stop Read** to stop the read in progress and reset the microplate handler and the microplate reader. This button turns red after a read starts. The Status line displays **Read Plate Session Stopped** after the read stops.

- If you stop the read before a read starts and while the microplate handler is in motion, no data saves.
- If you stop the read after a read starts, interrupting the read, the data does not automatically save. You can manually save the collected data.
- If you stop the read after a read completes, the data automatically saves if you define the protocol to use the Auto Export or Auto Save feature. You can manually save the collected data.

Emergency Stop

Click **Emergency Stop** to immediately shut down the entire system, including the microplate handler and the microplate reader. After you click **Emergency Stop**, clear objects that are in the way, remove plates that are in the drawer, and then click **Reset** in the StakMax Software dialog.

Settings

Click  to display the StakMax Settings dialog where you define how to name documents when you install a barcode reader, whether to append the date and time to script commands, and whether to display a prompt during script editing. See Settings on page 63.

Alignment

Click **Alignment** before you use the microplate handler for the first time to align the instrument with the microplate reader. The Alignment wizard provides instructions to complete the alignment process. Use the Alignment wizard one time after instrument installation. This process takes approximately 15 minutes. See Aligning the Gripper on page 48.

Help

Click **Help** for additional assistance.

Status Window

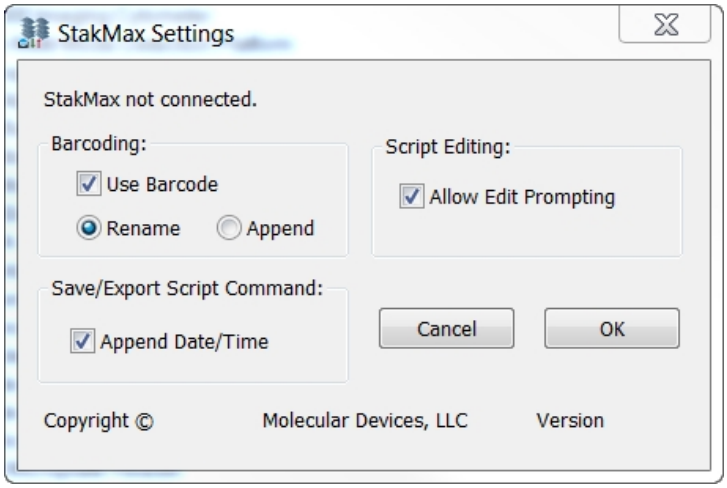
Click **Status Window** to display the Status dialog. The Status dialog displays information about the current run including low-level commands and error messages. Use the Status dialog to print the status, clear the status, and view the status history. To save status information, select the text, copy (Ctrl+C) the text, and then paste (Ctrl+V) the text into a text editor such as Microsoft Word or Notepad. See Status Dialog Error Codes on page 74.

Done

Click **Done** to exit the StakMax Software, and then click **Terminate** in the SoftMax Pro Software Automation dialog.

Settings

Click  to display the StakMax Settings dialog where you define how to name Plate sections in the data files when you install a barcode reader in the microplate handler, whether to append the date and time to script commands, and whether to display a prompt when you edit scripts.



Barcoding

Select the **Use Barcode** check box to use the microplate handler barcode reader to identify plates.

- Select **Rename** to overwrite the Plate section name with the barcode information.
- Select **Append** to add the barcode information to the Plate section name.

Script Editing

The Allow Edit Prompting option is applicable when you use the Scripting feature. See Scripting on page 66.

- Select the **Allow Edit Prompting** check box to have the software display a message each time you click **Remove** or **Remove All** in the Script Editor dialog.
- Leave the **Allow Edit Prompting** check box clear to not display messages when you delete a script command in the Script Editor dialog.

Save/Export Script Command

The Save/Export Script Command feature helps with record keeping, for backup purposes, and to reduce the risk of overwriting existing script files.

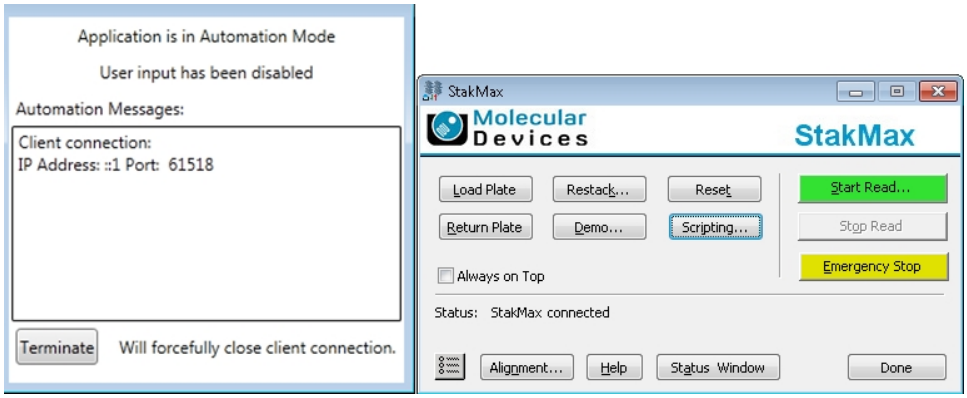
- Select the **Append Date/Time** check box to have the software add the date and time to the script file name when the file saves. Example: The script file: **user.pda** saves as **user_ 19.01.22-07-36-41 PM.pda**.
- Leave the **Append Date/Time** check box clear to have the software add a 1, 2, 3, and so on, to the script file name to prevent overwriting script files.

Reading Plates

CAUTION! You should define the protocol to use the Auto Export or Auto Save feature to prevent data loss before you start the StakMax Software. See the *SoftMax Pro Data Acquisition and Analysis Software User Guide* or the application help.

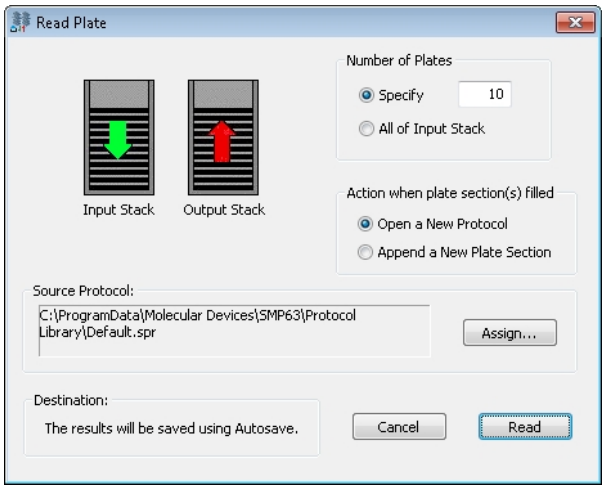
You should not do data analysis or other operations in the SoftMax Pro Software until the process completes. As with other robotic plate handling systems, it is best to do data analysis on a different computer from the computer that runs the microplate handler.

1. Power on the microplate handler and then power on the microplate reader. See Getting Started on page 47.
2. Load plates into the input magazine. See Loading the Microplate Handler on page 37.
3. In the SoftMax Pro Software, open the protocol to run and then click  to define the **Auto Export** or **Auto Save** settings to prevent data loss. See the *SoftMax Pro Data Acquisition and Analytics Software User Guide* or the application help.
4. Select the **Operations** tab and click **Plate Stacker**. The SoftMax Pro Software enters automation mode and the StakMax Software starts.



The StakMax dialog displays the status as the software connects to the StakMax Microplate Handler.

5. In the StakMax dialog, click **Start Read** to display the Read Plate dialog.



6. Select a **Number of Plates** option.
   - Select **Specify** and enter the number of plates to read.
   - Select **All of Input Stack** to read all of the plates in the input stack.
7. Select an **Action When Plate Sections Filled** option.
   - Select **Open a New Protocol** to save the data from each plate or set of plates to a different data file.
     Example: You have 50 sample plates and the protocol has one Plate section, the software opens 49 copies of the protocol and saves the data to 50 documents. Alternatively, you have 4 sets of 5 plates (1 control plate and 4 sample plates) and the protocol has 5 Plate sections, the software opens 4 instances of the protocol for each set of plates and saves the data to 4 documents. This allows you to automate the processing of plate sets without a script.
   - Select **Append a Plate Section** to save the data from all plates to the same document.
     Example: You have 50 sample plates and the protocol has one Plate section, the software adds 49 Plate sections to the original protocol, and the data from all plates save in a single document.
8. In the Source Protocol area, click **Assign** to display the Choose a Protocol for Reading dialog or the Open dialog. Select the protocol to read and click **Open**. The file path to the protocol displays in the Source Protocol field.

   Note: The Destination area should display **The Results Will Be Saved Using Auto Save**. If not, click Cancel and enable either Auto Export or Auto Save.

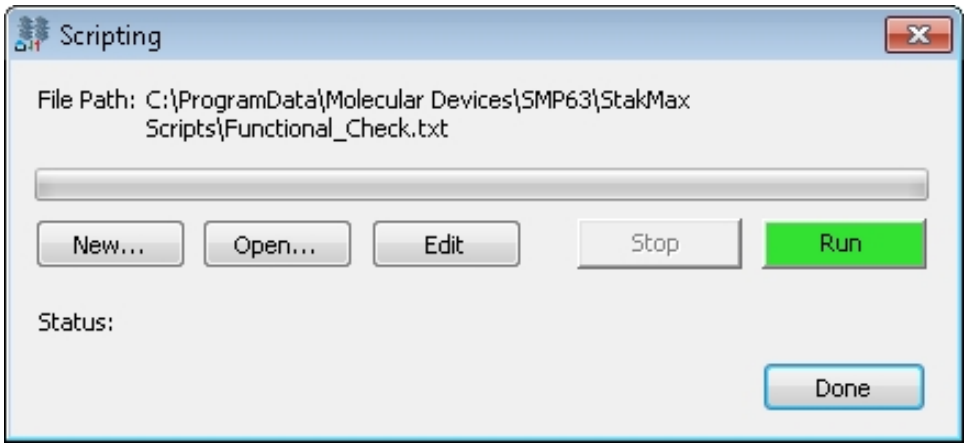
9. Click **Read**. The Status line displays the read status.

Note: If you leave a plate in the microplate reader and try to read a new plate, the system detects that a plate is present and moves the new plate back to the input stack where it came from. Click **Return Plate** to move the plate from the microplate reader to the output stack and then restart the read.

Scripting

Use the Scripting dialog to run scripts and it provides access the Script Editor dialog v
manage scripts. Scripting allows you to automate a series of commands that control r

Click **Scripting** in the StakMax dialog to display the Scripting dialog.



The file path for the open script displays at the top of the dialog.

- Click **New** to create a new script.
- Click **Open** to open a saved script.
- Click **Edit** to edit the open script.

Run Scripts

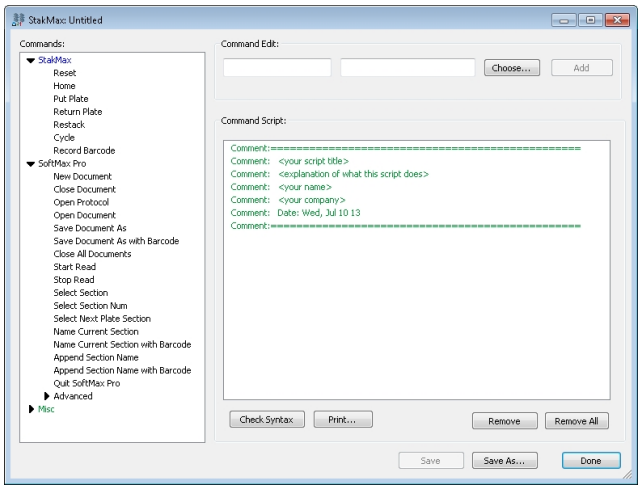
1. Click **New** or **Edit** to display the Script Editor dialog. The title bar displays StakMax: <script file name>.
2. Click **Open** to display the Open a Script dialog. Navigate to and select the script file to run and then click **Open**.
3. Click **Run** to run the script.

As the script is runs, the **Stop** button allows you to stop the run before it completes.

Note: If the script has unsaved changes on the Script Editor, the unsaved commands do not run.

Script Editor

Use the Scrip Editor dialog to manage scripts.



In the Scripting dialog click **New** or **Edit** to display the Script Editor dialog. The Script Editor has three areas:

- The **Commands** area lists the commands you can use in a script.
- The **Command Edit** fields allow you to add commands to the script.
- The **Command Script** field displays the script and allows you to modify the commands.

StakMax Commands

Command	Description
Reset	Resets the microplate handler to its initial start-up state and position.
Home	Returns all axes of the microplate handler to their home positions.
Put Plate	Opens the microplate reader plate drawer and moves one plate from the microplate handler input stack to the microplate reader plate drawer.
Return Plate	Opens the microplate reader plate drawer and moves one plate from the microplate reader plate drawer to the microplate handler output stack.
Restack	Moves the entered number of the plates from the microplate handler output stack to the input stack. If you do not enter a value, all plates in the output stack move to the input stack.
Cycle	Moves the entered number of plates from the microplate handler input stack to the output stack. If you do not enter a value, all plates in the input stack move to the output stack.
Record Barcode	Sets the barcode variable in the script to that of the plate that was most recently scanned by the barcode reader.

For detailed descriptions of SoftMax Pro commands, see the *SoftMax Pro Data Acquisition and Analysis Software User Guide* or the application help.

SoftMax Pro Commands

Command	Description
New Document	Creates a new protocol with the default protocol settings.
Close Document	Closes the current protocol.
Open Protocol	Opens the protocol from the path you enter.
Open Document	Opens the document from the path you enter.
Save Document As	Saves the current document with the name and file path you enter.
Save Document As with Barcode	Saves the current document with the name and file path you enter plus adds the current barcode to the end of the file name.
Close All Documents	Closes all documents.
Start Read	Starts the read.
Stop Read	Stops the read that is in progress.
Append Read	Appends data to the current read.
Select Section	Selects a specific section in the document.
Select Section Num	Selects a section by number.
Select Next Plate Section	Selects the next available Plate section.
Name Current Section	Gives the name you enter to the current section.
Name Current Section with Barcode	Gives the name you enter to the current section and adds the current barcode to the end of the name.
Append Section Name	Adds a text string to the end of the section name.
Append Section Name with Barcode	Adds the current barcode to the end of the section name.
Quit SoftMax Pro	Exits the SoftMax Pro Software.
Start Workflow	Starts a workflow.

Expand the list of SoftMax Pro commands to display the Advanced SoftMax Pro commands.

Advanced SoftMax Pro Commands

Command	Description
Open Drawer	Opens the microplate reader plate drawer.
Close Drawer	Closes the microplate reader plate drawer.
Set Temperature	Sets the temperature for a microplate reader plate drawer. To turn the incubator off, enter zero (0).
Shake Plate	Shakes the plate inside the microplate reader. Enter "on" to start shaking and "off" to stop shaking. Use the Wait command to enter the number of seconds to shake the plate.
New Plate Section	Creates a new Plate section in the protocol.
New Notes Section	Creates a new Note section in the protocol.
New Experiment	Creates a new experiment in the protocol.
Import Plate Template	Imports a plate template into the current Plate section.
Export Section	Exports the data from the current section to the file path you enter.
Export Section With Barcode	Exports the data from the current section to the file path you enter and adds the current barcode to the end of the name
Log On	When you use the SoftMax Pro Software - GxP edition, this command logs on the user you enter. Syntax: username/password/project
Log Off	When you use the SoftMax Pro Software - GxP edition, this command logs the current user off.

Miscellaneous Commands

Command	Description
Comment	Adds a comment or note to the current script.
Begin Repeat	Indicates the start of a set of commands that are to be repeated the number of times you enter.
End Repeat	Indicates the end of a set of commands that are to be repeated.
Wait	Pauses the script for the number of seconds you enter before proceeding to the next action.

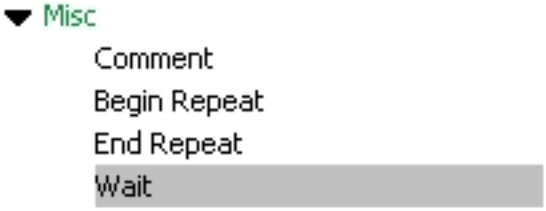
Managing Scripts

To create or edit a script:

1. In the **Command Script** area, click the line above where you want to insert the new command. The new command displays in the line below the line you select. To place the command at the top of the script, do not select a line.

Example: Select "Shake Plate: On" to add the command to the next line

2. In the **Commands** list, select the command to add.



Example: Select "Wait"

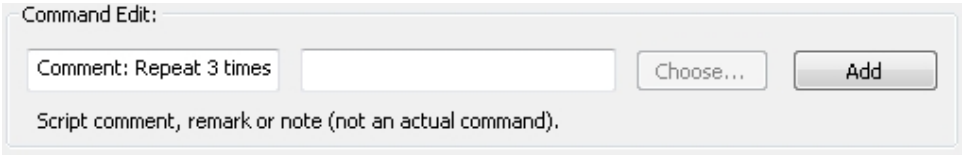
The command displays in the left side **Command Edit** field and its description displays below the field.

Example: Command Edit "Wait" with a 5 second duration

3. If the command requires a value, enter the value in the right side **Command Edit** field.
4. For the following commands: Open Protocol, Open Document, Save Document As, Save Document As with Barcode, and Set Protocol Folder, click **Choose** to display the Open dialog. Navigate to and select the path to the file or folder.

> **Note:** The StakMax Software uses the file extensions for SoftMax Pro Software version 5.x and earlier (.pda or .eda). To use a script with version 6.x or 7.0.x, you must edit the file name in the path statement to use the appropriate version 6.x or 7.0.x file extension (.sda or .sdax) before you add the command to the script.

5. For the Comment command: Click **Comment** in the Commands list to add the Comment command to the left side **Command Edit** field. In the left side **Command Edit** field enter a colon (:) after the Comment command and then enter the comment text after the colon. Comments do not initiate actions in the script.



Example: Comment command "Repeat 3 times" (for reference only)

6. Click **Add** to add the command to the script.

```
Shake Plate:on
Wait:5
Shake Plate:off
```

Example: "Wait" command displays in the script

7. Click **Check Syntax** to check the syntax of the individual commands in the script. If the syntax is invalid see Managing Commands on page 72.
8. Click **Save As** to display the Save Script As dialog. Name the script file, navigate to, and select the folder where you want to save the script file. Scripts files save as text (.txt) files.

   Note: If you use an existing script as a template for a new script, save the script file with a different file name or in a different folder to preserve the original script.

   After you name and save the script file, click **Save**.
9. Click **Print** to display the Print dialog where you select the printer and enter the number of copies to print. Click **OK** to print the script.

Repeat Loops

To add a repeat loop, define the beginning of the loop, end of the loop, and the number of times to repeat the loop.

1. In the **Command Script** field, click the line directly above where you want the repeat loop to start.
2. From the Commands list, select the **Begin Repeat** command to display the Begin Repeat command in the left side Command Edit field.
3. In the right side **Command Edit** field, enter the number of times to repeat the loop.
4. Click **Add** to add the Begin Repeat command to the script.
5. In the **Command Script** field, click the last line of the repeat loop.
6. From the Commands list, select the **End Repeat** command to display the End Repeat command in the left side Command Edit field.
7. Click **Add** to add the End Repeat command to the script below the last line of the repeat loop.

```
New Document
Select Next Plate Section
Begin Repeat:3
Put Plate
Shake Plate:on
Wait:5
Shake Plate:off
Record Barcode
Start Read
Return Plate
Save Document As with Barcode:C:\Data\ReadResults.sda
End Repeat
Close Document
```

Repeat a read three times

Note: Nesting of repeat loops is not supported. The syntax check does not detect an unpaired Begin Repeat or End Repeat as an error because the syntax check validates each individual command.

Managing Commands

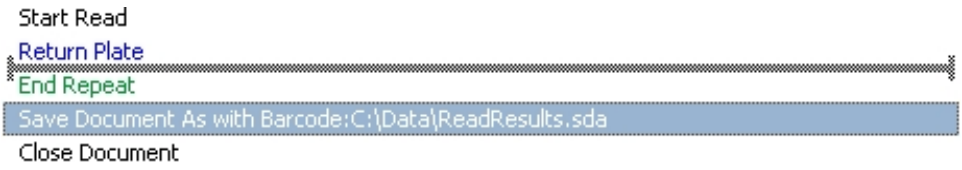
Use the Command Script area on the Script Editor dialog to edit, move, or remove commands from the script. You can edit a command value or change the command execution sequence.

In the Command Script area, double click a command to make it editable. Enter the value for the command. Make sure that a colon (:) follows the command name and precedes the value.

Edit the "Wait" command

Move a Command

Drag and drop commands to change the command sequence. A horizontal bar indicates where the command is placed.



Move a command in the script

Remove a Command

Select the command to remove and then click **Remove**. When you select the Allow Edit Prompting check box in the Settings dialog, you must click **OK** to confirm the removal. See Settings on page 63.

To clear the Command Script area, click **Remove All**.

Check Command Syntax

Click **Check Syntax** to check the syntax of each individual command in the script. When a syntax error exists, the erroneous command line appears highlighted in the Command Script area. An invalid command can be a typo or an unknown or missing parameter. If the command requires a value, make sure that a colon (:) follows the command name and precedes the value.

The Shake Plate command is missing the "on" or "off" value

Note: The syntax check validates each individual command. It does not detect the validity or logic of the sequence of the commands.

Chapter 6: Maintenance and Troubleshooting

Before you operate the instrument or perform maintenance operations, make sure you are familiar with the safety information in this guide. See Safety Information on page 4.

CAUTION! Maintenance procedures other than those specified in this guide must be performed by Molecular Devices. When service is required, contact Molecular Devices technical support.

WARNING! Power off the instrument and disconnect the power cord before you do maintenance procedures that require removal of a panel or cover or disassembly of an interior instrument component.

WARNING! Never operate the instrument in an environment where potentially damaging liquids or gases are present.

CAUTION! Do not touch or loosen screws or parts other than those specifically designated in the instructions. Doing so could cause misalignment and possibly void the warranty.

Clean the Instrument

Observe the following general tips when cleaning the instrument:

WARNING! BIOHAZARD. Always wear gloves when operating the instrument and during cleaning procedures that could involve contact with either hazardous or biohazardous materials or fluids.

CAUTION! Do not use abrasive cleaners. Do not spray cleaner directly onto the instrument or into any openings. Do not let water or other fluids drip inside the instrument.

- Always turn the power switch off and disconnect the power cord from the main power source before using liquids to clean the instrument.
- Wipe up all spills immediately.
- Periodically clean the outside surfaces of the instrument using a cloth or sponge that has been lightly dampened with water.
- If required, clean the surfaces using a mild soap solution diluted with water and then wipe with a damp cloth or sponge to remove all residue.
- If a bleach solution has been used, wipe the instrument using a lint-free cloth that has been lightly dampened with water to remove the bleach residue.

Status Dialog Error Codes

The following error messages can display in the Status dialog. To access the Status dialog, click **Status Window** in the StakMax Software dialog.

200 Error: A problem was encountered during Reset

The homing routine could not find a state change on the home flag. A sensor or flag problem is the likely source.

Solution:

Press the power interrupt button.

201 Error: Call Molecular Devices Technical Support at +1-800-635-5577

A timer resource was not available or not apparently used in the code.

Solution:

Contact Molecular Devices Technical Support.

202 Error: A problem occurred during a motion

A stall occurred during motion. The encoder and step counts exceeded the maximum threshold.

Solution:

Check for an object blocking movement and then realign the microplate handler.

203 Error: A problem occurred with the X axis

The X axis motion did not cause a state change on the edge-detect switch. Indicates a poorly gripped plate or that a plate is not present.

Solution:

Check to make sure plate is properly gripped and then realign the microplate handler. If the error persists, contact Molecular Devices Technical Support.

204 Error: A problem was encountered during Reset

Cannot move axis if it has not been homed.

Solution:

Press the power interrupt button.

205 Error: A problem occurred during a motion

Cannot move axis if it is currently in motion.

Solution:

Press the power interrupt button.

206 Error: A Problem occurred with the EPROM

Generic EPROM error.

Solution:

Contact Molecular Devices Technical Support.

207 Error: A problem occurred during a motion

Carriage drop off exceeds the maximum travel of the X axis.

Solution:

Realign the microplate handler.

208 Error: A problem occurred during a motion

The jaws snapped shut after opening.

Solution:

Check for an object blocking movement and then realign the microplate handler.

209 Error: A Problem occurred with the EPROM

EPROM space is larger than portion of FLASH memory allocated.

Solution:

Contact Molecular Devices Technical Support.

210 Error: A problem occurred during a motion

Moving gripper to the upward position did not find home.

Solution:

Check for an object blocking movement and then realign the microplate handler.

211 Error: A Problem occurred with the EPROM

EPROM did not have the proper checksum and cannot be trusted. This should prevent operation of the unit.

Solution:

Contact Molecular Devices Technical Support.

Obtaining Support

Molecular Devices is a leading worldwide manufacturer and distributor of analytical instrumentation, software, and reagents. We are committed to the quality of our products and to fully supporting our customers with the highest level of technical service.

Our Support website, support.moleculardevices.com, has a link to the Knowledge Base, which contains technical notes, software upgrades, safety data sheets, and other resources. If you still need assistance after consulting the Knowledge Base, you can submit a request to Molecular Devices Technical Support.

You can contact your local representative or Molecular Devices Technical Support at 800-635-5577 x 1815 (North America only) or +1 408-747-1700. In Europe call +44 (0) 118 944 8000.

To find regional support contact information, visit www.moleculardevices.com/contact.

Please have your instrument serial number or Work Order number, and your software version number available when you call.

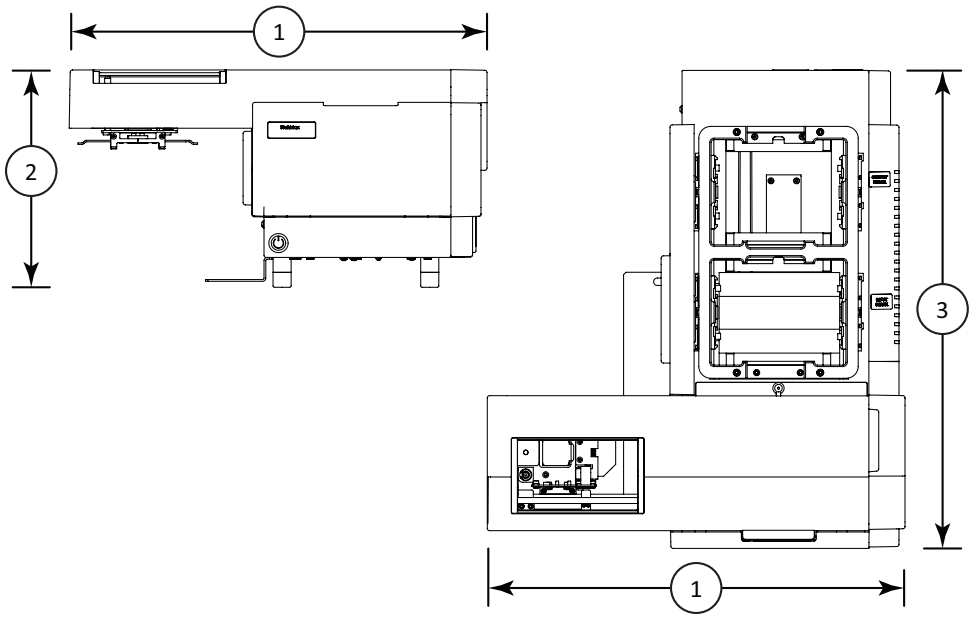
WARNING! BIOHAZARD. It is your responsibility to decontaminate components of the instrument before you request service by a service engineer or you return parts to Molecular Devices for repair. Molecular Devices does not accept items that have not been decontaminated where it is applicable to do so. If parts are returned, they must be enclosed in a sealed plastic bag stating that the contents are safe to handle and are not contaminated.

Appendix A: Instrument Specifications and Diagrams

This appendix lists the general specifications and shows diagrams of the StakMax Microplate Handler.

General Specifications for the StakMax Microplate Handling System

Item	Description
Environment	Indoor use only
Power requirements	100–240 VAC, autoranging line voltage, 50/60 Hz, ~1.5A
Dimensions	44.0 cm W x 23.1 cm H x 50.9 cm D 17.3 in W x 9.1 in H x 20.0 in D
Weight	11.8 kg (26 lbs.)
Ambient operating temperature	10°C to 40°C
Installation category	II
Pollution degree	2
Power disconnect clearance (right side)	15 cm (5.9 in)
Vertical clearance for most instruments	20-plate magazine: 54.0 cm (21.3 in) 40-plate magazine: 79.3 cm (31.2 in) 50-plate magazine: 102.6 cm (40.4 in)
Vertical clearance for SpectraMax i3x and SpectraMax Paradigm	20-plate magazine: 54.0 cm (21.3 in) 40-plate magazine: 79.3 cm (31.2 in) 50-plate magazine: 102.6 cm (40.4 in)

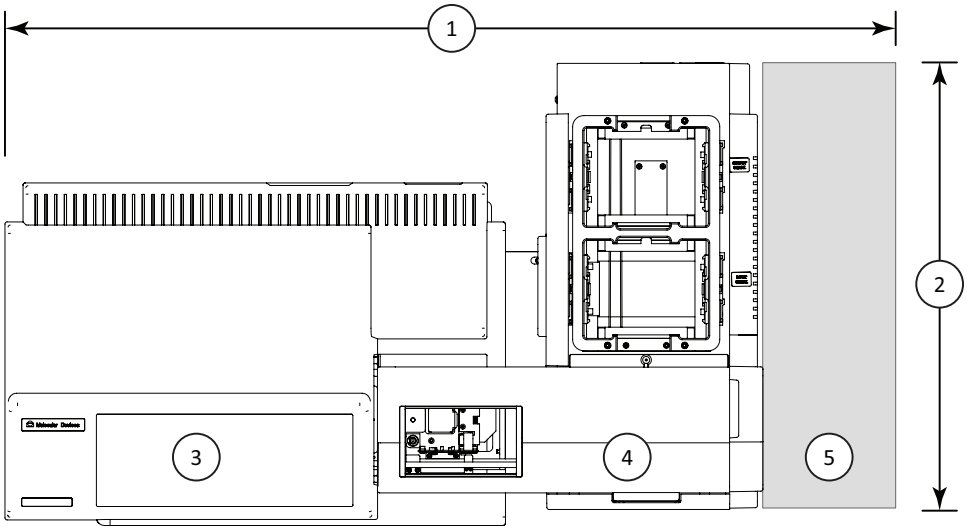


Dimensions of the StakMax Microplate Handler

Item	Description
1	Width: 44.0 cm (17.3 in)
2	Height: 23.1 cm (9.1 in)
3	Depth: 50.9 cm (20.0 in)

Space Requirements

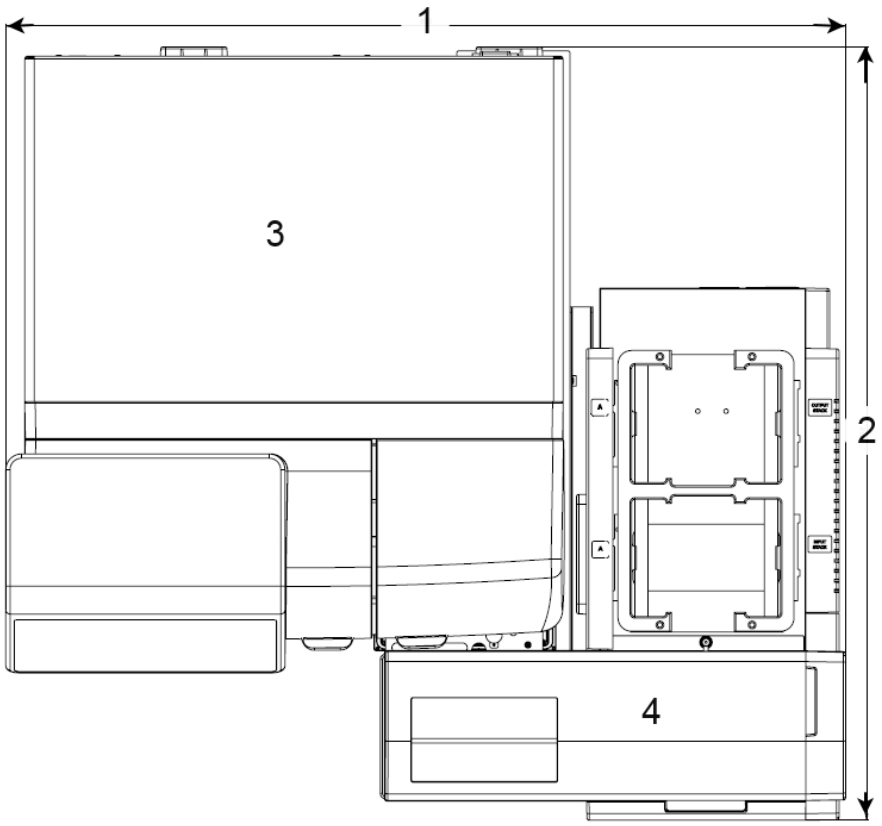
Most microplate readers require approximately this much space. See the following sections for specific instrument space requirements.



The following table lists the footprint for the Gemini EM, Gemini XPS, SpectraMax 190, SpectraMax 340PC384, SpectraMax M2, SpectraMax M2e, SpectraMax M3, SpectraMax M4, SpectraMax M5, SpectraMax M5e, SpectraMax Plus 384, and VersaMax.

Item	Description
1	Width: 101.6 cm (40.0 in)
2	Depth: 52.7 cm (20.7 in)
3	Microplate reader
4	Microplate handler
5	Required clearance for microplate handler

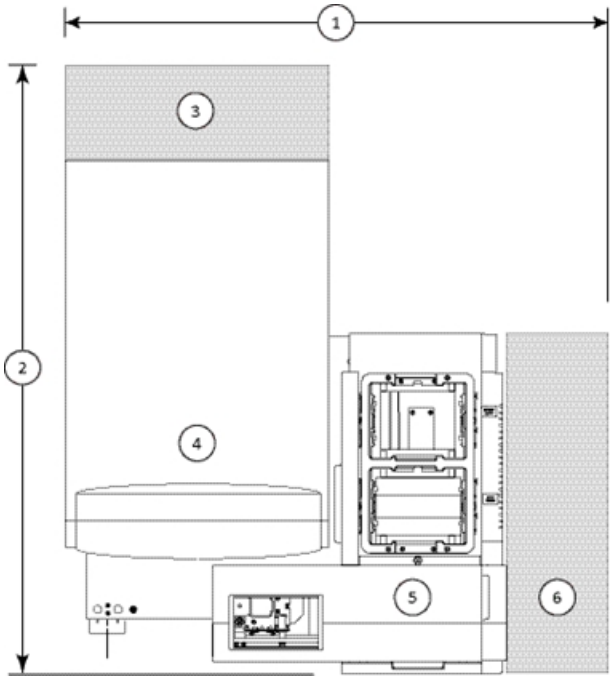
Required Area for the SpectraMax iD3 and SpectraMax iD5



Footprint for the SpectraMax iD3 and SpectraMax iD5

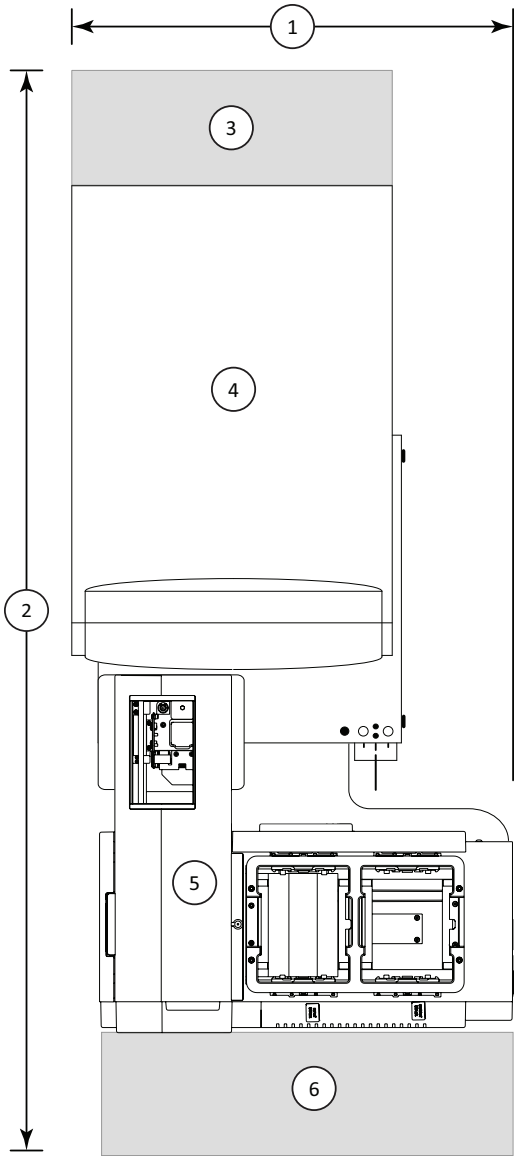
Item	Description
1	Width: 80.2 cm (31.6 in)
2	Depth: 73.8 cm (29.1 in)
3	Microplate reader
4	Microplate handler

Required Area for the SpectraMax i3x and SpectraMax Paradigm



Footprint for the SpectraMax i3x and SpectraMax Paradigm (side-by-side installation)

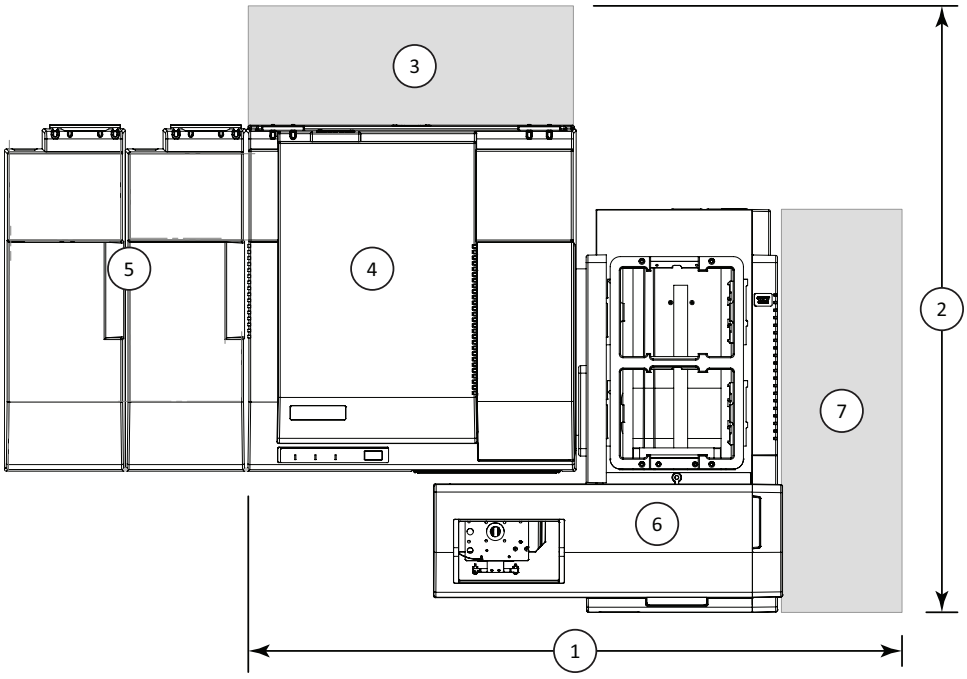
Item	Description
1	Width: 81.5 cm (32.1 in)
2	Depth: 86.5 cm (34.1 in)
3	Required clearance for microplate reader
4	Microplate reader
5	Microplate handler
6	Required clearance for microplate handler



Footprint for the SpectraMax Paradigm (front installation)

Item	Description
1	Width: 54.5 cm (21.5 in)
2	Depth: 129.0 cm (50.8 in)
3	Required clearance for microplate reader
4	Microplate reader
5	Microplate handler
6	Required clearance for microplate handler

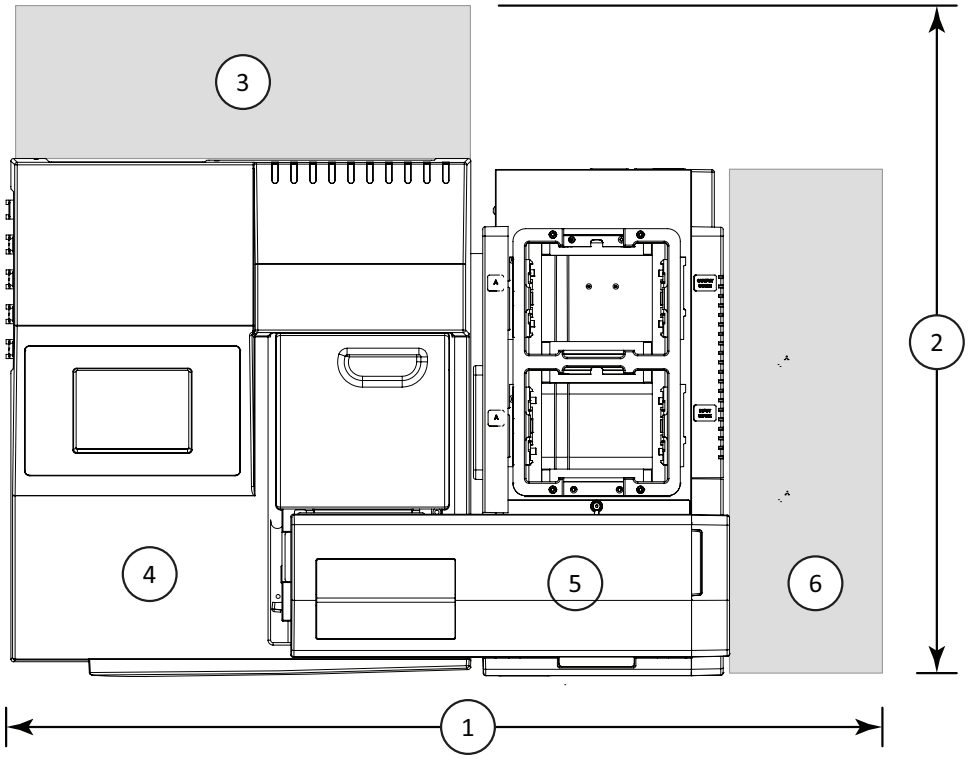
Required Area for the SpectraMax L



Footprint for the SpectraMax L

Item	Description
1	Width: 82.6 cm (32.5 in) For a microplate reader with the optional injector module, add 15.3 cm (6.0 in) to the width
2	Depth: 76.4 cm (30.1 in)
3	Required clearance for microplate reader
4	Microplate reader
5	Optional injector modules for microplate reader (optional)
6	Microplate handler
7	Required clearance for microplate handler

Required Area for the AquaMax Microplate Washer



Footprint for the AquaMax Microplate Washer

Item	Description
1	Width: 86.9 cm (34.2 in)
2	Depth: 66.9 cm (26.3 in)
3	Required clearance for microplate washer
4	Microplate washer
5	Microplate handler
6	Required clearance for microplate handler

Compatible Plates

The microplate handler supports ANSI/SLAS-standard 96-well and 384-well plates with a plate height of 12 mm to 16 mm.

Some, but not all, 96-well “strip” plates are also supported. For more information, contact your Molecular Devices sales representative or technical support. See Obtaining Support on page 75.

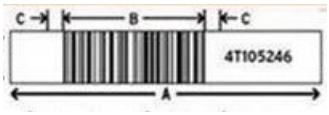
Barcode Specifications

The barcode reader supports barcodes that are up to 22 characters long. Ensure the barcode labels have high quality printing with quiet zones at each end.

The barcode label position on the plate is dependent on where you install the barcode reader in the microplate handler.

- Place the barcode labels on the long edge of the plate when you install the barcode reader under the front cover of the instrument.
- Place the barcode labels on the short edge of the plate when you install the barcode reader under the left side panel of the instrument.

Place the label a few millimeters above the plate skirt.



Item	Barcode Reader Installed Under Front Cover	Barcode Reader Installed Under Left Panel
A	22 characters (maximum)	22 characters (maximum)
B	70 mm (maximum)	42 mm (maximum)
C	3 mm	3 mm

The microplate handler supports the following barcode types:

- Interleaved 2 of 5 (ITF barcode must have an even number of digits with no additional characters.)
- Code128
- EAN 128
- Code 93
- Code 39
- CODABAR

Electromagnetic Compatibility

Regulatory Information for Canada (ICES/NMB-001:2006)

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est confomre à la norme NMB-001 du Canada.

ISM Equipment Classification (Group 1, Class A)

This equipment is designated as scientific equipment for laboratory use that intentionally generate and/or use conductively coupled radio-frequency energy for internal functioning, and are suitable for use in all establishments, other than domestic and those directly connected to a low voltage power supply network which supply buildings used for domestic purposes.

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Visit our website for a current listing of worldwide distributors.

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