SPECTRAmax™ 340
Microplate Reader
Operator's Manual

Molecular Devices Corporation

1311 Orleans Drive
Sunnyvale, California 94089

Part # 0112-0026

Rev. A

Molecular Devices Corporation

SPECTRAmax™ 340 Operator's Manual

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U.S. Patents **4,968,148** and **5,112,134**; Canadian Patent **1,305,334**.

Other U.S. and International patents pending.

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SPECTRAMAX 340

Microplate Spectrophotometer

90-250V~ 50-60 Hz *4.0 AT*

2 Lines Fused, **unplug before servicing!**
Vor Wartungsarbeiten Netzstecker ziehen!

Molecular Devices Sunnyvale, CA 94089
Made in USA

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Protected by Canadian Patent **1,305,334**
Other US and International patents pending

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Conventions Used in this Manual

The names of keys that appear on the SPECTRAmax 340 control panel are shown in boxed Helvetica type. Example: [Setup].

Italic and boldface type are used for emphasis. Examples: "Press *carefully* to engage," "**Do not press down.**"

NOTE: A note provides information that will help you properly execute an action or procedure.

⚠ **CAUTION:** Indicates an action or condition that could potentially damage the instrument or one of its components or could result in loss of data.

⚠ **WARNING:** Indicates a situation that could result in potential injury to a person working with the system.

☣ **BIOHAZARD:** Indicates a condition involving potentially infectious biological agents requiring that proper handling precautions be taken.

Chapter 1 Instrument Description

Introduction

The SPECTRAmax™ 340 is a vertical pathlength Spectrophotometer which measures the absorbances of the contents of the wells of a 96 well microtitration plate.

The SPECTRAmax 340 incorporates a holographic grating monochromator which allows you to specify a precise wavelength, from 340 nm to 750 nm, for the absorbance maximum of your sample. The SPECTRAmax 340 can measure optical density (OD) by means of an Endpoint reading or conduct a Kinetic analysis which measures the rate of optical density change per minute (milli-OD/min).

Typical applications include Endpoint assays (ELISAs, performed in microplates or as dot blots, quantitation of cytoproliferation by MTT reduction, colorimetric protein assays, and Kinetic measurements (enzyme studies, and Kinetic ELISAs).

Standard 96-well microplates, strip wells, and filter-bottom microplates can be used in the SPECTRAmax 340. When reading at wavelengths below 400 nm, special UV-transparent, disposable or quartz microplates (SPECTRAplate™) that allow transmission of the near UV spectra are available from Molecular Devices.

The contents of the wells in a microplate can be mixed automatically by shaking before each read cycle, which makes it possible to perform Kinetic analysis of solid-phase, enzyme-mediated reactions (mixing is not critical for liquid-phase reactions).

An on-board microprocessor calculates and reports the absorbance (optical density) or the Kinetic rate (change in optical density over time) for each well, allowing the SPECTRAmax 340 to function as a stand-alone system when connected to an external printer.

The SPECTRAmax 340 can also be controlled by an external computer. SOFTmax® PRO software from Molecular Devices provides integrated instrument control and statistical data analysis. If you elect not to purchase SOFTmax PRO but still wish to integrate the SPECTRAmax 340 with a computer, contact Molecular Devices Technical Services for information regarding writing your own software.

Component Description

The main components of the SPECTRAmax 340 are:

- The control panel
- The microplate drawer
- The back panel (connections and power switch)

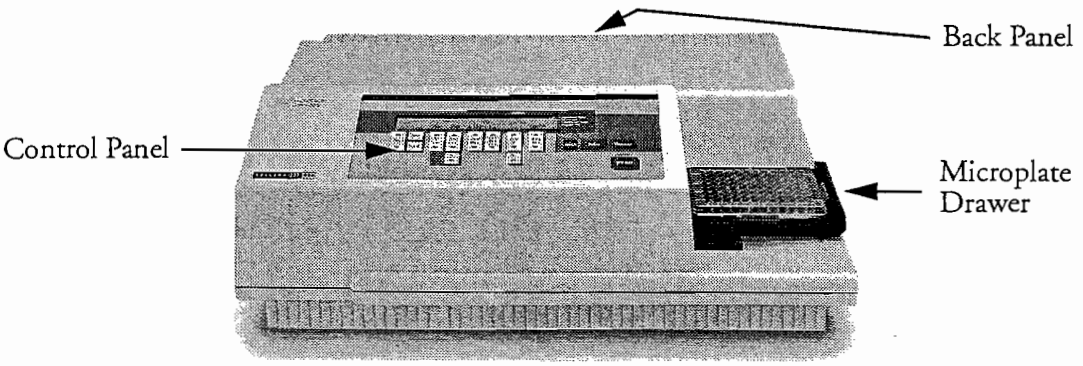


***Figure 1.1**: SPECTRAmax 340*

The Control Panel

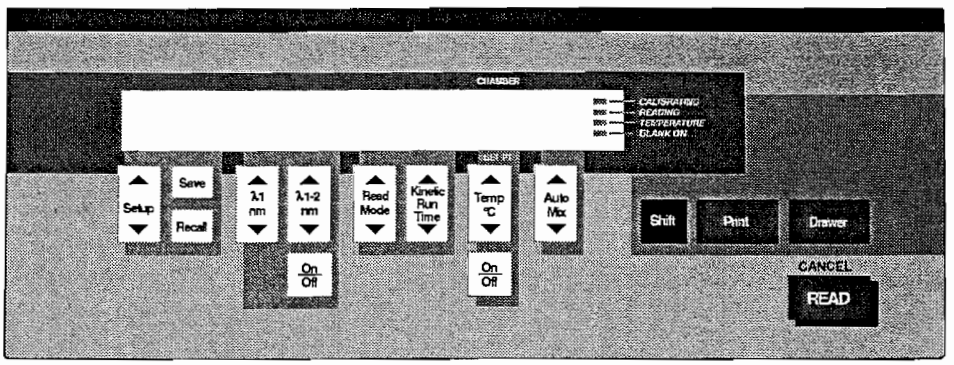


***Figure 1.2**: Control Panel*

The control panel consists of an LCD and 15 pressure-sensitive membrane keys—all the controls necessary to perform stand-alone operation of the SPECTRAmax 340. The control panel is used to configure the instrument settings, store and recall assay protocols, and to initiate readings. When you press a control panel key, the SPECTRAmax 340 begins the desired action.

NOTE: When using Molecular Devices' SOFTmax PRO software to control the SPECTRAmax 340 from an external computer, the LCD will show "Remote Control" during the time SOFTmax PRO is running. During computer-controlled operation, the front control panel keys are disabled (except the [Drawer] key and the [Shift] and [Read] keys, which are used for the "Cancel" function). If you quit SOFTmax PRO, the LCD returns to normal and the instrument can be operated in stand-alone mode again.

LCD

A 2-×-40-character liquid crystal display which shows the current instrument settings. You can change the contrast of the display to appear darker or lighter as desired. Press and hold the [Shift] key and then press the up or down arrow on the [Auto Mix] key. Pressing the up arrow makes the display lighter; the down arrow darkens the display.

Keys

Most stand-alone instrument functions can be performed by pressing a single key; a few others require that you press keys in combination. The functions of the control panel keys are described below.

[Setup]

Allows you to choose from a group of assay protocols that have been saved in non-volatile memory (stored by number from 0 through 9). The settings stored under "0" are factory preset defaults and cannot be modified or deleted. At the time of shipment, settings 1 through 9 also contain the same preset defaults.

NOTE: Non-volatile memory is retained even if the instrument is turned off.

[Save]

Stores the instrument settings you have chosen for the assay into memory under a specific number from 1 through 9 (0 is reserved for the default instrument protocol).

[Recall]

Recalls the instrument settings previously stored using the [Save] key.

[λ 1 nm]

Selects the *measurement* wavelength. Pressing this key scrolls up or down through the available wavelengths, starting at the previous setting. Pressing the up or down arrow *once* increments or decrements the wavelength shown in the display by 1 nm; pressing and *holding* either arrow increments or decrements the wavelength shown in the display by 10 nm until it is released. If you increment the setting to the highest limit (750 nm) and continue pressing the up arrow, the display returns to the lowest possible setting (340 nm) and begins incrementing from there. The inverse is true for decrementing by pressing the down arrow.

[λ 1-2 nm]

Selects the *reference* wavelength. This key will activate dual wavelength (if it was off) when pressed. When dual wavelength mode is selected (by pressing the [On/Off] key below this one), pressing this key scrolls up or down through the available wavelengths, starting from the previous setting. Pressing the up or down arrow *once* increments or decrements the wavelength shown in the display by 1 nm; pressing and *holding* either arrow increments or decrements the wavelength shown in the display by 10 nm until it is released. If you increment the setting to the highest limit (750 nm) and continue pressing the up arrow, the display

returns to the lowest possible setting (340 nm) and begins incrementing from there. The inverse is true for decrementing by pressing the down arrow.

On/Off (λ 1-2 nm)

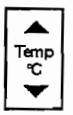
Enables/disables dual wavelength mode.

Read Mode

Selects the read mode by scrolling through the listed options. Choices are Blank, Endpoint, and Kinetic.

Kinetic Run Time

Allows you to choose the duration for a Kinetic run. (Kinetic read mode must have been chosen first for this key to be active.) Choices are 1, 2, 5, 10, and 20 minutes.



Temp °C (Incubator)

Allows you to enter a set point at which to regulate the microplate chamber temperature. Pressing this key scrolls up or down, starting at the previous temperature setting (or the default of 37.0°C, if no setting had been made). Pressing the up or down arrow *once* increments or decrements the temperature shown in the display by 0.1°C; pressing and holding either arrow increments or decrements the temperature shown in the display by 1°C until it is released. If you increment the setting to the highest limit (45°C) and continue to press the up arrow, the display will not change. If you decrement the setting to the lowest limit, 15°C, and continue to press the down arrow, the display will not change.

NOTE: The temperature set point must be at least 4°C above ambient. The ambient temperature must be greater than 20°C to achieve temperature regulation of 45°C.

⚠ **CAUTION:** If the incubator is disabled, pressing the Temp °C key will *enable* the incubator.

On/Off (Incubator)

Enables/disables the incubator function.

Auto Mix

Depending on the mode chosen, pressing this key selects automatic shaking of the microplate for a preset duration at one or more points before and/or during the read cycle. Choices are On, Once, and Off.

Shift

Activates secondary functions by first pressing the Shift key followed by pressing the secondary key. Labels for secondary functions are printed in blue on the control panel.

Secondary Functions

- CANCEL—Stops the reading in progress. CANCEL is invoked by pressing the Shift/READ key combination. CANCEL remains active when the instru-

ment is in remote control mode.

- Display Contrast—To darken or lighten the display, press and hold the Shift key and then press either the up or the down arrow on the Auto Mix key—the up arrow lightens the display; the down arrow darkens it.

Print

Sends the data from the most recent reading to the printer (if it is connected directly to the SPECTRAmax 340).

Drawer

Opens or closes the microplate drawer. Whether or not the drawer will remain open depends on the incubator setting. If the incubator is off, the drawer will remain open; if the incubator is on, the drawer will close after approximately 10 seconds to assist in maintaining temperature control within the microplate chamber.

READ

Pressing this key causes the microplate drawer to close automatically, if it was open, after which the selected assay read mode begins.

Status Indicators

At the far right of the LCD are indicators as shown in Figure 1.3. These indicators will be illuminated when the SPECTRAmax 340 is performing certain actions as described below.

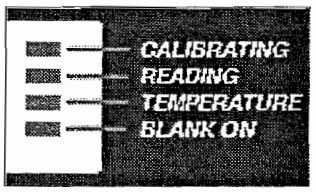


***Figure 1.3**: LCD Indicators*

CALIBRATING	Illuminated during the automatic calibration cycle before the instrument reads the microplate.
READING	Illuminated while the instrument is reading a microplate.
TEMPERATURE	This indicator flashes when the incubator is turned on and the set point has not yet been reached; it is illuminated continuously (no longer flashing) when the set temperature has been reached (± 0.3°C).
BLANK ON	Illuminated when a BLANK pattern is active.

The Microplate Drawer

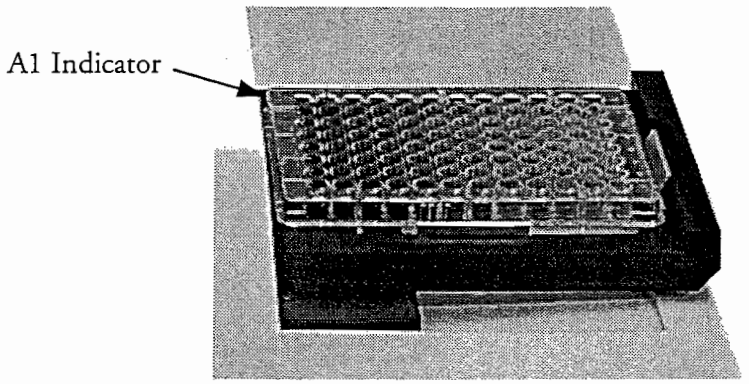


Figure 1.4: Microplate Drawer

The microplate drawer, located on the right side of the SPECTRAmax 340, holds microplates and blanking templates. The drawer slides in and out of the microplate chamber. Springs on two sides of the drawer automatically position and hold a microplate in the proper position. The drawer remains in the reading chamber during read cycles.

Microplate drawer operation varies, depending upon the incubator status. When the incubator is off, the microplate drawer remains open at power up and after a read. When the incubator is on, the drawer closes automatically to assist in controlling the temperature of the microplate chamber. To open the drawer, press the [Drawer] key. The drawer will remain open for approximately ten seconds, after which a beeping sound will alert you approximately two seconds before the drawer closes automatically.

NOTE: Do not obstruct the movement of the drawer. If you must retrieve a plate after an error condition or power outage and the drawer will not open, it is possible to open it manually (see Chapter 5, "Troubleshooting").

Microplates

The SPECTRAmax 340 can accommodate standard 96-well microplates, strip wells, and filter-bottom microplates. When using wavelengths below 400 nm, special UV-transparent, disposable or quartz microplates (SPECTRAplate) allowing transmission of the near UV spectra with negligible background, are available from Molecular Devices.

Not all manufacturers' microplates are the same with regard to design, materials, or configuration. Temperature uniformity within the microplate may vary depending on the type of microplate used.

Templates

Blank pattern templates supplied with the SPECTRAmax 340 can be used in stand-alone mode to select a blank set of wells. More information regarding the

use of templates and creating blank patterns can be found Chapter 3, "Stand-Alone Operation."

The Back Panel

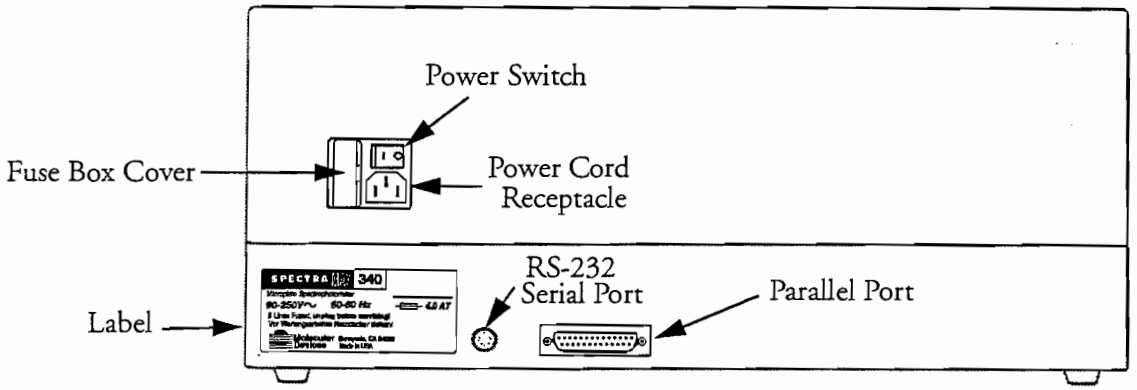


Figure 1.5: Components on the Back Panel of the SPECTRAmax 340

The following components are located on the back panel of the SPECTRAmax 340:

- **Power switch**—a rocker switch, labeled I/O (for on and off, respectively).
- **Power cord receptacle**—plug the power cord in here.
- **Fuse box cover**—cannot be opened while the power cord is plugged in. When opened, it provides access to the fuse box containing two fuses that are required for operation.
- **Printer port** (double-shielded, 25-pin parallel, for use in stand-alone operation)—plug the 25-pin end of the cable into this port; the other (Centronics) end attaches to a port on the printer.
- **Computer port** (double-shielded 8-pin RS-232 serial, for use with an external computer)—plug one end of an 8-pin DIN serial cable into this port; the other end attaches to the serial (modem) port of the computer.
- **Label**—provides information about the SPECTRAmax 340, such as line voltage rating, cautionary information, serial number, etc. Record the serial number shown on this label for use when contacting Molecular Devices Technical Services.

Functional Description

Instrument Settings

Up to nine user-definable assay protocols can be saved in non-volatile memory for future use. User-defined protocols are saved by number (1-9); the protocol labeled "0" contains default parameters, set at the factory, and cannot be altered. User-defined protocols can contain the following instrument settings:

- Read mode
- Wavelength(s) (up to two)
- Auto Mix state
- Blank pattern
- Temperature set point

Assay protocol settings that you save under numbers 1 through 9 are retained by the SPECTRAmax 340 in non-volatile memory—they are retained even when power to the instrument is turned off. At power up, the SPECTRAmax 340 always reverts to the default protocol 0, but the other saved settings are available.

Saving a Protocol

To store a protocol in memory, first define the instrument settings for the protocol by setting the parameters as desired. Then press the up or down arrows on the [Setup] key until the desired number (under which to save the protocol) is displayed. Then press the [Save] key to save the current protocol in non-volatile memory under that number.

NOTE: If any settings were already saved under that number, they will be overwritten by this process. Before choosing a number under which to save parameters, ensure first that it does not contain data you wish to retain.

Recalling a Saved Protocol

To recall a protocol that you saved previously, press the up or down arrows on the [Setup] key until the number of the saved protocol (from 1 to 9) appears in the display and then press [Recall].

NOTE: The temperature set point is recalled, but the incubator will not be enabled until the [On/Off] key has been pressed.

To restore the factory-default protocol and overwrite any settings in present memory, press [Setup], choose "0," and then press [Recall]. To replace the settings for any protocol stored under numbers 1 through 9 with these factory default settings, use [Setup] to select the desired protocol number and then press [Save].

Modes of Stand-Alone Operation

When operating the SPECTRAmax 340 as a stand-alone system, you can obtain readings using either Endpoint or Kinetic mode.

Endpoint

If you wish to obtain a single set of optical density (OD) readings for each well of a microplate, select either single- or dual-wavelength operation in Endpoint mode. OD data is printed in an 8-×-12 microplate format.

When the instrument is set to Endpoint mode, the nine-second read cycle (for each wavelength selected) is automatically preceded by a calibration cycle requiring less than one second.

Dual wavelength readings are taken at a measurement wavelength (λ1) as well as a reference wavelength (λ2)—you may choose both settings. The difference between these readings (λ1-λ2) is displayed for each well.

If the Auto Mix function is selected for Endpoint readings, the plate is shaken for five seconds prior to the reading.

Kinetic

Kinetic analysis at a single wavelength (λ1) can be performed for several predefined total reading times (1, 2, 5, 10, and 20 minutes) with preset read intervals. At the end of a reading, rates are reported as mOD/min for each well in an 8-×-12 microplate format.

Kinetic analysis has many advantages when determining the relative activity of an enzyme in different types of microplate assays, including ELISAs and the purification and characterization of enzymes and enzyme conjugates. Kinetic analysis is capable of providing improved dynamic range, precision, and sensitivity relative to Endpoint analysis.

In Kinetic mode, a calibration cycle requiring less than one second automatically precedes the first read cycle. During the Kinetic reading, the microplate remains in the isothermal microplate chamber. The interval between read cycles is determined by the instrument based on the Kinetic run time and the Auto Mix status.

If Auto Mix is selected for Kinetic analysis, the microplate is shaken for five seconds prior to the initial reading. Thereafter the microplate is shaken for three seconds before each read cycle. This ensures that the color developing in each well is uniformly distributed throughout the well prior to each reading. The Auto Mix function is strongly recommended for ELISAs and other solid-phase, enzyme-mediated reactions.

The SPECTRAmax 340 calculates the rate of reaction for each well, for either positive or negative Kinetic rates, using the first reading as the starting OD baseline value for each well and a limited OD excursion of 0.2 OD. The on-board, microprocessor-based, linear regression package reports the slope value for the line fit to each Kinetic plot as the Kinetic rate in mOD/min.

Kinetic Run Time

The total run time for a Kinetic reading is set using the up and down arrows on the [Kinetic Run Time] key. Choices are 1, 2, 5, 10, and 20 minutes. Table 1.1 shows the intervals (in seconds) and total number of readings that occur with each total run time setting, with and without Automix enabled.

Table 1.1: Intervals and Number of Readings for Total Kinetic Run Time

Kinetic Run Time (minutes)	No Mixing		Mixing	
	Interval (seconds)	Number of Plate Reads	Interval (seconds)	Number of Plate Reads
1	9	7	14	4
2	9	14	14	8
5	16	18	19	15
10	30	20	30	21
20	60	20	60	38

Blank Pattern

Selecting BLANK by pressing the arrows on the [Read Mode] key allows you to instruct the instrument regarding which wells should be treated as "blanks" or, taken together, as a blank pattern.

The active presence of a blank pattern is shown by the BLANK ON indicator on the LCD. The SPECTRAmax 340 retains blank pattern information in non-volatile memory; the blank value is recalculated for each subsequent reading. A blank pattern may be cleared by setting the active protocol to the factory presets or by reading an empty drawer in the BLANK mode.

Each time a microplate is read, the average OD or milli-OD/minute reading of the wells in the current blank pattern will be computed. This mean value is then subtracted from all the readings, including those of the individual members of the blank pattern.For wells which are members of the blank pattern, the character "#" will replace the decimal point in printouts. This feature allows subtraction of values of substrate blanks or other special calibrators and can be performed in single or dual wavelength modes.

Blank pattern information is provided to the SPECTRAmax 340 by the use of a blank pattern template. (More information regarding the use of templates can be found in Chapter 3, "Stand-Alone Operation.") After reading the template, the instrument will print the well locations designated as members of the blank pattern.

Wavelength Selection

In Endpoint mode, you can select either single- or dual-wavelength mode during stand-alone operation of the SPECTRAmax 340. Dual wavelength mode is used when you wish data from both measurement and reference wavelengths to be acquired. For Kinetic readings, only single-wavelength mode is available.

Typically, you should select a measurement wavelength that is near the wavelength of maximum absorption (λmax) for the chromophore/macromolecule of interest. The reference wavelength (if any) is usually set to a wavelength at which the chromophore/macromolecule shows relatively little absorption. The dual wavelength feature increases Endpoint accuracy—errors arising from optical imperfections, such as scratches and plastic irregularities in the microplate, can be effectively canceled out.

The display on the control panel shows the currently selected measurement (λ1) and reference (λ2) wavelength (if any). You can change the wavelength(s) by pressing the arrows on either wavelength selection key ([λ 1 nm] or [λ 1-2 nm]) until the display shows the desired wavelength. The wavelength list will wrap around to the top when the last selectable wavelength is presented.

NOTE: If the measurement and reference wavelengths are the same, the instrument will beep and deselect dual wavelength.

Temperature Regulation

The SPECTRAmax 340 has been designed to regulate the temperature of the microplate chamber from 4°C above ambient to 45°C. Upon power up, when the incubator is off, the temperature in the SPECTRAmax 340 microplate chamber is ambient and isothermal. Pressing the incubator [On/Off] key below the [Temp °C] (incubator) key will cause the SPECTRAmax to begin warming the microplate chamber. The temperature set point defaults to 37.0°C at start-up. With the incubator on, the temperature of the microplate chamber can be set and regulated from 4°C above ambient to 45°C.

NOTE: Accuracy of the temperature set point is only guaranteed if the set point is at least 4°C above ambient. If the temperature set point is lower than the ambient temperature, the chamber temperature will remain at ambient. Temperature regulation is controlled by heaters only and, therefore, cannot cool the temperature to a setting lower than ambient. Additionally, the highest setting (45°C) can be achieved only if the ambient temperature is >20°C.

You can change the temperature set point by pressing the up or the down arrow on the [Temp °C] (incubator) key until the desired set point is shown above the key in the display.

After activating the incubator, the TEMPERATURE indicator located at the right of the LCD will begin to flash and will continue flashing until the temperature within the microplate chamber reaches the set point (± 0.3°C) when it will remain illuminated. Typically, the microplate chamber will reach 37.0°C in less

than 15 minutes. The indicator also flashes as a warning if the temperature within the microplate chamber deviates more than ± 0.3°C from the set point.

The microplate chamber temperature is maintained at the set point until you press the incubator [On/Off] key again, turning temperature regulation off. The LCD indicator will go out, the drawer will open, and the temperature within the microplate chamber will begin returning to ambient.

NOTE: Should you turn the incubator back on after a momentary shutdown, allow about ten minutes for the control algorithm to fully stabilize the microplate chamber temperature.

Temperature regulation and control of the microplate chamber is achieved through electric heaters, a fan, efficient insulation, and temperature sensors. The heaters are located in the microplate chamber which is insulated to maintain the temperature set point. The sensors are mounted inside the chamber and measure the air temperature.

The temperature feedback closed-loop control algorithms measure the chamber air temperature, compares it to the temperature set point, and use the difference to calculate the heating cycles. This technique results in accurate, precise control of the microplate chamber temperature with a temperature variation of the air across the entire microplate of less than 0.3°C. (Temperature uniformity within the microplate itself will depend upon its design, materials, and/or configuration.)

Auto Mix

The Auto Mix function permits automatic shaking of the microplate at preset intervals, thereby mixing of the contents within each well. Auto Mix must be selected before beginning a reading.

Selectable Auto Mix settings are On, Once, or Off. The actions associated with these settings depend on the read mode chosen.

For Endpoint mode, setting Auto Mix to On or Once will shake the plate for five seconds and then read at all selected wavelengths.

When Kinetic mode is chosen, setting Auto Mix to On will shake the plate for five seconds before the initial reading and for three seconds before each subsequent reading. Setting Auto Mix to Once will shake the plate for five seconds only before the first reading, with no mixing between Kinetic readings.

When Auto Mix is enabled, either "On" or "Once" will be displayed above the [Auto Mix] key.

NOTE: Use of Auto Mix is strongly recommended for ELISAs and other solid-phase, enzyme-mediated reactions to enhance accuracy.

Data Collection

The SPECTRAmax 340 stores only the most recent Endpoint or Kinetic plate reading in a buffer memory.

⚠ **CAUTION:** Data in the buffer memory is lost when power to the SPECTRAmax 340 is turned off. This applies even to short power outages. Do not turn the instrument off while important data remains in the buffer memory.

Printed Data Output

During stand-alone operation, results are automatically printed as soon as a plate has been read. A new microplate can be loaded into the SPECTRAmax 340 while the results from the first reading are being printed.

NOTE: If you have performed a blank reading, the blank values will be subtracted from raw OD values, and the calculated result will be shown on the printout.

Computer Control

The SPECTRAmax 340 is equipped with an 8-pin DIN RS-232 serial port through which a computer can communicate with and control the instrument.

SOFTmax PRO®

Molecular Devices' SOFTmax PRO software is a highly integrated program that can be used to control and collect data from the SPECTRAmax 340. SOFTmax PRO is easy to use, yet is powerful and flexible, and expands the capabilities of the SPECTRAmax 340.

SOFTmax PRO allows you to:

- Expand the available read modes
  - Use up to six wavelengths for Endpoint and Kinetic readings
  - Extend Kinetic run times up to 99 hours
  - Select your own read intervals for Kinetic runs
  - Specify the duration for Auto Mix before and between readings
  - Read a subset of microplate strips
- Design a microplate template to simplify data reduction
  - Identify groups of wells with labels of your choice
  - Identify individual wells with unique names
  - Blank individual wells
- Save instrument settings, template formats, and data analysis parameters as assay protocol files and recall them for later use
  - Rapid instrument and analysis set up for repeated microplate assays
  - Uniform analysis for equivalent microplates
- Acquire data from the SPECTRAmax 340

- Save data files for in-depth analysis at a later time
- Save multiple microplates with individual template and data analysis parameters in one data file
- Pre-read microplates
- Analyze Kinetic data as it is collected

• Display data on screen
- Raw data is displayed in a microplate format
- Ranged display presents the data as integers between 0 and 9 in a microplate format
- Threshold display presents the data as being above, below, or between set limits in a microplate format
- Gray scale display presents the data in seven shades of gray corresponding to high and low limits in a microplate format
- Kinetic plots of all 96 microplate wells
- Enlarge the display of individual well plots and overlay multiple well plots

• Perform data analysis using SOFTmax PRO features
- Calculate maximum Kinetic rates on non-linear data
- Assign plate, group, or sample blanks
- Customize data analysis for each group in the template
- Create graphs with multiple plots
- Pick from five standard curve-fitting routines
- Analyze unknown samples against a standard curve

• Multiple print formats
- Print all or individual sections of the data file
- Define and print a report containing only selected sections
- Customize the order of data file sections

• Export data in tab-delimited ASCII format for use with Excel or other database programs

For a complete description of the features of SOFTmax PRO, refer to the *SOFTmax PRO User's Manual.*

Specifications

Thermal specifications for the SPECTRAmax 340 apply to flat-bottom microplates with isolated wells, with a plate lid in place. All other specifications apply to standard 96-well polystyrene flat-bottom microplates.

NOTE: Technical specifications are subject to change without notice.

Photometric Performance

Wavelength range	340–750 nm
Wavelength selection	Monochromator tunable in 1-nm increments
Wavelength bandwidth	5 nm
Wavelength accuracy	< ± 2.0 nm, referenced to Hoya V30 Didymium Multiband Calibration Filter
Wavelength repeatability	< ± 0.2 nm
OD indication range	0.000 to 4.200 OD
OD resolution	0.001 OD
OD accuracy (linearity)	**0–2.0 OD:** 340–750 nm <± 1.0% and ± 0.010 OD **2.0–3.0 OD:** 340–750 nm <± 3.0% and ± 0.010 OD
OD precision (repeatability)	**0–2.0 OD:** 340–750 nm <± 1.0% and ± 0.005 OD **2.0–3.0 OD:** 340–750 nm <± 3.0% and ± 0.005 OD
Photometric stabilization	Instantaneous
Photometric drift	None—continuous referencing of monochromatic output
Calibration	Automatic before first Kinetic read and before every Endpoint reading
Optical alignment	None required during lifetime of instrument
Light source	Xenon flash lamp (10 watts maximum)
Average lamp lifetime	> 5 years (1×10^6 plate readings)
Illumination	Top down
Stray light control	• Single-well sequential illumination • Lenses above and below microplate • Light-tight reading chamber
Photodetectors	Silicon photodiode

Photometric Analysis Modes

- Single wavelength, optical density
- Multiple wavelength (λ1-λ2 in stand-alone mode; up to six using SOFTmax PRO) optical density
- Kinetic; Kinetic graphics using SOFTmax PRO

Measurement Time

Read time (Endpoint)	• 96 wells in 9 seconds (single wavelength) • 96 wells in 11* N seconds (N wavelengths)
Kinetic read intervals	• 96 wells, 9-second minimum interval between readings • 1 column, 2-second minimum interval between readings • M columns, 1 second * (M columns, M≥2) • Multiple wavelength, 9 seconds * (N wavelengths)
Calibration time	< 1 second per wavelength
Wavelength selection	< 2 seconds

Temperature regulation

Reading chamber	Isothermal when temperature regulation is not enabled, < 1°C
Range	(Ambient + 4°C) to 45°C
Resolution	± 0.1°C
Accuracy	± 1.0°C
Well-to-well uniformity at equilibrium	± 0.5°C
Chamber warm-up time	30 minutes (measured on air)
Temperature regulation	3 sensors
Variation	< 0.3°C (regulated)
Temperature regulation diagnostics	Temperature regulation system is continuously monitored and updated
Evaporation	Plate lid required to minimize evaporative cooling
Recommended microplate	Flat-bottom microplates with isolated wells and lid

Plate Mixing

Plate mixing modes	Selectable: off, once prior to any reading, and once prior to and between Kinetic readings
Plate mixing duration	Selectable: 1 to 999 seconds (three-second default) using external software

General Instrument

Display	2-×-40-character backlit LCD with adjustable contrast
Operating panel	15-key (plus Shift key functions) membrane keypad
Memory back-up	Stored protocols (nine maximum) and instrument calibration parameters
Self-diagnosis	Continuous on-board diagnostics
Spill control	Drawer mechanism/reading chamber assembly is protected from accidental spillage by drainage ports
Calculated mean time between failures (MTBF)	> 20,000 hours
Data buffer	Memory downloading of data buffer (100-plate maximum)
Computer interface	8-pin DIN RS-232 serial (double shielding required)
Printer interface	Parallel 25-pin to Centronics (double shielding required)
Microplates supported	96-well and strip-well microplates including lids

Environmental

Operating temperature	15 to 40°C
Operating humidity	0 to 85%, non-condensing
Storage temperature	-20 to 65°C

Physical

Size (h × w × d)	8.6 in. (22 cm) × 22.8 in. (58 cm) × 15 in. (38 cm)
Weight	29 lb (13.2 kg)
Power consumption	< 340 watts
Line voltage	90–250 VAC, auto-ranging
Line frequency	50-60 Hz

Chapter 2 Installation

Installation Warnings

1) Always turn power to the instrument OFF and remove the power cord from the back of the instrument prior to any installation operation.

2) Never perform any operation on the instrument in an environment where potentially damaging liquids or gases are present.

Unpacking

The SPECTRAmax 340 is packed in a specially designed carton. Please retain the carton and the packing materials. If the unit should need to be returned for repair, you must use the original packing materials and carton for shipping. If the carton has been damaged in transit, it is particularly important that you *retain it for inspection by the carrier in case there has also been damage to the instrument.*

⚠ **WARNING:** The SPECTRAmax 340 weighs approximately 29 pounds (13.2 kg) and should be lifted with care. It is recommended that two persons lift the instrument together, taking the proper precautions to avoid injury.

After examining the carton, place it on a flat surface in the upright position. Open the top of the box and lift the SPECTRAmax 340, along with the packing materials around the ends, up and out of the shipping box. Remove the packing material from both ends of the instrument and set the instrument down carefully. The packing list that accompanies the instrument describes all components that should have been placed in the packing carton. Make sure all these items are present before proceeding.

Setting Up for Stand-Alone Use

1) Place the SPECTRAmax 340 on a *level surface, away from direct sunlight, dust, drafts, vibration, and moisture.*

2) Turn the instrument around so that the back of the instrument is facing you as shown in Figure 2.1.

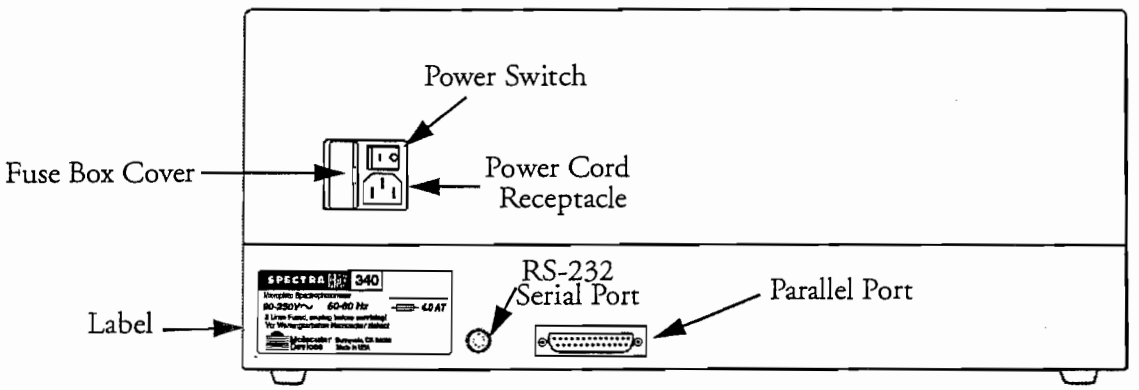


Figure 2.1: View of Rear Panel

3) Locate the printer port (25-pin parallel) on the rear panel. Connect one end of the cable here and the connect the other (Centronics) end to the printer.

4) Load paper into the printer according to the manufacturer's instructions and connect the printer's power cord to the power outlet.

5) Insert the female end of the power cord into the power receptacle at the rear of the SPECTRAmax 340. Connect the male end to a grounded power outlet of the appropriate voltage. Molecular Devices recommends that you use a surge protector between the power cord and the grounded power outlet.

6) Turn the SPECTRAmax 340 around so that the control panel now faces you. Be sure no cables run beneath the instrument. Leave at least three inches between the back of the instrument and the nearest objects or surfaces to ensure proper ventilation and cooling.

Chapter 3 Stand-Alone Operation

This chapter contains operating information for the SPECTRAmax 340 Microplate Reader. If you are an experienced user of this instrument, you can turn to the Operation Overview on page 3-6 for a quick review of the operating steps.

Prepare for a Reading

Turn the Instrument and Printer On

The power switch for the SPECTRAmax 340 is located on the back panel. Press the rocker switch to the on position. The instrument will automatically perform diagnostic checks to ensure that it is functioning correctly. Turn the printer on at this time also.

Set the Temperature

If elevated temperature within the microplate chamber is desired, you should turn on the incubator first, allowing enough time for the temperature to reach the set point before performing a reading. When you first turn the instrument on, up to 30 minutes may be required for the temperature within the chamber to reach the set point.

NOTE: Temperature cannot be regulated at a set point that is lower than 4°C above the ambient temperature.

The incubator can be left off for Endpoint readings where temperature control is not required and for ambient Kinetic assays.

To enable the incubator, press the incubator [On/Off] key (located below the [Temp °C] key). An indicator at the right side of the LCD will show that temperature control is on.

To change the temperature set point, press the up or down arrows on the [Temp °C] key until the desired temperature is shown in the display.

The microplate chamber temperature will be maintained at the set point until you disable temperature control by touching the incubator [On/Off] key again. When the incubator is off, the drawer will open and the temperature within the microplate chamber will begin returning to ambient.

NOTE: Should you turn the incubator back on after a momentary shutdown, allow about ten minutes for the control algorithm to fully stabilize the microplate chamber temperature.

Choose a Read Mode

Using a Blank Pattern

If your microplate has wells containing reagent blanks, you can enter a blank pattern. In stand-alone mode, the locations of blank wells are provided to the SPECTRAmax 340 by using a blank pattern template.

One packet of blank pattern templates is provided with the instrument. Pick up a template by the center tab and use a common lab marker (black works best) to mark the blank wells on the template as shown in Figure 3.1. Templates can also

be constructed from microplates or from microplate lids with marked well location. Fill selected microplate wells with an optically dense solution (OD > 0.500) or blacken microplate lids at selected sites with a glassware marking pen.

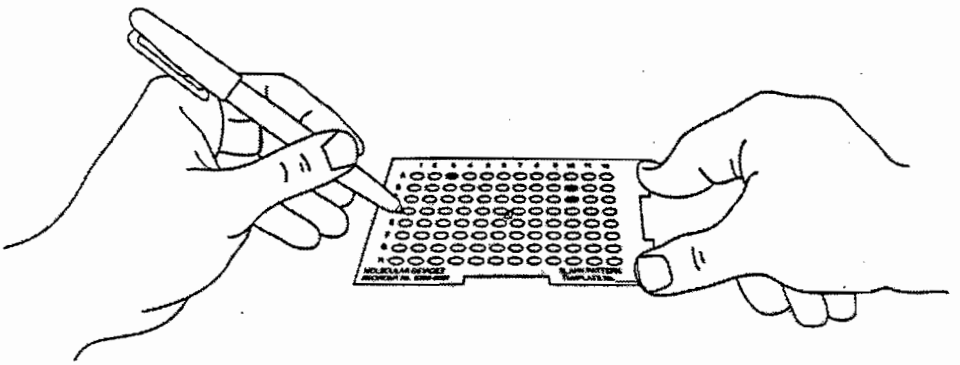


Figure 3.1: Preparing the Blank Pattern Template

When you have prepared the blank pattern, press the [Read Mode] key to scroll through the list of modes until BLANK appears.

If the incubator is on and the drawer is closed, open the drawer by pressing the [Drawer] key. The drawer will remain open for approximately 10 seconds, after which a beeping sound will alert you that the drawer is closing automatically. Load the template in the drawer, matching template well A1 with drawer position A1, making sure the template is flush on all sides and lies flat. Touch the [READ] key any time after the template is properly positioned in the drawer.

When reading is complete, the instrument will print a display of the well locations that have been designated as members of the blank pattern. Blank wells will be represented on the printout by the character "#." All other wells will be indicated by a single dot character (".").

The blank pattern may be stored as part of an assay protocol.

If a blank pattern has not been saved, it may be cleared by reading an empty drawer in BLANK mode, or by recalling the factory default protocol. To change or clear the blank pattern for an assay protocol, recall the protocol and temporarily switch the read mode to BLANK. To change the blank pattern, read the new blanking template; to clear the blank pattern, read an empty drawer. To save the new settings, switch back to the original read mode and press the [Save] key.

Endpoint Mode

Use the up or down arrows on the [Read Mode] key to scroll through the list until you select Endpoint (shown in the LCD).

Kinetic Mode

Use the up or down arrows on the [Read Mode] key to scroll through the list until you select Kinetic (shown in the LCD).

Kinetic Run Time. After choosing Kinetic mode, you must specify the total time for the reading. Press the up or down arrow on the [Kinetic Run Time] key until the desired total run time is displayed. In stand-alone mode, choices are 1, 2, 5, 10, and 20 minutes.

Select the Wavelength(s)

You can select either single or dual wavelength operation for Endpoint mode or single wavelength Kinetic mode during stand-alone operation. In Endpoint mode, dual wavelength is used when you want data from both a measurement and reference wavelength to be acquired by the SPECTRAmax 340.

Single Wavelength Selection. Select the measurement wavelength by pressing the up or down arrows on the [λ 1 nm] key on the control panel. The LCD will show the currently selected measurement (λ1) wavelength. The wavelength list will wrap around to the top or bottom when the last selectable wavelength is presented.

Dual Wavelength Mode Selection. Select dual wavelength mode by pressing the [On/Off] key below the [λ 1-2 nm] key on the control panel. The LCD will show the currently selected reference (λ2) wavelength. Change the wavelength by pressing the arrows on the [λ 1-2 nm] key until the desired wavelength is displayed. The wavelength list will wrap around to the top or bottom when the last selectable wavelength is presented.

NOTE: If you select the same setting for your measurement and reference wavelengths, the SPECTRAmax 340 will produce only a single wavelength reading.

Save/Recall Instrument Settings

If desired, you can save the currently selected instrument settings in memory for future use. Up to nine protocols can be saved, numbered 1 through 9.

To save the current instrument settings, press the [Setup] key until the desired number (1 through 9) appears in the display. Press the [Save] key to record the settings under that number.

⚠ **CAUTION:** The instrument does not inform you regarding whether or not a protocol has been saved previously under a certain number. You should keep a record of the protocols and numbers under which they are saved so that you don't accidentally overwrite a previously saved setting.

To recall parameters saved previously, press the [Setup] key until the number (1 through 9) of the saved protocol appears in the display. Press the [Recall] key to use the parameters stored under that number.

Read the Microplate

☣ **BIOHAZARD:** The underside of the microplate must be dry prior to placing it in the drawer. If the microplate has fluid on the underside, dry it using a paper towel (or equivalent) and then place it in the drawer. Alternatively, place a clear mylar sheet (such as a Molecular Devices blank pat-

tern template) beneath the microplate before inserting it in the drawer.

If you are reading filter-bottom microplates, fluid may drip off the filter membrane. **You must place a clear mylar sheet (such as a Molecular Devices blank pattern template) beneath the microplate when inserting it in the drawer.**

These precautions are necessary to prevent fluid from dripping from the microplate onto any lenses when the microplate is in the reading chamber and to minimize potential exposure to biohazardous fluids to yourself and other users of the instrument.

After selecting the read mode, setting the temperature (if desired), and choosing the wavelength(s), insert the filled microplate into the drawer, matching well A1 with position A1 in the drawer. Make sure the microplate is flat on the drawer bottom. Touch the [READ] key to begin reading the microplate. The SPECTRAmax 340 will automatically calibrate for less than two seconds (four seconds if dual wavelength has been selected), send a header for the reading to the printer, close the drawer (if it was open), and read the microplate according to the selected instrument settings.

The CALIBRATING status indicator on right side of the display will be illuminated during calibration, followed by illumination of the READING status indicator during the reading. When reading is complete, the drawer will open, allowing you to remove the microplate. If the incubator is on, the drawer will close again after approximately 10 seconds. If you return to the SPECTRAmax 340 and find the drawer closed after a microplate has been read, press the [Drawer] key. When the drawer opens, you can remove the microplate.

You do not have to wait for the printer to finish before loading another microplate.

Operation Overview

The following steps provide a quick reminder of the basic operating procedures required to perform an assay using the SPECTRAmax 340.

1) Turn on the printer and make sure it is properly connected.
2) Turn on the power switch of the SPECTRAmax 340 (located on the back panel). The microplate drawer will open automatically.
3) If you wish to regulate the temperature inside the microplate chamber, touch the [On/Off] key below the [Temp °C] (incubator) key to bring the microplate chamber to the default temperature of 37.0°C. The microplate drawer will close and the indicator on the right of the LCD will flash until the set temperature is reached.
4) If the incubator is on, the LCD will show the current temperature along with the temperature set point. To change the set point (to any setting from ambient +4° to 45°C), press the up or down arrows on the [Temp °C] key.
5) Select the desired measurement wavelength by pressing the arrows on the single

[λ 1 nm] key. Scroll up or down through the list of wavelengths shown in the LCD using the up or down arrows on the key until the desired measurement wavelength is highlighted.

6) To use a reference wavelength in Endpoint mode, press the [On/Off] key beneath the dual wavelength key ([λ 1-2 nm]). A listing of the reference wavelengths will appear on the LCD; you can scroll up or down through this list using the up or down arrows on the [λ 1-2 nm] key until the desired reference wavelength is highlighted.

7) To set a blank pattern prior to reading the microplate, mark the well areas corresponding to the blank wells using a blanking template or fill the same wells of a microplate with anything having an OD greater than 0.5 OD. Set the read mode to BLANK using the up or down arrows on the [Read Mode] key. Place the blank template in the open drawer and press the [READ] key. This blank pattern will be used for all subsequent readings until a new blank pattern is set. New blank values will be recalculated for each reading.

8) Set the read mode to either Endpoint or Kinetic using the up or down arrows on the [Read Mode] key. For a Kinetic reading, press the up or down arrows on the [Kinetic Run Time] key to set the total time for the Kinetic reading.

9) Set Auto Mix to On, Once, or off by pressing the [Auto Mix] key.

10) If you are performing Kinetic analysis, add substrate at this time.

11) Load the prepared microplate into the drawer, being sure to match well A1 with the A1 mark on upper left-hand corner of the drawer. Press the [READ] key. To cancel the reading, press the [Shift] key and then press the [READ] key.

Chapter 4 Maintenance

Technical Support

Molecular Devices Corporation is a leading worldwide manufacturer and distributor of analytical instrumentation. We are committed to the quality of our products and to fully supporting our customers with the highest level of technical service. In order to fully benefit from our technical services, please complete the registration card and return it to the address printed on the card.

If you have any problems using the SPECTRAmax 340 Microplate Spectrophotometer, in the U.S., contact our Technical Services group at 1-800-635-5577; elsewhere contact your local representative.

⚠ **WARNING:** All maintenance procedures described in this manual can be safely performed by qualified personnel. Maintenance not covered in this manual should be performed by a Molecular Devices representative.

⚠ **WARNING:** Turn the power switch off and disconnect the power cord from the main power source before performing any maintenance procedure that requires removal of any panel, cover, or disassembly of any interior instrument component.

⚠ **WARNING:** Removal of protective covers that are marked with the High Voltage warning symbol shown below can result in a safety hazard.

Cleaning

☣ **BIOHAZARD:** Wear gloves during any cleaning procedure that could involve contact with either hazardous or biohazardous materials or fluids.

Periodically, you should clean the *outside* surfaces of the SPECTRAmax 340 using a cloth or sponge that has been dampened with water. Do not use abrasive cleaners. If required, clean the surfaces using a mild soap solution diluted with water or a glass cleaner and then wipe with a damp cloth or sponge to remove any residue. Do not spray cleaner onto the instrument.

If needed, clean the microplate drawer using a cloth or sponge that has been dampened with water.

Should fluids spill in the drawer area (when the drawer is out), they will be directed to a tray at the bottom of the instrument, from which they will exit to the bench or counter beneath the instrument. Wipe up any spills immediately. Clean only the exterior of the unit (and the microplate drawer if necessary). Never clean the inside of the instrument. Do not allow excess water or other fluids to drip inside the instrument.

Changing the Fuses

Fuses burn out occasionally and must be replaced. If the instrument does not seem to be getting power after switching it on (the LCD shows no display), first check to see whether the power cord is securely plugged in to a functioning power outlet and to the receptacle at the rear of the SPECTRAmax 340. If power failed while the SPECTRAmax 340 was already on, check that the power cord is not loose or disconnected and that power to the power outlet is functioning properly.

If these checks fail to remedy the loss of power, follow the steps listed below to replace the fuses. Spare fuses (two U.S. and two metric) are shipped with the instrument in the original carton. The U.S. and metric fuses are identical except for physical size. The same fuses are used for 100- 240 V operation. They may be taped to the back of the SPECTRAmax 340.

If you no longer have spare fuses, you may obtain new ones from Molecular Devices (part numbers: 4601-0013, U.S., 4601-0014, metric) or from a local hardware store. Make sure fuses are rated SLOWBLOW (U.S.: 4-amp time-delay; Metric: 4-amp, 5 × 20 mm, time-delay).

1) Switch power to the instrument off and then remove the power cord from the outlet and from the SPECTRAmax 340 power cord receptacle.
2) Remove the printer cable and computer cable (if connected) from the back of the SPECTRAmax 340.
3) Turn the instrument around for easy access to the rear panel.
4) On the left-hand side of the rear panel (viewed from the back) is the power cord receptacle. As shown in Figure 4.1, insert a small, flat-blade screwdriver into the slot behind the tongue at the right of the black plastic cover. Gently pry the cover open. It will begin to slide forward.

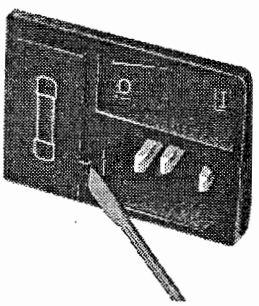


***Figure 4.1**: Pry Open the Fuse Box Cover*

5) Continue gently prying the fuse box forward until you can pull it free of the instrument. When removed, the fuse assembly will appear as shown in Figure 4.2.

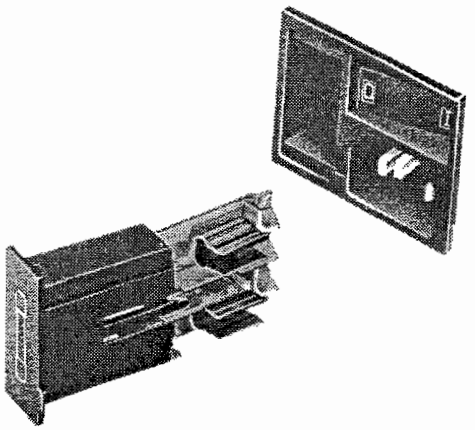


***Figure 4.2**: Removing the Fuse Box*

6) Once the fuse box is out, you will see a holder inside containing two fuses. Pull the fuse holder out of the box (see Figure 4.3).

7) It is possible that only one of the fuses may have blown. Molecular Devices recommends that you replace both fuses, however, to ensure continued proper operation. Pull both fuses out of the holder and discard them.

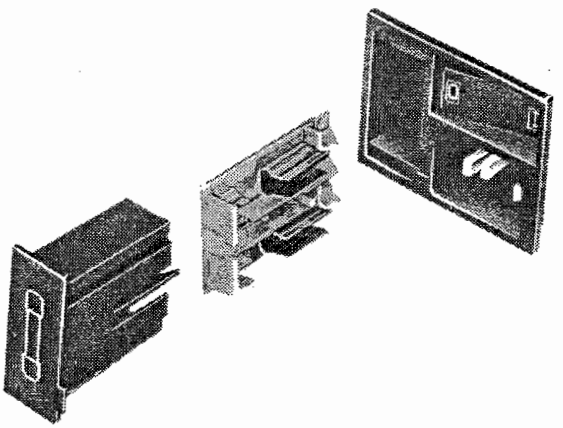


***Figure 4.3**: The Fuse Box and Holder with Fuses Removed*

8) Insert new SLOWBLOW-rated fuses into the fuse holder. Either end of the fuse may be forward.

9) Insert the fuse holder into the fuse box, making sure that the fuses face toward the right (toward the tongue on the cover) as you insert it. Slide the fuse holder all the way into the box.

10) Insert the fuse box into the opening in the instrument, making sure that the fuses are on the right side (toward the power receptacle). Press the fuse box into place, making sure the cover snaps closed.

11) Reconnect the power cord to the instrument and to the wall outlet and reconnect other cables previously disconnected.

Long-Term Shutdown

If you will not be using the SPECTRAmax 340 for an extended period of time, clean the *external* surfaces and cover the instrument.

Moving the SPECTRAmax 340

If you need to relocate the SPECTRAmax 340, follow these steps.

⚠ **WARNING:** The SPECTRAmax 340 weighs approximately 29 pounds (13.2 kilograms). To avoid injury, it is recommended that two people lift the instrument together, using proper lifting techniques.

1) Remove any microplate from the drawer then close the drawer.
2) Turn off the power switch and unplug the power cord from the source and from the receptacle on the back of the instrument.
3) Depending on the distance that you will be moving the instrument, you may wish to repackage the SPECTRAmax 340 in its original shipping carton. Otherwise, carry the instrument or place it on a rolling cart to transport it.
4) Ensure that the new location meets the proper specifications as described in Chapter 2, "Installation."

Chapter 5 Troubleshooting

This chapter lists error codes that may be seen, followed by their most likely causes and remedies. Maintenance procedures are described in Chapter 4. For problems with the SPECTRAmax 340 that are not listed here, in the U.S., contact Molecular Devices Technical Services group at 1-800-635-5577; elsewhere, call your local representative.

BIOHAZARD: It is your responsibility to decontaminate the instrument, as well as any accessories, before requesting service by Molecular Devices representatives and before returning the instrument or any components to Molecular Devices Corporation.

Error Codes and Probable Causes

If a problem occurs during operation that causes an unrecoverable (fatal) error, the instrument will stop and an error code number will be shown in the display on the front panel. Some errors are caused by equipment malfunction and others result from incorrect input. Some error codes are listed in Table 5.1, along with their probable causes and remedies. If you are unable to correct the problem, call your local Molecular Devices representative for assistance.

Table 5.1: Error Codes, Possible Cause, and Resolution

Error Code	Possible Cause	Resolution
504	"Insufficient Light" Insufficient Light for Measurement	1 Contact Molecular Devices.

Table 5.1: Error Codes, Possible Cause, and Resolution

Error Code	Possible Cause	Resolution
507	"Carriage motion time out" Microplate drawer carriage failure	1 If the drawer is out, remove the microplate from the drawer and attempt a reading. a If the error persists when the drawer is empty, turn off the instrument, then push the drawer in manually to determine if drawer carriage movement is obstructed. If it is obstructed, do not force the drawer. Open the drawer and remove any visible obstruction. If no obstruction is visible or if the error persists after removal of the obstruction, contact Molecular Devices. b If the error goes away when the drawer is empty, replace the microplate in the drawer, verify that it is completely seated in the microplate drawer, and attempt a reading. If the error persists with the microplate installed, push the drawer in manually to determine if carriage movement is obstructed by the microplate. If it is obstructed, do not force the drawer. Open the drawer and remove the microplate. Attempt a reading with a second microplate—if the error persists, contact Molecular Devices. If the error goes away with the second microplate, examine the first microplate for the cause of the obstruction. Contact Molecular Devices for further assistance. 2 If the drawer is closed, attempt to open the drawer. a If the drawer will open, follow the steps listed under 1, above. b If the drawer will not open, follow the steps outlined under "Opening the Drawer Manually" on page 5-5 to open the drawer. Once the drawer is open, follow the steps under 1, above. If you are unable to open the drawer, contact Molecular Devices.

Table 5.1: Error Codes, Possible Cause, and Resolution

Error Code	Possible Cause	Resolution
512	"Air calibration failed" Light level detected at a well diode during air calibration is inadequate	Open the drawer and check for debris in the 8 air calibration passages (the 8 holes located on the left side of the drawer carriage). 1 If no debris is present, contact Molecular Devices. 2 If debris is blocking one or more of the passages, remove the debris and attempt a reading. If the error persists, contact Molecular Devices.

For all other error messages (codes not listed here), please contact your local Molecular Devices representative for assistance.

Warning Messages

The LCD will display *error* codes when a situation arises that requires attention. Any assay in progress will stop. *Warning* messages do not stop a run but are printed below data on the printout. Warning messages indicate a situation that requires attention but is not sufficient to stop or prevent a reading. Examples of situations that might cause warning messages are low memory, entries being out of range, or operations that could result in loss of data. These messages are generally self explanatory. For assistance regarding warning messages, contact your local Molecular Devices representative.

Opening the Drawer Manually

If an error occurs while the drawer is closed and you need to remove a microplate, press the [Drawer] key. If the drawer does not open, turn power to the instrument off and then on again. If the drawer remains closed, turn the incubator off (if it was on) by pressing the [Temp °C] key.

If the drawer still remains closed, try using a blunt, flat object (such as a spatula) to open the door. With your index finger, pull the microplate drawer out of the instrument *(do not force the drawer)* and remove the microplate. This action will not harm the instrument, but should only be taken if the first two options have failed to open the drawer.

If you are still unable to open the drawer, contact your local Molecular Devices representative.

Appendix A Printers and Cables

Compatible Printers

In general, to be compatible with the SPECTRAmax 340, a printer must be able to emulate Epson graphics mode. This may require changing the dip switch or pin settings on the printer or insertion of an emulation cartridge. Please check your printer's manual to assess compatibility based on this criterion—some printers will not meet this requirement.

Please contact your local Molecular Devices representative for information regarding recommended printers.

Cables

Molecular Devices recommends that you use high-quality, double-shielded cables to connect the SPECTRAmax 340 to other peripheral instruments, such as a printer or computer. Choose cables that meet the following requirements:

Printer Cable (for Stand-alone operation only):

Centronics parallel, male 25D to male 36D.

Serial Interface Cable
(contact Molecular Devices for specific pin-out requirements)

Macintosh: Male DB8 to male DB8

IBM Compatible: Male DB8 to Female DB9

Appendix B Accessories

Items Available for Use with the SPECTRAmax 340

	Part Number
Cable, RS-232 (8-pin DIN, 8-pin DIN)	9000-0043
Cable, parallel printer (25-pin, Centronics)	9000-0002
Power Cord	4400-0002
Fuse, 4-amp Time Delay	4601-0013
Fuse, 4-amp (5 × 20 mm) Time Delay	4601-0014
SPECTRAplate—Disposable UV-transparent disposable microplates (case of 50)	R9013
SPECTRAplate—Quartz UV-transparent quartz microplate	R8024
SPECTRAstrip—Quartz UV-transparent quartz 8-well strip	R8025
Blanking Templates	6200-0001
SPECTRAmax Mouse Pad	9000-0133

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