

# Multimode Detection Software

User's Manual

Beckman Coulter PN 987958 Revision AA May 2004

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# **Safety Information**

All Warnings and Cautions in this document include an exclamation point, a lightning bolt, or a light burst symbol framed within a triangle. Please pay special attention to the specific safety information associated with these symbols.



WARNING: If the equipment is used in a manner not specified by Beckman Coulter, Inc., the protection provided by the equipment may be impaired.

## Warning and Caution Definitions



The exclamation point symbol is an international symbol which serves as a reminder that all safety instructions should be read and understood before installation, use, maintenance, and servicing is attempted.

When this symbol is displayed in this manual, pay special attention to the specific safety information associated with the symbol.

#### WARNING

A WARNING calls attention to a condition or possible situation that could cause injury to the operator.

#### CAUTION

A CAUTION calls attention to a condition or possible situation that could damage or destroy the product or the operator's work.

## Warnings and Cautions Found in this Manual

Please read and observe all cautions and instructions. Remember, the most important key to safety is to use Multimode Detection Software with care.

The WARNINGs and CAUTIONs found within this document are listed below.



WARNING: If the equipment is used in a manner not specified by Beckman Coulter, Inc., the protection provided by the equipment may be impaired.



CAUTION: Shake low density plates, such as 6- or 48-well plates, at low speed only. Shaking low density plates at higher speeds may cause liquid in wells to spill.



CAUTION: The plate height configured must not be less than that of the actual plate. Doing so may cause the DTX 880 optics transport to collide with the plate during a Read Height Optimization.

# **Table of Contents**

Safe	ety Info	rmation	•••••		v
Tab	le of C	ontents .			vii
List	of Fig	ures			xi
1	Insta	lling, S	etting Up	, and Using the Software	
	1.1	Overvi	ew		1-1
	1.2	Using I	Multimode	Detection Software	1-2
		1.2.1	Launchin	g the Software	1-2
		1.2.2	Using the	Software Interface	1-3
			1.2.2.1	About the Navigation Pane	1-3
			1.2.2.2	About the Toolbar	1-3
			1.2.2.3	About the Selection and Configuration Pane	1-3
		1.2.3	Accessin	g Online Help	1-4
	1.3	Installi	ng Multimo	de Detection Software	1-5
		1.3.1	Meeting	System Requirements	1-5
		1.3.2	Using the	Setup Program to Install the Software	1-5
		1.3.3	Repairing	or Removing the Multimode Detection Software Installation.	1-9
	1.4	Setting	Up Multim	ode Detection Software	. 1-11
		1.4.1	Configur	ing Communication Settings	. 1-13
		1.4.2	Configur	ing Software Settings	. 1-15
			1.4.2.1	Setting the System Language	. 1-16
			1.4.2.2	Configuring Print Settings	. 1-17
			1.4.2.3	Choosing Simulated Data Files.	. 1-18
			1.4.2.4	Choosing the Directory Where Measurement Results	
				are Saved	. 1-19

## 2 Setting Up and Controlling Instruments

2.1	Overvie	W		
2.2	Control	ling Instru	ment Functions	2-3
	2.2.1	Ejecting	the Plate Carrier	2-3
	2.2.2	Loading	the Plate Carrier	2-3
	2.2.3	Initializir	ng the Instrument	
	2.2.4	Connecti	ng to the Instrument	
	2.2.5	Enabling	Simulation Mode	2-5
2.3	Configu	iring Instru	ment Settings	
	2.3.1	Configur	ing Basic Instrument Settings	
	2.3.2	Defining	and Editing Filter Slides	
		2.3.2.1	Adding Filter Slides	
		2.3.2.2	Configuring Filter Slides	2-9
		2.3.2.3	Removing Filter Slides	2-10
		2.3.2.4	Exporting and Importing Filter Slides	2-10
	2.3.3	Manually	Controlling the Instrument	2-11
		2.3.3.1	Temperature Control (880 only)	2-11
		2.3.3.2	Shake Control	2-12
		2.3.3.3	Plate Control	2-12
		2.3.3.4	Excitation and Emission Filter Slide Control.	2-12

## **3** Creating and Editing Detection Methods

3.1	Overvi	erview		
3.2	Creating Detection Methods			
	3.2.1 Selecting a Method Technique		g a Method Technique	
	3.2.2	Selecting	g the Type of Absorbance Method	
	3.2.3	Defining	Method Parameters	
		3.2.3.1	Defining Absorbance Method Parameters 3-6	
		3.2.3.2	Defining Luminescence Method Parameters 3-7	
		3.2.3.3	Defining Fluorescence Intensity Top Method Parameters 3-8	
		3.2.3.4	Defining Fluorescence Intensity Bottom Method	
		2 2 2 5		
		3.2.3.5	Parameters (880 only) 3-10	
		3.2.3.6	Defining Time-Resolved Fluorescence Method	
			Parameters (880 only) 3-11	
3.3	Editing	g Detection	Methods 3-13	
3.4	Copyin	ng Detection	n Methods	
3.5	Deletir	ng Detection	n Methods	
3.6	Export	ing and Imp	porting Detection Methods	

## 4 Creating and Editing Labware

	4.1	Overvi	view		
	4.2	Creatin	ng Labware	4-3	
		4.2.1	Defining Labware Information	4-3	
			4.2.1.1 General Labware Selection Guidelines	4-5	
		4.2.2	Configuring Offsets and Well Dimensions for the Default Labware Lot.	4-5	
	4.3	Editing	g Labware	4-7	
		4.3.1	Viewing and Editing Labware Information	4-8	
		4.3.2	Selecting and Editing Labware Lots	4-9	
	4.4	Copyin	ng Labware	4-10	
	4.5	Deletin	ng Labware	4-11	
	4.6	Optimi	zing Labware	4-12	
		4.6.1	Selecting the Detection Method	4-13	
		4.6.2	Preparing and Loading the Labware	4-14	
		4.6.3	Performing the Optimization Read	4-15	
		4.6.4	Selecting the Centers of the Four Corner Wells	4-16	
		4.6.5	Verifying Well Centers	4-17	
	4.7	Export	ing and Importing Labware	4-19	
5	Defii	ning, Ed	diting, and Running Protocols		
	5.1	Overvi	ew	5-1	
	5.2	Creatin	ng Protocols	5-3	
		5.2.1	Configuring General Settings	5-3	
		5.2.2	Selecting the Technique Type.	5-4	
		5.2.3	Selecting the Labware Type Used in the Protocol	5-5	
		5.2.4	Configuring Labware Layout Settings	5-6	
		5.2.5	Configuring Detection and Preparation Methods	5-8	
			5.2.5.1 Configuring a Method in Basic Mode	5-9	
			5.2.5.2 Configuring a Method in Advanced Mode	5-13	
		5.2.6	Configuring Output Settings	5-18	
			5.2.6.1 Configuring a Program to Run after Protocol Executes	5-20	
	5.3	Runnin	ng Protocols	5-21	
		5.3.1	Running a Protocol on an Instrument	5-21	
			5.3.1.1 Optimizing Read Height (880 only)	5-23	
		5.3.2	Running a Protocol When Simulation Mode is Enabled	5-26	
	5.4	Editing	Protocols	5-28	
	5.5	Copvin	ng Protocols	5-29	
	5.6	Deletin	ng Protocols	5-30	
	5.7	Printin	g Protocol Configuration Information	5-31	
	5.8	Export	ing and Importing Protocols	5-33	
		-			

## 6 Viewing Measurement Results

	6.1	Overview
	6.2	Viewing Measurement Results in Run Protocol
		6.2.1 Viewing State
		6.2.2 Viewing Raw Data
		6.2.3 Viewing Kinetic and Scan Graphs
		6.2.3.1 Viewing Detailed Graphs of Individual Samples
	6.3	Viewing Exported Measurement Results
		6.3.1 Viewing Measurement Results Using Microsoft® Excel 6-9
		6.3.1.1 Viewing Information About the Protocol
		6.3.1.2 Viewing Measurement Results
	6.4	Printing Measurement Results
Α	Арре	endix A: Software Error Codes
	A.1	Troubleshooting Software Error Codes
Inde	ex	

# **List of Figures**

Figure 1-1. Multimode Detection Software main window	
Figure 1-2. Using online help	
Figure 1-3. Installer Language Options	
Figure 1-4. Starting the software installation	
Figure 1-5. Setup wizard	
Figure 1-6. Selecting installation options	
Figure 1-7. Setup wizard — repair or remove the software installation	
Figure 1-8. Multimode Detection Software main screen	1-11
Figure 1-9. Warning — Instrument is not connected	
Figure 1-10. Instrument Selection List with simulated instrument selected	1-13
Figure 1-11. Configuring communications settings	1-14
Figure 1-12. Configuring Software Settings	1-15
Figure 1-13. Choosing the software interface language	1-16
Figure 1-14. Configuring Print Settings	1-17
Figure 1-15. Choosing the Simulated Data files	
Figure 1-16. Choosing the directory where data is saved	1-19
Figure 2-1. Instrument Selection List	
Figure 2-2. Instrument Settings — Basic Settings	
Figure 2-3. Instrument Settings — Filter Slides	
Figure 2-4. Configuring filter properties	
Figure 2-5. Instrument Settings — Manual Control	
Figure 3-1. Accessing detection method functions	
Figure 3-2. Selecting a Method Technique	
Figure 3-3. Selecting an absorbance Method Type	
Figure 3-4. Defining absorbance measurement parameters	
Figure 3-5. Defining luminescence measurement parameters	
Figure 3-6. Defining fluorescence intensity top method parameters	
Figure 3-7. Defining fluorescence intensity bottom method parameters	3-9
Figure 3-8. Defining fluorescence polarization method parameters	
Figure 3-9. Defining time-resolved fluorescence method parameters	
Figure 3-10. Editing a fluorescence intensity top method	3-13

Figure 3-11. Confirming the deletion of a detection method	3-16
Figure 3-12. Choosing the folder where an exported detection method will be saved	3-17
Figure 4-1. Accessing labware functions	4-2
Figure 4-2. Defining plate dimensions and information	4-3
Figure 4-3. Defining offsets and well dimensions	4-6
Figure 4-4. Editing labware dimensions and well information	4-8
Figure 4-5. Configuring offsets and well dimensions in Labware Lots	4-9
Figure 4-6. Confirming a labware deletion	4-11
Figure 4-7. Selecting the detection method for labware optimization	4-13
Figure 4-8. Preparing the labware for optimization	4-14
Figure 4-9. Labware optimization in progress	4-15
Figure 4-10. Selecting the well center	4-16
Figure 4-11. Verifying well centers	4-17
Figure 4-12. Choosing the folder where exported labware will be saved	4-19
Figure 5-1. Protocol Selection List	5-2
Figure 5-2. Defining a protocol name and entering notes about the protocol	5-3
Figure 5-3. Selecting the measurement technique for a DTX 880	5-4
Figure 5-4. Selecting the type of labware used in the protocol	5-5
Figure 5-5. Selecting which wells are measured on a 384-well plate	5-6
Figure 5-6. Selecting how wells on the plate are read	5-7
Figure 5-7. Configuring parameters in Method Selection	5-8
Figure 5-8. Configuring a method in basic mode	5-9
Figure 5-9. Configuring an area scan	5-11
Figure 5-10. Configuring a linear scan	5-12
Figure 5-11. Configuring a method in advanced mode	5-13
Figure 5-12. Configuring a Shake preparation method	5-15
Figure 5-13. Configuring a Set Temperature preparation method	5-17
Figure 5-14. Configuring output settings	5-18
Figure 5-15. Configuring an external software application in Output Settings	5-20
Figure 5-16. Preparing to run a protocol on an instrument	5-21
Figure 5-17. Selecting the detection method used in the read height optimization	5-23
Figure 5-18. Selecting the well read in the read height optimization	5-24
Figure 5-19. Read height optimization in progress	5-25
Figure 5-20. Read height optimization completed	5-25
Figure 5-21. Preparing to run a protocol in simulation mode	5-26
Figure 5-22. Editing an absorbance protocol	5-28
Figure 5-23. Confirming the deletion of a protocol	5-30
Figure 5-24. Previewing a protocol configuration and sample layout printout	5-32
Figure 5-25. Choosing the folder where an exported protocol will be saved	5-33
Figure 6-1. Measurement results displayed after a protocol run	
Figure 6-2. State displayed for an area scan measurement	
Figure 6-3. Raw Data displayed for a kinetic absorbance measurement	
Figure 6-4. Viewing area scan measurement graphs	
Figure 6-5. Three-dimensional area scan graph	
Figure 6-6. Two-dimensional kinetic graph with zoom region selected	6-8

Figure 6-7. Viewing protocol information in the General worksheet (excerpt)	
Figure 6-8. Viewing absorbance data in a Cycle worksheet (excerpt)	
Figure 6-9. Viewing fluorescence polarization data (excerpt)	
Figure 6-10. Previewing a measurement results printout	

# Installing, Setting Up, and Using the Software

## 1.1 Overview

Multimode Detection Software configures and controls all measurement protocols and operations performed by the DTX 800 and DTX 880 Multimode Detectors. Absorbance, glow luminescence, fluorescence intensity (top and bottom), fluorescence polarization, and time-resolved fluorescence (TRF) measurements are all supported. The measurement methods available to users depend on the capabilities of the instrument being controlled. Measurement results are easily exported and may be evaluated with an external application such as Microsoft® Excel.

The simple interface divides the main window into three basic sections, which provide easy access to system functionality. Most operations use a wizard-type interface to efficiently guide the task being performed.

This user's manual provides comprehensive coverage of Multimode Detection Software functionality, including:

- <u>Setting Up and Controlling Instruments</u> (Chapter 2).
- <u>Creating and Editing Detection Methods</u> (Chapter 3).
- <u>Creating and Editing Labware</u> (Chapter 4).
- <u>Defining, Editing, and Running Protocols</u> (Chapter 5).
- Viewing Measurement Results (Chapter 6).

This chapter introduces users to the software and provides instructions for:

- <u>Using Multimode Detection Software</u> (Section 1.2).
- <u>Installing Multimode Detection Software</u> (Section 1.3).
- Setting Up Multimode Detection Software (Section 1.4).

## 1.2 Using Multimode Detection Software

Multimode Detection Software uses a simple interface that divides the main window into three basic sections: navigation pane, toolbar, and selection and configuration pane (Figure 1-1). The interface includes easy access to the five modules that provide system functionality and a comprehensive, context-sensitive online help system.

This section covers:

- *Launching the Software* (Section 1.2.1).
- Using the Software Interface (Section 1.2.2).
- Accessing Online Help (Section 1.2.3).

#### 1.2.1 Launching the Software

To launch Multimode Detection Software:

From the Windows® Start menu, choose **Programs>Beckman Coulter**, **Inc>Multimode Detection Software>Multimode Detection Software**. Multimode Detection Software appears (Figure 1-1).

**Note:** If Multimode Detection Software is not found in the Start menu, the software may have been installed for a single user account on the system instead of all accounts. Check with the site system administrator or login to the user account with permission to access the software. Refer to Section 1.3.2, *Using the Setup Program to Install the Software*, for more information about installing the software for a single or multiple user accounts.





#### **1.2.2 Using the Software Interface**

Multimode Detection Software uses a simple interface that is divided into three basic sections:

- Navigation pane (refer to Section 1.2.2.1, *<u>About the Navigation Pane</u>*).
- Toolbar (refer to Section 1.2.2.2, <u>About the Toolbar</u>).
- Selection and configuration pane (refer to Section 1.2.2.3, <u>About the</u> <u>Selection and Configuration Pane</u>).

The navigation pane provides access to the five modules that provide the majority of the functionality built into the software. The options available in the toolbar and selection and configuration pane are determined by the module currently selected in the navigation pane.

#### 1.2.2.1 About the Navigation Pane

The navigation pane is the narrow pane on the left of the Multimode Detection Software window (Figure 1-1). Use the navigation pane to switch between modules:

- Protocols opens the Protocol Selection List and provides the ability to define, run, edit, copy, delete, and print measurement protocols (refer to Chapter 5, <u>Defining, Editing, and Running Protocols</u>).
- Detection Methods opens the Detection Method Selection List and provides the ability to create, edit, copy, and delete detection methods (refer to Chapter 3, <u>Creating and Editing Detection Methods</u>).
- Labware opens the Labware Selection List and provides the ability to create, edit, optimize, copy, and delete labware types (refer to Chapter 4, <u>Creating and Editing Labware</u>).
- Instruments opens the Instrument Selection List and provides the ability to manually control instrument functions, such as shaking, and configure communications settings and filter slides (refer to Chapter 2, <u>Setting Up and Controlling Instruments</u>).
- Software Settings configures software settings, including system language, print options, default simulated data files, and the directory where measurement results are saved (refer to Section 1.4.2, <u>Configuring Software</u> <u>Settings</u>).

#### 1.2.2.2 About the Toolbar

The toolbar provides easy access to common software functions. Functions available in the toolbar are specific to the module chosen in the navigation pane. For example, Optimize Labware is only available when the Labware module is active.

#### 1.2.2.3 About the Selection and Configuration Pane

The selection and configuration pane is the large pane to the right of the navigation pane. Options available in this pane change depending on which module is currently selected in the navigation pane. For example, when **Protocols** is selected, the **Protocol Selection List** is displayed, which provides access to configured protocols and functionality specific to the **Protocols** module.

#### 1.2.3 Accessing Online Help

Multimode Detection Software contains a detailed online help system that covers defining and editing labware, detection methods, and protocols, performing measurements, and exporting measurement results. The online help is context sensitive, which provides instant access to help for the active screen.

To access online help:

Press F1 at any time to display online help for the active screen (Figure 1-2).

OR

From the Help menu, choose **Help** to display the table of contents.



Figure 1-2. Using online help

### **1.3 Installing Multimode Detection Software**

Installing Multimode Detection Software requires:

- <u>Meeting System Requirements</u> (Section 1.3.1).
- <u>Using the Setup Program to Install the Software</u> (Section 1.3.2).

#### 1.3.1 Meeting System Requirements

To install and use Multimode Detection Software successfully, the host computer must meet the minimum system requirements listed in Table 1-1. Where relevant, Table 1-1 also lists recommended specifications.

Component	Minimum Requirements	
CPU	Pentium® II 300 Mhz	
RAM	128 MB minimum 256 MB recommended	
Hard Drive	150 MB free space	
CD-ROM Drive	4X	
Monitor	640x480 resolution	
Keyboard	101 key	
Mouse	IBM® compatible	
Serial Port	1 free serial port	
Operating Systems	Windows NT® 4 (Service Pack 6a) Windows® 2000 Windows® XP	
Operating System Languages	English (U.S.), German	
Web Browser	Internet Explorer 5.01 or later	

 Table 1-1. Host computer System Requirements

# 1.3.2 Using the Setup Program to Install the Software

The setup program on the installation CD installs all of the components required to run Multimode Detection Software.

**Note:** The setup program also provides the ability to repair the software installation or remove (uninstall) the software from the host computer (refer to Section 1.3.3, *Repairing or Removing the Multimode Detection Software Installation*).

To install Multimode Detection Software:

- 1. Exit all open Windows programs before running the setup program.
- 2. Make sure the current user account has Administrator privileges. Accounts with Standard or Restricted access are not permitted to run the setup program. Contact the site system administrator for more information about account privileges.

3. Insert the Multimode Detection Software installation CD into the CD-ROM drive. After a few seconds, Language Options appears (Figure 1-3).

**Note:** If Language Options does not appear automatically within a few seconds of inserting the CD into the drive, use Windows Explorer to browse to the CD-ROM drive and run MultimodeDetectionSoftwareInstall.exe.

🗑 Multimode Detection Software Setup	
Language Options Operating System Language Selection.	
If the Multimode Detection Software is being installed on a German language Operating System, check the box below.	9
🔲 German Language Operating System	
Nullsoft Install System v2,0b4	
Install	ancel

Figure 1-3. Installer Language Options

- 4. If installing the software on a German language version of Windows, choose German Language Operating System. This ensures that all software screens are displayed correctly when German is set as the system language used in the Multimode Detection Software interface.
- 5. Choose **Install** to start the installation. Multimode Detection Software Installation appears (Figure 1-4).



Figure 1-4. Starting the software installation

6. Choose **OK** to start the installation. The Multimode Detection Software setup wizard appears (Figure 1-5).

🙀 Multimode Detection Software				
Welcome to the Multimode Detection Software Setup Wizard				
The installer will guide you through the steps required to install Multimode Detection S your computer.	Software on			
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.				
Cancel < Back	<u>N</u> ext >			

Figure 1-5. Setup wizard

7. Choose **Next** to continue the installation. Select Installation Folder appears (Figure 1-6).

🙀 Multimode Detection Software	
Select Installation Folder	
The installer will install Multimode Detection Software to the following folder. To install in this folder, click "Next". To install to a different folder, enter it be Folder:	low or click "Browse".
_ouer. c:\program files\beckman coulter, inc\multimode detection software\	Browse
Installation folder f, or for anyone who uses	<u>D</u> isk Cost
Everyone	
O Just <u>m</u> e	
Cancel < <u>B</u> ack	<u>N</u> ext >

Figure 1-6. Selecting installation options

- 8. Choose **Browse** to select a different installation folder for the software, if desired.
- 9. Choose **Disk Cost** to view the free space available on all hard drives installed in the computer, if desired.
- 10. Select **Everyone** to allow all user accounts configured on the computer to access and use the software. **Everyone** should be selected when more than one user will be using the software to perform measurements.

OR

Select **Just Me** to allow only the user account currently logged in to access and use the software.

**Note:** Only user accounts with Administrator or Standard access may use Multimode Detection Software. User accounts with Restricted access do not have access to the software.

11. Choose **Next** to continue the installation.

OR

Choose **Back** to return to the previous screen in the setup wizard.

OR

Choose **Cancel** to close the setup wizard without installing the software.

 Follow the remaining instructions in the setup wizard to complete the software installation. When installation is complete, communications and system settings may be configured (refer to Section 1.4, <u>Setting Up Multimode Detection</u> <u>Software</u>).

#### 1.3.3 Repairing or Removing the Multimode Detection Software Installation

Along with performing the initial Multimode Detection Software installation, the setup program also provides the ability to:

- Repair the installation if required software components or files are missing or damaged. Try repairing the installation if the software will not open or does not run correctly.
- Remove (uninstall) Multimode Detection Software from the host computer.

**Note:** Multimode Detection Software may also be removed from the computer using the Add/Remove Programs control panel in Windows<sup>®</sup>.

To repair or remove the software:

- 1. Exit all open Windows programs before running the setup program.
- Make sure the current user account has Administrator privileges. Accounts with Standard or Restricted access are not permitted to run Setup. Contact the site system administrator for more information about account privileges.
- 3. Insert the Multimode Detection Software installation CD into the CD-ROM drive. After a few seconds, Language Options appears.

**Note:** If Language Options does not appear automatically within a few seconds of inserting the CD into the drive, use Windows Explorer to browse to the CD-ROM drive and run MultimodeDetectionSoftwareInstall.exe.

- 4. If repairing software installed on a German language version of Windows, choose German Language Operating System. This ensures that all software screens are displayed correctly when German is set as the system language used in the Multimode Detection Software interface.
- 5. In Language Options, choose **Install** to start the installation. Multimode Detection Software Installation appears.
- Choose OK to continue. The Multimode Detection Software setup wizard appears.
- 7. Choose **Next** to continue. Options to repair or remove the software appear (Figure 1-7).



Figure 1-7. Setup wizard — repair or remove the software installation

8. Select **Repair Multimode Detection Software** to search for and automatically reinstall any missing or damaged files required to run the software.

OR

Select **Remove Multimode Detection Software** to remove the application and support files from the host computer.

**Note:** When removing the software, only files installed by the setup program during the initial installation are removed. Files created after the installation, such as exported measurement results and labware, detection method, and protocol definitions, are not removed. Measurement results files may still be viewed after the software is uninstalled. All file types may be copied, archived, or manually deleted.

9. Choose **Finish** to perform the selected action.

OR

Choose **Cancel** to close the setup wizard without repairing or removing the software.

## 1.4 Setting Up Multimode Detection Software

After installing the software and physically connecting the instrument to a serial port on the host computer, communications and software settings must be set up.

Setting up the software includes:

•

- Configuring Communication Settings (Section 1.4.1).
- <u>Configuring Software Settings</u> (Section 1.4.2).

To set up Multimode Detection Software:

 From the Windows® Start menu, choose Programs>Beckman Coulter, Inc>Multimode Detection Software>Multimode Detection Software. Multimode Detection Software appears (Figure 1-8).

**Note:** If Multimode Detection Software is not found in the Start menu, the software may have been installed for a single user account on the system instead of all accounts. Check with the site system administrator or login to the user account with permission to access the software. Refer to Section 1.3.2, *Using the Setup Program to Install the Software*, for more information about installing the software for a single or multiple user accounts.



Figure 1-8. Multimode Detection Software main screen

 If the Protocol Selection List (Figure 1-8) appears immediately, the instrument was automatically detected by the software. Proceed to Section 1.4.2, <u>Configuring Software Settings</u>, to configure system settings.

#### OR

If Warning appears (Figure 1-9), the instrument was not detected by the software. Choose **OK** to work in simulation mode until the communications settings are configured properly.

🔛 Warning	<li></li>
Instrument is not connected. Entering simulation mode.	
Don't show this message again           OK	

Figure 1-9. Warning — Instrument is not connected

- 3. If the instrument was not detected, configure the communications settings following the steps in Section 1.4.1, *Configuring Communication Settings*.
- 4. Configure system settings, such as language and printing options, following the steps in Section 1.4.2, *Configuring Software Settings*.

#### 1.4.1 Configuring Communication Settings

After physically connecting the instrument to a serial communications port on the host computer, the selected serial port and communications speed must be configured correctly before Multimode Detection Software can control instrument operations. Communications settings are configured in Instrument Settings.

Before communications with an instrument are configured, a simulated instrument (Serial # 0000) appears in the Instrument Selection List (Figure 1-10). When communications are configured correctly and the instrument is detected by the software, the simulated instrument is replaced in the list by the connected instrument.

To configure communications settings:

1. From the navigation pane, choose **Instruments**. The Instrument Selection List appears (Figure 1-10).

Hultimode Detection Software - Sime	Jated	
File Actions Help		
	Instrument Selection List	
Protocols	Name Serial # Measurement techniques	
Detection Methods	Multimode Reader 0000 Absorbance, Luminescence, Fluorescence Intensity Top, Fluorescence Intensity Bottom, Fluorescence	F
🚳 Labware	Simulated	
🔄 Instruments	instrument	
Software Settings		
		1

Figure 1-10. Instrument Selection List with simulated instrument selected



2. From the toolbar, choose **Instrument Settings**. Instrument Settings appears (Figure 1-11).

OR

From the Actions menu, choose Instrument Settings.

Basic Settings Filter	igs Slides   Manual Contro	
Communication Setti	ngs	Instrument
Port:	COM1 💌	information fields
Baudrate:	38400 💌	•
		Features
Instrument Name:	DTX 880	Absorbance Visible
Serial Number:	0004	Luminescence Polarization
Instrument Type:	123	Fluorescence bottom Absorbance UV Time Resolved Fluorescence
Firmware Version:	V0.1 03/16/2004	PMT Red Sensitive Temperature Controlled
PIC FW Version:	V1.0 16.03.04	
		OK Cancel Apply

Figure 1-11. Configuring communications settings

- 3. Select **Basic Settings** to display the **Basic Settings** tab, if necessary.
- 4. In Port, select the serial communications port on the host computer that connects to the instrument.
- 5. In Baudrate, select 38400.
- 6. Choose **Apply** to detect the instrument. When the instrument is detected, the instrument information fields are autopopulated with information about the connected instrument. Refer to Table 2-1 for more information about each field.
- 7. Choose OK to close Instrument Settings.

#### 1.4.2 Configuring Software Settings

Multimode Detection Software can be customized using the options available in Software Settings (Figure 1-12). Use the tabs in Software Settings to configure the system language, printout options, default simulated data files, and directory where measurement results are stored.

To configure Software Settings:

1. From the navigation pane, choose **Software Settings**. Software Settings appears (Figure 1-12).

Multimode Detection Software - C	Connected - Filter Slides: Ex:2 Em:	1		<u>_                                    </u>
	Software Setti	ngs		
Protocols	Language Print Settings Simula	ited Data Directory Settings		
🚺 Detection Methods	Name	Culture	File	—
🚺 Labware	German (Germany) German (Austria)	Deutsch (Deutschland) Deutsch (Österreich)	Apex.de-DE.resources Apex.de-AT.resources	
[ Instruments	English (United States)	English (United States)	Apex.en-US.resources	
5 Software Settings				- 11
<b>↑</b>				- 11
Software				
settings				
				Apply

Figure 1-12. Configuring Software Settings

- 2. Configure the settings in the desired tab(s):
  - Setting the System Language (Section 1.4.2.1).
  - <u>Configuring Print Settings</u> (Section 1.4.2.2).
  - <u>Choosing Simulated Data Files</u> (Section 1.4.2.3).
  - <u>Choosing the Directory Where Measurement Results are Saved</u> (Section 1.4.2.4).

#### 1.4.2.1 Setting the System Language

English is set as the default system language when Multimode Detection Software is installed, even when German Language Operating System is selected during installation (refer to Section 1.3.2, *Using the Setup Program to Install the Software*). The system language may be changed in the Language tab (Figure 1-13).

Multimode Detection Software - Co	onnected - Filter Slides: Ex:2 Em:	1		<u>_                                    </u>
File Actions Help	Software Setti Language Print Settings   Simula	ngs Ited Data   Directory Settings		
Detection Methods	Name	Culture	File	
🚳 Labwara	German (Germany)	Deutsch (Deutschland)	Apex.de-DE.resources	
	German (Austria)	Deutsch (Österreich)	Apex.de-AT.resources	
Instruments	English (United States)	English (United States)	Apex.en-us.resources	
Software Settings	Available languages			Apply

Figure 1-13. Choosing the software interface language

To change the system language:

- 1. Choose the **Language** tab. All available languages are listed, with the current system language highlighted (Figure 1-13).
- 2. Select the desired language.
- 3. Choose Apply. The system language changes to the language selected.

#### 1.4.2.2 Configuring Print Settings

Measurement results and protocol configurations may be printed. Printing parameters, such as headers and footers are configured in the Print Settings tab (Figure 1-14).

Multimode Detection Software - (	Connected - Filter Slides: Ex:2 Em:1	<u>_     ×</u>
File Actions Help	Software Settings	
Protocols	Language Print Settings Simulated Data Directory Settings	
🚺 Detection Methods	Print Header	
🚳 Labware	Line 1 International Laboratories	
Instruments	Fluorescence Intensity - Top	_
V Software Settings	Footer	
	Footer International Laboratories	
	Princ Opdons	
	✓ Print Preview ✓ Show printer settings	
		Apply

Figure 1-14. Configuring Print Settings

To configure print settings:

- 1. Choose the **Print Settings** tab. Print Settings appears (Figure 1-14).
- 2. In Print Header, enter text for each header Line, as desired. Header lines may be left blank.
- 3. In Footer, enter text for the **Footer** and **Comment**, as desired. The comment appears on printed pages below the footer. The footer and comment may be left blank.
- 4. In Print Options, select **Print Preview** to preview the page layout onscreen each time a protocol or measurement results are printed.
- 5. In Print Options, choose **Show printer settings** to display printing options each time a protocol or measurement results are printed.
- 6. Choose **Apply** to save the new print settings.

#### 1.4.2.3 Choosing Simulated Data Files

Protocols may be run in simulation mode, which allows the protocol configuration to be tested using simulated data before performing the protocol on actual samples. In simulation mode, all features for the instrument type currently selected in the Instrument Selection List are available, but measurement results are either randomly generated by the software or read from a data file.

Use Simulated Data to choose the default data files for simulated absorbance, luminescence, and fluorescence measurements (Figure 1-15).

Multimode Detection Software - Co	nnected - Filter Slides: Ex:2 Em:1	_ 🗆 ×
Multimode Detection Software - Co       File       Addons       Help         File       Addons       Help         Detection Methods       Detection Methods         Software       Instruments         Software Settings	Impleted - Filter Slides: Ex:2 Em:1         Software Settings         Language       Print Settings         Simulated Data       Directory Settings         Absorbance Simulated Data File       [:tprogram filestbeckman coulter, inc/multimode detection software[templatestAB5965]         Luminescence Simulated Data File       [:tprogram filestbeckman coulter, inc/multimode detection software[templatestLumi965]         Fluorescence Simulated Data File       [:tprogram filestbeckman coulter, inc/multimode detection software[templatestFluoro96]         Browse for	
	desired data f	iles
	Ap	ply

Figure 1-15. Choosing the Simulated Data files

To choose different simulated data files:

- 1. Choose the Simulated Data tab. Simulated Data appears (Figure 1-15).
- In the desired field, enter the full path to the new simulated data file; for example, c:\program files\beckman coulter, inc\multimode detection software\templates\DefaultDataFile.dat. Any data file with the .dat extension may be selected, including prior measurement results. Proceed to step 5.

OR

...

Choose the **Browse** button next to the desired measurement type. Open appears.

**Note:** Simulated data files are used when the number of measurement points in the simulated protocol run is the same as those present in the data file. When the number of measurement points is different, the software generates random data.

3. In Open, browse to desired data file. Any data file with the .dat extension may be selected, including prior measurement results.

4. Choose **Open** to select the data file and return to **Software Settings**.

OR

Choose **Cancel** to close Open without selecting a different data file.

- 5. Repeat steps 2 4 for each simulated data file desired to change.
- 6. Choose **Apply** to set the new default data file(s).

#### 1.4.2.4 Choosing the Directory Where Measurement Results are Saved

All exported measurement results files, regardless of format, are saved in a single directory. The default storage directory is c:\program files\beckman coulter, inc\ multimode detection software\data\. Use Directory Settings to change the storage directory, if desired (Figure 1-16).

Multimode Detection Software -	Connected - Filter Slides: Ex:2 Em:1	<u>_                                    </u>
File     Actions     Help       Protocols     Detection Methods       Image: Detection Methods     De	Software Settings Language Print Settings Simulated Data Directory Settings Data Directory c:\program Files\beckman coulter, inc\multimode detection software\data\ Browse for desired storage directory	
	Apr	ly

Figure 1-16. Choosing the directory where data is saved

To choose a different storage directory:

 In Data Directory, enter the complete path of the desired storage directory; for example, C:\documents\measurement results\DTX 880\MyResults\. Proceed to step 4.

....

Choose Browse for a directory. Open appears.

2. In Open, browse to desired directory.

Choose Open to select the directory and return to Output Settings.
 OR

Choose **Cancel** to close **Open** without selecting a new storage directory.

4. Choose **Apply** to set the new storage directory.

# Setting Up and Controlling Instruments

## 2.1 Overview

Before defining measurement protocols, detection methods, and labware, or running protocols on an instrument using Multimode Detection Software, the instrument must be set up and configured. All configured instruments are listed separately in the Instrument Selection List.

The Instrument Selection List contains quick access to control common instrument functions, such as loading and ejecting the plate carrier, and to configure instrument settings.

Use the Instrument Selection List for:

- <u>Controlling Instrument Functions</u> (Section 2.2).
- <u>Configuring Instrument Settings</u> (Section 2.3).

To configure and manually control instruments:

From the navigation pane, choose **Instrument**. The Instrument Selection List appears (Figure 2-1).

🌺 Multimode Detection Software - Simu	ulated		
File Actions Help			
<b>R R R R</b>			
	Instrum	ent S	election List
Protocols	Name	Serial # M	Aeasurement techniques
10 Detection Methods	Multimode Reader	0000 A	bsorbance, Luminescence, Fluorescence Intensity Top, Fluorescence Intensity Bottom, Fluorescence F
🚫 Labware			1
💽 Instruments			1
5 Software Settings			1
			1
			1
			1
			1
			1
			1
	•		>

Figure 2-1. Instrument Selection List

All instruments that have been connected to the host computer and configured in the software are displayed in the Instrument Selection List. When an instrument not currently connected to the computer is selected, the software automatically enters simulation mode (refer to Section 2.2.5, *Enabling Simulation Mode*). This allows protocols, detection methods, and labware to be defined, edited, and tested for the selected instrument even though it is not physically connected to the host computer.
# 2.2 Controlling Instrument Functions

Many common instrument functions, such as ejecting and loading the plate carrier and initializing the instrument, can be performed directly from the Instrument Selection List using the buttons on the toolbar.

Controlling instrument functions includes:

- <u>Ejecting the Plate Carrier</u> (Section 2.2.1).
- *Loading the Plate Carrier* (Section 2.2.2).
- <u>Initializing the Instrument</u> (Section 2.2.3).
- <u>Connecting to the Instrument</u> (Section 2.2.4).
- <u>Enabling Simulation Mode</u> (Section 2.2.5).

#### 2.2.1 Ejecting the Plate Carrier

Eject the plate carrier moves the plate carrier outside the instrument to allow access for placement or removal of a microplate.

To eject the plate carrier:

1. In the Instrument Selection List, select the desired instrument (Figure 2-1).



2. From the toolbar, choose **Eject the plate carrier**.

OR

From the Actions menu, choose Eject the plate carrier.

OR

Right-click on the desired instrument and choose **Eject the plate carrier** from the menu that appears.

#### 2.2.2 Loading the Plate Carrier

Load the plate carrier retracts the plate carrier and microplate back inside the instrument in preparation of performing a measurement.

To load the plate carrier:

1. In the Instrument Selection List, select the desired instrument (Figure 2-1).



2. From the toolbar, choose **Load the plate carrier**.

OR

From the Actions menu, choose Load the plate carrier.

OR

Right-click on the desired instrument and choose **Load the plate carrier** from the menu that appears.

#### 2.2.3 Initializing the Instrument

Initializing the instrument moves the optics and microplate transports to home positions. Each time the instrument is turned on, an initialization procedure is automatically performed. If necessary, the instrument may be initialized manually; for example, after an emergency stop has been performed (refer to the *DTX 800/880 Multimode Detectors User's Manual*, Section 1.3.1.1, *Performing an Emergency Stop*).

**Note:** When a hardware error occurs, turning the instrument off and on is recommended. The instrument initializes automatically on power up, and will not require manually initializing the instrument using the software.

To manually initialize the instrument:

1. In the Instrument Selection List, select the desired instrument (Figure 2-1).



2. From the toolbar, choose **Initialize the instrument**.

OR

From the Actions menu, choose Initialize the instrument.

OR

Right-click on the desired instrument and choose **Initialize the instrument** from the menu that appears.

#### 2.2.4 Connecting to the Instrument

When Multimode Detection Software is launched, it automatically connects to the instrument or starts in simulation mode if no instrument is detected. The connection to the instrument may be established manually after physically connecting a different instrument to the computer, or when switching from simulation mode (refer to Section 2.2.5, *Enabling Simulation Mode*).

To connect to the instrument:

1. In the Instrument Selection List, select the desired instrument (Figure 2-1).



2. From the toolbar, choose **Connect to the instrument**. The button remains depressed while the instrument is connected and not in simulation mode.

OR

From the Actions menu, choose **Connect to the instrument**.

OR

Right-click on the desired instrument and choose **Connect to the instrument** from the menu that appears.

#### 2.2.5 Enabling Simulation Mode

Multimode Detection Software can operate in simulation mode whether or not an instrument is connected. Simulation mode enables all features supported by the instrument currently selected in the Instrument Selection List, but measurement results are randomly generated by the software or read from a file. Refer to Section 1.4.2.3, *Choosing Simulated Data Files*, for more information about selecting simulated data files.

To enable simulation mode:

1. In the Instrument Selection List, choose the desired instrument.



2. From the toolbar, choose **Simulate the current instrument**. The button remains depressed while the instrument is in simulation mode.

OR

From the Actions menu, choose Simulate the current instrument.

OR

Right-click on the desired instrument and choose **Simulate the current** instrument from the menu that appears.

# 2.3 Configuring Instrument Settings

Communication settings and filter slides for the instrument are configured in Instrument Settings. Configuring the instrument in Instrument Settings informs Multimode Detection Software about the instrument, such as the communication speed and port used, and the configuration of filter slides and individual filters. Instrument features, such as microplate shaking, may also be controlled manually.

To configure instrument settings:

1. Select the desired instrument in Instrument Selection List.



2. From the toolbar, choose Instrument Settings. Instrument Settings appears.

OR

From the Actions menu, choose Instrument Settings.

OR

Right-click on the desired instrument and choose **Instrument Settings** from the menu that appears.

- 3. Configure instrument settings on the three tabs as described in the following sections:
  - <u>Configuring Basic Instrument Settings</u> (Section 2.3.1).
  - <u>Defining and Editing Filter Slides</u> (Section 2.3.2).
  - <u>Manually Controlling the Instrument</u> (Section 2.3.3).

#### 2.3.1 Configuring Basic Instrument Settings

The Basic Settings tab (Figure 2-2) contains information about the connection from the instrument to the operating computer, as well as identifying information about the instrument. The Port and Baudrate must be configured correctly to enable Multimode Detection Software to communicate with the instrument.

Basic Settings Filter	ngs Slides   Manual Control	1
Communication Setti	ngs	Instrument
Port: Baudrate:	COM1 •	
		Features
Instrument Name:	DTX 880	Absorbance Visible Fluorescence Top
Serial Number:	0004	Luminescence Polarization
Instrument Type:	123	Fluorescence bottom Absorbance UV Time Besolved Eluorescence
Firmware Version:	V0.1 03/16/2004	PMT Red Sensitive Temperature Controlled
PIC FW Version:	V1.0 16.03.04	
		OK Cancel Apply

Figure 2-2. Instrument Settings — Basic Settings

To configure basic instrument settings:

- 1. In Instrument Settings, select **Basic Settings** to display the Basic Settings tab, if necessary.
- 2. In Port, select the serial communications port on the host computer that connects to the instrument.
- 3. In Baudrate, select 38400.
- 4. Choose **Apply** to detect the instrument. When the instrument is detected, the instrument information fields are autopopulated with information about the connected instrument. Refer to Table 2-1 for more information about each field.

Field	Description
Instrument Name	The model of the instrument.
Serial Number	The serial number of the instrument.
Instrument Type	A numerical code used by the software to identify the instrument type.
Firmware Version	The version of firmware loaded for the instrument.
PIC FW Version	The version of firmware loaded for the PIC processor of the instrument.
Features	The types of measurements the instrument is capable of performing.

#### Table 2-1. Basic Settings Read-Only Fields

#### 2.3.2 Defining and Editing Filter Slides

The Filter Slides tab (Figure 2-3) is used to add, remove, and configure filter slides and the filters installed on a filter slide.

Filters used to perform measurements are mounted on two types of interchangeable slides. One slide is reserved for excitation filters used in absorbance and fluorescence measurements; the other is used for emission filters used in fluorescence and some luminescence measurements. Excitation and emission filter slides are different sizes to prevent them from being installed in the incorrect position. Each slide can hold up to six filters.

When a slide is exchanged, an identification code built into the slide allows the Multimode Detection Software to recognize the new slide and filter configuration. When a slide with a new configuration is inserted, or the filters on a slide change, the slide must be configured in the Filter Slides tab. Up to 31 excitation filter slides and 31 emission filter slides may be stored in Multimode Detection Software at one time.

**Note:** Refer to the *DTX 800/880 Multimode Detectors User's Manual*, Section 1.3.2, *Exchanging Filter Slides and Individual Filters*, for information on installing filters and filter slides.

Basic Settings Filter Slides Manual Control	×
<ul> <li>Excitation</li> <li>Add Slide</li> <li>Remove Slide</li> <li>Export Slides</li> <li>Import Slides</li> </ul>	Filter Slide Properties         Slide ID       1         Slide Name       1         Slide ID       1         Slide ID       1         Slide ID       1         Identification number of the selected filter slide.       1
	OK Cancel Apply

Figure 2-3. Instrument Settings — Filter Slides

#### 2.3.2.1 Adding Filter Slides

When a new filter slide is used with the instrument for the first time, it must be added so Multimode Detection Software can identify the slide and filter configuration.

To add filter slides:

- 1. Select the type of filter slide to add: **Excitation** or **Emission**. The list of filter slides displays all slides of the selected type currently stored in memory.
- 2. Choose Add Slide. A new filter slide is added to the list of filter slides.
- 3. Configure the slide following the steps in Section 2.3.2.2, *Configuring Filter Slides*.

#### 2.3.2.2 Configuring Filter Slides

The filter slide configuration includes a name and ID for the slide and information about the filters installed on the slide. When a new slide is added, or the filter configuration on a slide changes, the slide must be configured.

To configure a filter slide:

- 1. Select the type of filter slide to configure: **Excitation** or **Emission**. The list of filter slides displays all configured slides of the selected type.
- 2. Select the desired filter slide to configure from the list. Filter Slide Properties displays information about the selected slide (Figure 2-3).
- 3. In Slide ID, enter the identification number printed on the slide.
- 4. In Slide Name, enter a name to identify the filter slide.
- 5. In the list of filter slides, click the + to the left of the filter slide name to display the list of filters installed on the slide.
- 6. Select a filter to configure. Filter Properties for the selected filter is displayed on the right side of the screen (Figure 2-4).



Figure 2-4. Configuring filter properties

- 7. In Wavelength, enter the wavelength of the filter.
- 8. Click in the **Technique(s)** field and then click the down arrow to display a list of the available techniques.
- 9. Select all techniques for which the filter applies. The filter can be used only for measurements of the selected technique type(s). When techniques are selected, the read-only Installed field displays Yes. When No is displayed, no techniques are selected and the filter may not be used in any techniques.
  - DTX 880 Select Polarization only for filter positions where a polarization filter is installed.

- 10. In Name, enter a name for the selected filter. Filter names default to the wavelength entered, but may be renamed as desired.
- 11. In Bandwidth, enter the bandwidth in nanometers of the selected filter.
- 12. Repeat steps 6 to 11 to configure additional filters on the slide.

#### 2.3.2.3 Removing Filter Slides

If a filter slide is no longer used with an instrument, it can be removed from Multimode Detection Software.

To remove a filter slide:

- 1. Select the type of filter slide to remove: **Excitation** or **Emission**. The list of filter slides displays all slides of the selected type.
- 2. Select the desired filter slide to remove from the list. Filter Slide Properties displays information about the selected slide.
- 3. Choose **Remove Slide**. The selected filter slide is removed from the list.

#### 2.3.2.4 Exporting and Importing Filter Slides

Information for all excitation and emission filter slides configured for the instrument can be exported to an XML file and imported to restore that configuration or share the filter slide configuration with another instrument. Importing the filter slide configuration from an XML file replaces the current configuration for *all* filter slides with the configuration from the file.

To export all filter slides:

- 1. Choose **Export Slides**. Save As appears.
- 2. In Save As, select the desired directory and enter a file name.
- 3. Choose **Save**. Slide information is saved as an .xml file with the specified path and file name.

To import all filter slides from a previously exported file:

- 1. Choose Import Slides. Open appears.
- 2. In Open, browse to and select the desired .xml file to import.
- 3. Choose **Open**. The filter slides defined in the .xml file are imported into the filter slide list and replace all existing filter slides.

#### 2.3.3 Manually Controlling the Instrument

The Manual Control tab (Figure 2-5) provides options to control functions of the connected instrument, such as shaking microplates and ejecting or loading filter slides.

Manual Control is divided into five subsections:

- <u>Temperature Control (880 only)</u> (Section 2.3.3.1).
- <u>Shake Control</u> (Section 2.3.3.2).
- <u>*Plate Control*</u> (Section 2.3.3.3).
- <u>Excitation and Emission Filter Slide Control</u> (Section 2.3.3.4).

Instrument Setting	js		×
Basic Settings Filter S	lides Manual Control		
Temperature Control Actual: Set Point:	0 0 Set	Plate Control	
Shake Control		belore cacificad	
Mode:	Linear 💌	Excitation Filter Slide Control	
Intensity	Low	Eject Load	
Duration (s):	5	Emission Filter Slide Control	
	Shake	Eject Load	
		OK Cancel Apply	

Figure 2-5. Instrument Settings - Manual Control

#### 2.3.3.1 Temperature Control (880 only)

Temperature Control is used to set the microplate chamber temperature. The temperature is set by heating the microplate chamber; cooling the chamber is not supported. Depending on the measurement wavelength and light source used in the protocol, the temperature may range from  $3^{\circ}C$  ( $5.4^{\circ}F$ ) or  $4^{\circ}C$  ( $7.2^{\circ}F$ ) above ambient to  $45^{\circ}C$  ( $113^{\circ}F$ ). Actual displays the current temperature inside the instrument.

To set the temperature:

- 1. In Set Point, enter the desired temperature in Celsius.
- 2. Choose **Set**. Temperature control is activated for the instrument and begins to heat to the desired temperature. The set temperature is maintained until it is changed or the instrument is powered off.

**Note:** It takes a minimum of 30 minutes for the instrument to reach the desired temperature. The actual time required depends on the relative change in temperature.

To turn off temperature control:

In Set Point, enter 0.

OR

Turn power to the instrument off and on.

#### 2.3.3.2 Shake Control

Shake Control is used to manually shake a 96- or 384-well microplate in the plate carrier.

To manually perform a shaking operation:



CAUTION: Shake low density plates, such as 6- or 48-well plates, at low speed only. Shaking low density plates at higher speeds may cause liquid in wells to spill.

1. In Mode, select the desired shaking mode:

- **Linear** shakes from side to side.
- **Orbital** shakes in a circular pattern.
- **Squared** shakes in a square pattern, moving at right angles.
- 2. In Intensity, select the desired shaking intensity: Low, Medium, or High.
- 3. In Duration, enter the length of time to shake in seconds.
- Choose Shake. The instrument shakes the microplate according to the configured settings.

#### 2.3.3.3 Plate Control

Plate Control provides options to eject or load the plate carrier. It also features an option to sense that a microplate is in the plate carrier before starting a measurement.

To manually control the plate carrier:

- Choose **Eject** to extend the plate carrier outside the instrument.
- Choose Load to retract the plate carrier inside the instrument.
- Select **Check if plate is inserted before each read** to sense if a microplate is in the plate carrier before starting each measurement.

#### 2.3.3.4 Excitation and Emission Filter Slide Control

Excitation Filter Slide Control and Emission Filter Slide Control are used to manually eject or load the excitation or emission filter slides.

To manually eject or load the excitation or emission filter slide:

 Choose **Eject** from the desired filter slide control section to unload the filter slide from the filter compartment and partially open the compartment door.

**Note:** To remove the filter slide, it is still necessary to grasp it by the tab and pull it until it is free of the geared track. Store the removed filter slide in a protected, dust-free area, preferably in the original packaging.

 Choose Load from the desired filter slide control section to retract the filter slide into position.

# Creating and Editing Detection Methods

# 3.1 Overview

Multimode Detection Software stores measurement configuration parameters in detection methods. Stored parameters include the method technique (for example, absorbance), filter(s) used, and parameters specific to the selected method, such as integration time. Absorbance, luminescence, and fluorescence method techniques are all supported. The method techniques available to the user depend on the capabilities of the instrument being controlled.

Detection methods are created and edited using the Method Editor and stored in the Detection Method Selection List. Once a detection method has been defined, it may be used in a measurement protocol (refer to Chapter 5, *Defining, Editing, and Running Protocols*).

To view available detection methods and access the Method Editor:

Multimode Detection Software - Connected - Filter Slides: Ex:2 Em:1 - U × Actions Help File **Detection method** (i) X functions **Detection Method Selection List** Protocols Measurement technique Measurement type Created Last Edited Name ABS@260 1/28/2004 1/28/2004 Absorbance Monochromatic Fluoroscein Bottom FluorescenceIntensityBottom Monochromatic 1/28/2004 1/28/2004 Rhodamin Bottom FluorescenceIntensityBottom Monochromatic 1/28/2004 1/28/2004 1/28/2004 Labware ABS@595 Absorbance Monochromatic 1/28/2004 ABS@450 Absorbance Monochromatic 1/28/2004 1/28/2004 ABS@340 Absorbance Monochromatic 1/28/2004 1/28/2004 Instruments Fluorescein Top FluorescenceIntensityTop Monochromatic 1/28/2004 1/28/2004 ABS@405 Absorbance Monochromatic 1/28/2004 1/28/2004 Software Settings ABS@620 Absorbance Monochromatic 1/28/2004 1/28/2004 1/28/2004 1/28/2004 Luminescence Luminescence Monochromatic Detection Rhodamin Top FluorescenceIntensityTop 1/28/2004 1/28/2004 Monochromatic TRF Europium TimeResolvedFluorescence Monochromatic 1/28/2004 4/5/2004 methods TRF Europium TimeResolvedFluorescence Monochromatic 1/28/2004 4/5/2004

From the navigation pane, choose **Detection Methods**. The Detection Method Selection List appears (Figure 3-1).

Figure 3-1. Accessing detection method functions

All detection method functions are accessed from the Detection Method Selection List. Available detection method functions are:

- <u>Creating Detection Methods</u> (Section 3.2).
- <u>Editing Detection Methods</u> (Section 3.3).
- <u>Copying Detection Methods</u> (Section 3.4).
- <u>Deleting Detection Methods</u> (Section 3.5).
- Exporting and Importing Detection Methods (Section 3.6).

# 3.2 Creating Detection Methods

Detection methods are created in the Method Editor, which guides the creation process with a wizard-type interface. Creating a new detection method requires:

- <u>Selecting a Method Technique</u> (Section 3.2.1).
- <u>Defining Method Parameters</u> (Section 3.2.3).

**Note:** When creating absorbance measurements, a third screen, **Method Type**, must also be configured (refer to Section 3.2.2, *Selecting the Type of Absorbance Method*).

To create and define a new detection method:

From the toolbar, choose Create a new method.



From the Actions menu, choose Create a new method.

OR

OR

Right-click in the Detection Method Selection List and choose **Create a new method** from the menu. The Method Editor appears (Figure 3-2).

#### 3.2.1 Selecting a Method Technique

In the Method Editor, the type of detection method to create is selected in Method Technique (Figure 3-2). Only techniques supported by the instrument currently selected in the Instrument Selection List are available for configuration (refer to Chapter 2, <u>Setting Up and Controlling Instruments</u>).

🔟 Method Editor				×
	Method Teo	hnique		
Method Technique > Method Type	Supported techniques	Absorbance	•	
Method Parameters				
			Cancel	Next >

Figure 3-2. Selecting a Method Technique

To select a method technique:

- 1. In Supported techniques, choose the desired detection method.
- If defining an absorbance method, choose Next to select the Method Type (refer to Section 3.2.2, <u>Selecting the Type of Absorbance Method</u>).

OR

If defining a luminescence or fluorescence method, choose **Next** to define Method Parameters (refer to Section 3.2.3, *<u>Defining Method Parameters</u>*).

OR

Choose **Cancel** to close the Method Editor without defining a new detection method.

#### 3.2.2 Selecting the Type of Absorbance Method

When defining an absorbance detection method, use **Method Type** to select whether a monochromatic or bichromatic method will be defined (Figure 3-3). Monochromatic methods perform a single-wavelength measurement. Bichromatic methods perform a second measurement at a reference wavelength, which is subtracted from the first to calculate the final result.

 Method Editor
 X

 Method Type
 Method Type

 Method Parameters
 Method Type

 Method Parameters
 Cancel < Back</td>

**Note:** Method Type appears only when defining absorbance methods.

Figure 3-3. Selecting an absorbance Method Type

To select a method type:

- 1. In Method Type, choose the desired method: **Monochromatic** or **Bichromatic**.
- 2. Choose **Next** to define Method Parameters (refer to Section 3.2.3, <u>Defining</u> <u>Method Parameters</u>).

OR

Choose **Back** to select a different Method Technique (refer to Section 3.2.1, *Selecting a Method Technique*).

OR

Choose **Cancel** to close the **Method** Editor without defining a new detection method.

#### 3.2.3 Defining Method Parameters

Parameters, such as filters and integration time, are defined in Method Parameters. The parameters available for configuration depend on the technique selected in Method Technique (refer to Section 3.2.1, *Selecting a Method Technique*).

Use Method Parameters for:

- <u>Defining Absorbance Method Parameters</u> (Section 3.2.3.1).
- <u>Defining Luminescence Method Parameters</u> (Section 3.2.3.2).
- Defining Fluorescence Intensity Top Method Parameters (Section 3.2.3.3).
- <u>Defining Fluorescence Intensity Bottom Method Parameters (880 only)</u> (Section 3.2.3.4).
- <u>Defining Fluorescence Polarization Method Parameters (880 only)</u> (Section 3.2.3.5).
- <u>Defining Time-Resolved Fluorescence Method Parameters (880 only)</u> (Section 3.2.3.6).

#### 3.2.3.1 Defining Absorbance Method Parameters

A monochromatic absorbance method performs an absorbance measurement at a single wavelength. A bichromatic method performs a second measurement at a reference wavelength. This measurement is subtracted from the first to calculate the final result.

间 Method Editor					×
	Method Paran	neters			
Method Technique Method Type	Method Name	A	bs620		
Method Parameters >	Excitation Filter (nm)	6	20 5L 2		-
	Reference Excitation Filter (nm)	4	50 SL 2		J
	Date created	3,	/1/2004		
	ĺ	Referen Appears bichroma	nce Excita only when c atic measure	tion Filter configuring ments.	
			Cancel	< Back	Save

Figure 3-4. Defining absorbance measurement parameters

To define absorbance method parameters:

- 1. Enter a Method Name (Figure 3-4).
- 2. In Excitation Filter (nm), select the measurement filter.
- 3. If a bichromatic measurement is being defined, in Reference Excitation Filter (nm), select the reference filter.

**Note:** The filters available are those installed on the excitation filter slide loaded in the instrument and configured for absorbance techniques in Instrument Settings (refer to Section 2.3.2, *Defining and Editing Filter Slides*).

4. Choose **Save** to save the new absorbance detection method. The new method appears in the Detection Method Selection List.

OR

Choose **Back** to define a different Method Type (refer to Section 3.2.2, *Selecting the Type of Absorbance Method*).

OR

#### 3.2.3.2 Defining Luminescence Method Parameters

A luminescence method performs glow luminescence measurements on samples. Generally, luminescence measurements do not require a filter; however, cutoff filtration using an emission filter may be specified when eliminating photoluminescence generated by the microplate itself is desired.

🌺 Method Editor			×
	Method Param	eters	
Method Technique Method Parameters	Method Name	Lumi	
	Emission Filter (nm)	0 SL 1	
	Integration Time (seconds)	0.001	
	Date created	5/2/2004	
		Cancel < Back S	5ave

Figure 3-5. Defining luminescence measurement parameters

To define luminescence method parameters:

- 1. Enter a Method Name (Figure 3-5).
- 2. In Emission Filter (nm), select the cutoff filter.

Note: Most luminescence measurements do not require cutoff filtration.

The filters available are those installed on the emission filter slide loaded in the instrument and configured for luminescence techniques in Instrument Settings (refer to Section 2.3.2, *Defining and Editing Filter Slides*).

- 3. In Integration Time (seconds), enter the length of time, in seconds, the signal is collected from samples. The integration time may be set within the range of 0.00005 to 3600 seconds.
- 4. Choose **Save** to save the new luminescence detection method. The new method appears in Detection Method Selection List.

OR

Choose **Back** to select a different Method Technique (refer to Section 3.2.1, *Selecting a Method Technique*).

OR

#### 3.2.3.3 Defining Fluorescence Intensity Top Method Parameters

In a fluorescence intensity top method, a light source above the plate is directed through an excitation filter, which passes only the wavelength necessary to excite samples. The resulting fluorescence passes through an emission filter that separates background light from the specific wavelength generated by samples. This signal is read from above the plate by the photo multiplier tube.

#Method Editor			×
	Method Param	eters	
Method Technique Method Parameters	Method Name	Fluorescence Intensity (top)	
	Excitation Filter (nm)	535 SL 1	
	Emission Filter (nm)	595 SL 1	
	Integration Time (seconds)	0.001	
	Date created	5/2/2004	
		Cancel K Back Sa	ave

Figure 3-6. Defining fluorescence intensity top method parameters

To define fluorescence intensity top method parameters:

- 1. Enter a **Method Name** (Figure 3-6).
- 2. Select the Excitation Filter (nm).
- 3. Select the Emission Filter (nm).

**Note:** The filters available are those installed on the slides loaded in the instrument and configured for fluorescence techniques in Instrument Settings (refer to Section 2.3.2, *Defining and Editing Filter Slides*).

- 4. In Integration Time (seconds), enter the length of time, in seconds, the signal is collected from samples. The integration time may be set within the range of 0.00005 to 3600 seconds.
- 5. Choose **Save** to save the new fluorescence intensity top detection method. The new method appears in the Detection Method Selection List.

OR

Choose **Back** to select a different Method Technique (refer to Section 3.2.1, *Selecting a Method Technique*).

OR

#### 3.2.3.4 Defining Fluorescence Intensity Bottom Method Parameters (880 only)

In a fluorescence intensity bottom method, a light source below the plate is directed through an excitation filter, which passes only the wavelength necessary to excite samples. The resulting fluorescence passes through an emission filter that separates background light from the specific wavelength generated by samples. This signal is read from below the plate by the photo multiplier tube.

Method Editor			×
	Method Parame	eters	
Method Technique Method Parameters >	Method Name	Fluorescence Intensity (bottom)	
	Excitation Filter (nm)	535 SL 1	
	Emission Filter (nm)	595 SL 1	
	Integration Time (seconds)	0.001	
	Date created	5/2/2004	
		Cancel < Back	Save

Figure 3-7. Defining fluorescence intensity bottom method parameters

To define fluorescence intensity bottom method parameters:

- 1. Enter a **Method Name** (Figure 3-7).
- 2. Select the Excitation Filter (nm).
- 3. Select the **Emission Filter (nm)**.

**Note:** The filters available are those installed on the slides loaded in the instrument and configured for fluorescence techniques in Instrument Settings (refer to Section 2.3.2, *Defining and Editing Filter Slides*).

- 4. In Integration Time (seconds), enter the length of time, in seconds, the signal is collected from samples. The integration time may be set within the range of 0.00005 to 3600 seconds.
- 5. Choose **Save** to save the new fluorescence intensity bottom detection method. The new method appears in the **Detection Method Selection List**.

OR

Choose **Back** to select a different Method Technique (refer to Section 3.2.1, <u>Selecting a Method Technique</u>).

OR

#### 3.2.3.5 Defining Fluorescence Polarization Method Parameters (880 only)

A fluorescence polarization method performs a fluorescence intensity measurement where two orthogonal (perpendicular) polarization states are measured.

A light source above the plate passes through an excitation filter, which passes only the wavelength necessary for excitation, and a polarizing filter. The fluorescence resulting from the excitation of the sample is separated by polarization and passed through two emission filters equipped with polarizing filters to ensure both polarization states are measured.

👯 Method Editor			×
	Method Param	eters	
Method Technique Method Parameters	Method Name	Polarization	
	Excitation Filter (nm)	485 SL 1	
	Emission Filter (nm)	535 SL 1	
	Integration Time (seconds)	0.001	
	Date created	5/2/2004	
		Cancel < Back S	ave

The polarized signal is then read from above the plate by the photo multiplier tube.

Figure 3-8. Defining fluorescence polarization method parameters

To define fluorescence polarization parameters:

- 1. Enter a Method Name (Figure 3-8).
- 2. Select the Excitation Filter (nm).
- 3. Select the **Emission Filter (nm)**.

**Note:** The filters available are those installed on the excitation and emission filter slides loaded in the instrument and configured for fluorescence polarization techniques in Instrument Settings (refer to Section 2.3.2, *Defining and Editing Filter Slides*).

4. In Integration Time (seconds), enter the length of time, in seconds, the signal is collected from samples. The integration time may be set within the range of 0.00005 to 3600 seconds.

5. Choose **Save** to save the new fluorescence polarization detection method. The new method appears in the Detection Method Selection List.

OR

Choose **Back** to select a different Method Technique (refer to Section 3.2.1, *Selecting a Method Technique*).

OR

Choose **Cancel** to close the **Method** Editor without saving the new detection method.

#### 3.2.3.6 Defining Time-Resolved Fluorescence Method Parameters (880 only)

In a time-resolved fluorescence measurement, the excitation light source is turned off and the measurement is performed after a specified delay. Several of these excitation/ measurement cycles may be performed on each sample. When multiple excitation/ measurement cycles are performed, the results from all cycles are used to calculate a single measurement result for each sample.

🌺 Method Editor			>
	Method Paramet	ers	
Method Technique Method Parameters >	Method Name	Fluorescence (TRF)	
	Excitation Filter (nm)	370 5L 1	
	Emission Filter (nm)	625 SL 1	
	LED on Time (seconds)	0.0001	
	Number of Pulses	1000	
	Delay Before Measure (seconds)	0.00001	
	Integration Time (seconds)	0.00089	
	Date created	5/2/2004	
		Cancel < Back Sa	ave

Figure 3-9. Defining time-resolved fluorescence method parameters

To define time-resolved fluorescence parameters:

- 1. Enter a **Method Name** (Figure 3-9).
- 2. Select the Excitation Filter (nm).
- 3. Select the Emission Filter (nm).

**Note:** The filters available are those installed on the excitation and emission filter slides loaded in the instrument and configured for time-resolved fluorescence techniques in Instrument Settings (refer to Section 2.3.2, *Defining and Editing Filter Slides*).

- 4. In LED on Time (seconds), enter the length of time, in seconds, that the LED light source remains turned on.
- 5. In Number of Pulses, enter the number of excitation/measurement cycles performed in the measurement.
- 6. In Delay Before Measure (seconds), enter the interval, in seconds, between switching off the light source and performing the measurement. The delay may be set within the range of 0.000001 to 0.0075 of a second.
- 7. In Integration Time (seconds), enter the length of time, in seconds, each sample is measured. The integration time may be set within the range of 0.00005 to 0.0075 of a second.
- Choose Save to save the new time-resolved fluorescence detection method. The new method appears in the Detection Method Selection List.

OR

Choose **Back** to select a different Method Technique (refer to Section 3.2.1, <u>Selecting a Method Technique</u>).

OR

# 3.3 Editing Detection Methods

Parameters configured in saved detection methods may be edited; however, the method technique may not be changed. Default detection methods provided with the software and methods used in protocols may not be renamed.

To edit a detection method:

1. In the Detection Method Selection List, select the detection method to edit.



2. From the toolbar, choose **Edit the selected method**.

OR

From the Actions menu, choose Edit the selected method.

OR

Right-click on the selected detection method and choose **Edit the selected method** from the menu. The Method Editor appears (Figure 3-10).

🁯 Method Editor: Fluorescein Top	)		×	
	Method Parame	Method Parameters		
Method Parameters >	Method Name	Fluorescein Top		
	Excitation Filter (nm)	485 SL 1		
	Emission Filter (nm)	535 SL 1		
	Integration Time (seconds)	1		
	Date created	1/28/2004		
		Cancel	Save	

Figure 3-10. Editing a fluorescence intensity top method

- 3. Edit the method parameters as desired. For more information about the parameters for a specific detection method, refer to the section that covers defining the desired detection method:
  - <u>Defining Absorbance Method Parameters</u> (Section 3.2.3.1).
  - <u>Defining Luminescence Method Parameters</u> (Section 3.2.3.2).
  - <u>Defining Fluorescence Intensity Top Method Parameters</u> (Section 3.2.3.3).
  - <u>Defining Fluorescence Intensity Bottom Method Parameters (880 only)</u> (Section 3.2.3.4).
  - <u>Defining Fluorescence Polarization Method Parameters (880 only)</u> (Section 3.2.3.5).
  - <u>Defining Time-Resolved Fluorescence Method Parameters (880 only)</u> (Section 3.2.3.6).
- 4. Choose **Save** to close the Method Editor and save the changes.

OR

Choose **Cancel** to close the Method Editor without saving changes.

# 3.4 Copying Detection Methods

Copies may be made of existing detection methods. After a copy has been created, it may be used as a template for a new detection method using the same method technique.

To make a copy of a detection method:

1. In the Detection Method Selection List, select the detection method to copy.



2. From the toolbar, choose **Make a copy of the selected method**.

OR

From the Actions menu, choose Make a copy of the selected method.

OR

Right-click on the selected detection method and choose **Make a copy of the selected method** from the menu that appears.

**Note:** The default name format for copied detection methods is **Copy of** OriginalName. To change the name, edit the detection method (refer to Section 3.3, *Editing Detection Methods*).

# 3.5 Deleting Detection Methods

User-created detection methods not used in any measurement protocols may be deleted from the Detection Method Selection List. Default detection methods provided with the software and user-created methods used in protocols may not be deleted.

To delete a detection method:

1. In the Detection Method Selection List, select the detection method to delete.



2. From the toolbar, choose **Delete the selected method**.

OR

From the Actions menu, choose Delete the selected method.

OR

Right-click on the selected detection method and choose **Delete the selected method** from the menu. Message appears (Figure 3-11).

Message	×				
?	Are you sure you want to delete the selected method ABS@340?				
	Yes No				

Figure 3-11. Confirming the deletion of a detection method

3. Choose **Yes** to delete the selected detection method.

OR

Choose No to cancel the deletion.

# 3.6 Exporting and Importing Detection Methods

User-defined detection methods saved in the Detection Method Selection List can be exported to an XML file and imported later to restore that configuration or share it with a copy of Multimode Detection Software installed on another computer.

Exporting default detection methods included with the software installation is not necessary. Since a default detection method may not be edited, deleted, or overwritten, it is available to users at all times. Because of this, importing a default detection method from an XML export file is not permitted by the software.

To export a detection method:

- 1. In the Detection Method Selection List, select the detection method to export.
- From the File menu, choose Export>Detection Method. Browse for Folder appears (Figure 3-12).



Figure 3-12. Choosing the folder where an exported detection method will be saved

3. In Browse for Folder, browse to the folder where the exported detection method will be saved.

OR

Choose **Make New Folder** to create a new folder where the exported detection method will be saved.

 Choose OK to export the detection method. The exported detection method is saved using the default file name format, Method\_\_\_MethodName.xml. In order to import the file at a later date, the filename must not be changed.

OR

Choose **Cancel** to stop the operation without exporting the detection method.

To import a detection method from an exported XML file:

- 1. From the File menu, choose Import>Detection Method. Open appears.
- 2. In Open, browse to and select the desired XML file to import.
- 3. Choose **Open**. The detection method is imported to the **Detection Method** Selection List.

# 4 Creating and Editing Labware

## 4.1 Overview

Multimode Detection Software supports a wide range of labware, with many common microplate formats already preconfigured and ready for use in protocols. Configured labware types are listed in the Labware Selection List and are available for use in protocols.

New labware types may be created at any time using the Labware Editor. The Labware Editor also provides the ability to edit and delete existing labware types not used in protocols, make copies of labware types, and optimize labware dimensions to compensate for slight dimensional variations that may exist between production lots.

- > DTX 800 supports 96-well and 384-well microplates.
- **DTX 880** supports 6- to 384-well microplates.

All labware functions are accessed from the Labware Selection List (Figure 4-1). Labware functions include:

- <u>Creating Labware</u> (Section 4.2).
- <u>Editing Labware</u> (Section 4.3).
- <u>Copying Labware</u> (Section 4.4).
- <u>Deleting Labware</u> (Section 4.5).
- <u>Optimizing Labware</u> (Section 4.6).
- <u>Exporting and Importing Labware</u> (Section 4.7).

To define and edit labware:

From the navigation pane, choose **Labware**. The Labware Selection List appears (Figure 4-1).

File Actions Help     Labware functions							
Labware Selection List							
Protocols	Name	Number of Wells	Created	Last Edited	Last Optimization		
	Ab 384 Well Reaction Plate	384	2/8/2004	3/24/2004	3/24/2004		
Detection Methods	BC Flat 96	96	12/3/2003	4/5/2004	4/5/2004		
	BC Lumi 96	96	12/3/2003	12/3/2003	12/3/2003		
💫 Labware 🛛	Copy of Greiner Flat 384 Square	384	2/8/2004	2/8/2004	2/8/2004		
	Costar 12	12	2/15/2004	2/23/2004	2/23/2004		
Nostruments T	Costar 24	24	2/15/2004	2/23/2004	2/23/2004		
	Costar 48	48	2/15/2004	2/23/2004	2/23/2004		
	Costar 6	6	2/15/2004	2/23/2004	2/23/2004		
Software Settings	Costar 62	6	2/15/2004	4/5/2004	4/5/2004		
	Costar Cone 96 Round	96	2/8/2004	2/8/2004	2/8/2004		
Labware	Costar Flat 384 Square	384	2/8/2004	2/8/2004	2/8/2004		
	Greiner 24	24	2/15/2004	2/23/2004	4/5/2004		
	Greiner 384 Cone PP	384	2/8/2004	2/8/2004	2/8/2004		
	Greiner 384 Flat pp	384	2/8/2004	2/8/2004	2/8/2004		
	Greiner 384 Thermal Cycler	384	2/8/2004	2/8/2004	2/8/2004		
	Greiner 6	6	2/15/2004	2/23/2004	2/23/2004		
	Greiner 96 Cone PP	96	2/8/2004	2/8/2004	2/8/2004		
	Greiner 96 Cone PS	96	2/8/2004	2/8/2004	2/8/2004		
	Greiner 96 Flat	96	2/8/2004	2/8/2004	2/8/2004		
	Greiner 96 Round PP	96	2/8/2004	2/8/2004	2/8/2004		
	Greiner 96 Round PS	96	2/8/2004	2/8/2004	2/8/2004		
	Greiner 96 Thermal Cycler	96	2/8/2004	2/8/2004	2/8/2004		
	Greiner Flat 384 Square	384	2/8/2004	2/8/2004	2/8/2004		
	Greiner Shallow 384 Round	384	2/8/2004	2/8/2004	2/8/2004	<b>T</b>	
					1	اللے م	

Figure 4-1. Accessing labware functions

# 4.2 Creating Labware

New types of labware are created in the Labware Editor, which guides the creation process with a wizard-type interface. Creating labware includes:

- <u>Defining Labware Information</u> (Section 4.2.1).
- <u>Configuring Offsets and Well Dimensions for the Default Labware Lot</u> (Section 4.2.2).

To create and define new labware:



From the toolbar, choose **Create a new piece of labware**. The Labware Editor appears (Figure 4-2).

OR

From the Actions menu, choose Create a new piece of labware.

OR

Right-click in the Labware Selection List and choose **Create a new piece of labware** from the menu.

#### 4.2.1 Defining Labware Information

Use Labware Information to define labware names, dimensions, well parameters, and supported measurement techniques (Figure 4-2).



Figure 4-2. Defining plate dimensions and information

To define Labware Information:

- 1. If necessary, click the + next to Labware Info to display the fields in the category.
- 2. Enter the **Plate Name**. A name must be entered to proceed to the second configuration screen, Labware Lots.
- If necessary, click the + next to Labware Measurements to display the fields in the category.

**Note:** More information about the field being defined is displayed below the property grid (Figure 4-2).



CAUTION: The plate height configured must not be less than that of the actual plate. Doing so may cause the DTX 880 optics transport to collide with the plate during a Read Height Optimization.

- 4. Enter the **Height** of the plate. All labware dimensions are entered in centimeters.
- 5. Enter the Height with lid.
- 6. Enter the **Length** of the plate.
- 7. In Reading height, enter the height from the top of the plate at which the plate is read.
- 8. Enter the Width of the plate.
- 9. If necessary, click the + next to Well Info to display the fields in the category.
- 10. Enter the number of **Columns** on the plate.
- 11. Enter the number of **Rows** on the plate.
- 12. Click in either column of Well bottom shape, then click on the down arrow and choose the shape of well bottoms: **Flat**, **Cone**, or **Round**.
- 13. Click in either column of Well shape, then click on the down arrow and choose the shape of the wells: **Round**, **Square**, or **Cone**.
- 14. Enter the maximum **Well volume** in microliters.
- 15. In Supported Techniques, select all measurement techniques compatible with the plate being defined. Labware may be used only in protocols that use a compatible measurement technique.

**Note:** Refer to Section 4.2.1.1, <u>General Labware Selection Guidelines</u> for more information about choosing the appropriate labware for the desired techniques.

- 16. In Notes, enter information about the labware or configuration, if desired.
- Choose Next to define the default row and column offsets and well dimensions for the labware type in Labware Lots (refer to Section 4.2.2, <u>Configuring</u> <u>Offsets and Well Dimensions for the Default Labware Lot</u>).

OR

Choose **Cancel** to close the Labware Editor without creating or saving new labware.

#### 4.2.1.1 General Labware Selection Guidelines

When creating labware, select only measurement techniques compatible with the microplate being defined. Each measurement technique requires labware of a specific color and/or material be used.

Table 4-1 provides general labware color and material guidelines for each measurement technique. Along with these basic guidelines, always select microplates with a surface treatment suitable for the desired application, and follow any additional guidelines provided by the plate manufacturer.

Measurement Technique	Supported Plate Color	Additional Considerations
Absorbance	clear, white with clear bottom, or black with clear bottom	Clear polystyrene or film plates with transparent bottoms are suitable. Polypropylene or PVC plates do not provide sufficient optical quality.
Luminescence Glow Type	solid black or solid white	Black plates are recommended unless the signal is weak enough to require the higher sensitivity of white plates. However, with strong signals, white plates may produce crosstalk.
Fluorescence Intensity Top	solid black	N/A
Fluorescence Intensity Bottom	black with clear bottom	N/A
Fluorescence Polarization	solid black	N/A
Time-Resolved Fluorescence	solid white	N/A

#### Table 4-1. General Microplate selection guidelines

#### 4.2.2 Configuring Offsets and Well Dimensions for the Default Labware Lot

Use Labware Lots to define row and column offsets and well dimensions (Figure 4-3). The offsets and dimensions entered when new labware is created define the default labware lot (DefaultLot). After the new labware has been saved, additional lots may be created by optimizing the labware to compensate for dimensional variations between different production lots (refer to Section 4.6, <u>Optimizing Labware</u>).

In Labware Lots, x and y offsets are defined for all four corners of the labware. An x offset is the distance from the edge of the microplate to the first row; a y offset is the distance from the edge of plate to the first column. Well dimensions defined include well depth, length, and width, as well as distances between rows and columns.

To configure offsets and well dimensions:

1. If necessary, click the + next to Labware Lot Measurements to display the fields in the category. More information about the field being defined is displayed below the property grid (Figure 4-3).

**Note:** The fields in Labware Lot Info may not be configured when creating new labware.



2. Enter column and row x and y offsets for each of the four corner wells. *All* offsets and well dimensions are entered in centimeters.

Figure 4-3. Defining offsets and well dimensions

- If necessary, click the + next to Well Measurements to display the fields in the category.
- 4. In Column Distance, enter the distance between columns.
- 5. In Row Distance, enter the distance between rows.
- 6. Enter the Well depth.
- 7. In Well Length, enter the length of the well in the direction of the columns on the plate.
- 8. In Well Width, enter the length of the well in the direction of the rows on the plate.
- 9. In Notes, enter information about the labware lot or configuration, if desired.
- 10. Choose Save to save the new labware and close the Labware Editor.

OR

Choose **Back** to edit Plate Information (refer to Section 4.2.1, <u>*Defining</u></u><u><i>Labware Information*).</u></u>

OR

Choose **Cancel** to close the Labware Editor without creating new labware.

# 4.3 Editing Labware

Dimensions and information for user-defined labware not used in measurement protocols may be edited. For default labware included in the software installation or labware used in protocols, dimensions and information may be viewed, but not edited.

When labware lots have been created by optimizing the labware to compensate for dimensional variations between production lots, the active lot may be changed and/or edited. The active lot may be selected and/or edited for *all* labware in the Labware Selection List.

**Note:** Labware lots are created by optimizing the labware (refer to Section 4.6, *Optimizing Labware*).

Labware is edited in the Labware Editor (Figure 4-4) and includes:

- Viewing and Editing Labware Information (Section 4.3.1).
- Selecting and Editing Labware Lots (Section 4.3.2).

To view and edit labware dimensions and information:

1. In the Labware Selection List, select the labware to edit.



2. From the toolbar, choose Edit the selected labware.

OR

•

•

From the Actions menu, choose Edit the selected labware.

OR

Right-click on the selected labware and choose **Edit the selected labware** from the menu that appears.

#### 4.3.1 Viewing and Editing Labware Information

Use Labware Information to view and edit labware dimensions, information, and supported techniques. Plate information for default labware included in the software installation and labware used in protocols may be viewed, but not edited.



Figure 4-4. Editing labware dimensions and well information

To edit labware information:

- In the property grid, edit labware dimensions and information as desired. Refer to Section 4.2.1, *Defining Labware Information*, for more information about the fields available in the property grid.
- 2. In Supported Techniques, change the measurement techniques supported by the labware, if desired.

**Note:** Refer to Section 4.2.1.1, <u>*General Labware Selection Guidelines*</u> for more information about labware/technique compatibility.

- 3. Edit the labware **Notes**, if desired.
- 4. Choose **Next** to select and edit labware lots and save changes made to the labware (refer to Section 4.3.2, *Selecting and Editing Labware Lots*).

OR

Choose Cancel to close the Labware Editor without saving changes.
#### 4.3.2 Selecting and Editing Labware Lots

Use Labware Lots to select the active lot and/or edit and save changes made in the Labware Editor (Figure 4-5). Lots can be selected and edited for all labware, including labware used in measurement protocols.

**Note:** Labware Lots are created by optimizing labware (refer to Section 4.6, *Optimizing Labware*).

Labware Information				Choose the lo	ot
Labware Lots >	DefaultLot		⊡◀	to use or edit.	
	Labware Lot In	nfo	-		
	Current labware l	lot True			
	Date created	5/3/2004			
	Date edited	5/3/2004			
	Instrument Name	8			
	Optimized	Landscape			
	Optimized with	Absorbance			
Property	Serial #				
	🗕 🛨 Labware Lot M	easurements			
gria	Lower left × offse	et 1.435			
	Lower left y offse	et 1.135		Nekes	
	Lower right × off:	set 1.435		Notes	
	Lower right y offs	set 1.135		hine -	
	Upper left x offse	et 1.435		None	
	Upper left y offse	et 1.135			
	Upper right x off:	set 1.435			
	Upper right y offs	set 1.135			
	Well Measuren	nents			
	Column distance	0.9			
	Row distance	0.9	-		
	Offset from lower ri first row (cm)	set ght corner of labware t	•	<u> </u>	

Figure 4-5. Configuring offsets and well dimensions in Labware Lots

To select and edit lots:

- From the pull-down menu, choose the lot to use or edit. The default lot created when the labware was defined and all lots configured using Optimizing Labware are available (refer to Section 4.6, *Optimizing Labware*).
- 2. Click in Current labware lot and choose **True**, if necessary. True must be selected in order to save changes made to the labware lot.
- In the property grid, edit lot dimensions and information as desired. Refer to Section 4.2.2, <u>Configuring Offsets and Well Dimensions for the Default Labware</u> <u>Lot</u>, for more information about the fields available in the property grid.
- 4. Edit the lot Notes, if desired.
- 5. Choose Save to save changes made in the Labware Editor.

OR

Choose **Back** to view or edit Plate Information (refer to Section 4.3.1, <u>Viewing</u> and Editing Labuare Information).

OR

Choose Cancel to close the Labware Editor without saving changes.

## 4.4 Copying Labware

Labware can be copied and then used as a template for a new labware type by editing the dimensions and parameters in the Labware Editor (refer to Section 4.3, *Editing\_Labware*).

To make a copy of a labware type:

1. In the Labware Selection List, select the labware type to copy.



2. From the toolbar, choose **Make a copy of the selected labware**.

OR

From the Actions menu, choose Make a copy of the selected labware.

OR

Right-click on the selected labware type and choose **Make a copy of the selected labware** from the menu that appears.

**Note:** The default name format for copied labware types is **Copy of** OriginalName. To change the name, edit the labware type (refer to Section 4.3, *Editing Labware*).

## 4.5 Deleting Labware

User-defined labware not used in any measurement protocols may be deleted from the Labware Selection List. Default labware included with the software installation and labware used in protocols may not be deleted.

To delete labware:

1. In the Labware Selection List, select the labware to delete.



2. From the toolbar, choose **Delete the selected labware**.

OR

From the Actions menu, choose **Delete the selected labware**.

OR

Right-click on the selected labware and choose **Delete the selected labware** from the menu that appears. Message appears (Figure 4-6).

Message	×
?	Are you sure you would like to delete the labware Microplate96?
	Yes No

Figure 4-6. Confirming a labware deletion

3. Choose **Yes** to delete the selected labware.

OR

Choose **No** to cancel the deletion.

## 4.6 Optimizing Labware

Microplate dimensions may vary slightly between production lots, which potentially affects measurement accuracy. Multimode Detection Software provides the ability to create different labware lots for each type of labware, which increases accuracy by optimizing labware dimensions and information for each production lot used.

Labware is optimized in **Optimizing Labware** (Figure 4-7), which guides the process with a wizard type interface. Optimizing labware includes:

- <u>Selecting the Detection Method</u> (Section 4.6.1).
- <u>Preparing and Loading the Labware</u> (Section 4.6.2).
- <u>Performing the Optimization Read</u> (Section 4.6.3).
- <u>Selecting the Centers of the Four Corner Wells</u> (Section 4.6.4).
- <u>Verifying Well Centers</u> (Section 4.6.5).

To optimize labware:

In the Labware Selection List, select the labware to optimize.
 From the toolbar, choose Optimize the selected labware.



OR

From the Actions menu, choose Optimize the selected labware.

OR

Right-click on the selected labware and choose **Optimize the selected labware** from the menu that appears.



#### 4.6.1 Selecting the Detection Method

Labware is optimized by performing absorbance measurements of the four corner wells of the microplate and then defining the well centers using images of the wells generated by the measurements. To ensure the most accurate optimization is performed, use **Select Detection Method** to select the most appropriate detection method for the optimization (Figure 4-7).

🚆 Optimizing Labware: BCLumi96					_ 🗆 ×
	Select De	tection Meth	od		
Select a Detection Method Prepare the Labware Optimize Select Center of Left Top Well Select Center of Right Top Well Select Center of Right Bottom Well Verify Well Centers	Select a detection met in the target assay. C ABS@260 ABS@595 ABS@450 ABS@405 ABS@405 ABS@620 Abs450 Test Abs620Bichromatic	hod to proceed. The detectio lick Next to proceed. Absorbance Absorbance Absorbance Absorbance Absorbance Absorbance Absorbance Absorbance Absorbance Absorbance Absorbance	n method should use the Monochromatic Monochromatic Monochromatic Monochromatic Monochromatic Monochromatic Monochromatic Bichromatic Bichromatic	same technique Created 1/28/2004 1/28/2004 1/28/2004 1/28/2004 1/28/2004 2/27/2004 3/1/2004	that will be used 1/28/2004 1/28/2004 1/28/2004 1/28/2004 1/28/2004 1/28/2004 2/27/2004 3/1/2004
				Cancel	Next >

Figure 4-7. Selecting the detection method for labware optimization

To select the detection method:

- 1. Choose the detection method that most closely matches the method used in the desired protocol. For absorbance and fluorescence intensity top and bottom measurements, this is the exact method used. For luminescence, fluorescence polarization, and time-resolved fluorescence measurements, choose a method performed at the same or similar wavelength.
- Choose Next to Prepare Labware (refer to Section 4.6.2, <u>Preparing and</u> <u>Loading the Labware</u>).

OR

Choose **Cancel** to close **Optimizing Labware** without performing the optimization.

#### 4.6.2 Preparing and Loading the Labware

To optimize labware dimensions, the four corner wells of the plate are read while empty. **Prepare Labware** provides controls to load and eject labware from the instrument and to choose the orientation of the plate on the microplate carrier (Figure 4-8).



Figure 4-8. Preparing the labware for optimization

To prepare labware for optimization:

- 1. Choose **Eject Plate Carrier** to move the microplate carrier outside the instrument.
- 2. Place the microplate to be optimized on the plate carrier.



- 3. Choose Close Plate Carrier to load the microplate into the instrument.
- 4. In Select Plate Orientation, choose the orientation of the plate on the microplate carrier. The selected orientation is displayed graphically to the right of the screen, with well A1 highlighted in red.
- 5. Choose **Next** to start the optimization (refer to Section 4.6.3, *Performing the Optimization Read*). The optimization read begins automatically.

OR

Choose **Back** to select a different detection method (refer to Section 4.6.1, *Selecting the Detection Method*).

OR

Choose **Cancel** to close **Optimizing Labware** without performing the optimization.

#### 4.6.3 Performing the Optimization Read

Optimization in Progress displays the status of the optimization read and provides the ability to cancel the optimization in progress (Figure 4-9). The optimization read requires several minutes to complete.

👯 Optimizing Labware: Greiner 96 Fl	lat		
	Optimization in Prog	iress	
Select a Detection Method Prepare the Labware Optimize > Select Center of Left Top Well Select Center of Left Bottom Well Select Center of Right Top Well Select Center of Right Top Well	Wells are currently being read. Please wait.		
Verify Well Centers	Performing optimization scan		-
	Estimated Time	00:01:13	
	Measurement Time	00:00:06	
	optimization	Stop Optimization	
		Cancel < Back	Next >

Figure 4-9. Labware optimization in progress

During the optimization read:

Choose **Stop Optimization** to cancel the optimization process and close **Optimizing Labware** without saving the optimization data.

When the optimization read is complete:

Choose **Next** to select the centers of the four corner wells (refer to Section 4.6.4, *Selecting the Centers of the Four Corner Wells*).

OR

Choose **Cancel** to close **Optimizing Labware** without performing the optimization.

## 4.6.4 Selecting the Centers of the Four Corner Wells

Use Select Center to precisely define the centers of the corner wells read in the optimization (Figure 4-10). Select Center displays an image of the well generated by the absorbance measurement. Well centers are defined graphically by dragging cross hairs to the position visually identified as the center. Select Center is performed for each corner well individually.



Figure 4-10. Selecting the well center

To define the centers of the wells:

- 1. Place the cursor in the well image, then click and drag the cross hairs to the desired center of the well.
- Choose Next to define the center of the next well read. When all four well centers are defined, Verify Well Centers appears (refer to Section 4.6.5, <u>Verifying Well Centers</u>).

OR

Choose **Cancel** to close **Optimizing Labware** without completing the optimization.

#### 4.6.5 Verifying Well Centers

Use Verify Well Centers to verify that the x and y offsets and distances between rows and columns are correct (Figure 4-11). If desired, the offsets, distances, and lot name may be edited in Verify Well Centers.

👫 Optimizing Labware: Copy of BC F	Flat 96	_ 🗆 🗡		
	Verify Well Centers			
Select a Detection Method Prepare the Labware Optimize	Verify well measurements below. Click save to save optimization or back to adjust values graphically.			
Select Center of Left Top Well	Column distance 0.9			
Select Center of Left Bottom Well	Lower left x offset 1.438			
Select Center of Right Top Well	Lower left y offset 1.123			
Select Center of Right Bottom Well	Lower right x offset 1.438			
Verify Well Centers	Lower right y offset 1.123			
	Row distance 0.9			
Property	Upper left x offset 1.438			
arid	Upper left y offset 1.123			
grid	Upper right x offset 1.438			
	Upper right y offset 1.123			
	Labware Lot Name			
	Lot ID/Name Lot 2004-04-06T11:12:14			
	Column distance       Information about the field being configured.	_		
	Cancel < Back	Save		

Figure 4-11. Verifying well centers

To verify and edit offsets, distances, and lot name:

1. If necessary, click the + next to Labware Lot Dimensions to display the fields in the category.

**Note:** More information about the field being defined is displayed below the property grid (Figure 4-11).

- 2. In Column distance, verify the distance between columns and edit the dimension. *All* offsets and well dimensions are entered in centimeters, if desired.
- 3. Verify the x and y offsets for the lower two wells and edit the dimensions, if desired.
- 4. In Row distance, verify the distance between rows and edit the dimension, if desired.
- 5. Verify the x and y offsets for the upper two wells and edit the dimensions, if desired.
- 6. If necessary, click the + next to Labware Lot Name to display the default name assigned to the new labware lot.
- 7. Enter a new Lot ID/Name, if desired.

8. Choose **Save** to save the optimization data and create the new labware lot.

**Note:** To use the optimized lot in a measurement protocol, open the labware for editing and select the new **Labware Lot** (refer to Section 4.3.2, <u>Selecting and</u> <u>Editing Labware Lots</u>).

OR

Choose **Back** to redefine well centers graphically (refer to Section 4.6.4, *Selecting the Centers of the Four Corner Wells*).

OR

Choose **Cancel** to close **Optimizing Labware** without completing the optimization.

## 4.7 Exporting and Importing Labware

User-defined labware saved in the Labware Selection List can be exported to an XML file and imported later to restore that configuration or share it with a copy of Multimode Detection Software installed on another computer.

Exporting default labware included with the software installation is not necessary. Since default labware may not be edited, deleted, or overwritten, it is available to users at all times. Because of this, importing default labware from an XML export file is not permitted by the software.

To export labware:

- 1. In the Labware Selection List, select the labware to export.
- 2. From the File menu, choose **Export>Labware**. Browse for Folder appears (Figure 4-12).



Figure 4-12. Choosing the folder where exported labware will be saved

3. In Browse for Folder, browse to the folder where the exported labware will be saved.

OR

Choose **Make New Folder** to create a new folder where the exported labware will be saved.

 Choose OK to export the labware. The exported labware is saved using the default file name format, Labware\_LabwareName.xml. In order to import the file at a later date, the filename must not be changed.

OR

Choose **Cancel** to stop the operation without exporting labware.

To import labware from an exported XML file:

- 1. From the File menu, choose **Import>Labware**. Open appears.
- 2. In Open, browse to and select the desired XML file to import.
- 3. Choose **Open**. The labware is imported to the Labware Selection List.

# Defining, Editing, and Running Protocols

## 5.1 Overview

A protocol stores all parameters required to perform a measurement, including technique type, labware type, detection method(s), and preparation methods, such as shaking. Protocols are stored in the Protocol Selection List (Figure 5-1), which provides access to all protocol functions:

- <u>Creating Protocols</u> (Section 5.2).
- <u>Running Protocols</u> (Section 5.3).
- <u>Editing Protocols</u> (Section 5.4).
- <u>Copying Protocols</u> (Section 5.5).
- <u>Deleting Protocols</u> (Section 5.6).
- <u>Printing Protocol Configuration Information</u> (Section 5.7).
- <u>Exporting and Importing Protocols</u> (Section 5.8).

To select protocols and access protocol functions:

From the navigation pane, choose **Protocols**. The Protocol Selection List appears (Figure 5-1).

Multimode Detection Software - Cor	nnected - Filter Slides:	Ex:2 Em:1				
File Actions Help						
	∎ ← P	rotocol				
	Protocol S	election	List			
Protocols	Name	Application	Created	Last Edited	Last Executed	
	Absorbance@340 (384)	Basic Application	1/29/2004	2/25/2004	1/29/2004	
Detection Methods	Fluorescein Top (384)	Basic Application	1/29/2004	1/29/2004	1/29/2004	
	Luminecsence (384)	Basic Application	1/29/2004	2/25/2004	1/29/2004	
🚺 Labware	Rhodamin Bottom (384)	Basic Application	1/29/2004	2/25/2004	1/29/2004	
-	TRF Europium (384)	Basic Application	1/29/2004	3/17/2004	1/29/2004	
Instruments						
🍾 Software Settings						
Protocol	s					

Figure 5-1. Protocol Selection List

## 5.2 Creating Protocols

New protocols are defined in **Create Protocol**, which guides the creation process with a wizard-type interface. Creating a new protocol requires:

- <u>Configuring General Settings</u> (Section 5.2.1).
- <u>Selecting the Technique Type</u> (Section 5.2.2).
- <u>Selecting the Labware Type Used in the Protocol</u> (Section 5.2.3).
- <u>Configuring Labware Layout Settings</u> (Section 5.2.4).
- <u>Configuring Detection and Preparation Methods</u> (Section 5.2.5).
- <u>Configuring Output Settings</u> (Section 5.2.6).

To create and configure a new protocol:



From the toolbar, choose Create a new protocol.

OR

From the Actions menu, choose Create a new protocol.

OR

Right-click in the Protocol Selection List and choose **Create a new protocol** from the menu. Create Protocol appears (Figure 5-2).

#### 5.2.1 Configuring General Settings

Use General Settings to define the protocol name and enter any related notes about the protocol (Figure 5-2).

🌺 Create Protocol Absor	bance 260			×
1	General Sett	inas		1
General Settings >				
Technique Type	Please enter a name a	nd notes for this protocol. Click Next to proceed.		
Labware Selection				
Layout Settings				
Output Settings	Protocol name	Absorbance 260		
	Date created	Wednesday, April 14, 2004		
	Date edited	Wednesday, April 14, 2004		
	Date last run	Wednesday, April 14, 2004		
	Notes	Basic absorbance measurement with shaking.		
				<u> </u>
			Cancel	Next >



To configure the general settings for a new protocol:

- 1. In **Protocol name**, enter a unique name for the protocol. The name must be entered before the next configuration screen in the wizard can be accessed.
- 2. In Notes, enter a description of the new protocol, if desired.
- Choose Next to select the measurement technique used in the protocol (refer to Section 5.2.2, <u>Selecting the Technique Type</u>).

OR

Choose Cancel to close Create Protocol without saving the new protocol.

#### 5.2.2 Selecting the Technique Type

Use **Technique Type** to select the measurement technique performed by the protocol (Figure 5-3). Only techniques supported by the instrument and for which detection methods have already been defined are available. For more information about technique types, refer to Chapter 3, <u>Creating and Editing Detection Methods</u>.

🎇 Create Protocol Abso	rbance 260	×
	Technique Type	
General Settings Technique Type Labware Selection Layout Settings	Select technique below. Click Next to proceed, Click Back to go back.	
Method Selection Output Settings	Technique Type Absorbance Luminescence Fluorescence Intensity Top Fluorescence Intensity Bottom Time Resolved Fluorescence Fluorescence Polarization	
	Carcel / Back - Ma	
	Cancel < Back + Ne	x >

Figure 5-3. Selecting the measurement technique for a DTX 880

To select a technique type:

- 1. In Technique Type, choose the desired technique.
- 2. Choose **Next** to select the type of labware used in the protocol (refer to Section 5.2.3, <u>Selecting the Labware Type Used in the Protocol</u>).

OR

Choose **Back** to configure General Settings for the protocol (refer to Section 5.2.1, *Configuring General Settings*).

OR

Choose **Cancel** to close Create Protocol without saving the new protocol.

#### 5.2.3 Selecting the Labware Type Used in the Protocol

Use Labware Selection to select the type of labware used in the protocol (Figure 5-4). Labware must be configured prior to configuring the protocol. Only labware configured for the selected technique type is available. Labware cannot be edited once it is used in a protocol. Refer to Chapter 4, <u>Creating and Editing Labware</u>, for detailed information about creating and configuring labware.

🚟 Create Protocol Absor	bance 260			×
	Labware Sele	ection		
General Settings Technique Type Labware Selection > Layout Settings	Select labware in list be	slow. Click Next to proceed, Click Back to g	io back.	
Method Selection	Type of Labware			
Output Settings	Type of Labware	Name	Number of Wells	<b>_</b>
		Greiner 96 Cone PS	96	
		Greiner 96 Flat	96	
		Greiner 96 Round PP	96	
		Greiner 96 Round PS	96	
		Greiner 96 Thermal Cycler	96	
		Greiner Hat 384 Square	384	
		Greiner Shallow 384 Round	384	
		LUL Shallow 364 Round	304	
		MJ Microseal 364	304	
		Nunc 24 Nunc 4	24	
		Nunc O	8	
		Nunc Flat 304 Bauaro	304	
		Nunc Flat 384	394	
		SBS Elat 384 Dound	384	
		SBS Elat 384 Square	384	
		SBS Flat 96 Round	96	
		Standard 384	384	
		Standard 96	96	
			,,,	
			Capcel 🗸 Back 👻	Next >
			Cancor V Daux V	

Figure 5-4. Selecting the type of labware used in the protocol

To select labware:

- 1. Select the desired Type of Labware from the list.
- 2. Choose **Next** to configure the plate layout (refer to Section 5.2.4, <u>Configuring</u> <u>Labware Layout Settings</u>).

OR

Choose **Back** to change the measurement technique performed by the protocol (refer to Section 5.2.2, <u>Selecting the Technique Type</u>).

OR

Choose **Cancel** to close Labware Selection without saving the new protocol.

#### 5.2.4 Configuring Labware Layout Settings

Use Layout Settings to configure how wells on the plate are read (Figure 5-5). Settings are configured in two tabs:

- Layout Selection Settings configures which wells are read in the measurement (Figure 5-5).
- Reading Direction Settings configures the order of how wells are read: row-by-row, column-by-column, or well-by-well (Figure 5-6).

To configure labware layout settings:

1. In Layout Settings, choose the Layout Selection Settings tab to view the layout of the selected labware (Figure 5-5).



Figure 5-5. Selecting which wells are measured on a 384-well plate

- 2. Select the desired wells to read:
  - All wells on the plate click the small button in the upper left corner of the plate layout display.
  - All wells in a column click the desired column header. Multiple columns may be selected.
  - All wells in a row click the desired row header. Multiple rows may be selected.
  - Individual wells click each desired well.
  - **Groups of wells** click and drag over the desired group of wells. Multiple groups may be selected.

**Note:** Wells are deselected using the methods listed above; for example, clicking the header of a selected column deselects all wells in the column.

3. Choose the **Reading Direction Settings** tab to configure the order in which wells are read in the protocol (Figure 5-6).

Figure 5-6. Selecting how wells on the plate are read

- 4. Select the desired reading direction:
  - **Read by row** Reads plates row-by-row.
  - **Read by column** Reads plates column-by-column. Available for all measurement techniques except absorbance.
  - **Read by well** Reads each well individually before reading the next well, which is useful for kinetic and scan measurements.

5. Choose **Next** to configure detection and preparation methods (refer to Section 5.2.5, <u>Configuring Detection and Preparation Methods</u>).

OR

Choose **Back** to select a different labware type (refer to Section 5.2.3, <u>Selecting</u> <u>the Labware Type Used in the Protocol</u>).

OR

Choose **Cancel** to close Create Protocol without saving the new protocol.

#### 5.2.5 Configuring Detection and Preparation Methods

Use Method Selection to select and configure detection and preparation methods (Figure 5-7). Two configuration modes are available:

- **Basic** a single detection method may be selected and optionally configured as a kinetic or scan measurement, if desired. Microplate shaking may also be configured (refer to Section 5.2.5.1, *Configuring a Method in Basic Mode*).
- Advanced provides the configuration options available in basic mode and adds the ability to define multiple detection methods and to configure preparation methods, such as shaking and temperature control (880 only). Detection and preparation methods may be arranged in any order within the execution sequence (refer to Section 5.2.5.2, <u>Configuring a Method in</u> <u>Advanced Mode</u>).

👯 Create Protocol Abso	bance 260	X
	Method Selection	
General Settings Technique Type Labware Selection Layout Settings Method Selection >	Select from available methods below. Click Next to proceed, Click Back to go back.	
Output Settings	Method Selection Method Properties	
	ABS@260 Kinetic No	
Tog	le between basic	
and	dvanced modes	
	Kinetic Determines if this method uses kinetic reads.	
	Cancel < Back - Ne	ext >

Figure 5-7. Configuring parameters in Method Selection

#### 5.2.5.1 Configuring a Method in Basic Mode

Configuring a method in basic mode includes selecting a detection method and configuring properties for a kinetic or scan measurement and shaking, if desired.

To select and configure a method in basic mode:

Basic

 In Method Selection, choose Basic to toggle from advanced mode, if necessary. Basic mode configuration parameters appear (Figure 5-8). Refer to Section 5.2.5.2, *Configuring a Method in Advanced Mode*, to configure a method with multiple detection and/or preparation methods.

🚆 Create Protocol Kinetic 260				×
Met	hod Selection			
General Settings Technique Type S Labware Selection	elect from available methods below. Click Next to	proceed, Click Back to go back		
Method Selection >	Advanced New Method	]		
	Method Selection	Method Properties		
Selection	► ABS@260 Method Properties	Kinetic Kinetic Cycles Kinetic Interval Shake Shake Intensity Shake Interval Shake Mode	Yes 29 Yes Medium 5 Linear	
Informa field be	tion about the property	Shake Determines if shaking wi	I be performed in the kinetic interv	/als.
		Cance	I < Back 🗸	Next >

Figure 5-8. Configuring a method in basic mode

 In Method Selection, select the detection method for use with the protocol. Only detection methods of the technique selected for the protocol are available (refer to Section 5.2.2, <u>Selecting the Technique Type</u>).

OR

Choose **New Method** to create a new detection method using the currentlyselected technique type. Refer to Chapter 3, <u>Creating and Editing Detection</u> <u>Methods</u>, for more information about creating detection methods.

 To configure a kinetic measurement, in Method Properties, click in Kinetic and choose Yes. Kinetic measurements read wells several times at specified intervals.

Note: If a kinetic measurement not desired, proceed to step 6.

4. In Kinetic Cycles, enter the number of measurement cycles to be performed. Kinetic measurements may be set to perform 1 to 100 cycles. 5. In Kinetic Interval, enter the length of time, in seconds, between each measurement of the same well.

**Note:** The minimum kinetic interval is populated automatically in Kinetic Interval, and is determined by the labware type and layout settings configured in the protocol. The maximum interval between each measurement cycle is 65,535 seconds.

6. To shake the microplate before performing the measurement, click in Shake and choose **Yes**. In kinetic measurements, the plate is shaken for the specified intensity and interval before each measurement cycle.

**Note:** If shaking is not desired, proceed to step 10.



# CAUTION: Shake low density plates, such as 6- or 48-well plates, at low speed only. Shaking low density plates at higher speeds may cause liquid in wells to spill.

- 7. In Shake Intensity, select the desired intensity of shaking: Low, Medium, or High.
- 8. In Shake Interval, enter the length of time in seconds (0–60) to shake the microplate.
- 9. In Shake Mode, select the desired shaking pattern.
  - **Linear** shakes from side to side.
  - **Orbital** shakes labware in a circular pattern.
  - **Squared** shakes labware in a square pattern, moving at right angles.
- 10. To configure an area or linear scan, click in Scan and select Yes. Area scans read a number of measurement points arranged in a grid pattern across each well. Linear scans read a number of points in a linear axis crossing the center of each well. Scan measurements are not available when a kinetic measurement is configured.

**Note:** Scans may only be performed on samples on plates with 96 or fewer wells.

**Note:** If a scan measurement is not desired, proceed to step 15.

- .... 11.
  - 11. To configure the type of scan measurement and the number of points measured, click in Scan Points and choose the configuration button. Scan Selection Editor appears (Figure 5-9).



Figure 5-9. Configuring an area scan

12. In Resolution (mm), use the up and down arrows to choose the proximity of measurement points. Choosing a smaller value increases the number of measurement points available; choosing a larger value decreases the number of points available. Available resolutions are determined by the type of labware selected and configured in the protocol. Refer to Sections 5.2.3, <u>Selecting the Labware Type Used in the Protocol</u> and 5.2.4, <u>Configuring Labware Layout Settings</u>, for more information.

13. To configure an area scan, click anywhere inside the well boundary, except the center row, and drag until the desired number of measurement points is selected (Figure 5-9).

OR

To configure a linear scan, click anywhere on the center row or column inside the well boundary and drag towards the boundary until the desired number of measurement points is selected (Figure 5-10).

**Note:** The type of scan that may be configured is determined by the Reading Direction Settings in Layout Settings (refer to Section 5.2.4, <u>Configuring</u> <u>Labware Layout Settings</u>). For example, horizontal linear scans along the center row may be configured only when Read by row is selected, while vertical linear scans along the center column may be configured only when Read by column is selected. When Read by well is selected, only area scans may be configured.



Figure 5-10. Configuring a linear scan

14. Choose **OK** to save the scan configuration and close the **Scan Selection Editor**. OR

Choose **Cancel** to close the Scan Selection Editor without updating changes.

 Choose Next to configure how measurement results are saved and/or printed (refer to Section 5.2.6, *Configuring Output Settings*).

OR

Choose **Back** to configure the plate layout (refer to Section 5.2.4, <u>*Configuring*</u> Labware Layout Settings).

OR

Choose **Cancel** to close **Create Protocol** without saving the new protocol.

#### 5.2.5.2 Configuring a Method in Advanced Mode

Configuring methods in advanced mode includes selecting detection and preparation methods, arranging the execution sequence of methods, and optionally configuring properties for a kinetic or scan measurement.

Protocols that require multiple measurements at different wavelengths, such as multiwavelength absorbance or fluorescence resonance energy transfer (FRET) measurements, must be configured in advanced mode.

To select and configure a method in advanced mode:

 In Method Selection, choose Advanced to toggle from basic mode, if necessary. Advanced mode configuration parameters appear (Figure 5-11). Refer to Section 5.2.5.1, <u>Configuring a Method in Basic Mode</u>, to configure a protocol that requires only one detection method and no preparation methods.



Figure 5-11. Configuring a method in advanced mode

Advanced



2. Add a detection method by choosing **Add a method to this protocol**, then selecting the desired **Detection Method** from the menu that appears.

OR

Right-click in Method Selection and choose **Add Method>Detection Methods>** and the desired detection method from the menu that appears.

OR

Choose **New Method** to create a new detection method. Refer to Chapter 3, <u>Creating and Editing Detection Methods</u>, for detailed information about creating detection methods.

- Configure Method Properties as desired. Refer to Section 5.2.5.1, <u>Configuring</u> <u>a Method in Basic Mode</u>, for more information about configuring method property parameters.
- 4. Add and configure additional detection methods by repeating steps 2 and 3 for each method desired.



5. Add a preparation method by choosing **Add a method to this protocol**, then selecting **Preparation Methods>Shake** or **Set Temperature** from the menu that appears.

OR

Right-click in Method Selection and choose Add Method>Preparation Methods>Shake or Set Temperature from the menu that appears.

- DTX 880 Set Temperature is available only when controlling this instrument.
- Configure the preparation method as desired. Refer to Section 5.2.5.2.1, <u>Configuring a Shake Preparation Method</u>, for more information about shaking. Refer to Section 5.2.5.2.2, <u>Configuring a Set Temperature Preparation Method</u> <u>(880 only)</u>, for more information about configuring temperature control in the protocol.
- 7. Add and configure additional preparation methods by repeating steps 5 and 6 for each method desired.



8. To reorder the detection and preparation methods in the method execution sequence, select the method to be moved and choose **Move the selected method forward** or **Move the selected method backward**.

OR

In Method Selection, right-click on the desired detection or preparation method and choose **Move Up** or **Move Down**.



9. To delete a detection or preparation method from the protocol, in Method Selection, select the method to be deleted and choose **Delete the selected method from this protocol**.

OR

In Method Selection, right-click on the desired detection or preparation method and choose **Remove Method**.

 Choose Next to configure Output Settings (refer to Section 5.2.6, <u>Configuring</u> <u>Output Settings</u>).

OR

Choose **Back** to change Labware Layout Settings (refer to Section 5.2.4, <u>Configuring Labware Layout Settings</u>).

OR

Choose **Cancel** to close Create Protocol without saving the new protocol.

#### 5.2.5.2.1 Configuring a Shake Preparation Method

A Shake preparation method shakes the microplate at the point in the execution sequence where it is positioned. For example, Figure 5-12 shows a protocol where the microplate is shaken before absorbance measurements are performed at three wavelengths.

**Note:** A Shake preparation method only shakes the plate once for the configured duration and intensity. To perform interval shaking between each cycle in a kinetic measurement, shaking must be configured in Method Properties for the desired detection method (refer to Section 5.2.5.1, *Configuring a Method in Basic Mode*).

To configure a Shake preparation method:

1. In Method Selection, choose the desired **Shake** preparation method. Method Properties for the selected method appear (Figure 5-12).

👯 Create Protocol Absorb	bance 260	X
	Method Selection	
General Settings Technique Type Labware Selection Layout Settings Method Selection > Output Settings	Select from available methods below. Click Next to proceed, Click Back to go back.           Basic         New Method           Method Selection         Method Properties	
	Shake       ABS@260       ABS@260         ABS@340       ABS@405         ABS@405       Shake Interval       5         Shake       Shake Interval       5         Shake       Shake       Shake         Image: Shake       Shake       Shake         Imag	
	The intensity of the shaking operation.	
	Cancel K Back + N	lext >

Figure 5-12. Configuring a Shake preparation method



CAUTION: Shake low density plates, such as 6- or 48-well plates, at low speed only. Shaking low density plates at higher speeds may cause liquid in wells to spill.

2. In Shake Intensity, select the desired intensity of shaking: Low, Medium, or High.

- 3. In Shake Interval, enter the length of time in seconds (**0–60**) to shake the microplate.
- 4. In Shake Mode, select the desired shaking pattern.
  - **Linear** shakes from side to side.
  - **Orbital** shakes labware in a circular pattern.
  - **Squared** shakes labware in a square pattern, moving at right angles.



5. To move the Shake preparation method to a different location in the execution sequence, in Method Selection, select the method and choose Move the selected method forward or Move the selected method backward.

OR

In Method Selection, right-click on the Shake preparation method and choose **Move Up** or **Move Down**.

#### 5.2.5.2.2 Configuring a Set Temperature Preparation Method (880 only)

A Set Temperature preparation method sets the temperature inside the microplate chamber. The temperature is set by heating the microplate chamber; cooling the chamber is not supported by the instrument. Depending on the measurement wavelength and light source used in the protocol, the set temperature may range from  $3^{\circ}$ C (5.4°F) or 4°C (7.2°F) above ambient to 45°C (113°F).

It takes a minimum of 30 minutes for the instrument to reach the desired temperature. The actual time required depends on the relative change in temperature. When a protocol with a **Set Temperature** preparation method is run, the protocol does not pause to wait for the desired temperature to be reached. To set an exact temperature before starting a protocol run, use **Manual Control** to set the temperature and check it at regular intervals until the desired temperature is reached (refer to Section 2.3.3.1, *Temperature Control (880 only)*).

**Note:** Set Temperature preparation methods are useful for kinetic measurements intended to measure the effects of temperature changes on samples.

To configure a Set Temperature preparation method:

 In Method Selection, choose the desired Set Temperature preparation method. Method Properties for the selected method appear (Figure 5-13).

🌺 Edit Protocol Absorba	nce 260 Shaking	×				
	Method Selection					
General Settings Labware Selection Layout Settings Method Selection > Output Settings	Select from available methods below. Click Next to proceed, Click Back to go back.					
	Method Selection Method Properties					
	Set Temperature 35					
	Set Temperature Temperature in °C to set chamber.					
		_				
	Cancel K Back V Nex					

Figure 5-13. Configuring a Set Temperature preparation method

2. In **Set Temperature**, enter the desired microplate chamber temperature in degrees Celsius. In protocols that perform measurements only at visible wavelengths (>369 nm), the minimum temperature that may be set is 3°C (5.4°F) above ambient. When the protocol performs measurements in the UV band using the deuterium lamp, the minimum temperature is 4°C (7.2°F) above ambient. The maximum temperature that may be set is 45°C (113°F).

**Note:** The temperature remains at the current setting until overridden by another Set Temperature preparation method, by changing the temperature in Manual Control, or by turning the instrument off and on.



3. To move the Set Temperature preparation method to a different location in the execution sequence, in Method Selection, select the method and choose Move the selected method forward or Move the selected method backward.

OR

In Method Selection, right-click on the Set Temperature preparation method and choose **Move Up** or **Move Down**.

#### 5.2.6 Configuring Output Settings

Use Output Settings to configure how measurement results are saved and/or printed after a protocol run (Figure 5-14). Options available include choosing to export results and automatically open them in Microsoft® Excel following a protocol run, choosing the file formats used to save measurement results, and configuring which protocol information and measurement results are included in printouts. An external software application, such as a database, may also be configured to execute after a protocol run.

🚟 Edit Protocol Absorbar	ce 260 Shaking	X
	Output Settings	
General Settings Labware Selection Layout Settings Method Selection	Select output options for Excel export and printer settings. Excel export	
Output Settings >	Export to Microsoft® Excel	
Execut	e program Run protocol	
	▼ Run this protocol now       Run this protocol now before saving.	
	Execute a program after protocol executes      Cancel      Cancel      Save	

Figure 5-14. Configuring output settings

To configure Output Settings:

1. Choose Excel, data file, and print output options as desired. Table 5-1 describes the options available.



- Choose Run this protocol now before saving to run the protocol immediately. Refer to Section 5.3, <u>Running Protocols</u>, for more information about running protocols.
- Choose Execute a program after protocol executes to display options for configuring an external software application to run immediately after the protocol run is completed. Refer to Section 5.2.6.1, *Configuring a Program to <u>Run after Protocol Executes</u>, for more information.*
- 4. Choose **Save** to save the protocol and close **Create Protocol**.

OR

Choose **Cancel** to close **Create Protocol** without saving the new protocol.

OR

Choose **Back** to configure methods used in the protocol (refer to Section 5.2.5, *Configuring Detection and Preparation Methods*).

Output Option	Description			
Export to Microsoft® Excel				
Perform after completing measurement(s)	Saves results in a format compatible with Microsoft® Excel, and automatically opens Excel when the protocol run is completed.			
	<b>Note:</b> Versions of Excel prior to Office 2000 are not supported by the Export to Microsoft Excel function, but can open measurement results stored in tab-delimited data (.dat) files.			
Create .XML and .dat data files				
Perform after completing measurement(s)	Automatically exports measurement results to a tab- delimited data (*.dat) file and an XML file. These files may be opened by software applications compatible with tab-delimited data or XML files.			
	<b>Note:</b> The directory where the data files are saved is configured in <b>System Settings</b> . Refer to Section 1.4.2.4, <i>Choosing the Directory Where Measurement Results are Saved</i> .			
Print options				
Perform after completed measurement(s)	Automatically prints the results after completing a protocol run. This option <i>must</i> be selected to print measurement results.			
Raw Data	Prints raw data measured for each sample. For kinetic measurements, prints raw data measured in each cycle. For scan measurements, prints raw data for all measurement points.			
	<b>Note:</b> Printing kinetic and scan measurement results may require numerous pages, depending on the number of measurement cycles performed or points measured.			
Protocol Information	Prints the name of the protocol underneath the printout header.			
Labware Information	Prints information about the labware used, including plate type, number of wells measured, lot name, and the date that the lot was optimized.			
General Information	Prints general information about the protocol including when the protocol was created or last edited and performed.			
Plate Graph	Prints graphs of kinetic and scan measurement results. Only available for configuration when a kinetic, area scan, or linear scan measurement is configured in the protocol.			
Method Information	Prints information about the detection method(s) used in the protocol.			

### Table 5-1. Output Options

#### 5.2.6.1 Configuring a Program to Run after Protocol Executes

Output Settings can be configured to open an external software application, such as a custom data logger or database, after completing a protocol run. If the selected application supports entering commands using a command line interface, a specific command for the application may also be configured.

To configure a program to run after a protocol is executed:

1. In Output Settings, choose **Execute a program after protocol executes**. Execute Program expands to show the fields that may be configured (Figure 5-15).

👯 Create Protocol Blah Pr	otocol	X
	Output Settings	
General Settings Technique Type Labware Selection Layout Settings Method Selection	Select output options for Excel export and printer settings.	
Output Settings >	Perform after completing measurement(s)     Greate.XWL and .dt data files     Perform after completing measurement(s)     Perform after completing me	
	▷ Run this protocol now ♥ Execute a program after protocol executes	
	Execute program Command line parameter	
	Cancel < Back - Save	

Figure 5-15. Configuring an external software application in Output Settings

 In Execute Program, enter the complete path of the program to run; for example, C:\Program Files\Data Logger\MyCustomDataLogger.exe.

OR

Choose Browse to find an executable program. Open appears.

- 3. In Open, browse to the location of the desired application and select it.
- 4. Choose **Open** to return to **Output Settings**. The selected path appears in Execute Program.

OR

Choose **Cancel** to close Open without selecting an application.

5. If the selected application supports command line parameters, in Command line parameter, enter the desired parameter.

## 5.3 Running Protocols

Saved protocols may be accessed and run at any time, either on an instrument or in simulation mode. The run options available are different for each mode. For more information, refer to:

- <u>Running a Protocol on an Instrument</u> (Section 5.3.1).
- <u>Running a Protocol When Simulation Mode is Enabled</u> (Section 5.3.2).

#### 5.3.1 Running a Protocol on an Instrument

Running a protocol on an instrument performs measurements on samples and outputs results data following the parameters configured in the protocol.

To run a protocol on an instrument:

1. In the Protocol Selection List, select the protocol to run.



2. From the toolbar, choose **Run the selected protocol**.

OR

From the Actions menu, choose Run the selected protocol.

OR

Right-click on the selected protocol and choose **Run the selected protocol** from the menu. **Prepare to Run Protocol** appears (Figure 5-16).

👯 Run Protocol Fluoresce	zin Top (384)
1	Prepare to Run Protocol
Prepare to Run Proto> Run Protocol	Click Next to run protocol.
	Eject Plate Carrier Optimize Read Height
	Close Plate Carrier Only available for the DTX 880.
	Landscape (Optimized)     Portrait     Opposite Landscape     Opposite Portrait
	Run the selected protocol
	Optimize Read Height C Default C Maximum C Set Value 2:46 mm
	Cancel Next >

Figure 5-16. Preparing to run a protocol on an instrument

3. Use **Eject Plate Carrier** and **Close Plate Carrier** to load the microplate into the instrument, if necessary.

- 4. Select the orientation that matches how the plate is positioned on the plate carrier:
  - **Landscape** the long edges of the plate run parallel to the front of the instrument, with well A1 located in the upper left corner.
  - **Portrait** the short edges of the plate run parallel to the front of the instrument, with well A1 located in the upper right corner.
  - **Opposite Landscape** the edges of the plate run parallel to the front of the instrument, with well A1 located in the lower right corner.
  - **Opposite Portrait** the short edges of the plate run parallel to the front of the instrument, with well A1 located in the lower left corner.

Note: Well A1 is identified in the plate graphic by a red highlight.



 When preparing to run a fluorescence top, fluorescence polarization, or timeresolved (TRF) protocol, choose **Optimize Read Height** to automatically determine and set the optimal read height used in the protocol run (refer to Section 5.3.1.1, <u>Optimizing Read Height (880 only)</u>).

> **DTX 880** — Optimize Read Height is available for this instrument only.

OR

Select the read height manually:

- Default uses the read height defined in Labware Information for the labware type used in the protocol (refer to Section 4.2.1, <u>Defining Labware</u> <u>Information</u>).
- **Maximum** sets the read height at 10.6 mm, the maximum height supported by the instrument.
- Set Value manually sets the reading height using the adjacent configuration field. Setting the reading height manually is useful when the height determined by a prior optimization for the same labware type is known.



6. Choose **Run** or **Next** to run the protocol.

OR

Choose Cancel to close Run Protocol without running the protocol.

#### 5.3.1.1 Optimizing Read Height (880 only)

The DTX 880 features an objective lens that may be moved up and down to optimize the read height used in fluorescence intensity top, fluorescence polarization, and timeresolved fluorescence protocols. Read height is the distance between the top surface of the microplate being read and the lower surface of the objective lens. Optimizing read height matches the focus of the optics with the sample volume. This maximizes the raw signal, which yields the highest precision and maximum sensitivity.

Read height is optimized using the **Read Height Optimization Wizard** (Figure 5-17). A single sample with a known maximum signal is placed on the same type of microplate used in the protocol. The sample is measured using the same, or very similar, detection method used in the protocol.

The optimized read height is saved in the protocol and is used for all subsequent runs of the protocol until reset by performing a new optimization or manually selecting a read height option.

To optimize read height:



1. In Run Protocol, select **Optimize Read Height**. The Read Height Optimization Wizard appears (Figure 5-17).

🏶 Read Height Optimization W	izard					
	Select I	Detection M	ethod			
Select a Detection Method > Prepare the Labware Optimize	Select a detection method to proceed. The detection method should use the same technique that will be used in the target assay. Click Next to proceed.					used in
Optimize Optimization Complete	Name	Measurement technique	Measurement type	Created	Last Edited	
Optimization Complete	Fluorescein Top	FluorescenceIntensityTop	Monochromatic	1/28/2004	1/28/2004	
	PicoGreen	FluorescenceIntensityTop	Monochromatic	4/1/2004	4/9/2004	
	Rhodamin Top	FluorescenceIntensityTop	Monochromatic	1/28/2004	1/28/2004	
	1				Cancel	Next
					Cancel	Next >



- 2. In Select Detection Method, select the detection method used in the optimization. For fluorescence top protocols, choose the same detection method used in the protocol. For fluorescence polarization and time-resolved fluorescence protocols, choose the detection method that is the closest match to that used in the protocol.
- 3. Choose **Next** to select the well measured to perform the optimization. Prepare Labware appears (Figure 5-18).

OR

Choose **Cancel** to close the wizard without performing the optimization.

- 4. Pipette liquid with a known maximum signal to a single well on the microplate used in the optimization. The liquid volume of the optimization sample should be the same as that of samples measured in the protocol.
- 5. Load the plate into the instrument.



Figure 5-18. Selecting the well read in the read height optimization

- 6. In **Prepare Labware**, select the well containing the optimization sample (Figure 5-18).
- 7. Choose **Next** to start the optimization. Optimization in Progress appears (Figure 5-19). The optimization may take several minutes.

OR

Choose **Back** to change the detection method used in the calibration.

OR

Choose Cancel to close the wizard without performing the optimization.
🏶 Read Height Optimization	Wizard	
	Optimization in Progress	
Select a Detection Method Prepare the Labware Optimize > Optimization Complete	Reading height is currently being optimized. Please wait. Optimizing Estimated Time 00:05:43	
	Cancel < Back	Next >

Figure 5-19. Read height optimization in progress

 While the optimization is in progress, choose Cancel to stop the optimization read and close the wizard, if desired. When the read is finished, Optimization Complete appears, displaying the Optimized Read Height (Figure 5-20).

🎇 Read Height Optimization \	Wizard	
	Optimization Complete	
Select a Detection Method Prepare the Labware Optimize Optimization Complete	Note optimized read height below. Optimization in complete, click finish to save results.           Optimized Read Height           0.97   mm	
	Cancel K Back	Save

Figure 5-20. Read height optimization completed

9. In Optimization Complete, choose **Save** to save the optimized read height in the protocol. The optimized read height is used for all subsequent runs of the protocol until reset by performing a new optimization or manually selecting a read height option.

OR

Choose **Cancel** to close the wizard without saving and using the optimized read height in the protocol run.

# 5.3.2 Running a Protocol When Simulation Mode is Enabled

Running a protocol in simulation mode allows the protocol configuration to be tested using simulated data before performing the protocol on actual samples. Simulated data is either generated randomly or read from a file.

Simulation mode is automatically enabled when the host computer is not connected to an instrument. When an instrument is connected, simulation mode may be enabled manually in Instruments (refer to Section 2.2.5, *Enabling Simulation Mode*).

To run a protocol in simulation mode:

1. In the Protocol Selection List, select the protocol to run.



2. From the toolbar, choose **Run the selected protocol**. OR

From the Actions menu, choose Run the selected protocol.

OR

Right-click on the selected protocol and choose **Run the selected protocol** from the menu. **Prepare to Run Protocol** appears (Figure 5-21).

🎇 Run Protocol Absorba	nce 260	×
	Prepare to Run Protocol	
Prepare to Run Proto) Run Protocol	Click Next to run protocol.	
	Check to generate random data Use this Data Simulation File for this read c:\program files\beckman coulter\multimode detection software\templates\ABS96Simulated.dat	
	Run the selected protocol Directory path of simulated data file	
	Cancel Next	>

Figure 5-21. Preparing to run a protocol in simulation mode

3. Select **Check to generate random data** to run the protocol using random data generated by the software, if desired.

- 4. In Use this Data Simulation file for this read:
  - Leave the directory path of the simulated data path as configured to use the data file selected in Software Settings (refer to Section 1.4.2.3, <u>Choosing Simulated Data Files</u>).
  - Enter the directory path of the desired data file. The complete directory path must be entered; for example, c:\program files\Beckman
     Coulter multimode reader\simulations\simulated absorbance data.dat.
  - Browse to the location where the desired data file is saved and select it.

**Note:** Results from prior measurements saved in .dat format may be used as simulated data files (refer to Section 5.2.6, *Configuring Output Settings*). Simulated data files are used when the number of measurement points in the simulated protocol run is the same as those present in the data file. When the number of measurement points is different, the software generates random data.

When a different simulated data file is selected in **Prepare to Run Protocol**, the file is used for the current simulated run only. After the simulated run has finished, the data file defaults to the file selected in **Software Settings** (refer to Section 1.4.2.3, <u>*Choosing Simulated Data Files*</u>).



5. Choose **Run** or **Next** to run the selected protocol.

OR

Choose **Cancel** to close Run Protocol without running the protocol.

### 5.4 Editing Protocols

The parameters configured for user-defined protocols may be edited. Default protocols included with the software installation may not be edited.

To edit a protocol:

1. In the Protocol Selection List, select the protocol to edit.



2. From the toolbar, choose Edit the selected protocol.

OR

From the Actions menu, choose Edit the selected protocol.

OR

Right-click on the selected protocol and choose **Edit the selected protocol** from the menu.

OR

Double-click on the selected protocol. Edit Protocol appears (Figure 5-22).

🚆 Edit Protocol Absorban	nce 260			×
1	General Sett	ings		1
General Settings > Labware Selection Layout Settings Method Selection	Please enter a name a	nd notes for this protocol. Click Next to proceed.		
Output Settings	Protocol name	Absorbance 260		
	Date created	Wednesday, April 14, 2004		
	Date edited	Wednesday, April 14, 2004		
	Date last run	Wednesday, April 14, 2004		
	Notes	Basic absorbance measurement with shaking.		X
			Cancel	Next >
				11

Figure 5-22. Editing an absorbance protocol

3. Edit the parameters in each Edit Protocol screen as desired.

**Note:** Refer to Section 5.2, <u>*Creating Protocols*</u>, for detailed information about configuring protocol parameters.

4. Choose **Save** to close Edit Protocol and save the changes.

OR

Choose Cancel to close Edit Protocol without saving changes.

### 5.5 Copying Protocols

Copies may be made of existing protocols. After a copy has been created, it may be used as a template for a new protocol using the same technique.

To make a copy of a protocol:

1. In the Protocol Selection List, select the protocol to copy.



2. From the toolbar, choose Make a copy of the selected protocol.

OR

From the Actions menu, choose Make a copy of the selected protocol.

OR

Right-click on the selected protocol and choose **Make a copy of the selected protocol** from the menu. A copy of the selected protocol appears in the Protocol Selection List.

**Note:** The default name format for copied protocols is **Copy of OriginalName**. To change the name, open the protocol for editing and enter the new protocol name (refer to Section 5.4, *Editing Protocols*).

### 5.6 Deleting Protocols

User-defined protocols that are no longer used to perform measurements may be deleted from the **Protocol Selection List**. Default protocols included with the software installation may not be deleted.

To delete a user-defined protocol:

1. In the Protocol Selection List, select the protocol to delete.



2. From the toolbar, choose **Delete the selected protocol**.

OR

From the Actions menu, choose **Delete the selected protocol**.

OR

Right-click on the selected protocol and choose **Delete the selected protocol** from the menu. Message appears (Figure 5-23).

Message	×
2	Are you sure you want to delete the protocol 260 Area Scan?
	Yes No

Figure 5-23. Confirming the deletion of a protocol

3. Choose **Yes** to delete the selected protocol.

OR

Choose **No** to cancel the deletion.

### 5.7 Printing Protocol Configuration Information

Information about the protocol configuration and sample layout may be printed separately from measurement results.

To print protocol configuration information:

1. In the Protocol Selection List, select the protocol to print.



2. From the toolbar, choose **Print the selected protocol**.

OR

From the Actions menu, choose Print the selected protocol.

OR

Right-click on the selected protocol and choose **Print the selected protocol** from the menu.

**Note:** Depending on how Print Settings are configured, Print and/or Print Preview may appear before the protocol configuration prints. Refer to Section 1.4.2.2, *Configuring Print Settings*, for more information about enabling and disabling Print and Print Preview.

3. If Print and Print Preview are not enabled in Print Settings, no additional configuration is required. The protocol configuration and layout of samples on the plate prints.

OR

If Print appears, configure printing options as desired and choose **OK**.

OR

If **Print Preview** appears, use the toolbar controls to change the magnification, layout view, or page(s) displayed, if desired (Figure 5-24).

							- C	Chai d	nge ispl	page aved
layout vie	mational Laboratories Lab Report #0149 Time 13612 PM	Date: Wedne	sdav, April 14.	2004	Internati Lab	onal Labo Report #0	oratories )149		Ter	e: 1:36:12 PM
	Protocol Definition Absorbance 260			Pro	tocol Defi	nition Abs	sorbance	260		
nange view agnification	: Absorbance 260 : BasicApplication : Row	3.1 Sample 4.1 Sample 5.1	3.2 Sample 4.2 Sample 5.2	3.3 Sample 4.3 Sample 5.3	3.4 Sample 4.4 Sample 5.4	3.5 Sample 4.5 Sample 5.5	3.6 Sample 4.6 Sample 5.6	3.7 Sample 4.7 Sample 5.7	3.8 Sample 4.8 Sample 5.8	3.9 Sample 4.9 Sample 5.9
Date Last Used Notes Labeware Name	: weenessay, April 14, 2004 : Wednesday, April 14, 2004 : Wednesday, April 14, 2004 : Basic: absorbance measurement with shaking. : Standard 384	6.1 Sample 7.1 Sample	Sample 6.2 Sample 7.2 Sample	Sample 6.3 Sample 7.3 Sample	Sample 6.4 Sample 7.4 Sample	Sample 6.5 Sample 7.5 Sample	Sample 6.6 Sample 7.6 Sample	Sample 6.7 Sample 7.7 Sample	Sample 6.8 Sample 7.8 Sample	Sample 6.9 Sample 7.9 Sample
Wells X, Y, count Used Wells Labware Created Labware Edited Notes	: 24 x 16, 384 : 187 : Wednesday, December 03, 2003 : Wednesday, December 03, 2003 : None	8.1 Sample 9.1 Sample 10.1	8.2 Sample 9.2 Sample 10.2	8.3 Sample 9.3 Sample 10.3	8.4 Sample 9.4 Sample 10.4	8.5 Sample 9.5 Sample 10.5	8.6 Sample 9.6 Sample 10.6	8.7 Sample 9.7 Sample 10.7	8.8 Sample 9.8 Sample 10.8	8.9 Sample 9.9 Sample 10.9
Lot # Lot Created Lot Optimized Notes	: DefaultLot : Wednesday, December 03, 2003 : Wednesday, December 03, 2003 : None	Sample 11.1 Sample	Sample 11.2 Sample	Sample 11.3 Sample	Sample 11.4 Sample	Sample 11.5 Sample	Sample 11.6 Sample	Sample 11.7 Sample	Sample 11.8 Sample	Sample 11.9 Sample
Measurement Method 1 Set Point (°C) Wait to Reach Temperature Measurement Method 2 Shake Type	: Sei Temperature : 20 : False : Shake : Linuar	Sample 2.10 Sample 3.10 Sample	Sample 2.11 Sample 3.11 Sample	Sample 2.12 Sample 3.12 Sample	Sample 2.13 Sample 3.13 Sample	Sample 2.14 Sample 3.14 Sample	Sample 2.15 Sample 3.15 Sample	Sample 2.16 Sample 3.16 Sample	Sample 2.17 Sample 3.17 Sample	
Shake Intensity Shake Duration Measurement Method 3 Measurement Technic Measurement Method 4	: Medium :5 :ABS@260 : Abstroance : Abstroance	4.10 Sample 5.10 Sample 6.10	4.11 Sample 5.11 Sample 6.11	4.12 Sample 5.12 Sample 6.12	4.13 Sample 5.13 Sample 6.13	4.14 Sample 5.14 Sample 6.14	4.15 Sample 5.15 Sample 6.15	4.16 Sample 5.16 Sample 6.16	4.17 Sample 5.17 Sample 6.17	
Measurement Technic Measurement Method 5 Measurement Technic Matrix-Legend: Position Allocation	: Absolunce : ABS@405 : Absorbance	Sample 7.10 Sample 8.10 Sample	Sample 7.11 Sample 8.11 Sample	Sample 7.12 Sample 8.12 Sample	Sample 7.13 Sample 8.13 Sample	Sample 7.14 Sample 8.14 Sample	Sample 7.15 Sample 8.15 Sample	Sample 7.16 Sample 8.16 Sample	Sample 7.17 Sample 8.17 Sample	
1.1         1.2         1.3           Sample         Sample         Sample           2.1         2.2         2.3           Sample         Sample         Sample	1.4         1.5         1.6         1.7         1.8         1.9           te         Sample         Sample         Sample         Sample         Sample           2.4         2.5         2.6         2.7         2.8         2.9         Sample           4         Sample         Sample         Sample         Sample         Sample         Sample	9,10 Sample 10,10 Sample	9.11 Sample 10.11 Sample	9.12 Sample 10.12 Sample	9.13 Sample 10.13 Sample	9.14 Sample 10.14 Sample	9.15 Sample 10.15 Sample	9.16 Sample 10.16 Sample	9.17 Sample 10.17 Sample	
Compre Campre Samp	International Laboratories Page 1				Intern	ational Labora	itories			Page 2

Figure 5-24. Previewing a protocol configuration and sample layout printout



4. In Print Preview, choose **Print** to print out the measurement results.

Close

5. In Print Preview, choose **Close** to close the window.

Note: Choosing Close without first choosing Print cancels the printout.

### 5.8 Exporting and Importing Protocols

User-defined protocols saved in the Protocol Selection List can be exported to an XML file and imported later to restore that configuration or share it with a copy of Multimode Detection Software installed on another computer. An exported XML file also saves detection method(s) and labware configurations used in the protocol.

Exporting default protocols included with the software installation is not necessary. Since default protocols may not be edited, deleted, or overwritten, they are always available to users at all times. Because of this, importing a default protocol from an XML export file is not permitted by the software.

To export a protocol:

- 1. In the Protocol Selection List, select the protocol to export.
- From the File menu, choose Export>Protocol. Browse for Folder appears (Figure 5-25).



Figure 5-25. Choosing the folder where an exported protocol will be saved

3. In Browse for Folder, browse to the folder where the exported protocol will be saved.

OR

Choose **Make New Folder** to create a new folder where the exported protocol will be saved.

 Choose OK to export the protocol. The exported protocol is saved using the default file name format, Protocol\_ProtocolName.xml. In order to import the file at a later date, the filename must not be changed.

OR

Choose **Cancel** to stop the operation without exporting the protocol.

To import a protocol from an exported XML file:

- 1. From the File menu, choose Import>Protocol. Open appears.
- 2. In Open, browse to and select the desired XML file to import.
- 3. Choose **Open**. The protocol, as well as detection method(s) and labware used in the protocol, are imported. Any default detection method(s) or labware used in the protocol are not imported because default methods and labware may not be edited, deleted, or overwritten. Instead, the imported protocol uses the same default methods and labware stored in the software.



### 6.1 Overview

Multimode Detection Software displays measurement results in a series of tabs within Run Protocol (Figure 6-1). Raw data is displayed immediately after each column or row is read. All measurements display sample status and raw data; kinetic and scan measurements also display graphs for each sample. Detection methods and measurement cycles performed in the protocol are displayed in the left pane of the tab; results are displayed in the right pane. The tabs may be viewed until Finish is chosen.

🌺 Run Protocol Kinetic 02														2
	Run Proto	col												
Prepare to Run	Click Finish to exp	port da	ta.											
Run Protocol >														
	Estimated Time		00	:00:25	5									
	Measurement Tim	ne	00	:00:28	3									
Selected	State Raw Data Gran	ohs												
cycle to			1	2	3	4	5	6	7	8	9	10	11	12
view	- Cycle 1	А	0.012	0	4	4	0.152	0.301	1.126	1.932	0.109	4	0	0.012
	Cycle 2	в	2.545	4	0.011	4	0.153	0.3	1.127	1.936	0.108	4	0	2.54
		С	0.012	0	4	4	0.152	0.301	1.127	1.938	0.107	4	0	0.012
		D	2.413	4	0.009	4	0.153	0.302	1.13	1.94	0.107	4	0	2.381
	Cycle 1	Е	0.012	0	4	4	0.153	0.304	1.132	1.942	0.107	4	0	0.012
	- Cycle 2	F	2.408	4	0.009	4	0.155	0.305	1.137	1.948	0.107	4	0	2.32
	Cycle 3	G	0.012	0	4	4	0.153	0.307	1.142	1.949	0.108	4	0	0.012
		н	2.384	4	0.009	4	0.157	0.31	1.153	1.954	0.107	4	0	2.251
	Cycle 1							T						
	Cycle 2													
	- Cycle 3													
							Ra	aw da	ta					
Detection	methods may be	e												
	and collongs <sup>1</sup>	~										_		
expanded a	and collapsed.											F	inis	sn 📋
												<u> </u>		
													Fi	nish
		-	_		-		_	-	_	_	_	-	-	

Figure 6-1. Measurement results displayed after a protocol run

When Finish is chosen, Run Protocol closes and results are exported and printed according to the file and printing options defined in the protocol (refer to Section 5.2.6, *Configuring Output Settings*). When no file or printing options are defined, measurement results are deleted and may not be recovered.

Measurement results are exported to the data directory specified in **System Settings** (refer to Section 1.4.2, *Configuring Software Settings*). Exported results may be viewed, edited, evaluated, and printed using Microsoft® Excel or other applications compatible with the file format of the exported data. Multimode Detection Software does not provide the ability to open, view, or evaluate exported results.

This chapter covers:

- <u>Viewing Measurement Results in Run Protocol</u> (Section 6.2).
- <u>Viewing Exported Measurement Results</u> (Section 6.3).
- <u>Printing Measurement Results</u> (Section 6.4).

### 6.2 Viewing Measurement Results in Run Protocol

Measurement results are displayed in a series of tabs within Run Protocol:

- State displays which samples were measured successfully and which were not because of errors during the measurement (refer to Section 6.2.1, *<u>Viewing State</u>*).
- Raw Data displays actual values measured. For kinetic measurements, results are displayed for each measurement cycle. For linear and area scan measurements, results are displayed for each measurement point (refer to Section 6.2.2, *Viewing Raw Data*).
- Graphs displays graphs of measurement data for kinetic and scan measurements only (refer to Section 6.2.3, <u>Viewing Kinetic and Scan</u> <u>Graphs</u>).

### 6.2.1 Viewing State

State displays which samples were measured successfully and which were not because of errors during the measurement (Figure 6-2):

- OK sample measured successfully.
- Error sample not measured because an instrument error occurred.
- Overflow no results available because the value measured exceeds the upper measurement limit.
- Incorrect sample was measured, but is incorrect because an instrument error occurred.
- Unused sample not selected for measurement in the protocol.



Figure 6-2. State displayed for an area scan measurement

To view State of samples or measurement points:

- 1. If necessary, in the left panel of the tab, click the + next to the desired detection method to expand the view and access measurement cycles (Figure 6-2).
- 2. For absorbance, luminescence, and fluorescence measurements, select the desired measurement cycle. The status of each sample measured in the cycle appears in the right pane.

OR

For linear and area scan measurements, choose the desired sample. The status of each measurement point for the chosen sample appears in the right pane.

3. Choose a different cycle or sample to view.

OR

Choose a different results tab to view.

OR

Choose **Finish** to close Run Protocol. Measurement results are saved and/or prepared for printing when file and print options are defined in the protocol (refer to Section 5.2.6, *Configuring Output Settings*).

### 6.2.2 Viewing Raw Data

**Raw Data** displays the results for each sample or point measured in every cycle (Figure 6-3).

Run Protocol Kinetic 02 Prepara to Run Run Detection method(s)	Click Finish to e	xport i	data.	00:00:00 00:00:08										
	State Raw Data G	aphs	1	2	3	له	4	E	7	a		10	11	12
	Cycle 1	Δ	3 369	0.253	0.556	1 37	3 134	1 944	2 977	0.63	1 826	2 897	0.636	0.19
	- Cycle 2	в	2.154	3,585	2.648	3.515	2,994	1.911	3.302	3.25	3.446	3.978	0.434	2.267
	Cycle 3	С	2.639	1.227	0.249	1.28	2.474	1.763	3.912	0.481	0.444	3.416	2.024	0.285
	Cycle 1	D	0.838	0.409	2.654	0.179	1.201	3.316	1.449	2.44	1.881	0.711	3.048	1.579
		Е	3.823	1.479	2.808	0.254	3.457	0.327	0.448	3.391	3.818	2.289	2.73	1.906
Measuremen	it	F	1.694	1.697	2.155	0.063	2.985	0.154	3.746	2.737	1.56	2.363	2.677	2.585
cvcle or		G	3,256	3.122	2.049	0.129	2.528	1.994	0.386	1.927	2.179	2.67	2.495	0.994
sample		п	2,904	3.037	1.024	0.117	2,900	2.033	0.400	2.349	1.070	0.740	2.405	3.304
													Fi	inish

Figure 6-3. Raw Data displayed for a kinetic absorbance measurement

To view Raw Data of samples or measurement points:

- 1. If necessary, in the left panel of the tab, click the + next to the desired detection method to expand the view and access measurement cycles (Figure 6-3).
- 2. For absorbance, luminescence, and fluorescence measurements, select the desired measurement cycle. Raw data measured for each sample in the cycle appears in the right pane.

OR

For linear and area scan measurements, choose the desired sample. Raw data measured at each point within the chosen sample appears in the right pane.

- If desired, right-click on the raw data results and choose Copy to copy the raw data values to the clipboard. The values may then be pasted into another document or file.
- 4. Choose a different cycle or sample to view.

OR

Choose a different results tab to view.

OR

Choose **Finish** to close Run Protocol. Measurement results are saved and/or prepared for printing when file and print options are defined in the protocol (refer to Section 5.2.6, *<u>Configuring Output Settings</u>*).

### 6.2.3 Viewing Kinetic and Scan Graphs

**Graphs** displays graphs for each sample measured in kinetic, area scan, and linear scan protocols (Figure 6-4). The tab is not displayed unless a kinetic or scan measurement is performed.

👫 Run Protocol 340 Scan													
1	R	un Pi	otoc	ol									
Prepare to Run Proto		Click Fi	nish to expo	rt data.									
		Estimat	ed Time		00:22								
		Measur	ement Time		00:39								
	Sta	te Raw D	ata Graph	is 2	4	E	6	7	0	0	10	11	12
	A									ANA			
	в					NAME			-	WA	<b>Why</b>		N N
	c			<b>P</b>		<b>Mala</b> i	藆	-	19 <b>1</b> 00	1		*	
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	E	WARA				<b>We</b>		A					
	F	-				<b>WAR</b>		WWW.					
	G			WAN I	MA)	W							
	н				WHA.	Man				MARINA	<b>Week</b>	MA	
	_									<	Back	•	Finish

Figure 6-4. Viewing area scan measurement graphs

Graphs for individual samples can be viewed in detail. To view a detailed graph of an individual sample:

Click on the desired sample to view. **Graphic View** appears (Figure 6-5). Refer to Section 6.2.3.1, *Viewing Detailed Graphs of Individual Samples*, for more information about viewing and printing detailed graphs.

#### To exit Graphs:

Choose a different results tab to view.

#### OR

Choose **Finish** to close Run Protocol. Measurement results are saved and/or prepared for printing when file and print options are defined in the protocol (refer to Section 5.2.6, *<u>Configuring Output Settings</u>*).

#### 6.2.3.1 Viewing Detailed Graphs of Individual Samples

Graphic View displays a detailed graph of the measurement results for an individual sample. Two types of graphs are available:

- Area scan measurements display a three-dimensional graph that may be rotated horizontally and vertically (refer to Section 6.2.3.1.1, *Viewing and Printing an Area Scan Graph*).
- Kinetic and linear scan measurements display a two-dimensional graph that may be zoomed (refer to Section 6.2.3.1.2, <u>Viewing and Printing a Kinetic or</u> <u>Linear Scan Graph</u>).

#### 6.2.3.1.1 Viewing and Printing an Area Scan Graph

Area scan measurements display a three-dimensional graph with the optical density (OD) of all points measured color coded (Figure 6-5). The graph may be rotated horizontally and vertically and printed.



Figure 6-5. Three-dimensional area scan graph

To rotate the graph:

- Use the vertical scroll bar to rotate the graph vertically.
- Use the horizontal scroll bar to rotate the graph horizontally.
- Double-click on the graph to start and stop a continuous animated horizontal rotation of the graph.

To print the graph:

- 1. From the File menu, choose **Print**. Print appears.
- 2. Configure printing options as desired, and choose OK to print the graph.

To close Graphic View:

From the File menu, choose **Close**.

#### 6.2.3.1.2 Viewing and Printing a Kinetic or Linear Scan Graph

Kinetic and linear scan measurements display a two-dimensional graph tracking the optical density (OD) measured in each cycle or at each point (Figure 6-6). Two-dimensional graphs support zooming in on selected regions and printing.



Figure 6-6. Two-dimensional kinetic graph with zoom region selected

To zoom in on a region:

- 1. Position the cursor at the desired starting point for the region, then click and hold the mouse button down.
- 2. Drag the mouse until the desired region is selected (Figure 6-6). The selected region is highlighted in black.
- 3. Release the mouse button. Graphic View displays the zoomed view of the selected region.

To print the graph:

- 1. From the File menu, choose **Print**. Print appears.
- 2. Configure printing options as desired, and choose **OK** to print the graph.

To close Graphic View:

From the File menu, choose Close.

### 6.3 Viewing Exported Measurement Results

When a protocol has export and/or data file options configured in Output Settings, measurement results are exported after completing a protocol run. Exported results are always opened, viewed, and evaluated in a compatible software application, such as Microsoft® Excel. Multimode Detection Software only provides the ability to view results before they are exported.

Two file export and save options are available:

 Export to Microsoft Excel — saves results in a format compatible with Microsoft Excel, and automatically opens Excel when the protocol run is completed. Refer to Section 6.3.1, <u>Viewing Measurement Results Using</u> <u>Microsoft® Excel</u>, for more information about viewing exported results in Excel.

**Note:** Multimode Detection Software automatically determines the appropriate export method based on the version of Microsoft Office installed on the host computer. XML (.xml) files are exported when Office XP is installed. When Office 2000 installed, the measurement results are copied into a new spreadsheet which must be saved in Excel. Versions of Excel prior to Office 2000 are not supported by the Export to Microsoft Excel function, but can open measurement results stored in tab-delimited data (.dat) files.

• Create .XML and .dat data files — saves results in .xml and tab-delimited data (.dat) files, which may be opened by compatible software applications.

**Note:** Refer to Section 5.2.6, <u>*Configuring Output Settings*</u>, for more information about configuring export and file options.

To view saved measurement results:

- 1. Open the desired software application.
- Browse to the directory where exported measurement results are stored, and open the desired file. Saved measurement results are stored in the data directory selected in Software Settings (refer to Section 1.4.2.4, <u>Choosing the Directory</u> <u>Where Measurement Results are Saved</u>).

### 6.3.1 Viewing Measurement Results Using Microsoft<sup>®</sup> Excel

When Export to Microsoft Excel is defined in the protocol, protocol information and measurement results are exported to a file and automatically opened in Excel after completing a protocol run. Each exported Excel spreadsheet contains data for a single protocol run. Data is presented in a series of worksheets. The first worksheet, General, contains information about the protocol (refer to Section 6.3.1.1, <u>Viewing</u> <u>Information About the Protocol</u>). Raw data is contained in separate worksheets for each measurement cycle (refer to Section 6.3.1.2, <u>Viewing Measurement Results</u>).

### 6.3.1.1 Viewing Information About the Protocol

**General**, the first worksheet in all Excel files exported by Multimode Detection Software, contains information about parameters configured in the protocol and the protocol run itself (Figure 6-7).

2	Microsoft Excel - Basic Endpo	int Measurement Fluorescein	(96)_F	luorescein	Top.0_0	4-23-2004	4_01.26.0	6.40.xml
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	A	B	С	D	E	F	G	Н
1	Operator	Operator						
2	Header	Fluorescein (96)						
3	Identification	Fluorescein (96)						
4	Date	4/23/2004 13:26						
5	Description	Description						
6	PlateName	PlateNamelsDefined						
7	DateMeasured	4/23/2004 12:06						
8	DateEvaluated	4/7/2004 9:06						
9	ValidState	Defined						
10								
11	Software	Apex						
12	Version	1.0.0.13						
13								
14	Instrument Name	Multimode Reader						
15	Serial Number	0						
16	FW Version							
17	PIC Version							
18								
19	Labware							
20	Name	Standard 96						
21	Rows	8						
22	Columns	12						
23	ProtectionState	ReadOnly						
24	WellShape	Round						
25	BottomShape	Flat						
26	Created	12/3/2003 18:00						
27	DateEdited	12/3/2003 18:00						

Figure 6-7. Viewing protocol information in the General worksheet (excerpt)

To view the General worksheet:

In Excel, choose the General tab in the lower left corner of the window.

#### 6.3.1.2 Viewing Measurement Results

Measurement results exported to Excel display raw data in matrices that represent the layout of measured wells on the plate (Figure 6-8). When multiple measurement cycles were performed in a protocol run, data from each cycle is presented in a separate worksheet.

DTX 880 — Fluorescence polarization measurement results contain raw data and calculated mP (refer to Section 6.3.1.2.1, <u>Viewing Fluorescence</u> <u>Polarization Results (880 only)</u>).

	1icrosoft Excel - Ba	sic Endpo	int Measu	irement l	Fluoresce	in (96)_F	luorescei	n Top.0_0	14-23-20	04_01.26.	.06.40.xn	ıl	
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		7× 0	-ycie C	D	F	F	G	н	1	. I	к		М
1	Cycle	1	of	1	L		Overflow			•	10		m
2	Temperature	22	°C	· ·			Error						
3	Time	0	seconds				Unused						
4	MatrixFormat	Plate					Incorrect						
5							OK						
6		1	2	3	4	5	6	7	8	9	10	11	12
7	1	0.012	0	4	4	0.152	0.301	1.126	1.932	0.109	4	0	0.012
8	2	2.545	4	0.011	4	0.153	0.3	1.127	1.936	0.108	4	0	2.54
9	3	0.012	0	4	4	0.152	0.301	1.127	1.938	0.107	4	0	0.012
10	4	2.413	4	0.009	4	0.153	0.302	1.13	1.94	0.107	4	0	2.381
11	5	0.012	0	4	4	0.153	0.304	1.132	1.942	0.107	4	0	0.012
12	6	2.408	4	0.009	4	0.155	0.305	1.137	1.948	0.107	4	0	2.32
13	1	0.012	0	4	4	0.153	0.307	1.142	1.949	0.108	4	0	0.012
14	0	2.384	4	0.009	4	0.157	0.31	1.153	1.954	0.107	4	U	2.251
16													
17													
18													

Figure 6-8. Viewing absorbance data in a Cycle worksheet (excerpt)

To view results for a measurement cycle:

In Excel, choose the **Cycle** tab for the desired measurement cycle.

## 6.3.1.2.1 Viewing Fluorescence Polarization Results (880 only)

Fluorescence polarization measurement results exported to Excel contain raw data measured at both the parallel and perpendicular polarization planes and calculate an approximate mP for each sample (Figure 6-9). Data is laid out in matrices that represent the wells on the plate. When multiple measurement cycles were performed in a protocol run, data from each cycle is presented in a separate worksheet.

The mP calculated for each sample is considered approximate because:

- Blank samples are not defined at run time, but are required to increase the accuracy of the results.
- The G-factor used in the calculation, which factors out differences in detection efficiency between the polarization planes, is derived from fluorescein measurements performed on a number of DTX 880 instruments.

**Note:** Minor deviations between the actual G-Factor present in the measurement and the average G-factor used in the calculation result in a common shift for all mP values measured. Differences in mP between samples and controls are not affected to a first order approximation. If a more accurate G-factor has been determined for the instrument, it may be entered in the G-factor cell in the spreadsheet.

	8	<u>File Edit V</u> iew	Insert	Format	<u>T</u> ools	Data V	/indow	Help						
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	1	Cycle	1	of	1		e	Overflow						
	2	Temperature	0	°C				Error						
	3	Time	0	seconds				Unused						
	4	MatrixFormat	Plate					Incorrect						
	5	Barallal		2	2		Б	CK CK	7	•	•	10	11	12
<b>.</b>	6	r aranei 1	1200224	Z 70700	3 101E007	9440000	160070	1600000	1071040	9 1122090	3 10200E0	10	1210257	1002500
Parallel	2	2	2008897	250007	325009	1107325	106672	3009800	2478041	2937941	488922	616520	2966642	32025
nolorization		3	3735267	411448	923796	24667	3686759	2058571	1269501	3773845	262697	2884305	838280	49522
	10	4	2563314	661601	2861616	1635649	136983	458374	1763470	517249	843349	3859345	1039214	1849722
lane raw data 📃	11	5	1543516	3011252	900184	61070	2740933	648881	1220745	2960518	1835794	1009347	2791205	220282
	12	6	3608513	3559676	1717639	1702857	3045573	2449378	2807387	1324213	3289586	2793620	1246257	901892
	13	7	2227146	1170803	782263	2448136	2412549	3232367	69319	440642	3966519	982926	1582394	306073
	14	8	2509960	2629258	3445672	1121300	3859774	1423468	3872121	3989441	974122	1816235	3562401	43866
	15													
	17													
	18													
	19													
	20													
	21	Perpendicular	1	2	3	4	5	6	7	8	9	10	11	12
Pernendicular	23	1	779350	67459	1519509	98854	1370032	2889290	3848080	2527563	1501256	1150524	3478199	602293
cipenalealai	24	2	169006	193641	2174919	1441045	868017	3546105	3097786	3119224	1317362	3273950	3784489	89935
polarization		4	2730455	3212136	1818640	2224397	3971993	1534553	3243573	2122637	125762	403026	1791610	1239343
	27	5	2632831	2840880	3628996	2158282	1669376	28500	31772	1868119	3834173	1918844	2239292	236755
nane raw data	28	6	761667	3650614	1042925	771704	3422259	228784	2794769	507987	2300091	94093	488748	811576
	29	7	1991226	1205041	3930877	3304224	643694	138517	410455	1698008	3877177	1798485	2731733	3041024
	30	•	501353	401113	120100	3113764	2748100	3726412	437510	3114636	3140103	2163633	1160630	207313
	32													
	33													
	34													
	36													
	37													
	38													
	39	li-Factor	0.62	2	2		5	e	7	0	•	10	11	12
	40	1	452 1509	276 1445	165 3399	965.0225	-685 2022	-66 86726	-304.8422	-165.0444	328 112	-960 1014	-244 0925	490 501
Calculated	42	2	900.8514	351 1539	-6115721	106 9017	-9816479	155 7517	126 7233	206.086	-251.0882	-534 0269	116 7432	-8913803
		3	366.8905	-657.5561	-116.3443	-957.264	262.7933	486,7109	-226.9134	508,4003	542,2399	840.5477	-76,78958	-943.3907
mP	44	4	643.9944	-578.2213	434.6914	85.08855	-876.2792	-349.7304	200.2697	-435.7132	67.73224	348.6114	-33.29479	413.0187
	45	5	-27.97318	261.8923	-428.4839	-912.7076	451.7861	946.9808	968.2394	437.5802	-128.506	-82.00718	335.6434	-739.0282
-	46	6	768.5553	222.6142	453.0081	561.3134	178.7702	890.5181	236.6952	615.7166	395.1804	959.0894	608.8201	283.768
	47	7	286.7331	220.9037	-514.0328	88.84565	716.1156	948.2374	-571.8421	-409.8836	245.3028	-62.98167	-33.96768	237.6176
	40	8	779 607	792 4225	955 5967	-266 0577	387 5105	-237 532	852 3499	347 6593	.333 7325	150 3441	657 8823	-605 467

Figure 6-9. Viewing fluorescence polarization data (excerpt)

### 6.4 Printing Measurement Results

When a protocol has Print options configured in Output Settings, the measurement results are available to print after completing a protocol run. Refer to Section 5.2.6, *Configuring Output Settings*, for information about the printing options available.

**Note:** Depending on how Print Settings are configured, Print and/or Print Preview may appear before the measurement results print. Refer to Section 1.4.2.2, *Configuring Print Settings* for information about enabling and disabling Print and Print Preview.

To print measurement results:

- 1. When the measurement is complete, press **Finish**. If Print and Print Preview are not enabled in Print Settings, no additional configuration is required. The measurement results print out.
- 2. If Print appears, configure printing options as desired and choose **OK**.

OR

If **Print Preview** appears, use the toolbar controls to change the magnification, layout view, or page(s) displayed, if desired (Figure 6-10)

Print preview		Page 13
Change	International Laboratories	displayed
		alepiayea
layout view	Date: Friday, April 23, 2004 Time: 11:53:21 AM	
	Protocol Definition Absorbance 260 Shaking	
Change view	Protocol Name : Absorbance 260 Shaking Application Type : BasicApplication	
magnification	Date Measured : Friday, April 23, 2004 Date Evaluated : Thursday, April 15, 2004 Valid : Defined	
	Value         . Oblined           Labeware Name         : Ab 384 Well Reaction Plate (24 x 16)           Used Wells         : 384           Lot #         : DefaultLot	
	Lot Optimized : Wednesday, March 24, 2004	
	Measurement Technic : Absorbance	
	C/P 1.1-1 1.2-1 1.3-1 1.4-1 1.5-1 1.6-1 1.7-1 1.8-1 1.9-1 1.10-1 1/1 3.748 2.647 2.053 0.336 2.345 2.997 0.404 2.132 2.633 0.745	
	C/P 1.11-1 1.12-1 1.13-1 1.14-1 1.15-1 1.16-1 1.17-1 1.18-1 1.19-1 1.20-1 1/1 0.301 2.503 3.02 2.253 3.122 3.017 2.247 1.901 0.555 0.894	
	OF         1.21*1         1.22*1         2.1*1         2.2*1         2.0*1         2.0*1         2.0*1           1/1         3.967         0.384         0.472         3.589         3.969         1.032         1.445         0.585         1.849         2.282	
	C/P 27.1 28.1 29.1 210.1 211.1 212.1 213.1 214.1 215.1 216.1	
	1/1         0.49         2.709         0.047         1.369         1.993         0.412         3.045         0.727         2.362         2.475	
	C/P 217-1 218-1 219-1 220-1 221-1 222-1 223-1 224-1 31-1 32-1	
	1/1         3.842         2.873         0.059         1.537         1.511         1.397         2.836         1.212         1.689         1.433	
	C/P 33-1 34-1 35-1 36-1 37-1 38-1 39-1 310-1 311-1 312-1	
	1/1 2.735 0.226 3.458 1.956 0.029 3.363 2.175 2.464 0.367 1.312	
	C/P 313-1 314-1 315-1 316-1 317-1 318-1 319-1 320-1 321-1 322-1	
	1/1         1.552         3.818         0.283         0.35         0.254         1.592         2.456         1.65         0.259         2.709	
	C/P 323-1 324-1 41-1 42-1 43-1 44-1 45-1 46-1 47-1 48-1	
	1/1 3.972 1.519 3.538 2.08 1.051 1.093 0.325 2.935 2.077 2.571	
	C/P 4.9-1 4.10-1 4.11-1 4.12-1 4.13-1 4.14-1 4.15-1 4.16-1 4.17-1 4.18-1	
	International Laboratories Page 1	

Figure 6-10. Previewing a measurement results printout

9	
---	--

Close

3. In Print Preview, choose **Print** to print out the measurement results.

4. In Print Preview, choose **Close** to close the window.

**Note:** Choosing Close without first choosing Print cancels the printout.

# Appendix A: Software Error Codes

### A.1 Troubleshooting Software Error Codes

Table A-1 lists software error codes, error messages, and recommended solutions for resolving errors.

Error Code	Error Message	Recommended Solution
1	Commanded transport motion exceeds actual physical travel limits.	Check plate parameters configured in Labware Information (refer to Section 4.2.1, <i>Defining Labware Information</i> ).
3	Auto calibration ramp parameter exceeds valid range.	Make sure the microplate carrier movement is not obstructed and run the measurement again.
4	Transport is not operational or the transport sensor is defective.	Make sure the transport lock has been removed from the microplate carrier.
5	Transport lost more than 2 full steps.	Make sure the microplate carrier movement is not obstructed.
6	Calibration positioning failed.	N/A
7	Offset calculated in auto calibration is out of expected range. Possible causes: ADC values are too low, lamp is not adjusted, incorrect EEPROM parameters.	Check filter parameters configured in Instrument Settings (refer to Section 2.3.2, <i>Defining and Editing Filter Slides</i> ).
8	Offset calculated in auto calibration is out of expected range. Possible causes: ADC values are too low, lamp is not adjusted, incorrect EEPROM parameters.	Contact a Beckman Coulter Service Engineer.
9	Z-transport adjust error. Possible causes: wrong well for adjustment, low fluorescein concentration.	In the Read Height Optimization Wizard, confirm that the correct well is selected for the optimization read (refer to Section 5.3.1.1, <i>Optimizing Read Height (880 only)</i> ).
10	Measurement attempted with no labware loaded.	Load a plate into the instrument.

Table A-1. Software Error Codes and Solutions

Error Code	Error Message	Recommended Solution
11	The current labware definition is invalid.	Check plate parameters configured in Labware Information (refer to Section 4.2.1, <i>Defining Labware Information</i> ).
12	Detection method parameters are invalid.	Check the configuration of detection method parameters.
13	The current labware format is not supported.	Make sure the plate type has been defined (refer to Section 4.2, <i><u>Creating Labware</u></i> ).
14	Currently loaded labware is not in the correct orientation.	Load the plate into the instrument with the orientation configured in the protocol.
16	Linear scan range exceeds well diameter.	Reduce the number of measurement points in the scan configuration (refer to Section 5.2.5.1, <i>Configuring a Method in Basic Mode</i> ).
21	Bright measurement below limit. Check Platedefinition.	Check plate parameters configured in Labware Information (refer to Section 4.2.1, <i>Defining Labware Information</i> ).
41	Filter wavelength or filter type in current detection method is not installed.	Check filter parameters configured in Instrument Settings (refer to Section 2.3.2, <i>Defining and Editing Filter Slides</i> ).
42	Filter wavelength in command is not defined in any Slide.	Check filter parameters configured in Instrument Settings (refer to Section 2.3.2, <i>Defining and Editing Filter Slides</i> ).
44	Currently inserted slide code does not match set slide code. Reinsert slide.	Make sure the correct filter slides are installed in the instrument.
46	No filter slide detected.	Make sure filter slides are installed.
47	Currently inserted filter slide code is invalid.	Make sure the correct filter slides are installed in the instrument.
48	Currently inserted filter slide contains no valid defined filters.	Make sure the correct filter slides are installed in the instrument and check filter parameters configured in Instrument Settings (refer to Section 2.3.2, <i>Defining and Editing Filter</i> <u>Slides</u> ).
51	Temperature setpoint exceeds 45°C/113°F.	Check the temperature set in Manual Control and/or the protocol. Set a desired temperature less than 45°C, if necessary (refer to Section 2.3.3.1, <u>Temperature Control (880 only)</u> ).
60	Currently inserted LED is not defined.	Contact a Beckman Coulter Service Engineer.
61	LED causing ADC overflow.	Make sure the correct filter slides are installed in the instrument and check filter parameters configured in Instrument Settings (refer to Section 2.3.2, <i>Defining and Editing Filter</i> <u>Slides</u> ).

Error Code	Error Message	Recommended Solution
62	LED energy too low.	Make sure the correct filter slides are installed in the instrument and check filter parameters configured in Instrument Settings (refer to Section 2.3.2, <u>Defining and Editing Filter</u> <u>Slides</u> ).
63	No LED for selected filter installed.	Contact a Beckman Coulter Service Engineer.
64	ADC gain cannot be maintained	Contact a Beckman Coulter Service Engineer.
65	LED gain setting failed.	Contact a Beckman Coulter Service Engineer.
66	ADC gain fluctuated during measurement, correction of PMT counts is not possible. Try measurement again.	Run the measurement again.
67	Reference ADC too high for valid luminescence measurement.	Make sure the filter compartment and microplate chamber doors are closed.
68	PMT dark counts exceed valid range for measurement. Check threshold or ensure that flaps are closed.	Make sure the filter compartment and microplate chamber doors are closed.
69	Reference ADC LED too low, retry measurement.	Run the measurement again.
140	Command canceled. Aborted by user.	N/A
141	Measurement time exceeds limit for current measurement method.	Use a shorter measurement time in the detection method configuration.
142	Current measurement incomplete, wrong command received.	Check the parameters configured in the protocol.
144	Instrument is busy.	Wait until the amber LED on the instrument is off. If instrument is still busy when the LED is off, turn the instrument off and on.
400	Unknown PIC error.	Contact a Beckman Coulter Service Engineer.
401	Communication timeout with PIC controller.	Contact a Beckman Coulter Service Engineer.
403	PIC timeout during a measurement or initialize.	Contact a Beckman Coulter Service Engineer.
410	Number of steps are zero.	Check the parameters configured in the protocol.
411	LED transport commanded to move to a position less than 0.	Contact a Beckman Coulter Service Engineer.
412	Shutter transport commanded to move to a position less than 0.	Contact a Beckman Coulter Service Engineer.
413	Z transport commanded to move to a position less than 0.	Contact a Beckman Coulter Service Engineer.
415	LED transport commanded to move to a position greater than maximum travel.	Contact a Beckman Coulter Service Engineer.
416	Shutter transport commanded to move to a position greater than maximum travel.	Contact a Beckman Coulter Service Engineer.

Error	Error Message	Recommended Solution
Code		
417	Z transport commanded to move to a position greater than maximum travel.	Contact a Beckman Coulter Service Engineer.
419	LED transport initialization failed.	Contact a Beckman Coulter Service Engineer.
420	Shutter transport initialization failed	Contact a Beckman Coulter Service Engineer.
421	Z transport initialization failed	Contact a Beckman Coulter Service Engineer.
423	LED transport lost steps.	Contact a Beckman Coulter Service Engineer.
424	Shutter transport lost steps.	Contact a Beckman Coulter Service Engineer.
425	Z transport lost steps.	Contact a Beckman Coulter Service Engineer.
427	LED transport is not energized	Initialize the instrument (refer to Section 2.2.3, <i>Initializing the Instrument</i> ).
428	Shutter transport is not energized	Initialize the instrument (refer to Section 2.2.3, <u>Initializing the Instrument</u> ).
429	Z transport is not energized	Initialize the instrument (refer to Section 2.2.3, <i>Initializing the Instrument</i> ).
431	LED transport error while positioning.	Contact a Beckman Coulter Service Engineer.
432	Shutter transport error while positioning.	Contact a Beckman Coulter Service Engineer.
433	Z transport error while positioning.	Contact a Beckman Coulter Service Engineer.
440	LED number is out of valid range (0-15).	Contact a Beckman Coulter Service Engineer.
441	LED not initialized	Contact a Beckman Coulter Service Engineer.
442	The LED is not powered.	Contact a Beckman Coulter Service Engineer.
443	The LED has exceeded maximum allowed power consumption.	Contact a Beckman Coulter Service Engineer.
444	LED power is low.	Contact a Beckman Coulter Service Engineer.
445	LED power overflow.	Contact a Beckman Coulter Service Engineer.
446	No LED installed.	Contact a Beckman Coulter Service Engineer.
450	No temperature installed.	Check instrument configuration.
451	Temperature setpoint exceeds maximum valid setpoint.	Decrease the temperature setting (refer to Section 2.3.3.1, <u>Temperature Control (880</u> <u>only)</u> ).
452	Temperature sensor is not responding.	Check the current temperature setting (refer to Section 2.3.3.1, <u>Temperature Control (880</u> <u>only)</u> ).
453	Temperature sensor not found	Decrease the temperature setting (refer to Section 2.3.3.1, <u>Temperature Control (880</u> <u>only)</u> ).

Table A-1. Software Error Codes and Solution
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# Index

### Α

absorbance detection methods configuring 3-6 selecting type 3-4 area scan measurements configuring 5-10 viewing graph 6-7

### С

communication settings configuring 1-13 copying detection methods 3-15 labware 4-10 protocols 5-29 creating detection methods 3-3 labware 4-3 protocols 5-3

### D

deleting detection methods 3-16 labware 4-11 protocols 5-30 detection methods configuring absorbance 3-6 configuring fluorescence intensity bottom 3-9 configuring fluorescence intensity top 3-8 configuring fluorescence polarization 3-10 configuring in protocols 5-8 configuring luminescence 3-7 configuring time resolved fluorescence 3-11 copying 3-15 creating 3-3 deleting 3-16 editing 3-13 selecting absorbance type 3-4 selecting for labware optimization 4-13 selecting technique 3-3

### Ε

editing detection methods 3-13 labware 4-7 labware dimensions 4-8 labware lots 4-9 protocols 5-28 well information 4-8 error codes A-1

### F

filter slides adding 2-8 configuring 2-9 exporting and importing 2-10 overview 2-8 removing 2-10 fluorescence intensity bottom detection methods configuring 3-9 fluorescence intensity top detection methods configuring 3-8 fluorescence polarization detection methods configuring 3-10 viewing results 6-12

#### Η

host computer removing software from 1-9 system requirements 1-5

### I

instrument connecting to 2-4 initializing 2-4 instrument selection list overview 2-1 instrument settings configuring 2-6 filter slides 2-8 manual control 2-11 emission filter slide control 2-12 excitation filter slide control 2-12 plate control 2-12 temperature control 2-11

### Κ

kinetic measurements configuring 5-9 viewing graph 6-8

### L

labware configuring layout settings in a protocol 5-6 copying 4-10 creating 4-3 defining dimensions 4-3 defining well information 4-3 editing dimensions 4-8 editing well information 4-8

optimizing manually selecting well centers 4-16 overview 4-12 performing the optimization 4-15 preparing for optimization 4-14 selecting detection method 4-13 verifying well centers 4-17 selecting and editing lots 4-9 selecting in protocols 5-5 selection guidelines 4-5 languages installing on a German language operating system 1-6 setting 1-16 linear scan measurements configuring 5-10 viewing graph 6-8 luminescence detection methods configuring 3-7

#### Μ

measurement results choosing storage directory 1-19 printing 6-13 viewing in Run Protocol 6-3 viewing kinetic graphs 6-6 viewing raw data 6-4 viewing results in Excel 6-9 viewing saved 6-9 viewing scan graphs 6-6 viewing state 6-3 measurement techniques selecting in protocols 5-4 microplate carrier ejecting 2-3 loading 2-3 Multimode Detection Software accessing online help 1-4 configuring communication settings 1-13 configuring software settings 1-15 error codes A-1 installing 1-5 launching 1-2 overview 1-1 removing from host computer 1-9 repairing an installation 1-9

setting up 1-11 system requirements 1-5 using the software interface 1-3

### 0

online help accessing 1-4 optimizing labware 4-12 optimizing read height 5-23

#### Ρ

preparation methods configuring in protocols 5-8 configuring set temperature 5-16 configuring shake 5-15 printing configuring settings 1-17 measurement results 6-13 protocols 5-31 protocols configuring an external program 5-20 configuring detection methods 5-8 configuring general settings 5-3 configuring labware layout 5-6 configuring methods in basic mode 5-9 configuring output settings 5-18, 5-19 copying 5-29 creating 5-3 deleting 5-30 optimizing read height 5-23 printing 5-31 running in simulation mode 5-26 on an instrument 5-21 selecting labware 5-5

selecting methods advanced mode adding set temperature preparation methods 5-16 configuring a shake preparation method 5-15 configuring set temperature preparation methods 5-16 selecting technique type 5-4

### R

read height optimizing 5-23 setting before a protocol run 5-22

### S

shaking configuring a shake preparation method 5-15 configuring in protocols 5-10 manual control 2-12 simulated data files choosing default 1-18 selecting before a protocol run 5-26 simulation mode choosing default simulated data files 1-18 running protocols 5-26 software settings choosing data storage directory 1-19 choosing default simulated data files 1-18 configuring 1-15 configuring print settings 1-17 setting system language 1-16

### Т

temperature control configuring a set temperature preparation method 5-16 configuring in Instrument Settings 2-11 time resolved fluorescence detection methods configuring 3-11