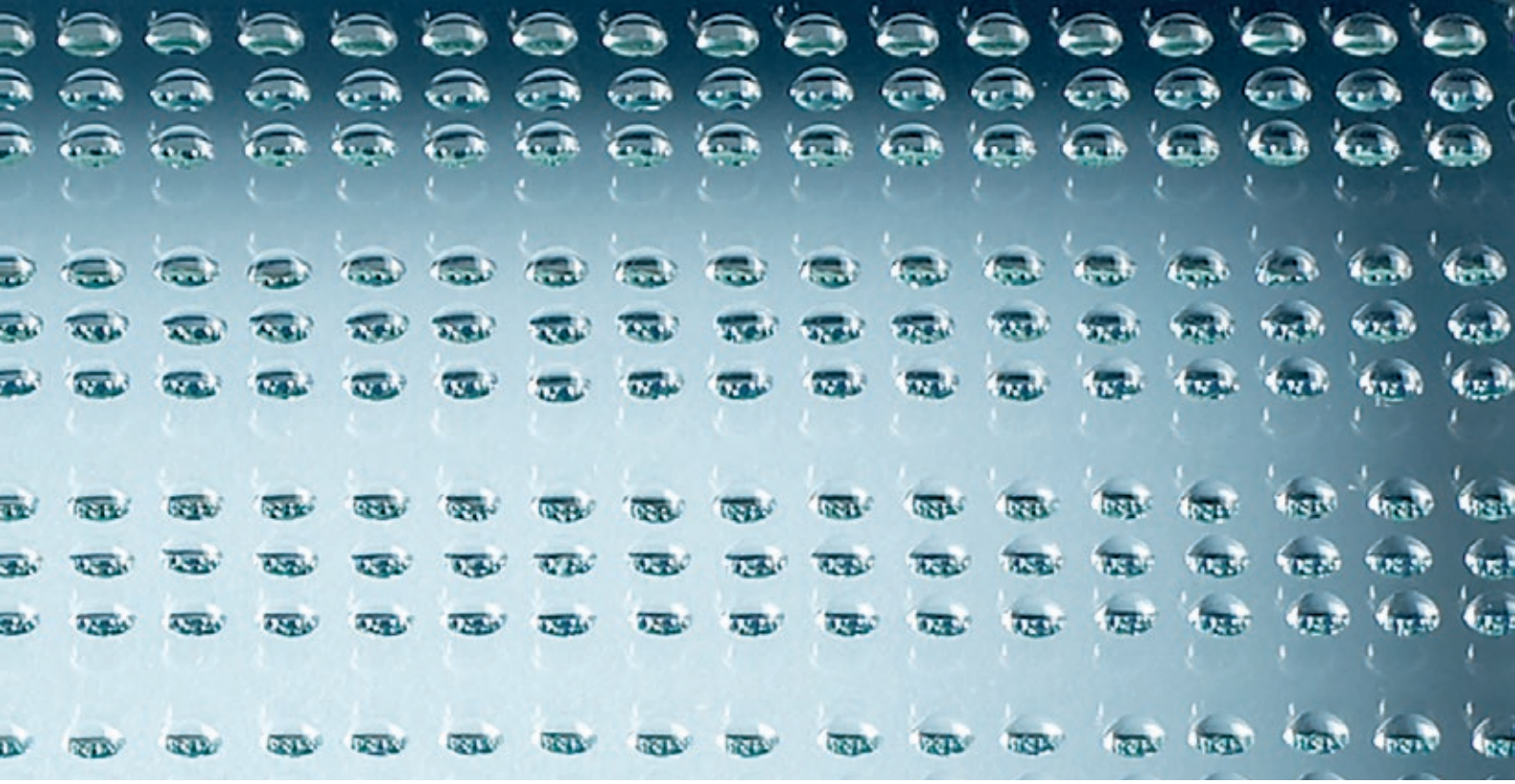

Thermo Scientific

FILLit™ Software for Multidrop™ Combi nL

User Manual

Software version 2.0

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About the User Manual

Intended users

The user manual has been written for the users of the Thermo Scientific Multidrop Combi nL reagent dispenser and provides information on Thermo Scientific FILLit Software for Multidrop Combi nL. The manual contains the operating instructions for version 2.0 of the software.

Read the manual in its entirety before using the software.

For more information

For instrument-related issues, refer to the *Thermo Scientific Multidrop Combi nL User Manual* (Cat. no. N07171). The software user manual can be found in PDF format on the software installation USB stick.

Please refer to the printed user manual for the latest information.

For the latest information on products and services, visit our website at:

http://www.thermofisher.com

http://www.thermofisher.com/multidrop

In an effort to produce useful and appropriate documentation, we appreciate your comments on this user manual to your local Thermo Fisher Scientific representative.

Warning and other markings used in the documentation

The following symbols and markings appear in this user manual.

Caution Risk of damage to the instrument, other equipment or loss of performance or function in a specific application.

Note Marks a tip, important information that is useful in the optimum operation of the system, or an item of interest.

Tip Gives a helpful hint for getting the most out of the software functionality.

Chapter 1
Introduction

Thermo Scientific FILLit Software

FILLit Software is used to control the Multidrop Combi nL reagent dispenser.

The software provides features needed to create, open and run dispensing protocols, control the instrument, and to transfer protocols between the workstation (PC) and the instrument. The software also provides features needed for calibration and for transferring calibrations. The plate templates cover the most common plate formats. The software also lets you edit existing protocols.

Creating a protocol is effortless. The protocol steps are simply added to a step tree while their parameters can be viewed and defined in one window.

With the software you can:

- Open, create and edit dispensing protocols
- Run a protocol directly from the software with the instrument
- Use dispense, shake, prime, empty and pause protocol steps
- Calibrate liquids for accurate dispensing
- Control the instrument, for example, to prime and empty the dispensing system
- Transfer protocols and calibrations between the workstation and instrument
- Create and print reports

The dispensing protocols are created and then stored in the file system on the workstation using the software. Once you have created a protocol, you can run it directly from the software or transfer it to the instrument. The workstation and the instrument only have to be connected to each other when protocols are run directly from the software or when protocols or calibrations are transferred. This lets you create and edit protocols independently without a connection to the instrument.

Figure 1-1. Operation principle

Thermo Scientific Multidrop Combi nL

The Multidrop Combi nL (Figure 1-2) is an automatic, programmable, eight-valve bulk reagent dispenser for nanoliter to microliter volume dispensing. It has a pressure/vacuum based dispensing system for rapid and continuous dispensing of liquids into various microplates. It can dispense one reagent from an external pressurized liquid reservoir into different rows, columns or wells. The instrument can be used in several applications in drug discovery, and genomic and proteomic assays.

With a volume range of 50 nl to 50 µl for 96-, 384- and 1536-well plates with dispensing heights from 5 to 55 mm, the Multidrop Combi nL offers outstanding flexibility for a wide range of applications. The Multidrop Combi nL is lightweight, transportable and compact on a laboratory bench. It can dispense 50 nl into the entire 384-well microplate in 6 seconds or 50 nl into the entire 1536-well microplate in 21seconds.

Figure 1-2. Multidrop Combi nL microplate dispenser

The instrument is available in the following configuration:

- Multidrop Combi nL, 100–240 V 50/60 Hz, (Cat. no. 5840400)

For more information, see the *Thermo Scientific Multidrop Combi nL User Manual* (Cat. no. N07171).

Chapter 2
Installing FILLit Software

This chapter contains information on installing FILLit Software.

Before installation

Read these instructions before you attempt to install FILLit Software.

Note Failure to follow these instructions may lead to an unsuccessful installation of FILLit Software.

Checking the PC requirements

The table below lists the minimum PC requirements for FILLit Software.

Table 2-1. Minimum PC requirements

Minimum PC requirements	
Supported operating systems	Microsoft Windows 7 with Service Pack 1 or later, Microsoft Windows 8.1 and Microsoft Windows 10
Disk space	0.5 GB free disk space
Processor	Intel Pentium (or equivalent), 1 GHz or faster
Memory	1 GB RAM
Serial or USB ports available	1
Pointing device	Mouse or equivalent is necessary
Monitor / color settings	XVGA monitor with 1024 x 768 resolution

If you do not have the correct Service Packs installed, you can download them from the Microsoft website at:

http://www.microsoft.com

Checking Microsoft Windows regional settings

The Microsoft Windows regional format should be set to *English (United States)* or *English (United Kingdom)* before installing FILLit Software. The regional settings can be accessed in the Windows Control Panel:

Windows 7:

Start > Control Panel > Region and Language > Formats > Format > **English**

Windows 8.1:

Charms bar > Settings > Change PC Settings > Time and Language > Region and language > Country or region > **United Kingdom** or **United States**

Windows 10:

Settings menu > Time and Language > Region and language > Country or region > **United Kingdom** or **United States**

Installing

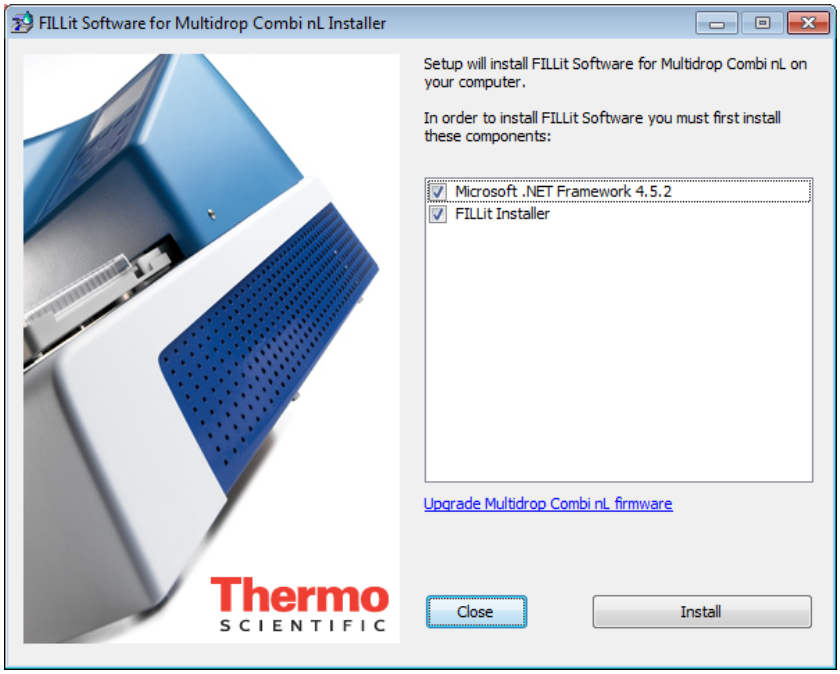
This section guides you through the software installation procedure.

Note FILLit Software cannot be installed on a network drive.

Note You must be logged on to your computer with Windows administrator rights to install FILLit Software.

Note You can stop the installation procedure at any stage by clicking **Cancel**. The setup will roll back your system to the initial state.

1. Check that the PC requirements in Table 2-1 are met.
2. Insert the FILLit Software installation USB stick into a USB port on your PC.
3. The **FILLit Software Installer** window appears automatically. If it does not appear, launch the installation from the USB stick by double-clicking the *Setup.exe* file.



4. FILLit Software Installer checks that all the software and system requirements are met and installs the required components:

   - Thermo Scientific FILLit Software, always installed.
   - Microsoft .NET Framework 4.5.2, installed if not found on your PC.

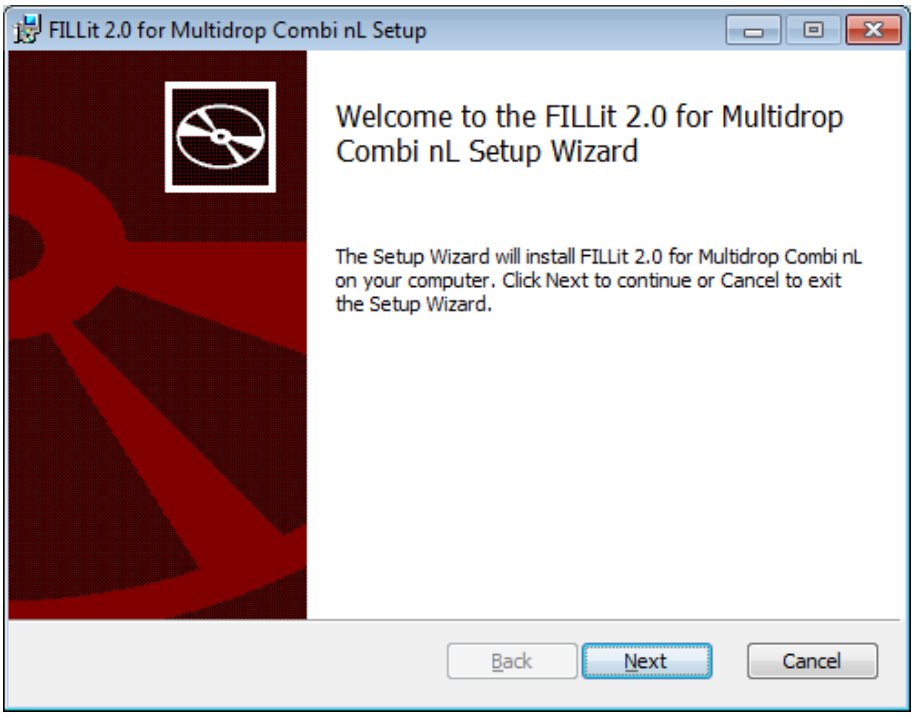
   Close all other programs from your computer and click **Next**.

5. The installation steps are shown.

   You may have to restart your computer after the prerequisites have been installed. However, the setup will inform you about it and the setup will continue after the restart.

Installing/Upgrading the software

When the prerequisites have been installed, the FILLit for Multidrop Combi nL Setup proceeds with the actual FILLit Software installation.

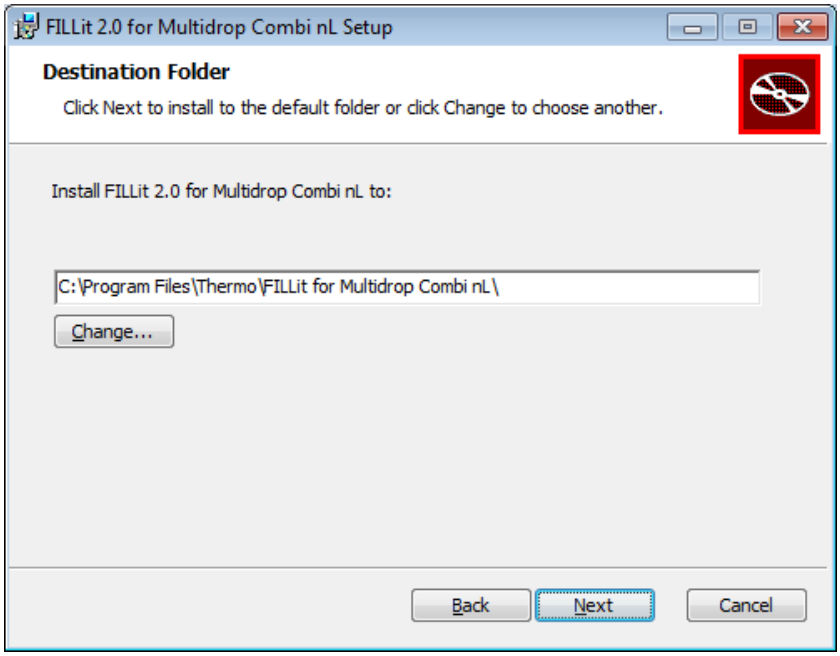


1. The Setup Wizard is launched automatically. The wizard guides you through the entire installation procedure. Click **Next**.

2. Read the End-User License Agreement and agree with it to proceed with the installation. Click **Next**.

3. The wizard automatically suggests file locations for the files to be installed. It is recommended to use these suggestions. Change them

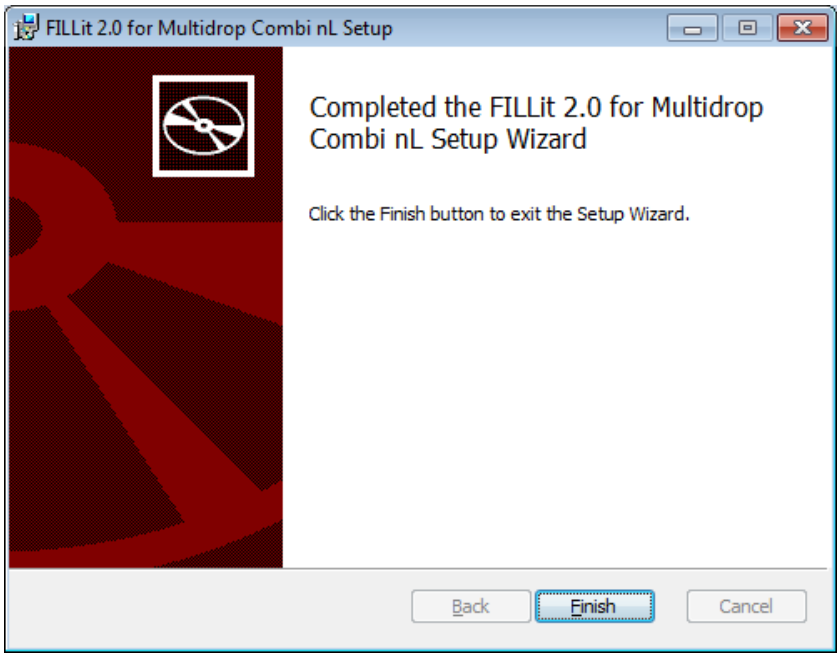
only if absolutely necessary. The recommended free disk space is minimum 0.5 GB.



Click **Change...** to select another folder or drive. Click **Next**.

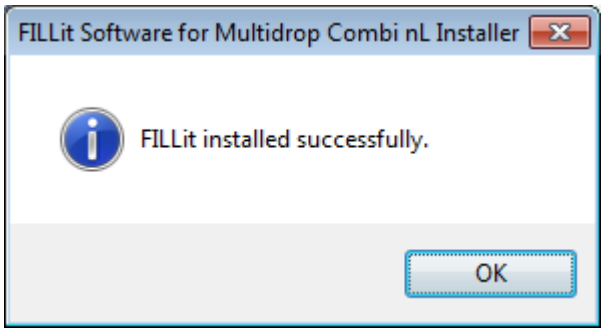
4. The wizard is now ready for the actual installation. Click **Install** to proceed. The installation files are copied to the selected folder.

5. When the installation is complete, you will receive a notification of it.



Click **Finish**.

6.



Exit the setup by clicking **OK**.

7. You can now open FILLit Software from the **Start** menu. For more information, see "Starting the software" on page 34.

Updating the embedded software

It is recommended that you always update the software to the newest embedded software version. Using the valve correction factor that relates to the valve change requires embedded software version 1.00.43 or later. This software version is supplied on the FILLit Software for Multidrop Combi nL version 2.0 USB stick. When you start the instrument, you will receive a message that shows you the current version number of the software.

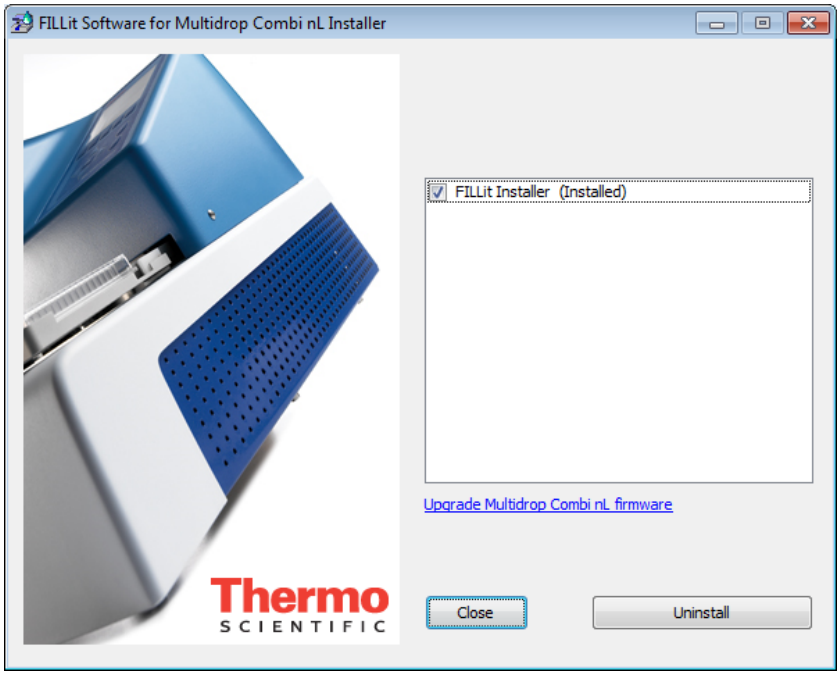
Before you start, check that:

- the workstation is connected to the instrument through a COM (1–9) port or USB port.
- the instrument is switched on.

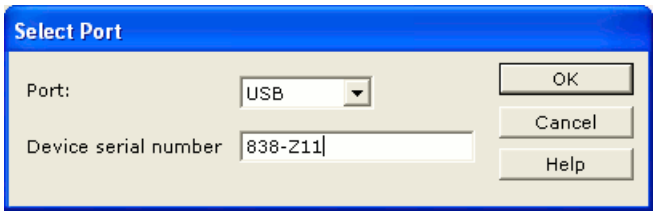
Caution Do not disconnect the cable or power off the instrument during the embedded software update. Failure to comply may render the instrument unworkable and require contacting the Thermo Fisher Scientific service representative.

Note After the update you cannot downgrade back to the previous version of the embedded software.

1. If you are already in the process of installing the embedded software, proceed with Step 3. Otherwise, insert the installation USB stick of FILLit Software into a USB port of your workstation. The **FILLit Software Installer** dialog opens.



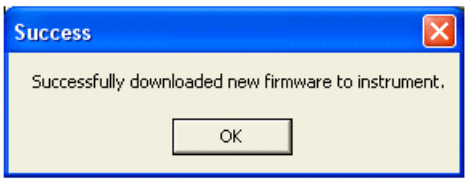
2. Click **Upgrade Multidrop Combi nL firmware**.



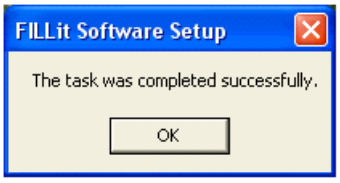
3. Select the serial communications port (COM 1–9) or USB port that the instrument is connected to from the **Port** list. When USB is selected, the *Device serial number* field can be left empty. Click **OK**.

Caution Do not switch off or disconnect the instrument during the installation. Otherwise a major service will be required.

Note Upgrading the embedded software may take several minutes.



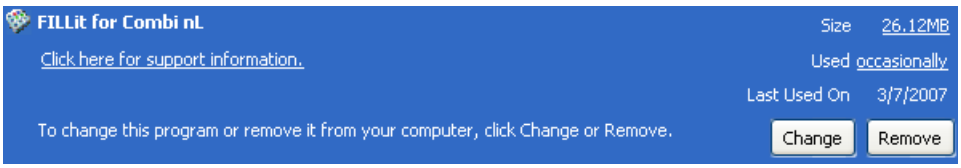
4. When the update has finished, you are notified of it. Click **OK**.



5. The FILLit Software installation is now completed. Click **OK**.

Uninstalling the software

You can uninstall FILLit Software by using the "Add-Remove Programs" application in the Windows Control Panel.



Click **Remove**. You are asked to confirm the removal of the program. Click **Yes**. FILLit Software is uninstalled.

Communicating with instruments

The instrument has to be configured in FILLit Software before a connection can be established between the instrument and FILLit Software on the workstation.

When the instrument and FILLit Software are connected, the software checks the serial number of the instrument and compares it to the configured instruments. The following sections describe the instrument and software settings. Also see Chapter 8: "*Settings*".

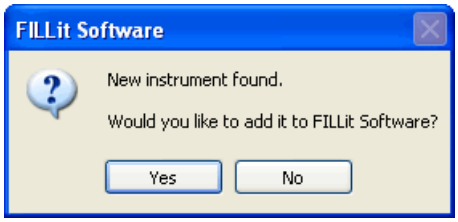
Defining a new instrument automatically

When you connect the workstation and a new instrument for the first time with FILLit Software, the software detects the new instrument automatically. Make sure that the corresponding computer interface, either USB or RS-232 (COM), is selected in the **Options** menu of the instrument. You can then add the instrument to FILLit Software.

1. Connect to the instrument with FILLit Software. Select the instrument from the list based on the communication mode, either USB or COM. For more information, see "Connecting the instrument to the workstation through a COM port" on page 25 or "Connecting the instrument to the workstation through a USB port" on page 26.

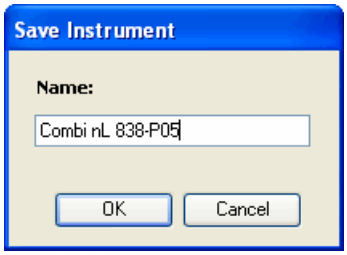
Click **Connect**.

2. When the software finds the instrument, you are asked if you want to add it to FILLit Software.



Click **Yes**.

3. Enter a name for the instrument. The default name has the instrument serial number.

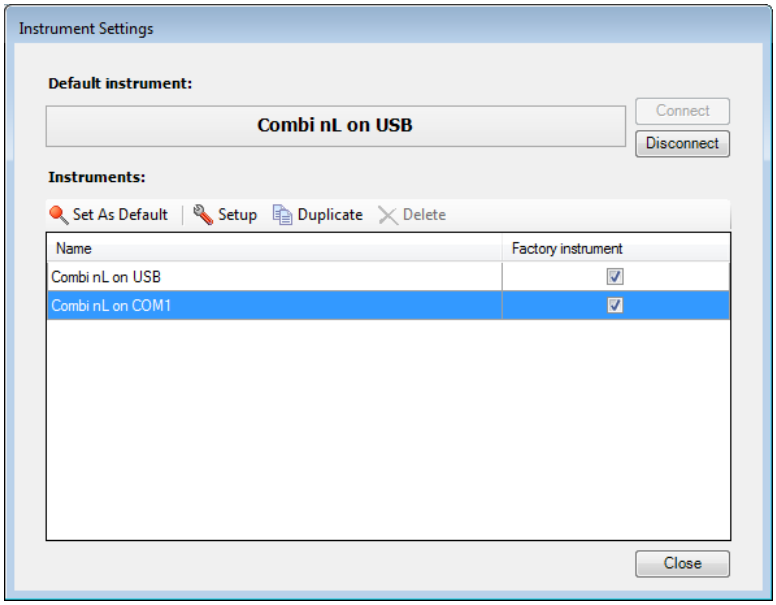


Click **OK**.

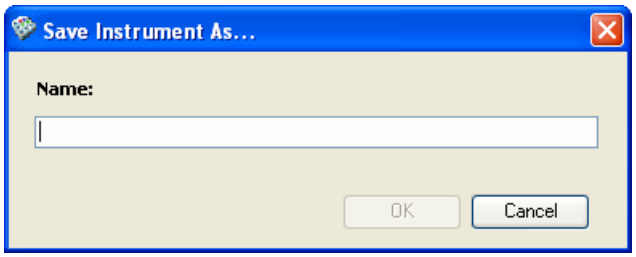
The instrument is added to FILLit Software as the default instrument and the workstation is connected to the instrument.

Defining a new instrument manually

1. Open the **Instrument Settings** dialog by selecting Settings > **Instrument...**. For more information about the dialog, see “Instrument” on page 85.

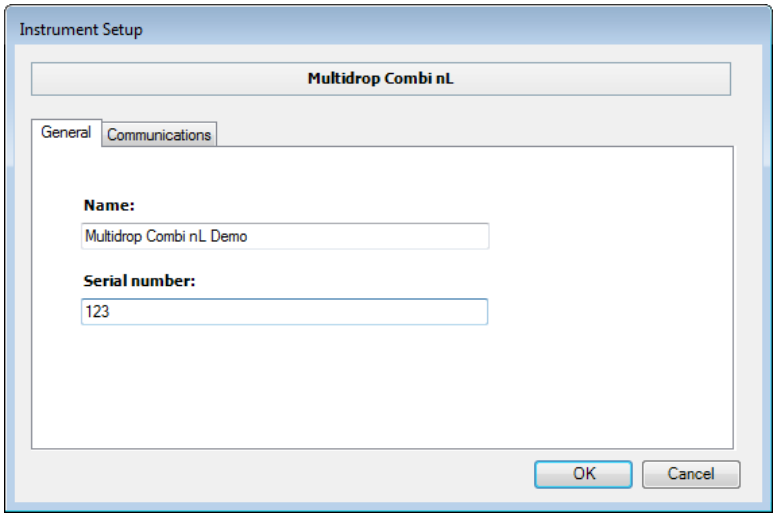


2. If your instrument is not included in the list, add the instrument to FILLit Software: select *Combi nL on USB* or *Combi nL on COM1* and click **Duplicate**. The **Save Instrument As...** dialog opens.



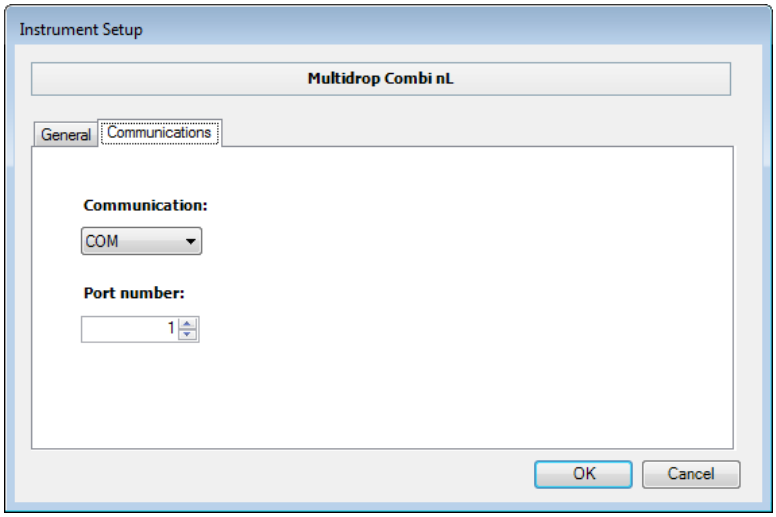
Type the name of your instrument in the field and click **OK**.

3. A duplicate of the selected instrument is added to the Instruments list with the new name and you can now modify it. Select the instrument from the Instruments list and click **Setup...**. The **Instrument Setup** dialog opens.



4. Change the instrument information in the fields (see “General” on page 87).

5. Select the **Communications** tab.

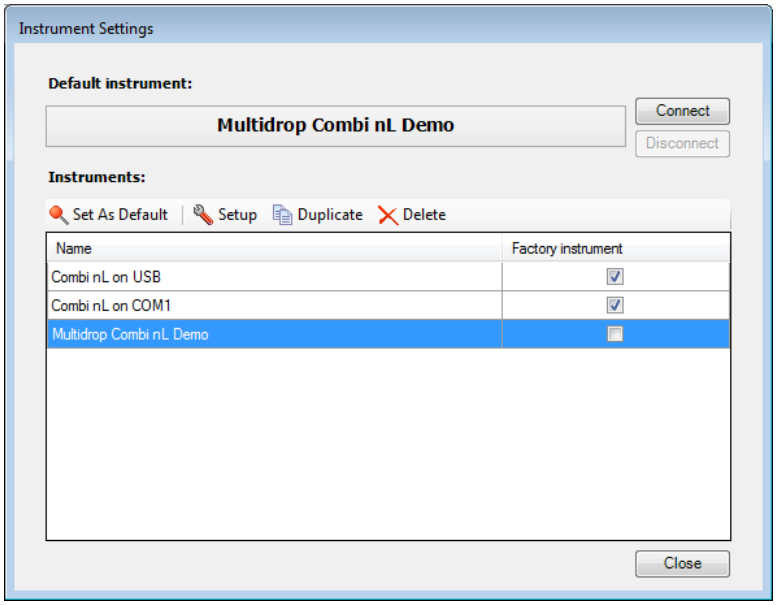


6. Select the data communication options in the fields (see “Communications” on page 87).

7. Click **OK**.

8. You can now change the default instrument to be the newly added instrument. Select the new instrument from the *Instruments* list and click **Set As Default**.

Note You must disconnect from the current default instrument first.



9. Click **Close** to exit the **Instrument Settings** dialog.

Note You can add several new instruments before clicking **Close**.

Connecting the instrument to the workstation through a COM port

The workstation and the instrument can be connected by using an RS-232 C serial cable.

1. Close FILLit Software and shut down the workstation. Switch off the instrument from its mains switch.

2. Connect the serial cable to a free serial (COM) port on your workstation.

Note Check that the port corresponds to the port that is defined for the instrument in the Instruments list. The port is defined in the **Instrument Setup** dialog, under the **Communications** tab.

Note Check that *RS-232* is selected as the computer interface in the **Options** menu of the instrument.

3. Connect the other end of the cable to the SERIAL RS-232 C connector (Figure 2-1) on the back panel of the instrument.

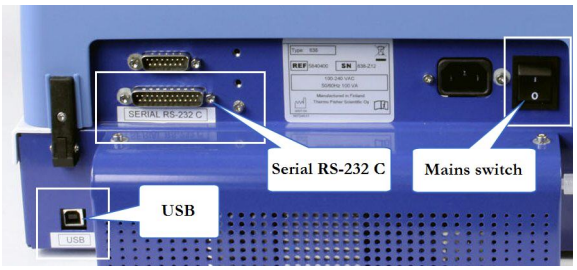


Figure 2-1. Computer and mains power supply connectors in the instrument

4. Switch ON the instrument and then the workstation.
5. Start FILLit Software as described in “Starting the software” on page 34.
6. After startup the instrument is ready for operation.

Connecting the instrument to the workstation through a USB port

The workstation and the instrument can also be connected by using a USB cable. The USB driver is installed automatically during the software installation.

Note Check that *USB* is selected as the computer interface in the **Options** menu of the instrument control panel.

1. Turn off the instrument.
2. Connect the instrument to the workstation using a USB cable (see Figure 2-1).
3. Turn on the instrument. The computer recognizes the new USB device. After a while, a message appears on the system tray telling when the instrument is ready for operation.

Chapter 3
User Interface

Navigating in the software

When a dispensing protocol is open, the main window of the software is divided into the following areas (see Figure 3-1):

- The **Protocol** action panel (**1**) has buttons for creating, opening and saving protocols, and for viewing the Help.
- The **Steps** action panel (**2**) has buttons for adding steps to protocols. The adjacent step tree shows the structure of a protocol. The step order corresponds to the order in which the steps are run on the instrument. When you select a step in the step tree, the view on the right-hand panel changes accordingly and you can modify the step parameters. The plate type is the root item in the tree; all the steps are added to it.
- When the workstation is connected to the instrument, the **Instrument** action panel (**3**) shows status information related to the pressure or vacuum in the pressure/vacuum system needed for priming, dispensing or emptying. The panel also tells whether the instrument is primed and whether the priming vessel and the protective cover are in place.

  – The pressure gauge shows the pressure in psi. The red color means vacuum, the orange color means pressure not yet sufficient for dispensing, and the green color means sufficient dispensing pressure.

  The action panel has instrument control functions to connect or disconnect the selected instrument, prime or empty the dispensing system, pressurize the pressure/vacuum system, and run protocols.
- The right-hand panel (**4**) shows step parameters according to the selection in the step tree. You can view and edit step parameters, plate type properties and plate type settings of a dispensing protocol.
- The menu bar (**5**) has menu commands for software functions and settings as well as for instrument functions and settings (see Chapter 9: "*Menus and Action Panels*").
- The status bar (**6**) shows which instrument the workstation is connected to, the logged-on Windows user, and the current date and time. When

the workstation is connected to an instrument, the background color is green, and when not connected, the background color is red.

See “Protocol editing window” on page 28 for an example of the protocol editing window.

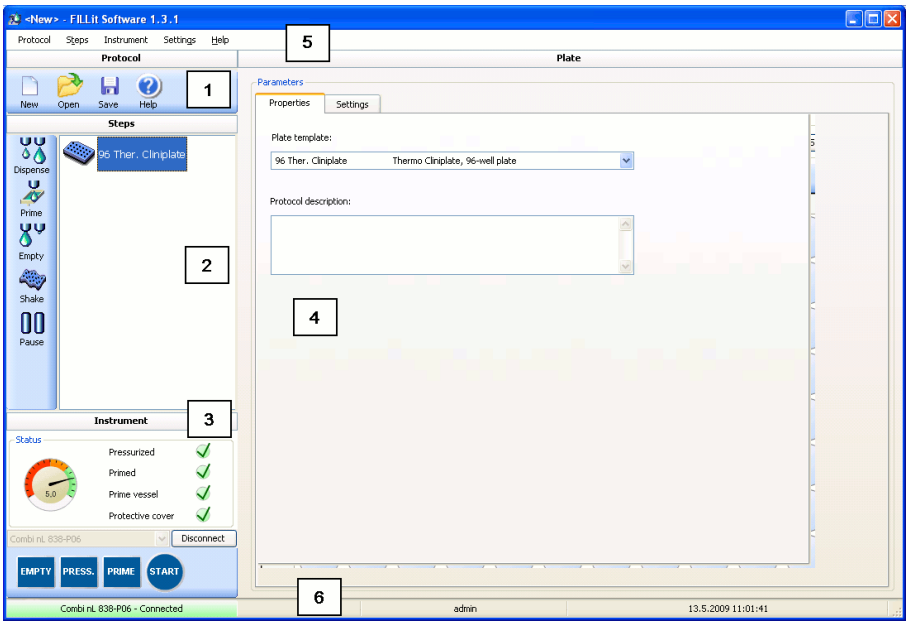


Figure 3-1. Different parts of the main window

Protocol editing window

The following figure shows an example of a dispensing protocol that has been opened in the main window. Plate type is the first item in the step tree. The desired step is added to or selected from the tree. The parameters of the plate or selected step can now be viewed or edited in the main panel.

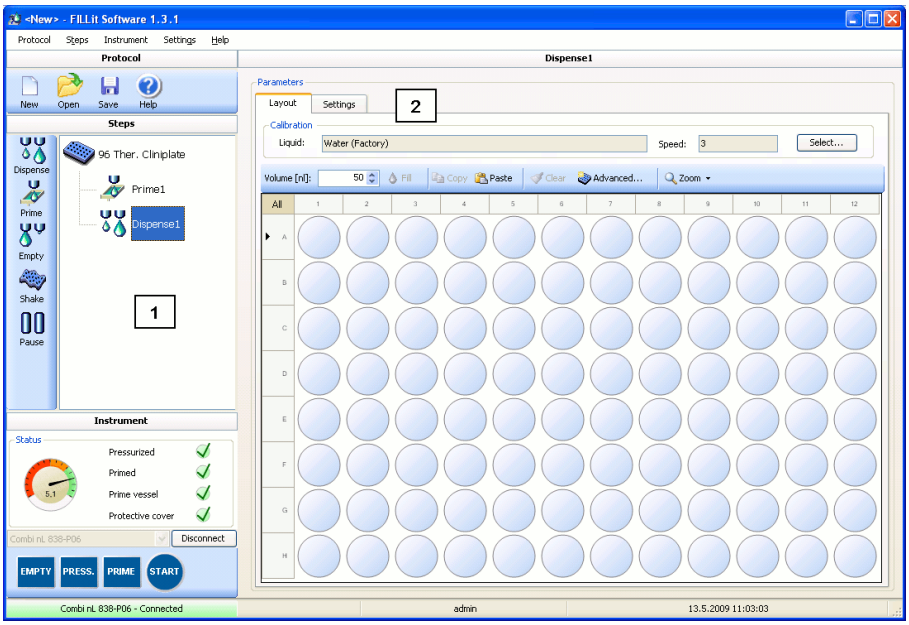


Figure 3-2. Main window for protocol editing

- **1** – Step tree. You can drag-and-drop the steps. To rename or delete a step, right-click on the step.
- **2** – The main panel shows the parameters of the plate or the selected protocol step.

For more information on editing a protocol, see “Editing a protocol” on page 36 and Chapter 5: “*Step Parameters*”.

Effective use of the software features

You can speed up your use of the software by using the following features.

Right-click menus

In many cases when using the software, you can open an additional menu by right-clicking the mouse. The menus allow quick access to functions that are relevant to the item you are clicking. For example, you can right-click:

- the *step tree* to add, rename or delete steps
- the *plate map* in the *Dispense* step to add volumes to target wells, to copy and paste volumes , or to clear volumes from the wells

- *text fields* to select, cut, copy and delete text

Entering information without using the mouse

The software requires the use of a mouse, but you can do without one in certain cases. When you are entering information in fields (parameters, text fields, check boxes, and so on), you can use the tabulator on your keyboard instead of the mouse to move from one field to the next.

You can use the arrow keys to select radio buttons or steps in the step tree, change the available values in fields or open the main menus and select menu commands. You can open a menu command by pressing the **Enter** key. You can also use the arrow keys to toggle between tabs in a dialog.

In the *Dispense* step, you can move on the plate map using the arrow keys. You can paint an area by keeping the **Shift** key down while moving with the arrow keys.

Shortcuts

You can select menus by pressing **Alt** and the underlined letter. For example, **Steps** is selected by pressing **Alt+t**.

Some operations have keyboard shortcuts. These are presented in Table 3-1.

Table 3-1. Keyboard shortcuts

Operation	Keyboard shortcut
Open an existing protocol	**Ctrl+O**
Create a new protocol	**Ctrl+N**
Save a protocol	**Ctrl+S**
Close an open dialog	**Esc**
Accept and save changes made through a dialog	**Enter**

Some operations have function key shortcuts. These are presented in Table 3-2.

Table 3-2. Function key shortcuts

Operation	Function key shortcut
Open the Help	**F1**
Rename a protocol step	**F2**
Run a protocol *	**F5**
Prime the dispensing system *	**F6**
Empty the dispensing system *	**F7**
Pressurize the pressure/vacuum system *	**F8**
Calibrate *	**F9**
Connect to the default instrument *	**F11**
Disconnect from the default instrument *	**F12**

* Only when connected to the instrument

Drag-and-drop

You can drag-and-drop protocol steps in the step tree under the **Steps** panel. Click on the desired step and while holding your left or right mouse button down, pull the step to a new position in the step tree, and release the button.

Tooltips

Tooltips appear when you move the cursor over a button in a toolbar or an action panel.

When the information icon appears next to a field or a button in a dialog, it means that a precondition related to the task must be fulfilled first. Move the cursor over the icon to view instructions.

Chapter 4
Protocols

A protocol contains all the information required by the instrument to dispense a plate. The information includes a plate template, plate settings, steps and their parameters. The instrument uses the information to determine the actual movements of the plate carrier and dispensing valves, and the dispensing functions. The protocol steps tell the instrument which functions are required (for example, priming, dispensing and shaking) and in which order they should be performed.

A protocol you create can be either an instrument protocol or a multistep protocol. The instrument protocol can only contain one dispense step and one additional shake step. Instrument protocols can be downloaded to the instrument and then run on the instrument directly without a remote connection. The instrument protocols can also be uploaded back to the workstation for modification or backup.

The multistep protocol can contain any of the available steps with no limitations. Multistep protocols are stored only on the workstation and cannot be downloaded to the instrument. The protocol itself is run on the workstation while FILLit Software controls the instrument and the steps run on the instrument.

General operational procedure

The general operational procedure with FILLit Software is as follows:

- Start the FILLit Software application.
- Open an existing protocol or create a new one. A new protocol is opened by default at startup.
- Edit the protocol (plate properties, plate settings, and protocol steps) if necessary and save it.
- Transfer protocols if the protocols are needed for the standalone use of the instrument.
- Pressurize the dispensing system.
- Prime the instrument.
- Calibrate a combination of speed and liquid if it has not been used with the instrument before.
- Run the protocol.

Starting the software

1. Start the software from the **Start** menu:

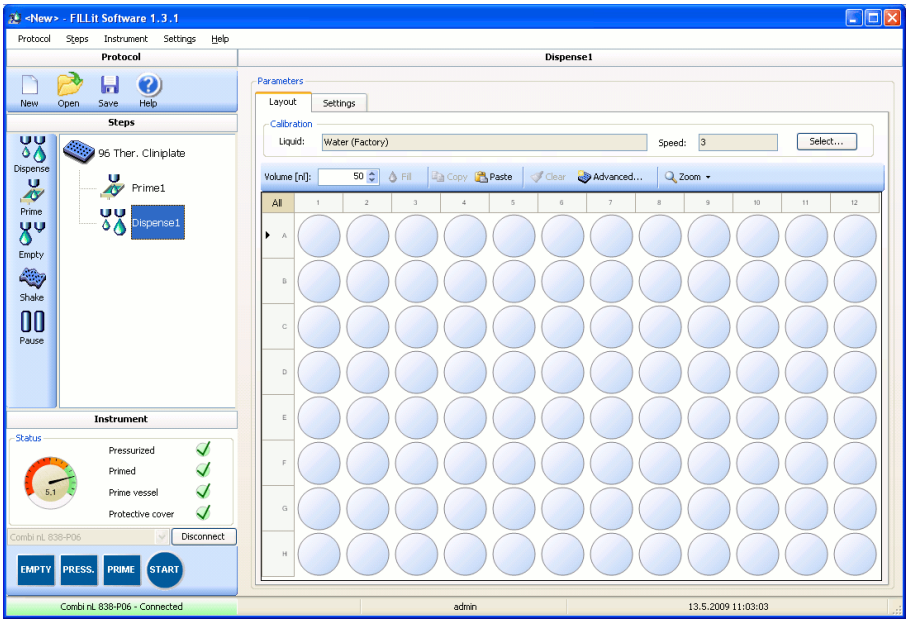
   Start > All Programs > Thermo FILLit Software > **FILLit 2.0 for Multidrop Combi nL**.

   Or: double-click the shortcut icon on your desktop. There is also a shortcut for FILLit Control Panel on your desktop.

2. The software starts to load and a splash screen appears.

   The software connects to the default instrument if the **Connect to default instrument at startup** setting is selected from the Settings > **Options...** menu.

When the software is ready for use, the main window opens. You can now create a new protocol (see “Creating a new protocol” on page 35) or open an existing protocol (see “Opening an existing protocol” on page 36).



Creating a new protocol

1. Create a new protocol in one of the following ways:

   - Select Protocol > **New...**.
   - Click the button on the **Protocol** action panel.
   - Press **Ctrl+N**.

   A new empty protocol opens in the main window. The window also opens when you start the software for the first time (see “Protocol editing window” on page 28).

2. Select a plate template (see “Editing plate and protocol properties” on page 36).

3. Give a description for the protocol (see “Editing plate and protocol properties” on page 36).

4. Define the plate settings, such as dispensing height and offset (see “Editing plate settings” on page 38).

5. Add steps to the protocol (see “Adding new protocol steps” on page 40) and define their parameters (see Chapter 5: “*Step Parameters*”).

6. Save the protocol (see “Saving a protocol” on page 42).

Opening an existing protocol

1. Open an existing protocol in one of the following ways:
   - Select Protocol > **Open...**.
   - Click the  button on the **Protocol** action panel.
   - Press **Ctrl+O**.

   Windows **File Open** dialog box opens.
2. Select the protocol file (*.pnl) from the workstation file system.
3. Click **Open**.

The selected protocol opens in the main window.

Editing a protocol

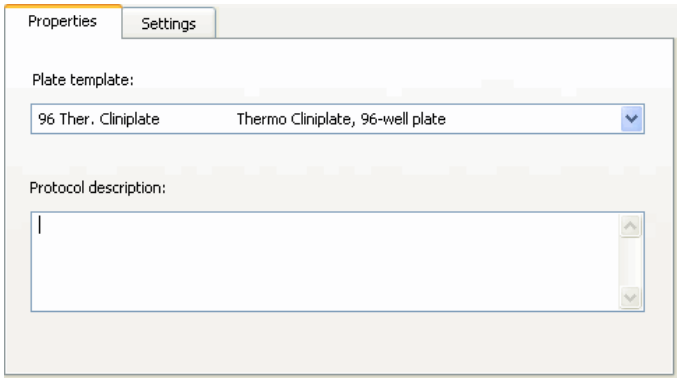
Here is a list of tasks that can be done when editing new or existing protocols. After editing the protocol, save your changes.

- Check that the plate template in the protocol matches the actual plates used on the instrument. Create a new plate template or edit the existing one, if necessary (see “Plate template settings” on page 88).
- Edit the plate properties (see “Editing plate and protocol properties” on page 36).
- Edit the plate settings (see “Editing plate settings” on page 38).
- Add, delete or edit protocol steps (see “Adding new protocol steps” on page 40, “Deleting protocol steps” on page 41 and Chapter 5: “*Step Parameters*”).

Editing plate and protocol properties

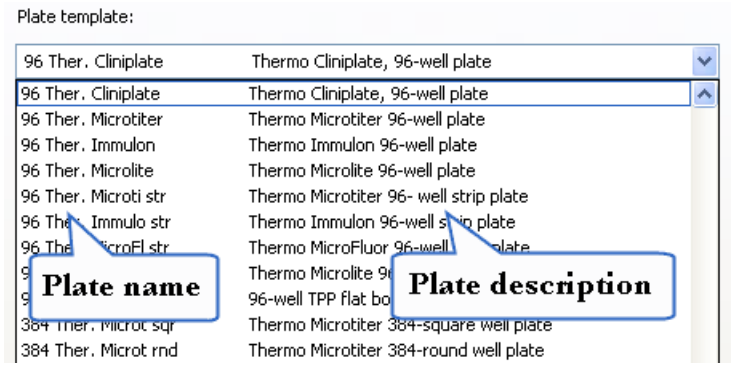
You can select the plate template used in the protocol and give the protocol a description.

1. Create a new protocol or open an existing protocol (see “Creating a new protocol” on page 35 and “Opening an existing protocol” on page 36).
2. Click the plate in the step tree. The default plate template is shown.
3. Select the **Properties** tab.



4. Select a plate template used in the protocol. You can change the plate template which is selected by default in the list (see “Plate template settings” on page 88).

   The list shows the plate name in the first column and the plate description in the second column. The plate name is transferred with a protocol to the instrument. It is shown in the instrument display when you select the plate type using the instrument control panel.



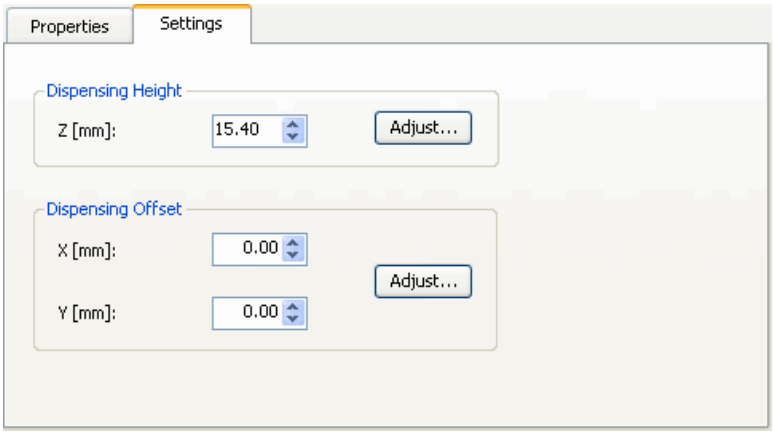
   After saving the protocol, you can only change to a plate template within the same category, that is, plates with the same number of wells. The acceptable plates are shown on the green background. The change does not affect other step parameters nor the target well selection of the plate.

   If you change the plate template category, a new protocol is automatically created and the target well selection is cleared. However, the original protocol remains unchanged.

5. Enter a description for the protocol.

Editing plate settings

You can set and adjust the dispensing height or the dispensing offset of the plate in the **Settings** tab.



The tab has the following parameters:

- *Dispensing Height*:
  - **Z [mm]** – The default dispensing height of the plate in millimeters.
  - **Adjust...** – Opens the **Dispensing height and offset** dialog when you are connected to the instrument. You can adjust the dispensing height by moving the dispensing valve head (see "Adjusting the dispensing height and offset" on page 38).
- *Dispensing Offset*:
  - **X [mm]** – The default dispensing X offset of the plate in millimeters.
  - **Y [mm]** – The default dispensing Y offset of the plate in millimeters.
  - **Adjust...** – Opens the **Dispensing height and offset** dialog when you are connected to the instrument. You can adjust the dispensing X/Y offset by moving the dispensing valve head or the plate carrier (see "Adjusting the dispensing height and offset" on page 38).

Adjusting the dispensing height and offset

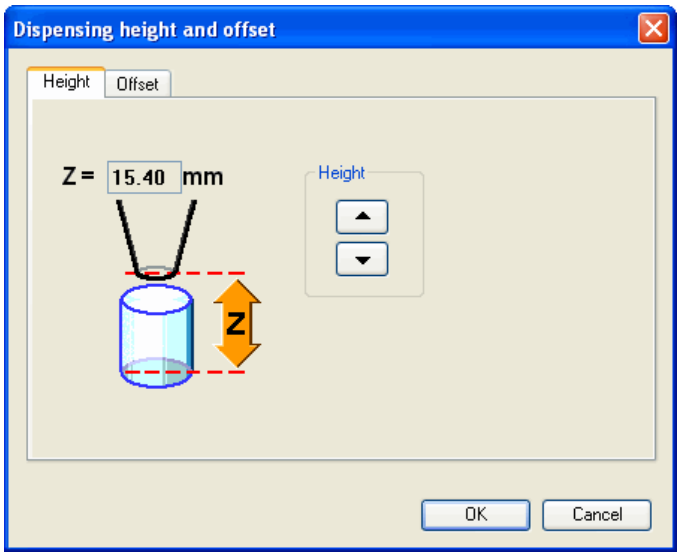
You can adjust the dispensing height and the dispensing offset by moving the lifting mechanism of the dispensing valve head and the plate carrier.

The default dispensing height depends on the plate type. You can change the dispensing height if the plate used is not the standard one defined in the plate template list. The default dispensing X/Y offset is 0.00/0.00 mm. You can change the x- and y-axis offset values if the plate used is not the standard one defined in the plate template list.

Before you start, check that:

- the workstation is connected to the instrument.
- the plate that you want to adjust is in the plate carrier.

1. Open a dispensing protocol or create a new one (see “Opening an existing protocol” on page 36 and “Creating a new protocol” on page 35).
2. Click the plate in the step tree.
3. Select the **Settings** tab and click on **Adjust...**. The **Dispensing height and offset** dialog opens.
4. To adjust the dispensing height, select the **Height** tab.

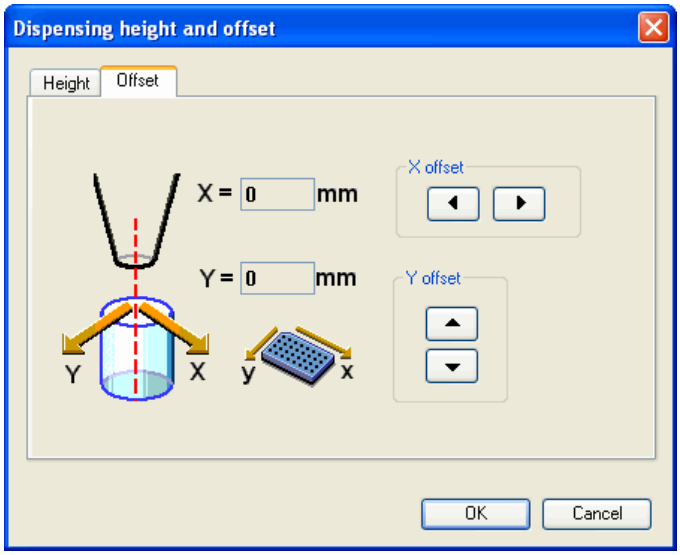


Set the dispensing height in increments of 0.05 mm. The height is the distance from the plate bottom to the dispensing valves when dispensing. The available range varies between 5 and 55 mm depending on the selected plate type. The default dispensing height is 1 mm above the selected plate.

For example, when the plate height is 15 mm and you set the value to 17 mm, it leaves a gap of 2 mm between the dispensing tips and the top of the plate.

Use the *Height* buttons to move the dispensing valve head accordingly. You can also use the up and down arrow keys on your keyboard.

5. To adjust the dispensing offset, select the **Offset** tab.



Set the dispensing offset in increments of 0.05 mm. The offset is the dispensing position distance in the x- and y-axis directions from the well center point.

Use the *X offset* buttons to move the plate carrier accordingly. You can also use the left and right arrow keys on your keyboard.

Use the *Y offset* buttons to move the dispensing valve head accordingly. You can also use the up and down arrow keys on your keyboard.

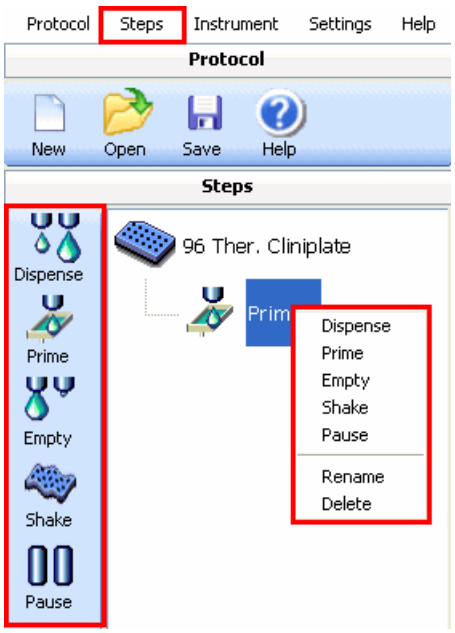
Adding new protocol steps

You can add steps to a new or an existing protocol.

1. Create a new protocol or open an existing protocol (see “Creating a new protocol” on page 35 and “Opening an existing protocol” on page 36).

2. Add steps to the step tree in the order in which you want them to be run. Use one of the following ways:

- Go to the **Steps** menu and select the step you want to add.
- Click on the desired step button in the **Steps** action panel.
- Right-click on the step tree and select the step from the menu.



New steps appear after the last step in the step tree. You can move steps up and down in the step tree structure by dragging and dropping. You can rename steps by right-clicking on a step or by pressing **F2** and by entering a longer and more descriptive name for the step. Also see "Deleting protocol steps" on page 41.

3. Modify step parameters as necessary (see Chapter 5: "*Step Parameters*").
4. Save the protocol (see "Saving a protocol" on page 42).

Deleting protocol steps

You can delete steps from the step tree when the protocol is open.

1. Open the protocol from which you want to delete steps (see "Opening an existing protocol" on page 36).
2. Select the protocol step you wish to delete from the step tree.
3. Right-click on the step and select **Delete**.

Caution Before deleting, always check that you have selected the item you wish to delete.

4. Confirm the step deletion by clicking **Yes**.

Saving a protocol

You can save a protocol in one of the following ways:

- Click on the **Protocol** action panel.
- Select Protocol > **Save**.
- Press **Ctrl+S**.

The protocol is saved with its current name. If you are saving a protocol for the first time, you are prompted to give the protocol a name. Save the protocol before you run it.

You can use letters a to z or A to Z, numbers 0 to 9, and special characters "_" and "-" in the name. The maximum length of the name is 20 characters.

To save a protocol with another name, for example, after modification:

- Select Protocol > **Save As…** and give a new name to the protocol.

The protocols are saved as files in the file system of the workstation (see "Opening an existing protocol" on page 36). The protocol files for Multidrop Combi nL have the extension .pnl.

Managing protocols or calibrations

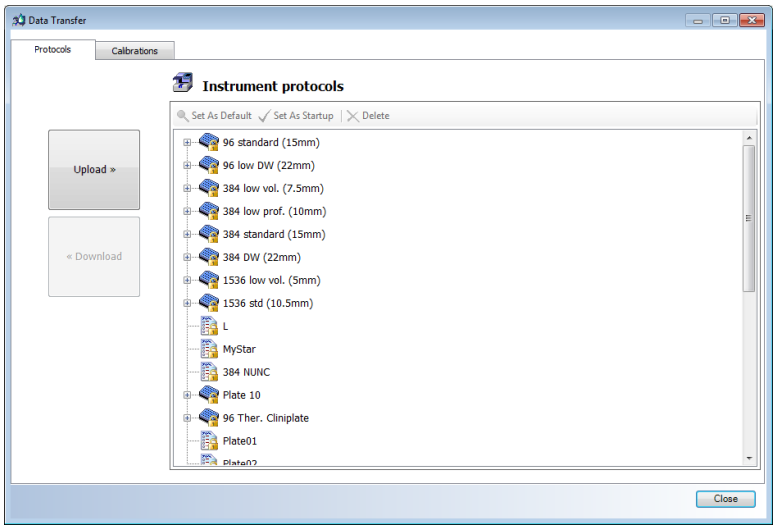
Instrument protocols and calibrations stored in the workstation can be transferred to the instrument. It is also possible to transfer protocols and calibrations stored in the instrument to the workstation for modification or backup. Instrument protocol types, such as default and startup protocols, can also be set.

Transferring protocols

You can download instrument protocols, which contain only a dispense and an additional shake step, to the instrument. The protocols to be downloaded must also have at least one volume filled in the *Dispense* step. You can upload protocols stored in the instrument to the workstation.

Before you start, check that the workstation is connected to the instrument.

1. Select Protocol > **Data Transfer...**. The **Data Transfer** dialog opens.
2. Select the **Protocols** tab.



3. The instrument protocols list shows the protocols currently stored in the instrument. The protocols are grouped by plate type. You can expand the protocols stored under the plate type by clicking the plus ⊞ icon.

 – Instrument protocol can be downloaded from the instrument.

4. a. Click **Upload** to transfer a protocol from the workstation to the instrument. Windows **File Open** dialog box opens.

   Select the protocol file (*.pnl) from the workstation file system. Click **Open**.

   The protocol is transferred and stored under the appropriate plate type in the list.

   b. Under the Instrument protocols list select the protocol you want to transfer to the workstation and click **Download**. Windows **File Save** dialog box opens.

   Choose the folder where you want to save the protocol file and give the protocol a name. Click **Save**.

   The protocol is transferred and stored as a file in the workstation file system. The protocol files for Multidrop Combi nL have the extension .pnl.

Note If you upload a read-only instrument protocol and modify it on the workstation, it cannot be downloaded back to the instrument. You can run it on the workstation instead. You must save it with a different name (Protocol > **Save As...**) if you want to download it to the instrument.

About instrument protocol types

Instrument protocols, which are stored in the instrument, can have any or all of the following type attributes:

- *Default protocol* – The default protocol of each plate type. The default protocol is loaded when you change the plate type in the instrument control panel. Each plate type must have a default protocol defined.
- *Startup protocol* – A protocol which is loaded at instrument startup. Only one protocol can be set as the startup protocol at a time.
- *Read-only protocol* – Protocols which are stored in the instrument memory at the factory. Protocols transferred from the instrument cannot be set as read-only.
- *Currently loaded to the instrument editor* – A protocol which is currently loaded and open in the instrument control panel.

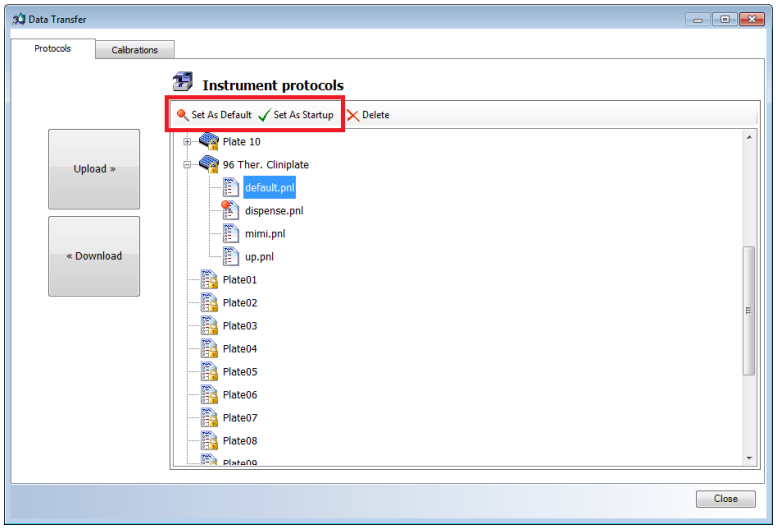
Setting default or startup instrument protocols

You can set protocols stored in the instrument as default or startup protocols. For more information, see "About instrument protocol types" on page 44.

Before you start, check that:

- the workstation is connected to the instrument.

1. Select Protocol > **Data Transfer...**. The **Data Transfer** dialog opens.
2. Select the **Protocols** tab.



3. Under the instrument protocols, select the protocol whose type you want to set.

4. Click either the **Set As Default** or **Set As Startup** button.

   The protocol type is set. To clear the type, select another protocol and set the type to it.

Deleting protocols stored in the instrument

You can delete protocols stored in the instrument. The following types of protocols can be deleted:

- Protocols transferred from the workstation. If the protocol is loaded and opened in the instrument control panel, it cannot be deleted until another protocol is opened in the instrument control panel.
- Startup protocols. You must first change another protocol as the startup protocol before deleting.
- A protocol currently loaded to the instrument editor. You must close it first and open another protocol in the instrument control panel before deleting.

Note Read-only protocols cannot be deleted from the instrument memory.

Before you start, check that:

- the workstation is connected to the instrument.

1. Select Protocol > **Data Transfer...**. The **Data Transfer** dialog opens.
2. Select the **Protocols** tab.
3. In the list of instrument protocols, select the protocol you want to delete. Click the **Delete** button in the header of the list.

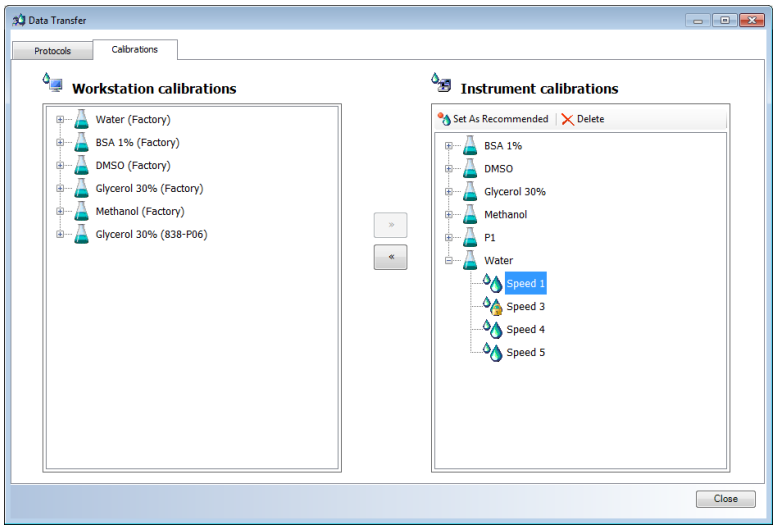
Transferring calibrations

You can download calibrations, which have been carried out for the instrument, to the instrument. You can also upload calibrations to the workstation.

Before you start, check that:

- the workstation is connected to the instrument.

1. Select Protocol > **Data Transfer...**. The **Data Transfer** dialog opens.
2. Select the **Calibrations** tab.



3. Under the workstation or instrument calibrations, select the calibration you want to transfer.

   Calibrations are grouped by liquid in the lists. The instrument name, for which the calibrations are, is shown after the liquid name. Calibrations for different speeds are stored under the liquid. You can expand the calibrations by clicking the plus ⊞ icon.

   Any calibration stored in the workstation can be downloaded to any of the Multidrop Combi nL instruments.

4. a. Click [›] between the two lists to transfer the selected calibration to the instrument.

   b. Click [‹] between the two lists to transfer the selected calibration to the workstation.

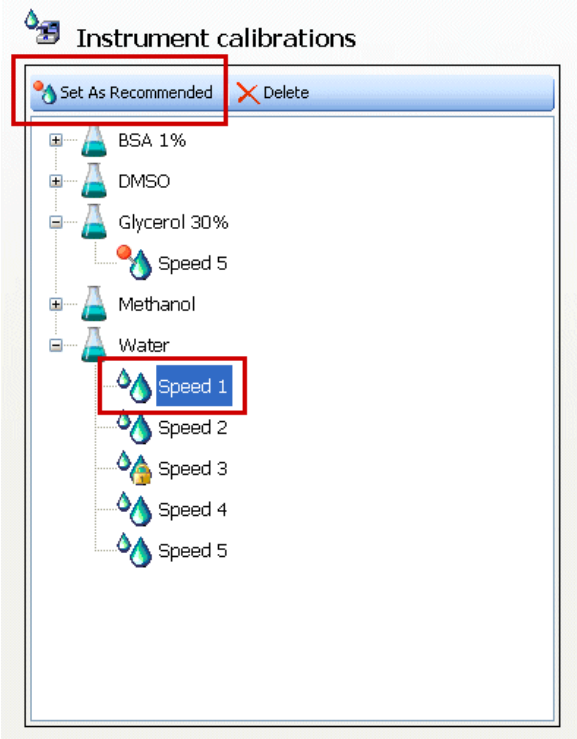
The calibration is transferred and stored under the appropriate liquid in the list.

Setting recommended speeds in the instrument

Each liquid, which is stored in the instrument, can have one of its calibrated speeds set as the recommended (optimal) dispensing speed. The speed is loaded to the instrument main menu when the liquid is selected.

For factory calibrated liquids the recommended speed is set by default.

1. Select Protocol > **Data Transfer...**. The **Data Transfer** dialog opens.
2. Select the **Calibrations** tab.



3. Select a liquid, and under it, select the speed you want to set. Click **Set As Recommended**.

Chapter 5
Step Parameters

This chapter describes the contents and the usage of the available step parameters in Fillit Software for Combi nL.

Dispense

The *Dispense* step is used for instructing the instrument to dispense liquid into the selected wells in a microplate.

Note If you create an instrument protocol for downloading to the instrument, the protocol can only have one dispense step and one additional shake step.

Select Steps > **Dispense**, click  on the **Steps** action panel or right-click on the step tree and select **Dispense**.

The dispense step has two tabs:

- **Layout** – Select a calibration to be used. You can also select target wells, rows or columns and fill them with different volumes. With the **Advanced Fill** function you can fill a series or to fill the plate with the same volume. A plate map shows the plate layout, the target wells and their dispensing volumes. For more information, refer to “Layout” on page 49.

  Settings – You can adjust the predispensing volume. You can also select the delay between dispensing actions and select the dispensing direction. For more information, refer to “Settings” on page 59.

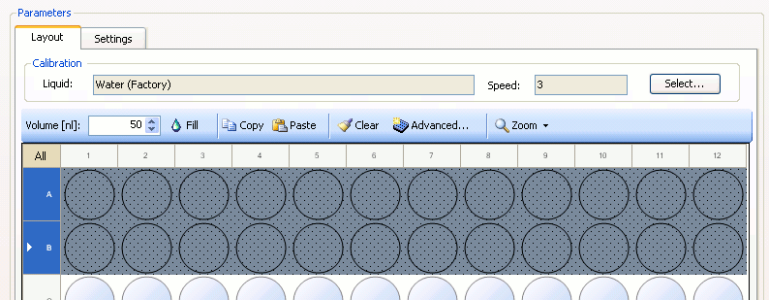
Layout

The Steps > Dispense > **Layout** tab is used for selecting the calibration for the combination of a liquid and speed. You can also select the dispensing volume and fill the target wells, rows or columns to be dispensed. In addition, you can copy and paste values from and to the plate layout. With the **Advanced Fill** function you can fill a series of target wells with different volumes.

A plate map shows the plate layout for the plate template and the selected target wells. You can select:

- an individual well by clicking it.
- an area by dragging the mouse over the wells you want to select.

- a whole row or column by clicking the column or row header.
- the whole plate by clicking on **All**.
- several wells, areas, columns or rows at once. Hold the **Ctrl** key down while selecting. This way you can select areas, columns or rows that are not next to each other.



The **Layout** tab has the following parameters:

- *Calibration* – Shows the selected calibration for the liquid to be dispensed.
  - **Select** – Opens the **Calibration Selection** dialog for selecting a liquid and an associated speed from the tree view. For more information, see "Selecting a calibration for dispensing or priming" on page 54.
- **Volume [nl]** – Type or select the volume you want to dispense into the target wells. The range is from 50 nl to 50,000 nl in increments of 1 nl.

Note Every well, column or separately selected area can have a different volume.

- **Fill** – Fills the target wells with the selected volume. Select the target wells first before clicking the button. You can also right-click on the selected target wells to fill them.
- **Copy** – Copies the selected well(s) from the plate layout. You can also right-click the selection, and select **Copy** from the menu.
- **Paste**– Pastes the selected wells into the plate layout. You can also right-click the selection, and select **Paste** from the menu.
- **Clear** – Clears the volume from the selected wells. You can also right-click on the selection to clear the volume.

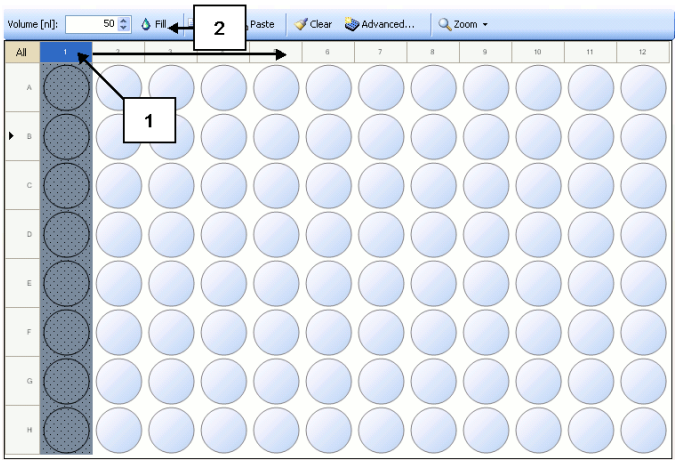
- **Advanced** – Opens the **Advanced Fill** dialog for adding a fill series or for filling the plate with the same volume. For more information, see "Filling a plate using Advanced Fill" on page 57.
- **Zoom [%]** – Zoom in on the plate map by increasing the percentage. Zoom out by decreasing the percentage.

Tip You can zoom in on a 1536–well plate to make sure that you have the intended volume in the wells.

Examples of filling a plate

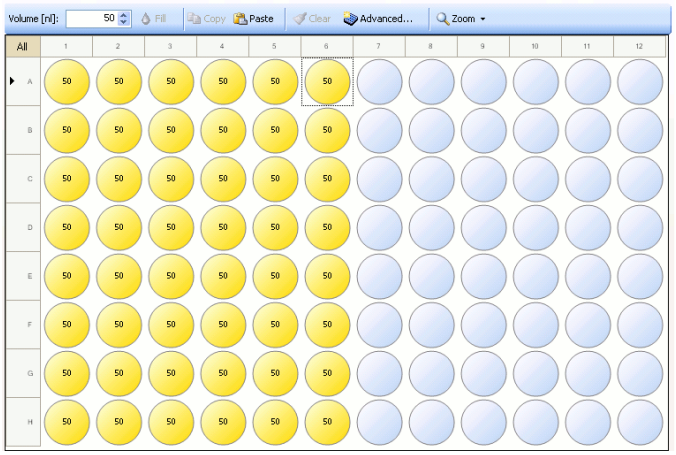
The following examples illustrate how you can select the target wells in a microplate to be filled and add a dispensing volume to the wells. The target wells are selected in the dispense step.

Example 5-1 Filling six columns of a 96-well plate



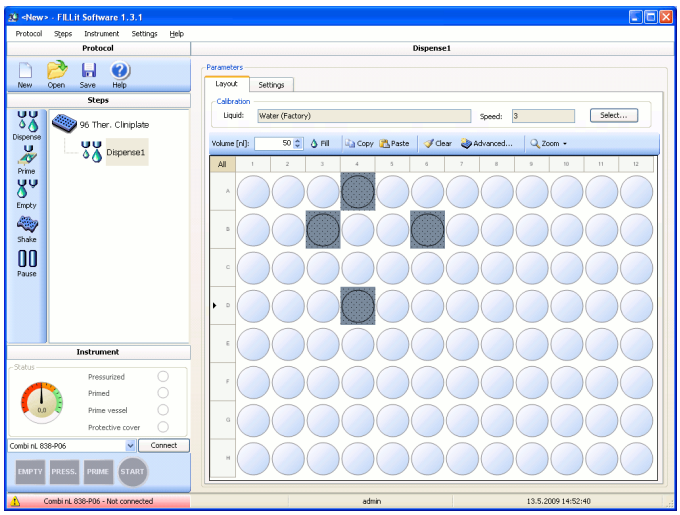
1. Place the cursor on the header row of column 1, press the left mouse button down and drag the cursor over to column 6. The columns are selected as the cursor moves to the right.

2. Add the dispensing volume to the wells by selecting the volume and clicking **Fill**.

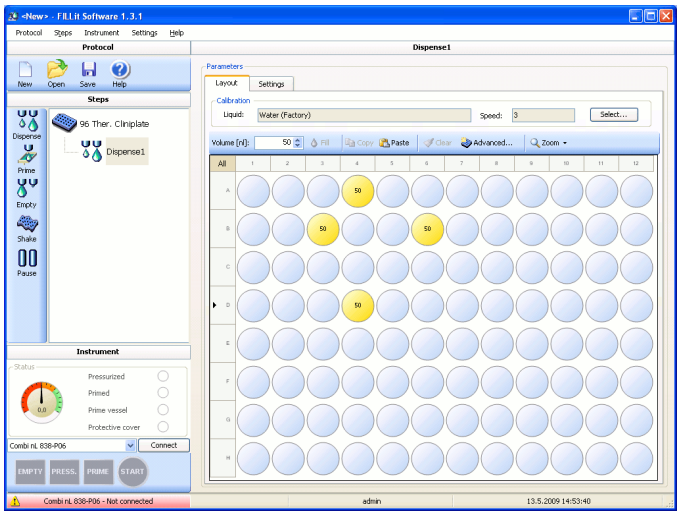


Example 5-2 Filling several separate wells in a 96–well plate

1. In the plate layout, hold down the **Ctrl** key as you click the desired wells.



2. Add the dispensing volume to the wells by selecting the volume and clicking **Fill**.



In the same way, you can also fill separate areas, columns or rows at once.

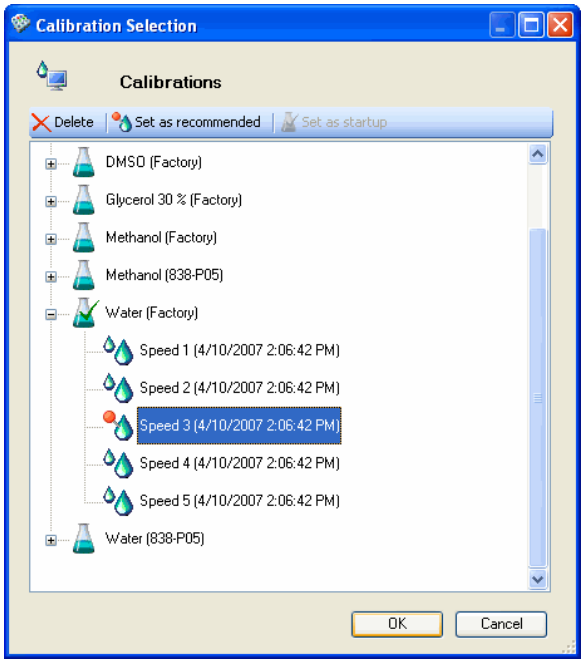
Note The selected volume is shown only in the wells while the **Volume** field has the default fill volume. You can zoom in on a 1536–well plate to make sure that the correct volume is selected.

Selecting a calibration for dispensing or priming

You can select the calibration which is used in a dispense or prime step. Calibration is the combination of liquid and speed and ensures accurate volumetric dispensing. A liquid can have five calibrations as there are five speeds available. Calibrations can be created for each instrument in use individually. If you are running a protocol with the workstation or creating a protocol for a specific instrument, you can use all the calibrations stored in the workstation.

Tip Water has factory calibrations for all five speeds. With them you can test unknown liquids with all the speeds.

1. Select Steps > Dispense > Volume > **Select ...** or Steps > Prime > **Select...**. The **Calibration Selection** dialog opens.



The dialog shows calibrations sorted by the liquid. Only the calibrated speeds are listed under each liquid. The instrument name, with which the liquid is calibrated, is shown after the liquid name.

2. Click the plus ⊞ icon to view the speeds.

3. Select the appropriate speed.

   The optimal (recommended) dispensing speeds for different liquids are factory set. For example, the optimal dispensing speed for water is *3*. If a higher density solution is dispensed, it requires a greater speed to dispense the corresponding volume. On the other hand, a lower speed is sufficient for a lower density solution, for example, methanol.

   If droplets form on the dispensing valve heads, it means that the liquid is being dispensed with a speed too low.

4. Click **OK**.

Setting recommended speeds and startup calibrations

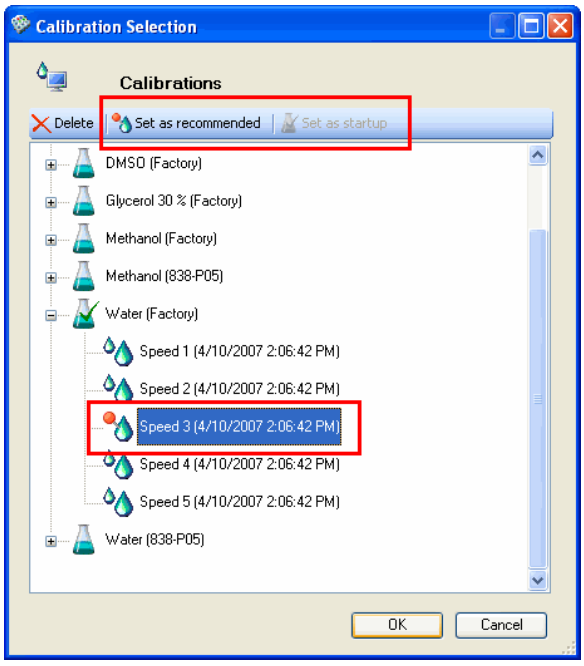
Calibrations, which are stored in workstation file system, can have the following type attributes:

- *Recommended speed* – Each liquid can have one of its calibrated speeds set as the recommended (optimal) dispensing speed. The information is not downloaded to the instrument. For more information, see "Setting recommended speeds in the instrument" on page 47.

  To delete a recommended speed, you must first set another speed as recommended and then delete the desired speed. If there are no other speeds for the liquid than the recommended speed, then it is possible to delete it directly.

- *Startup calibration* – One calibration can be set as the startup calibration. When a new protocol is created with FILLit Software, the startup calibration is set as the default calibration in the *Dispense* and *Prime* steps.

1. Select Steps > Dispense > Volume > **Select ...** or Steps > Prime > **Select...**. The **Calibration Selection** dialog opens.



2. To set a recommended speed, select a liquid and under it, the speed. Click **Set as recommended**.

3. To set a startup calibration, select the liquid and click **Set as startup**.

Filling a plate by using the Copy and Paste functions

With the **Copy** and **Paste** functions you can copy values and paste them to the other wells within the same plate layout. You can also copy and paste dispensing volume values from a spreadsheet application, such as Microsoft Excel or OpenOffice.org Calc, into the plate layout and vice versa. Only the wells that are within the limits of the plate layout area can be pasted.

Note You will get a warning message if you try to paste areas that are not within the plate layout area. If you continue the procedure, only the wells that are within the plate layout area will be pasted. If you cancel the procedure, no wells will be pasted into the plate layout.

To copy and paste values from a spreadsheet into the plate layout:

1. In the spreadsheet, copy the desired values to the clipboard.

2. Click the desired well in the plate layout and click **Paste**.

The values are added into the plate layout.

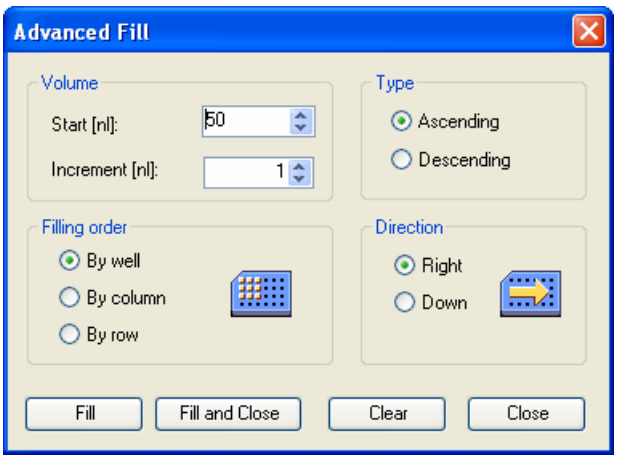
The decimal numbers are rounded to the nearest whole number in the plate map (for example, *1,6* > *2,0*). Note also that the decimal symbol (a comma or a period) used in a spreadsheet must be the same set on your computer. The decimal symbol can be set in Control Panel > **Regional and Language Settings**.

Note Note that the software allows you only to paste from the clipboard values that can be dispensed with the Multidrop Combi nL. You will get a warning message if you try to add such values into the layout that are not within the dispensing limits, or that include invalid characters (for example, non-numerical data and images). The 0 values are pasted as empty wells into the plate layout.

Filling a plate using Advanced Fill

You can add a fill series. When you add a fill series, the plate is filled with a different volume well by well, column by column, or row by row. You can also fill the whole plate with the same volume.

Select Steps > Dispense > Volume > **Advanced**. The **Advanced Fill** dialog opens. You can select the target wells when the dialog is open because it floats on top of the plate map.



The **Advanced Fill** dialog has the following parameters:

- *Volume*:

- **Start [nl]** – Select the dispensing volume which is filled first in the fill series. The range is from 50 nl to 50,000 nl in increments of 1 nl.

- **Increment [nl]/Decrement [nl]** – Select the increment or decrement volume by which each subsequent dispensing volume in the fill series is increased or decreased. When you select 0, all the target wells are filled with the volume defined in the **Start [nl]** field. The default value is 1 nl

- *Type* – Select the fill series type:

  - **Ascending** – The increment volume is added to the next dispensing volume in the fill series.

  - **Descending** – The decrement volume is subtracted from the next dispensing volume in the fill series.

Note The minimum amount that the instrument can dispense is 50 nl.

- *Filling order* – Select the order in which the dispensing volume is added to the plate:

  - **By Well** – Each well in the selection is filled with a different amount of liquid. The offset volume is either added to or subtracted from the volume dispensed into the next well in the series.

  - **By Column** – Each column in the selection is filled with a different amount of liquid. The offset volume is either added to or subtracted from the volume dispensed into all the wells in the next column in the series.

  - **By Row** – Each row in the selection is filled with a different amount of liquid. The offset volume is either added to or subtracted from the volume dispensed into all the wells in the next row in the series.

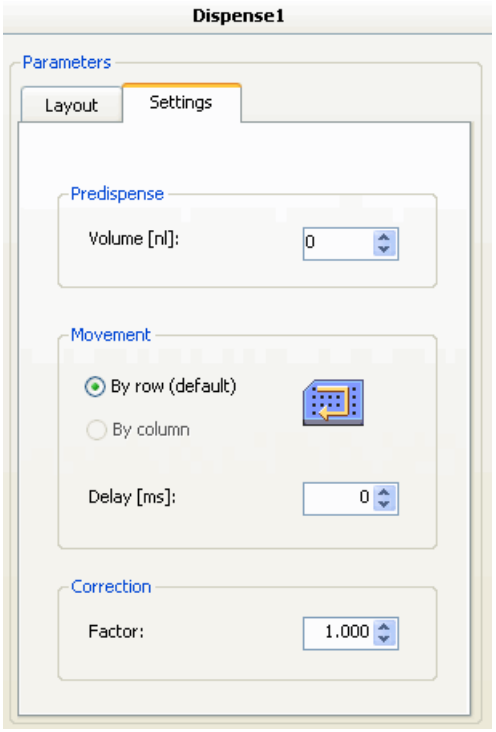
- **Direction** – Select the direction in which the offset volume is filled into the wells. The option is only available when the filling order is by well. Columns are filled from left to right and rows from top to bottom so that each column or row is filled with the same offset volume.

- **Fill** – Fills the target wells with the set volumes according to the settings. Select the wells first before clicking the button.

- **Fill and Close** – Fills the target wells with the set volumes according to the settings and closes the dialog. Select the wells first before clicking the button.
- **Clear** – Removes the set volumes from the target wells. Select the wells first before clicking the button.

Settings

The Steps > Dispense > **Settings** tab is used for setting the predispensing volume, dispensing direction, delay, and the calibration curve correction factor.



The **Settings** tab has the following parameters:

- *Predispense:*
  - **Volume [nl]** – Select the volume that is dispensed into the priming vessel before starting to dispense into the plate. Some denser solutions may sometimes require extra predispensing. The range is from 0 nl to 50,000 nl in increments of 50 nl.
- *Movement:*

- **By row** – The plate is filled row wise. The dispensing valve head moves from left to right and then from right to left using all the eight dispensing valves until all the rows are filled. With a 96-well plate the whole plate becomes filled at once. With 384 or 1536-well plates changes of direction are needed. For more information, refer to the instrument user manual.

- **By column** – The plate is filled column wise. The dispensing valve head moves first from top to bottom in phases using all the eight dispensing valves until the column is filled. The head then moves right to the next column filling it from bottom to top and continues in this way until all the columns are filled. The option is available only for 384 or 1536-well plates. For more information, refer to the instrument user manual.

- **Delay [ms]** – Select the delay time between two dispensing actions. The range is from 0 to 100 ms in increments of 10 ms. The default delay time is 0 ms.

- **Factor** – Shows the liquid factor value of a protocol which is normally saved in and transferred from the instrument and opened with FILLit Software. The factor can be used if there is no calibration curve for a new liquid or a new speed. The volume dispensed is changed in proportion to the factor. The default value in protocols created with FILLit Software is 1.000.

  The available range is 0.500 to 1.500 in increments of 0.001. Liquid factor is a calibration of one dispensing point and it is carried out with the instrument. For more information, refer to the instrument user manual.

  The liquid factor is based on a gravimetric measurement of multiple dispenses into a microplate strip. It is calculated by dividing the expected dispensing volume by the measured volume. For example, if you expect to dispense 10,000 nl but 9,900 nl is actually dispensed, the correction factor would be 10,000 nl / 9,900 nl = 1.010. In this case, the instrument dispenses 1.010 times more liquid compared to the value in the calibration curve.

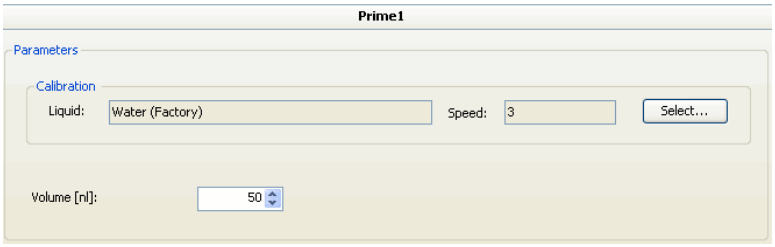
Prime

The *Prime* step is used for filling up the tubings and dispensing valves with a liquid to be dispensed.

Note The *Prime* step is not needed in a routine protocol unless a longer prime is needed in particular.

Note Even if you use the *Prime* step in a protocol, you must always prime the dispensing system first using the PRIME button in the **Instrument** action panel.

Select Steps > **Prime** or click on the **Steps** action panel or right-click on the step tree and select **Prime**.



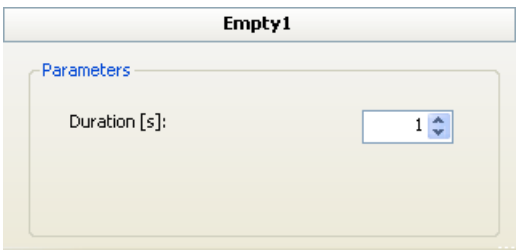
The prime step has the following parameters:

- *Calibration* – Shows the selected calibration for the liquid and speed combination used in priming.
    - **Select...** – Opens the **Calibration Selection** dialog. The steps uses calibration to set the speed at a correct level for dispensing. For more information, see "Selecting a calibration for dispensing or priming" on page 54.
- **Volume [nl]** – Select the priming volume. The range is from 50 nl to 50,000 nl in increments of 1 nl.

Empty

The *Empty* step is used for emptying the remaining liquid from the tubings and dispensing valves into the reagent reservoir.

Select Steps > **Empty**, click on the **Steps** action panel or right-click on the step tree and select **Empty**.



The empty step has the following parameters:

- **Duration [s]** – Select the duration of emptying in seconds. The range is 1 to 60 s in increments of 1 s.

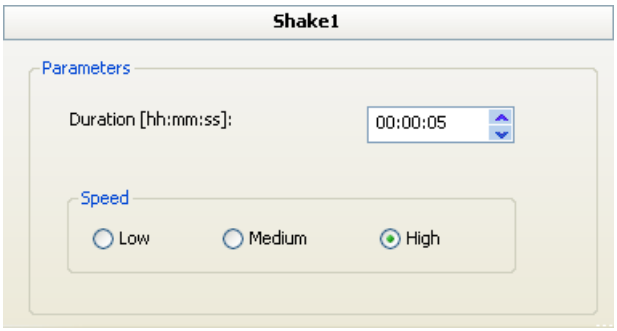
  It takes approximately 15 seconds to empty the tubings when the dispensing system is pressurized for *Speed 3* and a 250 ml reagent reservoir is used. When the dispensing system is not pressurized, it takes between seven and eight seconds to empty the tubings.

Shake

The *Shake* step is used for shaking the microplate linearly to mix the liquid in the wells after dispensing.

If you create an instrument protocol for downloading to the instrument, the protocol can only have one dispense step and one additional shake step.

Select Steps > **Shake** or click  on the **Steps** action panel or right-click on the step tree and select **Shake**.



The shake step has the following parameters:

- **Duration [hh:mm:ss]** – Enter the total shaking time (step duration). The range is from one second to one hour in increments of 1 s.

- **Speed** – Select a shaking speed. The available options are: *Low*, *Medium* and *High*.

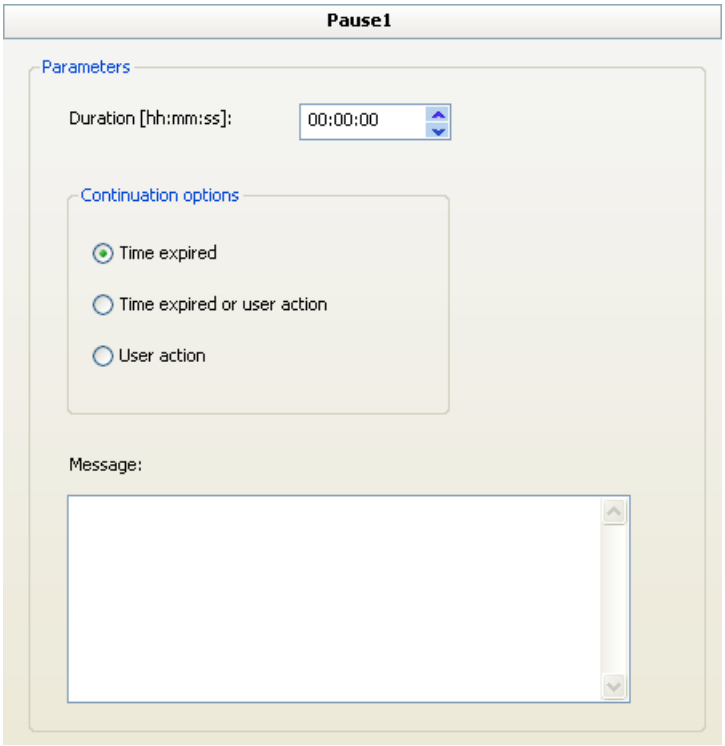
  The speed settings with regard to the movement distance in millimeters (mm) and the frequency (cycles per second) in hertz (Hz) are shown below.

Speed	Movement distance (mm)	Frequency (Hz)
Low	2	10
Medium	1	15
High	1	20

Pause

The *Pause* step is used for stopping the run of a dispensing protocol for a moment. A message is displayed during the pause if a message has been entered in the step parameters. The instrument continues to run the protocol after the condition set in **Continuation options** is met.

Select Steps > **Pause** or click on the **Steps** action panel or right-click on the step tree and select **Pause**.



The pause step has the following parameters:

- **Duration [hh:mm:ss]** – Enter the pause time. The maximum pause time is one hour in increments of 1 s.
- **Continuation options** – Select the condition for continuing the protocol execution.
  - *Time expired* – The protocol continues after the set pause time expires.

- *Time expired or user action* – The protocol continues after the set pause time expires or when you click **Skip Pause** in the **Execution Progress** dialog.
- *User action* – The protocol continues when you click **Skip Pause** in the **Execution Progress** dialog. No pause time can be set when this option is selected.

- **Message** – Type in the message that is shown in the **Execution Progress** dialog during the *Pause* step.

Chapter 6
Controlling the Instrument

Running a dispensing protocol

You can run both instrument and multistep protocols stored in the workstation when you are connected to the instrument. For more information about protocols, see Chapter 4: "*Protocols*".

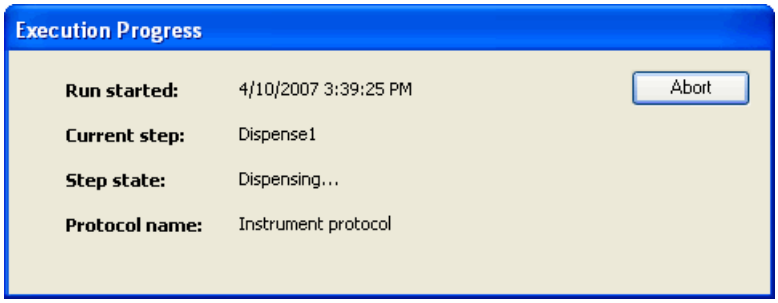
1. Make sure that the instrument is connected correctly to the workstation (see "Connecting the instrument to the workstation through a COM port" on page 25 or "Connecting the instrument to the workstation through a USB port" on page 26).
2. Turn on the instrument.
3. Start up the software (see "Starting the software" on page 34).
4. Connect the software to the instrument (see "Connecting to the instrument" on page 80).
5. Open the protocol (see "Opening an existing protocol" on page 36). If the protocol is already open, make sure that the protocol has been saved.
6. Insert the plate into the plate carrier.

Caution Ensure that a correct microplate has been inserted.

7. Check that the protective cover over the dispensing valve head and the priming vessel are in place.
8. Pressurize the dispensing system (see "Pressurizing the dispensing system" on page 68).
9. Prime the dispensing system (see "Priming the instrument" on page 67).
10. Click 

on the **Instrument** action panel, select Instrument > **Start**, or press **F5** on your keyboard.
11. You are prompted to give the run a name. The run is saved in the file system as a file called <name>.mdrun.

12. The **Execution Progress** dialog opens and dispensing starts.



- **Run started** – Shows when the dispensing was started (the date and time). The information is also used for selecting and viewing run reports (see "Viewing run reports" on page 83).
- **Current step** – Shows the step being run.
- **Step state** – Shows the state of the step being run.
- **Protocol name** – Shows the name of the protocol being run.
- **Abort** – Interrupts the run. You can start the run again if needed.

13. Empty the tubings after dispensing if needed (see "Emptying the tubings" on page 67).

Using the instrument controls

The following sections describe how you can control the instrument using either the **Instrument** menu, the function key shortcuts, or the **Instrument** action panel.

Priming the instrument

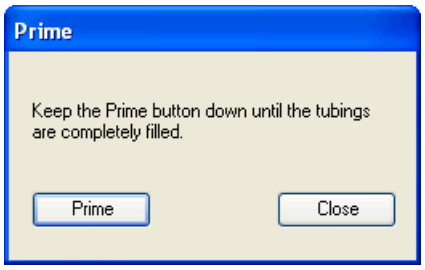
You must fill the tubings and dispensing valves with a liquid before dispensing. The tubings should be completely filled. Make sure that you see liquid coming through the valves before starting to dispense.

Before you start, check that:

- the workstation is connected to the instrument.
- the reagent reservoir is filled with a liquid.
- the priming vessel and protective cover are in place.
- the dispensing system is pressurized.

1. Select Instrument > **Prime...**, click the PRIME button on the **Instrument** action panel, or press **F6** on your keyboard.

   The **Prime** dialog opens.



2. Click **Prime** and keep the button pressed down until the tubings are filled. The instrument primes the dispensing system.

   You can see the priming progress on the **Instrument** action panel. During priming the lifting mechanism is lowered, the pressure rises and the dispensing valves open.

3. Close the dialog, click **Close**.

Emptying the tubings

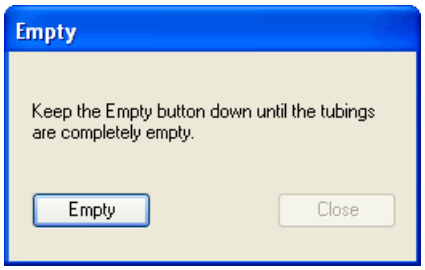
You can empty the remaining liquid from the tubings and dispensing valves into the reagent reservoir. You can also routinely clean the tubes and microsolenoid valves by using emptying.

Before you start, check that:

- the workstation is connected to the instrument.
- the reagent reservoir is in place.
- the priming vessel and protective cover are in place.

1. Select Instrument > **Empty...**, click the EMPTY button on the **Instrument** action panel, or press **F7** on your keyboard.

   The **Empty** dialog opens.



2. Click **Empty**. Keep the button pressed down until the tubings are completely empty. The instrument empties the liquid into the reagent reservoir.

   You can see the emptying progress on the **Instrument** action panel. The pressure is released and a vacuum is created for emptying the dispensing system.

3. Close the dialog, click **Close**.

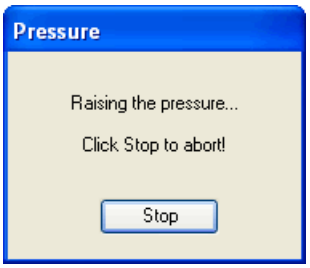
Pressurizing the dispensing system

You must raise the pressure in the pressure/vacuum system at instrument startup. This ensures that there is enough air pressure for priming and dispensing. The instrument uses compressed air to push the liquid through the dispensing system into the target wells at a certain speed.

Before you start, check that:

- the workstation is connected to the instrument.
- the reagent reservoir is filled with a liquid.
- the priming vessel and protective cover are in place.

Select Instrument > **Pressure...**, click the PRESS. button on the **Instrument** action panel, or press **F8** on your keyboard.



The pressure is raised in the pressure/vacuum system to a limit which is the dispensing pressure of the currently selected protocol in the instrument.

You can release the pressure by clicking the PRESS. button when the dispensing system is pressurized.

Calibrating liquids

This section has information related to calibration.

About calibrations

Calibrations are needed to ensure that the instrument dispenses the set volume of liquid accurately into the wells at the set speed. The instrument uses air pressure to dispense liquids through the dispensing system. Different levels of air pressure are needed to move the liquid at different speeds. A lower pressure means a lower speed and a higher pressure means a higher speed.

Dispensed liquids have different densities that affect the valve open time needed to achieve the same dispensing volume. The combination of liquid and speed defines the valve open times for different volumes of a liquid at a certain air pressure. Therefore each combination of liquid and speed should be calibrated with FILLit Software. Calibrations are instrument-specific and also include the instrument serial number. Calibrations can be created, carried out and transferred to the instrument with FILLit Software using **Calibration** and **Data Transfer** (see “Calibrating or recalibrating liquids” on page 70 and “Transferring calibrations” on page 46).

Calibration creates a calibration curve for the combination of liquid and speed. The curve contains a series of five calibration points, each of which consists of a volume/time pair. Each calibration point has a fixed valve open time. The dispensed volumes vary according to the properties of the liquid and the dispensing speed. As there are five speed settings available, a liquid can have a maximum of five calibrations, one for each speed. Thus several different calibrations and corresponding calibration curves are needed to achieve accurate dispensing results.

The *Dispense* and *Prime* steps include the selection of the calibration to be used with a protocol (see "Dispense" on page 49 and "Prime" on page 60).

Calibrating or recalibrating liquids

You should calibrate a liquid and an associated speed you are using for a specific instrument. Calibration is carried out for new liquids. It is also possible to recalibrate existing liquids, such as those having factory calibrations. After calibration the instrument accurately dispenses the selected volume with an optimal valve open time into target wells according to the created calibration curve.

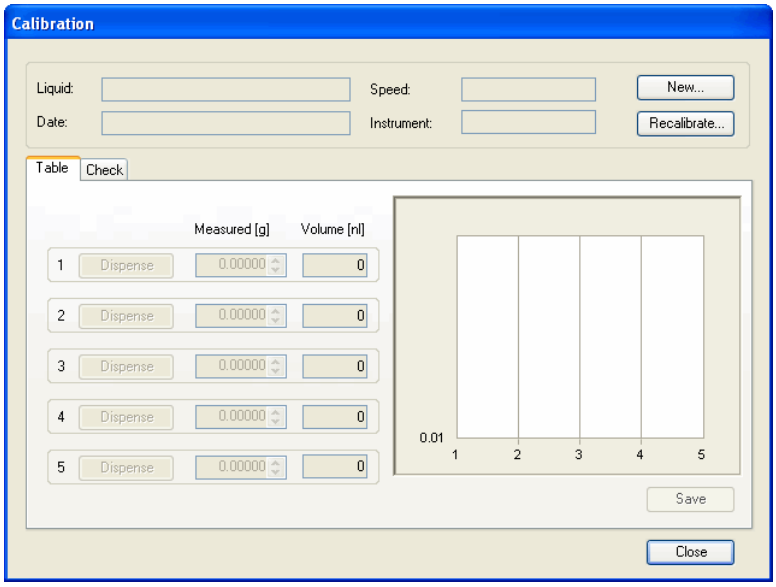
Note After upgrading the FILLit Software version, recalibrating or creating a new calibration, you must transfer the workstation calibrations to the instrument in the **Data Transfer** dialog. See "Transferring calibrations" on page 46.

Before you start, check that:

- the workstation is connected to the instrument.
- the reagent reservoir contains the liquid that is calibrated.

  An estimated amount of liquid needed for calibration is at least 4 ml. The estimate is based on water at *Speed 3*, including dead volume and valve check.
- the dispensing system is primed.
- an analytical balance (four digits) is available.
- Thermo Scientific Microtiter 96 1x8 Strip Plate (Cat. no. 95029350) or similar, and five 1x8 strips are available. The strips must be tare weighed to zero.

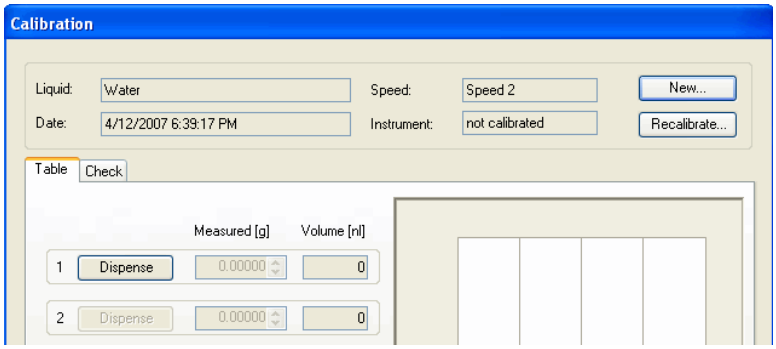
1. Select Instrument > **Calibrate...** or press **F9** on your keyboard. The **Calibration** dialog opens.



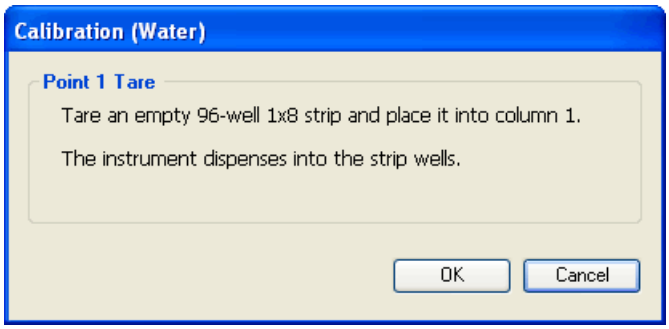
2.
   - To create a new calibration, click **New...**. The **Create New Calibration** dialog opens (see “Creating a new calibration” on page 74).
   - To recalibrate an existing liquid or to view a calibration curve, click **Recalibrate...**. The **Calibration Selection** dialog opens listing all the existing calibrations stored in the workstation file system. Select the appropriate calibration from the list and click **OK**. You can view calibration curves without being connected to the instrument.

     When you open and view a calibration curve, the values in the **Measured [g]** fields are calculated from the corresponding values in the **Volume [nl]** fields using the liquid's density.

Information about the liquid, speed, calibration date and instrument are shown in the dialog after selecting the calibration. A calibration curve is shown if you are recalibrating a liquid. The first **Dispense** button is now active.



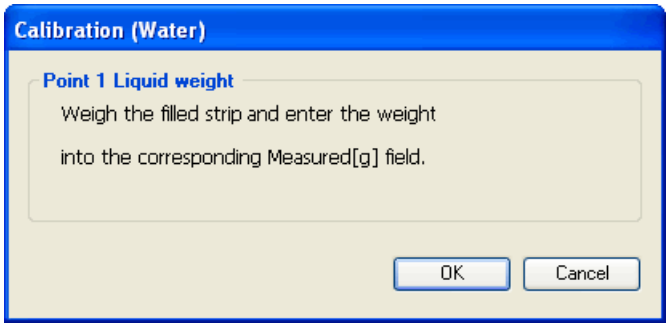
3. Click the first **Dispense** button.



4. Tare an empty 96-well 1x8 strip and place it into column 1 of the plate. Place the plate onto the plate carrier. Click **OK**.

   The instrument dispenses the first calibration point with 300 dispensings of 60 nl of liquid using all the eight channels. The volume is for water and can vary.

5. Remove the filled strip from the plate and weigh the strip.



6. Enter the weight in grams into the corresponding **Measured [g]** field.

   The value of the **Volume [nl]** field is calculated automatically.

Note If the calculated volume in the first calibration point will be too far away from the minimum volume of 50 nl, the required valve open time cannot be met. In this case, the instrument cannot necessarily dispense volumes that are notably smaller than that in the first calibration point. You can either accept the value as such or redispense the first calibration point and check the measured weight again.

7. Click the second **Dispense** button.

8. Tare another 96-well 1x8 strip and place it into column 1 of the plate. Click **OK**.

   The instrument dispenses the second calibration point with 150 dispensings of 100 nl of liquid using all the eight channels. The volume is for water and can vary.

9. Remove the strip and weigh it. Enter the measured weight into the corresponding field.

Note You can only enter a value which is greater than the one entered into the **Measured [g]** field of the previous dispensing point.

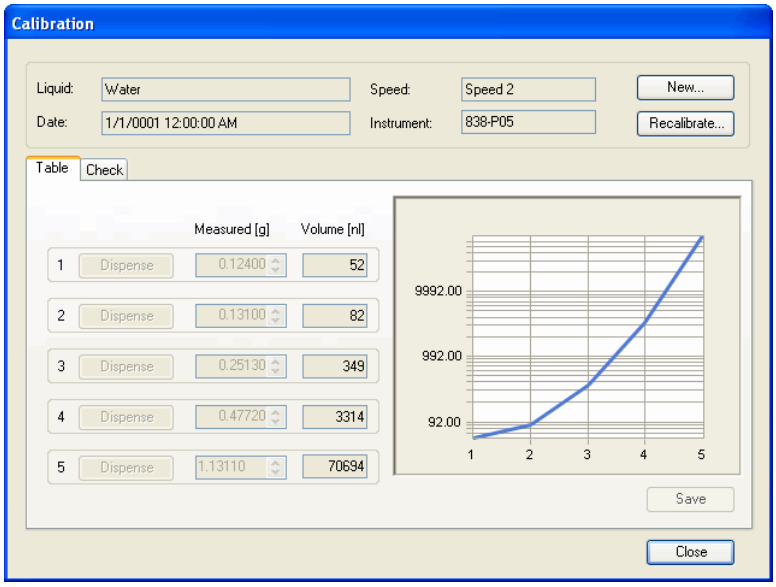
10. Continue dispensing all the remaining calibration points until all the values are calculated. The third calibration point is dispensed with 45 dispensings of 350 nl of liquid, the fourth with 18 dispensings of 3.5 µl of liquid, and the fifth with 2 dispensings of 70 µl of liquid. The volumes are for water and can vary.

    The measured calibration points are displayed as a graph. Valve open times for other volumes than the ones given in the calibration curve are calculated from the graph by linear interpolation.

    If there is a peak in the graph, it indicates a likely mistake in the calculation. You should recalibrate the point to ensure accurate dispensing results. After all the points are dispensed and calculated, it is possible to redispense any of the five points.

11. Save the calibration. All the dispensing points must be dispensed and measured before you can save the calibration curve.

    When you recalibrate a liquid and have measured all the five dispensing points, the previous calibration curve is overwritten when you save the new calibration curve.

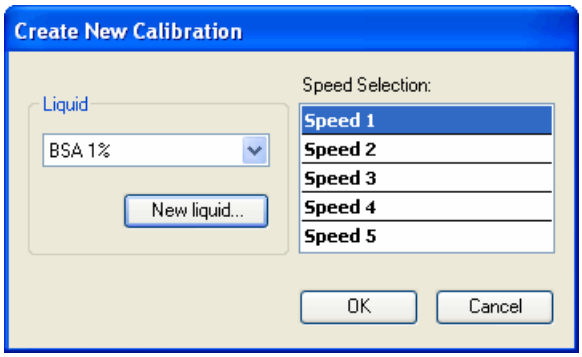


Creating a new calibration

You can create a new calibration for a liquid if a suitable calibration does not exist. A calibration consists of a liquid and an associated speed.

1. Select Instrument > **Calibrate...** or press **F9** on your keyboard. The **Calibration** dialog opens.

2. Click the **New...** button in the dialog. The **Create New Calibration** dialog opens.



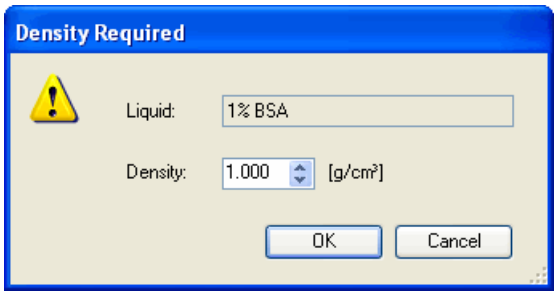
3. Select a predefined liquid from the list or add a new one by clicking **New liquid...** (see "Adding a new liquid" on page 75).

4. Select the speed. Only the uncalibrated speeds can be selected. The speed options are: *Speed 1*, *Speed 2*, *Speed 3*, *Speed 4* and *Speed 5*.

If you want to calibrate a speed which is already calibrated (grayed), use the **Recalibrate...** button in the **Calibration** dialog.

5. Save the new calibration by clicking **OK**.

   If you have uploaded a calibration, whose liquid does not exist in the workstation, you must set a correct density for the liquid at this point to carry out the calibration. The density of a liquid uploaded from the instrument is –1.000 g/cm^3. After setting the correct density in the **Density Required** dialog, click **OK**.

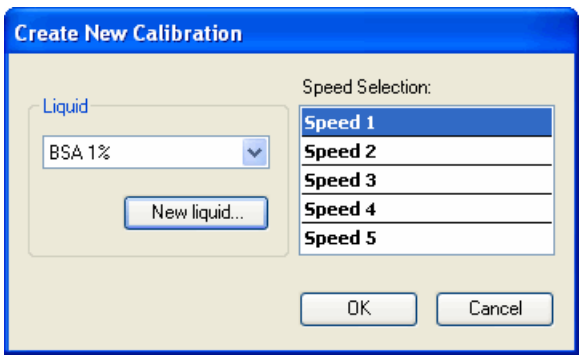


Adding a new liquid

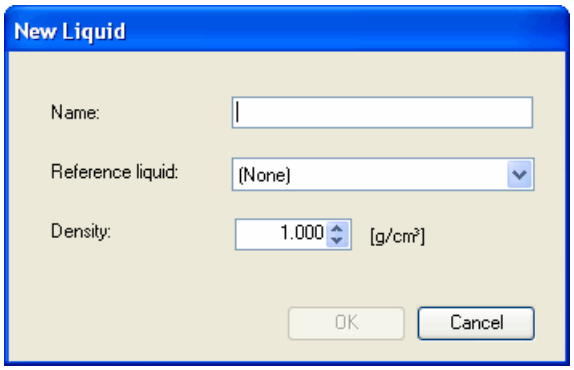
You can add a new liquid if a suitable liquid does not exist for creating a calibration. You can create new liquids without being connected to the instrument.

1. Select Instrument > **Calibrate...** or press **F9** on your keyboard. The **Calibration** dialog opens.

2. Click the **New...** button in the dialog. The **Create New Calibration** dialog opens.



3. Click the **New liquid...** button in the dialog. The **New Liquid** dialog opens.



4. Give a name to the liquid.
5. Select one of the reference liquids to use its density value.

   OR

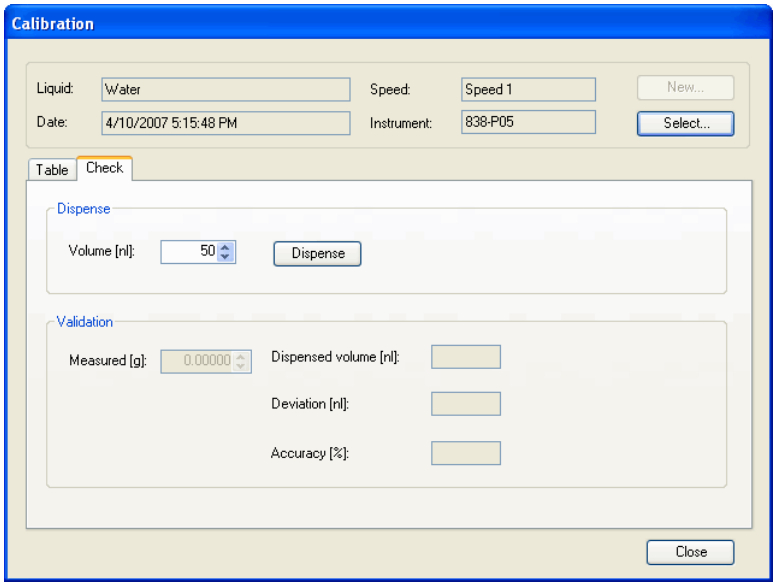
6. Select (None) as the reference liquid and enter the known density of the liquid in the field.
7. Save the liquid.

When you are not connected to the instrument, you can also create new liquids and edit existing liquids by selecting Settings > **Liquids...** (see "Liquids" on page 93).

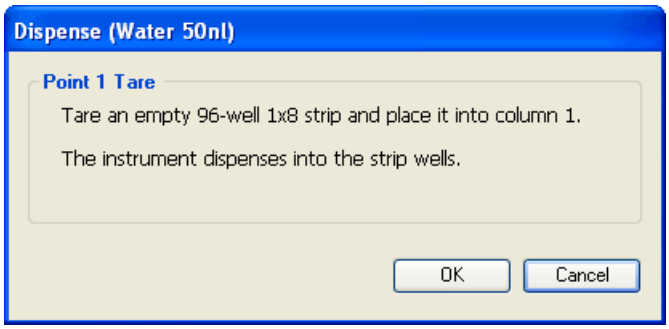
Checking the calibration accuracy

You can check the accuracy of a calibration at a certain volume.

1. Select Instrument > **Calibrate...** or press **F9** on your keyboard. The **Calibration** dialog opens.
2. Select the **Check** tab. You cannot use the tab after starting a calibration. You can use it again after the calibration is finished and saved or after the **Calibration** dialog is closed.
3. Click **Select...** and select the appropriate calibration from the list. Click **OK**.



4. Select the volume in the **Volume [nl]** field and click **Dispense**.



5. Tare an empty 96-well 1x8 strip and place it into column 1 of the plate. Place the plate onto the plate carrier. Click **OK**.

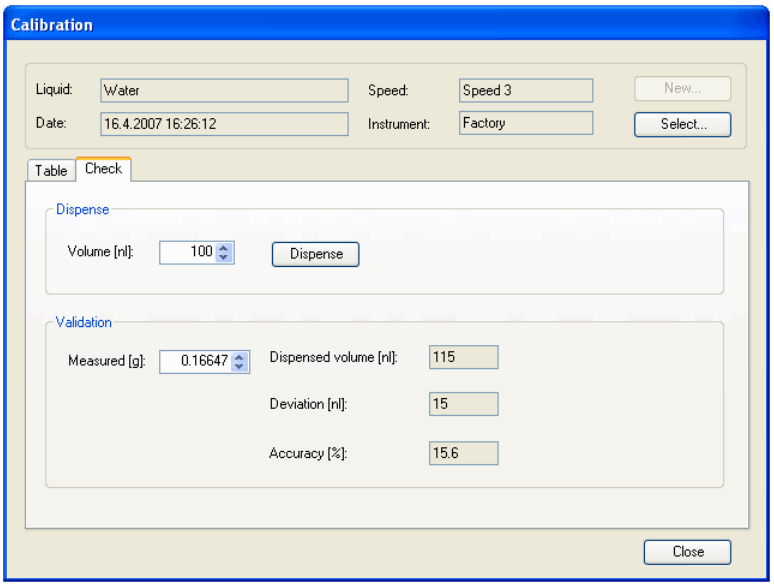
   The instrument dispenses into the strip.

6. Remove the filled strip from the plate and weigh the strip.

7. Enter the weight in grams into the **Measured [g]** field.

   The value of the **Dispensed volume [nl]** field is calculated automatically. The value should be close to the value you entered into the **Volume [nl]** field. Deviation from the set volume in nl and the accuracy in percentage are also calculated. The dispensed volume and deviation are rounded to the closest whole number. The accuracy is rounded to the closest decimal number.

Note If the weight of the dispensed liquid in the strip is weighed and entered incorrectly into the **Measured [g]** field, the calculation can be inaccurate as the values are rounded.



8. Click **Close** to exit the check.

Correcting differences between valves – Valve correction factor

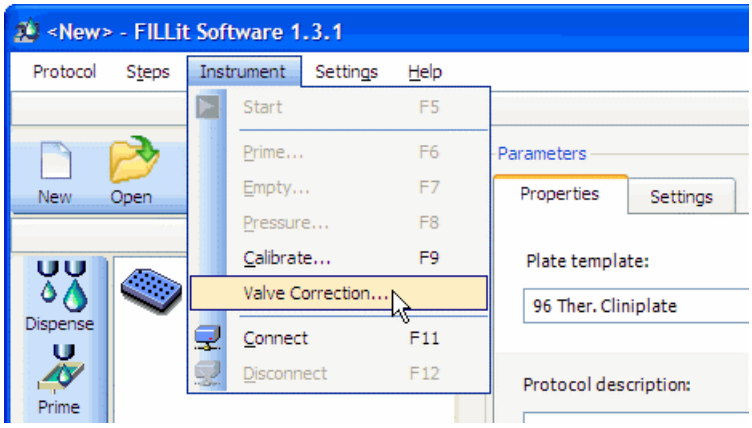
With the valve correction feature you can set the compensation factor required for each spare valve and compensate for the dispensing volume of a single valve.

Using the valve correction factor is *necessary* when a spare valve is changed. The valve correction factor is provided with the valve and the value must be entered in FILLit Software to guarantee accurate dispensing. Correction factors are valve specific and need to be entered for the correct channel.

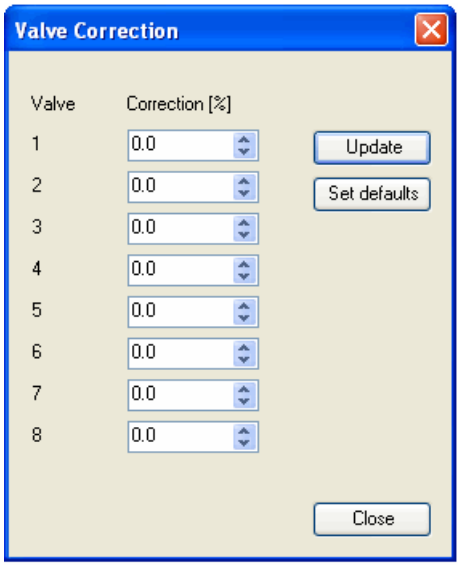
Note Make sure that the instrument is using embedded software version 1.00.41 or later for valve correction to function correctly with spare valves.

The valve correction factor may also be used to correct any differences between valves when the highest possible precision is required.

1. Select Instrument > **Valve Correction**.



The **Valve Correction** dialog opens.



2. Change the values of the valves by typing the new value into the field in question or by using the arrow keys. Make sure that you enter the value provided in the spare valve's documentation. The value is given as a percentage.

Note The **Valve Correction** dialog is active and editable only if the instrument is connected to the PC. In addition, you cannot see the changed values of the valves if the PC is not connected to the instrument, because all values are then displayed as "0.0" even if they have been changed earlier.

You can enter a correction factor in percentage, for example, if valve 1 is consistently dispensing 515 nl instead of 500 nl, you can type –3 in the appropriate **Correction %** box. This correction factor will control the valve to dispense 3 % less liquid than before with valve 1.

- **Update** – Saves the entered values into the instrument memory. Updating will affect all future actions, for example, calibration.
- **Set defaults** – Changes all the values back to zero and removes all changes into a valve dispensing pattern.

Caution Valve correction is not intended to adjust dispensing valves due to clogging or contamination if daily maintenance is missing. Valve correction does not replace the normal five-point calibration. You should always calibrate the liquid and the associated speed you are using.

Channel-to-channel variation should always be tested before changing any dispensing volume of an individual valve. Channel-to channel variation can be tested by dispensing a dye or fluorescein into, for example, a 384-well plate and detecting the dispensing result with a photometer or fluorometer.

3. Click **Close** to confirm the changes and to exit the **Valve Correction** dialog.

   The valve correction values used in a run are listed in the instrument report and they can also be printed out if necessary. See Chapter 7: "*Reports*".

Connecting to the instrument

To control the instrument with FILLit Software, connect the software to the instrument after starting the software.

Before you start, check that:

- the instrument is configured in FILLit Software (see "Defining a new instrument manually" on page 22, "Defining a new instrument automatically" on page 21, and "Instrument" on page 85).
- the instrument is connected to the workstation by a serial or a USB cable. For more information, see the instrument user manual.

You can connect the software to the instrument in one of the following ways:

- In the **Instrument** action panel, select the instrument from the list and click **Connect**.

- Select Instrument > **Connect** to connect to the default instrument (see "Instrument" on page 85).
- Press **F11** on your keyboard to connect to the default instrument.
- Connect to the default instrument automatically when the software starts (see Chapter 8: "*Settings*").

Disconnecting from the instrument

You can disconnect the software from the instrument in one of the following ways:

- Select Instrument > **Disconnect**.
- Press **F12** on your keyboard.
- In the **Instrument** action panel, click **Disconnect**.

Chapter 7
Reports

With FILLit Software you can view run, software and instrument reports, and print or save them.

Viewing run reports

A run file is created each time a protocol is run. The file includes general run information, run report, instrument information, protocol settings, software parameters, and step parameters of each step in the protocol.

When the protocol run has been started, Windows **File Save** dialog opens. Choose the folder where you want to save the run file and give the run file a name. Click **Save**.

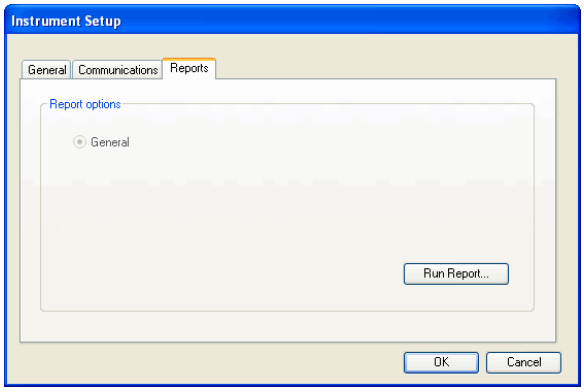
The run file is stored in the workstation file system. The run files for Multidrop Combi nL have the extension .nlrun.

Viewing instrument reports

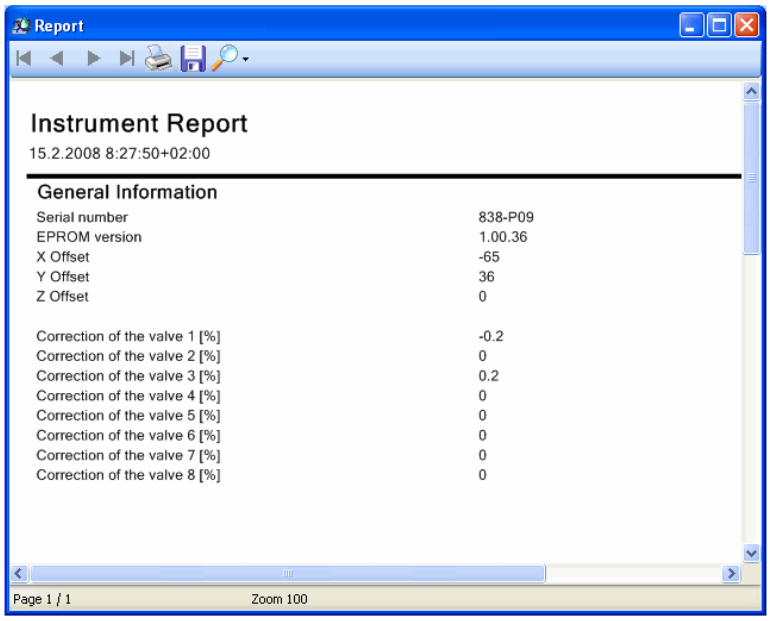
When you are connected to the instrument, you can view instrument reports. The report has information about the serial number, embedded software version, dispensing height and offset values, and the number of cycles (open and close) of each dispensing valve.

1. Select Settings > **Instrument...**. Select the instrument from the list and click **Setup...**.

2. Select the **Reports** tab in the **Instrument Setup** dialog.



3. Click **Run Report...**. The report is created and it opens.



For information about printing and saving, see “Printing and saving reports” on page 84.

Printing and saving reports

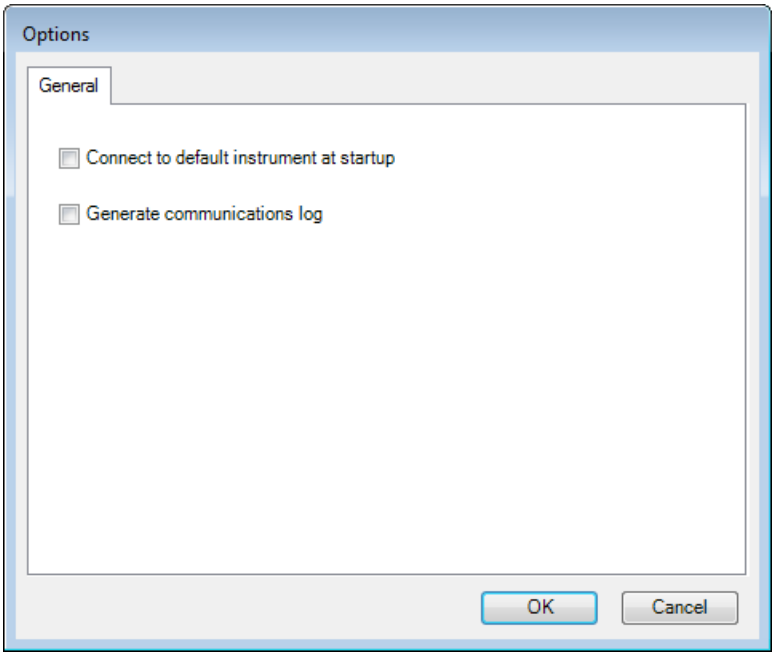
You can save a created report in an Adobe Portable Document Format file (.pdf), a Microsoft Excel file (.xls), or a text file (.txt). Click the button in the report toolbar. The **Save As** dialog is launched. Give a name to the report, select the file type and the folder, and click **Save**.

You can also print the report by clicking the button in the report toolbar.

Chapter 8
Settings

Options

Select Settings > **Options...** to open the **Options** dialog.

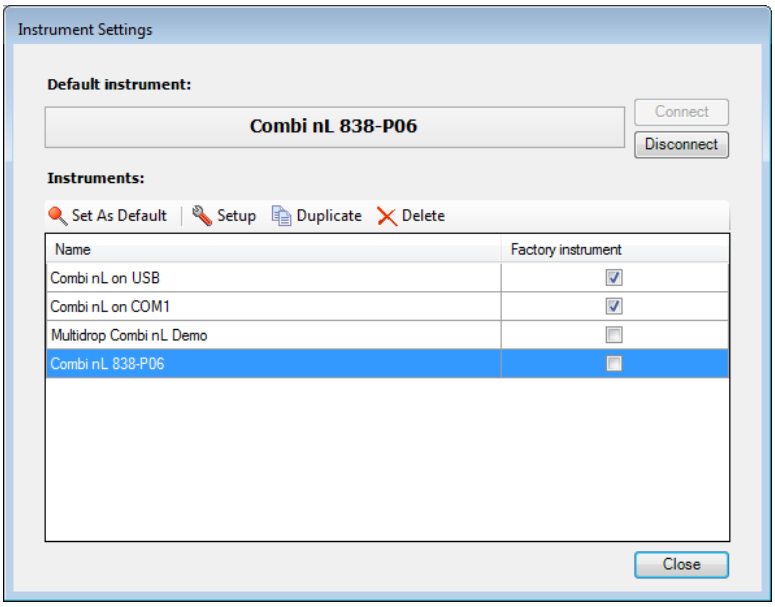


The dialog has the following parameters:

- **Connect to default instrument at startup** – When selected, the software connects to the default instrument (see “Instrument” on page 85) at startup. When you create the default instrument for the first time, the option is enabled. Otherwise, the instrument is not connected. You can establish the connection later by selecting Instrument > **Connect**.
- **Generate communications log** – As the communication log may generate a lot of data, turn this setting on only to investigate communication problems. The log file is saved in the Log folder under the software installation folder.

Instrument

Select Settings > **Instrument...** to open the **Instrument Settings** dialog.



The **Instrument Settings** dialog has the following parameters:

- **Connect** – Opens a connection to the default instrument.
- **Disconnect** – Closes the connection to the default instrument. You must close the connection before setting another instrument as the default.
- **Set As Default** – Click the button to set the selected instrument as the default. The software tries to connect to the default instrument when it is started (see "Starting the software" on page 34), if the **Connect to default instrument at startup** setting is selected (see Chapter 8: "*Settings*").
- **Setup** – Edit the setup parameters of an existing instrument.
- **Duplicate** – If you want to add a new instrument that does not exist in the list, first make a duplicate of an existing instrument and save it with a new name. Then you can modify the setup information.
- **Delete** – Remove the selected instrument from the list.
- **Close** – Close the dialog.

To edit instrument-related settings, select the instrument from the list and click **Setup...**. The **Instrument Setup** dialog opens. Also see "Options" on page 85.

The **Instrument Setup** dialog has the following tabs:

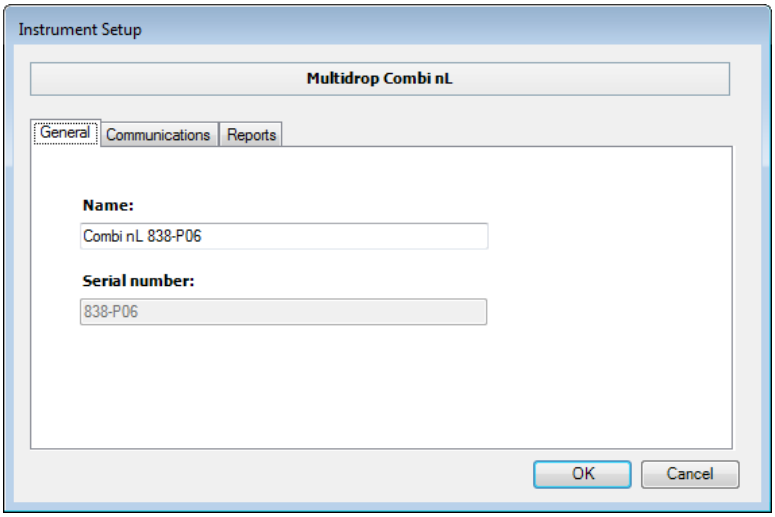
- "General" on page 87

- "Communications" on page 87
- "Reports" on page 88 (when connected to the instrument)

To add a new instrument to FILLit Software, see "Defining a new instrument manually" on page 22 and "Defining a new instrument automatically" on page 21.

General

Check the general information related to the instrument on the **General** tab.

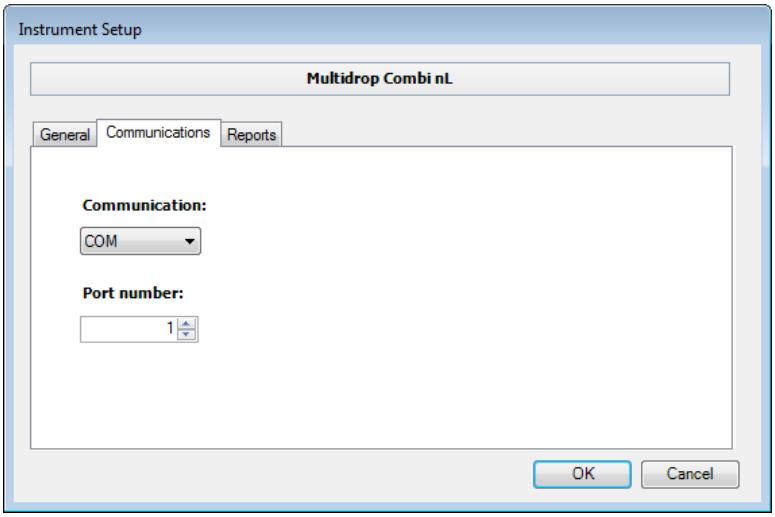


The **General** tab has the following parameters.

- **Name** – The unique name of the specific instrument.
- **Serial number** – Check the serial number of the instrument from the type label on the instrument and enter it here.

Communications

Define the communication settings between the instrument and the PC on the **Communications** tab.



The **Communications** tab has the following parameters:

- **Communication** – Select the type of data communication port. The options are COM and USB.
- **Port number** – Select the COM port that the instrument is connected to. Allowed port numbers are 1 to 100. The option is only for the COM port.

Reports

You can view instrument reports on the **Reports** tab when you are connected to the instrument. For more information, see "Viewing instrument reports" on page 83.

Plate template settings

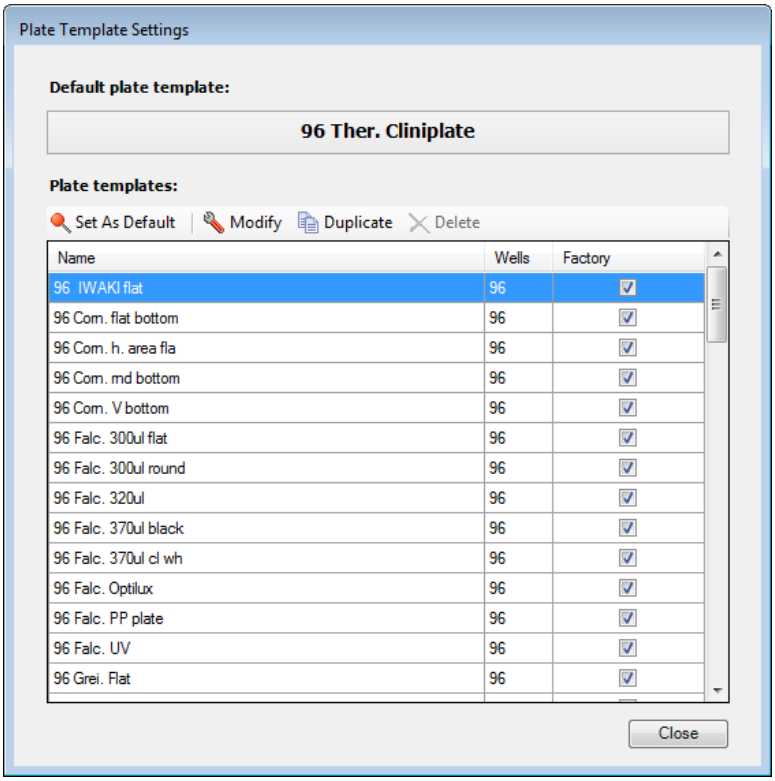
Select Settings > **Plate Template...** to open the **Plate Template Settings** dialog. The plate templates contain the most common plate types. You can change the default plate template, create new templates, modify existing plate templates, and delete plate templates.

Plate type is a microplate definition which has enough information about the plate so that the instrument can correctly dispense into the plate. The information includes, among others, the plate name, well coordinates, maximum well volume, and the plate height.

Caution Verify the plate template settings each time you start using a new batch of plates. The dimensions of the plate may have changed slightly and thus the instrument performance may be jeopardized. This may even cause damage to the instrument. Thermo Fisher Scientific takes no responsibility for any damage

to the instrument if caused by using incorrect plate template settings.

Note You cannot modify or delete factory-created plate templates. You can only view the settings. If you want to modify an existing plate template, make a duplicate of it and save it with a new name.

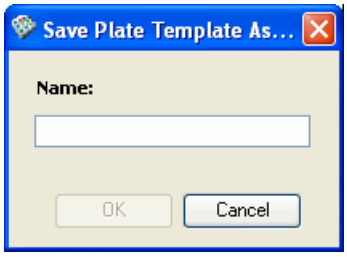


- **Set As Default** – Click the button to set the selected plate type as the default. The default plate type is used when creating a new protocol (see "Creating a new protocol" on page 35 and "Editing a protocol" on page 36).
- **Modify** – You can view the settings of an existing plate template and edit them. See "Modifying plate templates" on page 90.
- **Duplicate** – You can create a new plate template by making a duplicate of an existing plate template. See "Creating plate templates" on page 89.
- **Delete** – Remove the selected plate template from the list. The software requires you to confirm the deletion.
- **Close** – Close the dialog.

Creating plate templates

You can create new plate templates by duplicating existing plate templates.

1. Select Settings > **Plate Template...**. The **Plate Template Settings** dialog opens.
2. Select a plate template from the list. Select a plate template that is as similar as possible to the one you want to create.
3. Click **Duplicate**.



4. Give a name to the new plate template. You can use letters a to z, numbers 0 to 9, an underscore (_), and a hyphen (-) in the name. Click **OK** to save the duplicate plate template.
5. Select the new plate template from the list of plate templates and click **Modify...**. **Plate template editor** opens.
6. Modify the dimensions of the plate template as necessary (see “Modifying plate templates” on page 90).
7. Click **Save**.

Modifying plate templates

You can modify the dimensions of a plate template, for example, after creating the plate template by duplicating an existing plate template.

1. Select Settings > **Plate Template...**. The **Plate Template Settings** dialog opens.
2. Select the plate template from the list and click **Modify...**. **Plate template editor** opens.

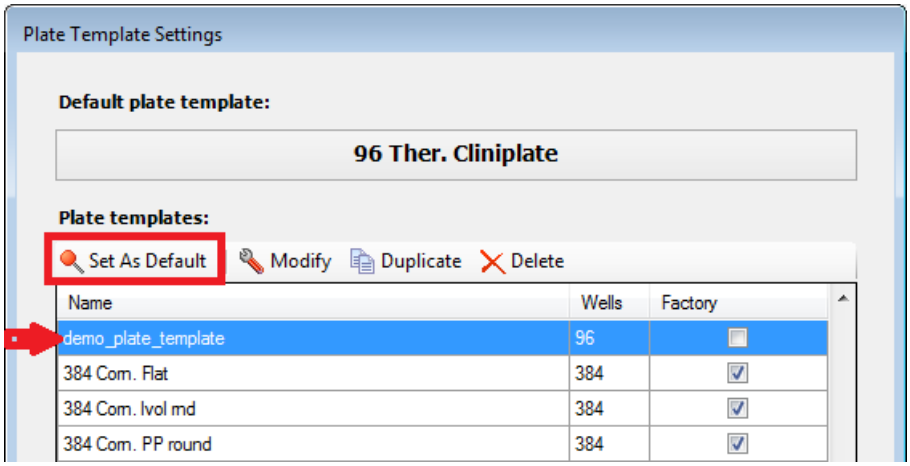


Plate Preview shows a model of the plate.

Helper View is a visual aid showing the selected distance on a 6-well plate.

The plate template definition has the following parameters. The unit of the distances is given in mm at a precision of 0.1 mm.

General:

- **Name** – The name of the plate.
- **Plate description** – The description of the plate, including information such as the well number and the shape of the well bottom.
- **Well count X** – The number of wells in the X-direction.
- **Well count Y** – The number of wells in the Y-direction.

Plate size:

- **Height [mm]** – The height of the plate.
- **Length [mm]** – The length of the plate (vertical).
- **Width [mm]** – The width of the plate (horizontal).

Well location:

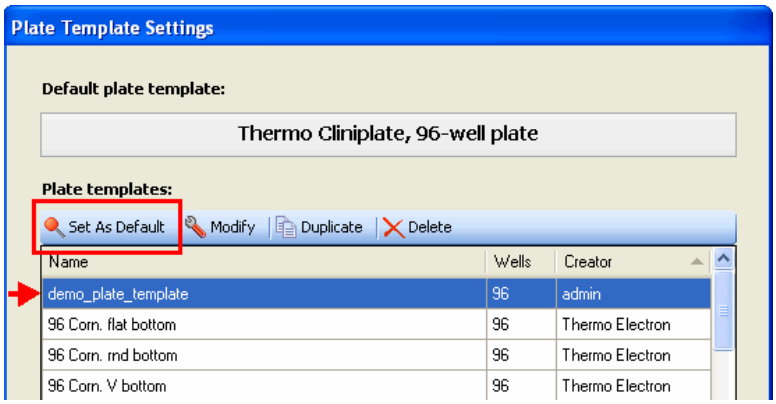
- **First column position [mm]** – The position of the first column as indicated by the visual aid.

- **First row position [mm]** – The position of the first row as indicated by the visual aid.
- **Last column position [mm]** – The position of the last column as indicated by the visual aid.
- **Last row position [mm]** – The position of the last row as indicated by the visual aid.

Well parameters:

- **Well shape** – The shape of the well is usually a circle or a square.
- **Well volume [µl]** – The maximum filling volume of the well in µl.

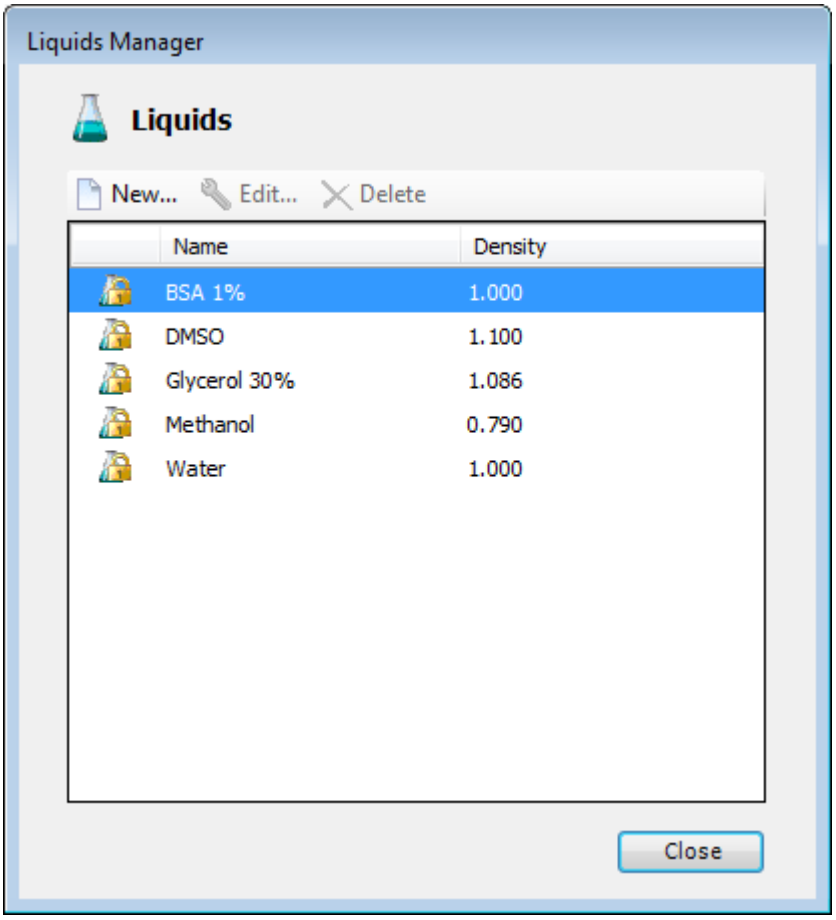
3. Click on appropriate fields and enter the new dimensions in them.
4. Save your changes by clicking **Save**.
5. Close the editor by clicking **Close**. If you have modified the plate template, you can save or ignore the modifications at this point.
6. If needed, set the plate template as the default plate template:
    1. Select the plate template from the list.



    2. Click **Set As Default**.

Liquids

Select Settings > **Liquids...** to open the **Liquids Manager** dialog. You can add new liquids and edit existing liquids. The instrument does not have to be connected. However, to carry out a calibration, you must be connected to the instrument. It is also possible to add new liquids when you are calibrating liquids (see “Adding a new liquid” on page 75).



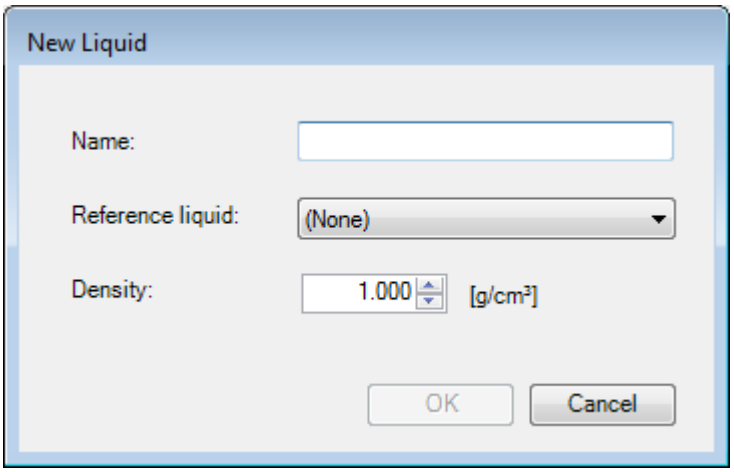
The **Liquids Manager** dialog has the following parameters:

- **New...** – Opens the **New Liquid** dialog for adding new liquids (see “Adding new liquids” on page 94).
- **Edit...** – Opens the **Edit Liquid** dialog for editing the liquid name and density (see “Editing liquid names and densities” on page 94). Select a liquid you want to edit from the list and click the button. You can only edit liquids which are not used in calibrations.
- **Delete** – Deletes the selected liquid. You cannot delete a liquid which is used in a calibration.

- List of liquids and their densities saved in the software.
  - – Liquid is used in calibrations and cannot be edited.
  - – Liquid is not used in calibrations and can be edited.

Adding new liquids

You can add a new liquid and save it in the software. Select Settings > Liquids... > **New...** to open the **New Liquid** dialog.

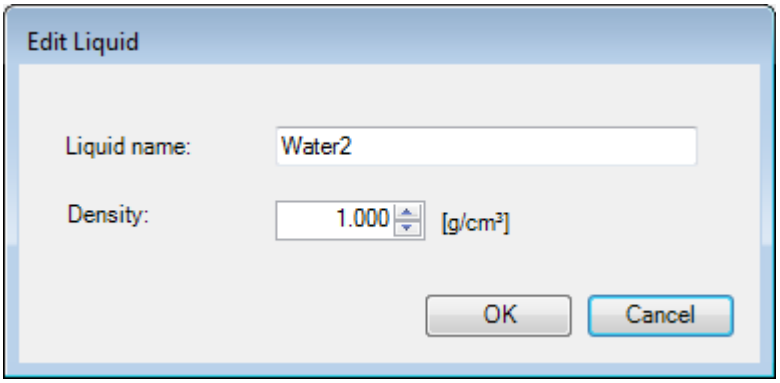


The **New Liquid** dialog has the following parameters:

- **Name** – Enter a unique name of the liquid.
- **Reference liquid** – Select a liquid whose density is used for the new liquid.
- **Density** – Enter a known density of the liquid in g/cm^3 and select (None) as the reference liquid. If you select a reference liquid, its density is shown in the field and you can modify it, if necessary.

Editing liquid names and densities

You can edit the name or density of a liquid saved in the software and not yet used in any calibration. Select Settings > Liquids... > **Edit...** to open the **Edit Liquid** dialog.



The **Edit Liquid** dialog has the following parameters:

- **Liquid name** – Modify the name in the field. If the liquid is used in calibrations, you cannot modify the name.
- **Density** – Modify the value in g/cm^3 in the field.
- **Save** – Save your changes.
- **Cancel** – Discard your changes.

Chapter 9
Menus and Action Panels

Figure 9-1 shows the location of the menu bar and action panels in the main window of FILLit Software.

Figure 9-1. Menus and action panels of FILLit Software

- **1** – Menu bar. For more information about the menu items, see “Menu commands” on page 98.
- **2** – Protocol action panel. For more information about the buttons, see “Protocol action panel” on page 99.
- **3** – Steps action panel and step tree for editing protocols. For more information about the buttons, see “Steps action panel” on page 100.

- **4** – Instrument action panel. For more information about the buttons, see “Instrument action panel” on page 100.
- **5** – Report toolbar. It is available when a report has been created. For more information about the buttons, see “Report toolbar” on page 100.

Menu commands

This section includes descriptions of all the menu items in FILLit Software.

Protocol

- **New...** – Opens a new protocol editing window (see “Creating a new protocol” on page 35).
- **Open...** – Opens the **Open Existing Protocol** dialog for opening protocols from the file system (see “Opening an existing protocol” on page 36).
- **Save** – Saves the current protocol in the file system (see “Saving a protocol” on page 42).
- **Save As...** – Opens the **Save Protocol** dialog for saving the current protocol with a new name.
- **Data Transfer...** – Transfers stored protocols and calibrations between a workstation and the instrument (see “Managing protocols or calibrations” on page 42).
- **Exit** – Exits the software.

Steps

- **<Step type>** – Adds the chosen step type to the current protocol after the last step. For more information, see “Adding new protocol steps” on page 40 and Chapter 5: “*Step Parameters*”.

Instrument

- **Start** – Runs the protocol on the instrument (see “Running a dispensing protocol” on page 65).
- **Prime** – Opens the **Prime** dialog for priming the dispensing system (see “Priming the instrument” on page 67).
- **Empty** – Opens the **Empty** dialog for emptying the dispensing system after use (see “Emptying the tubings” on page 67).
- **Pressure** – Opens the **Pressure** dialog for pressurizing the dispensing system (see “Pressurizing the dispensing system” on page 68).

- **Calibrate** – Opens the **Calibration** dialog for calibrating liquids (see "Calibrating or recalibrating liquids" on page 70).
- **Valve correction** – Opens the **Valve correction** dialog for changing the dispensing volume of an individual valve (see "Correcting differences between valves – Valve correction factor" on page 78).
- **Connect** – Connects the workstation to the default instrument.
- **Disconnect** – Disconnects the workstation from the default instrument.

Settings

- **Options...** – Opens the **Options** dialog. You can set general default parameters (see "Options" on page 85).
- **Instrument...** – Opens the **Instrument Settings** dialog. You can configure the instrument connected to FILLit Software and set the default instrument. You can also define a new instrument (see "Instrument" on page 85).
- **Plate Template...** – Opens the **Plate Template Settings** dialog. You can set a plate template as default, modify plate template dimensions (such as well sizes and positions), create new plate templates by making plate duplicates and modifying the data, and delete plate templates (see "Plate template settings" on page 88).
- **Liquids...** – Opens the **Liquids Manager** dialog. You can manage liquids used in dispensing by editing their names or densities. You can also create new liquids (see "Liquids" on page 93).

Help

- **Contents...** – Opens the Help application (see Chapter 10: "*Using Help*").
- **About...** – Shows information about FILLit Software.

Action panels and toolbars

This section includes descriptions of all the action panel and toolbar buttons in FILLit Software.

Protocol action panel

The **Protocol** action panel has the following buttons:

 New protocol (“Creating a new protocol” on page 35)

 Open protocol (“Opening an existing protocol” on page 36)

 Save protocol (“Saving a protocol” on page 42)

 Open the Help (Chapter 10: “*Using Help*”)

Steps action panel

The **Steps** action panel has the following buttons:

 Dispense (“Dispense” on page 49)

 Prime (“Prime” on page 60)

 Empty (“Empty” on page 61)

 Shake (“Shake” on page 62)

 Pause (“Pause” on page 63)

Instrument action panel

The **Instrument** action panel has the following buttons:

Connect to the instrument selected from the list

Disconnect from the instrument

Empty the dispensing system (“Emptying the tubings” on page 67)

Pressurize the dispensing system (“Pressurizing the dispensing system” on page 68)

Prime the dispensing system (“Priming the instrument” on page 67)

Run the protocol on the instrument (“Running a dispensing protocol” on page 65)

Report toolbar

The report toolbar has the following buttons:

 Go to the first page of the report

 Go to the previous page

 Go to the next page

 Go to the last page of the report

 Print the report

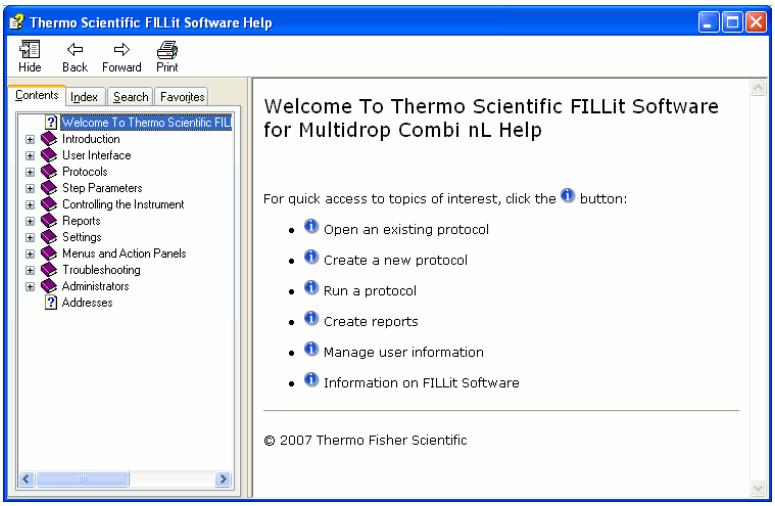
 Save the report

 Zoom the report view

Chapter 10
Using Help

You can open the Help by selecting Help > **Contents...** from the menu bar, pressing the **F1** key on your keyboard, or clicking the button on the **Protocol** action panel.

The following **Thermo Scientific FILLit Software Help** viewer opens.



The Help toolbar buttons are:

- **Hide** – Hides the left-hand side navigation pane. To display the navigation pane again, click the **Show** button that appears instead of the **Hide** button.
- **Back** – Takes you back to the previous view in your view history.
- **Forward** – Takes you to the next view in your view history.
- **Print** – Prints a single topic or multiple topics.

You can access the help content in different ways by selecting one of the following tabs:

- **Contents** – Browse the help topics by subject.
- **Index** – Type a keyword or browse all keywords to find a specific topic.
- **Search** – Find a specific help topic by entering words to search in the help content.

- **Favorites** – Add shortcuts to help topics of your choice.

Chapter 11
Troubleshooting Guide

Note Do not use the instrument if it appears that it does not function properly.

Note that the instrument does not verify the logic flow of the received commands.

When an error is detected, the current operation is terminated. After an error, it is best to abort the current run and restart from the beginning after the problem is fixed.

The Multidrop Combi nL embedded software has the following error messages (see Table 11-1).

Table 11-1. Embedded software error messages reported

Error	Cause	Action
Plate X position error.	Plate carrier cannot move	Power off/on (or contact service).
Plate Y position error.	Plate carrier cannot move	Power off/on (or contact service).
Z position error.	Dispensing valve lifting mechanism cannot move	Power off/on (or contact service).
No more memory for storing user data.	Too many protocols saved	Delete protocols that are not used.
Not primed!	Prime undone	Press the PRIME button.
Missing prime vessel.	Priming vessel missing	Insert the priming vessel.
Protective cover not in place.	Protective cover not in place	Pull the protective cover over the dispensing valve head.

The run report in FILLit Software shows the error and warning messages that occur during dispensing.

Cannot connect to the instrument

If you receive an error message when trying to connect to the instrument, make sure that the correct communication port is selected in both the instrument and the software.

Problem A

After you click **Connect**, the connection fails. You receive the following error message:

Connection failed. Instrument not connected.

Problem B

After you click **Connect**, the connection fails. You receive the following error message:

Connection failed.

Solution A

Do the following:

1. Check the **Options** menu in the instrument control panel.
2. Make sure that the selected computer interface (USB or RS-232) matches the communication port in use.

Solution B

Do the following:

1. Check the **Instrument Setup** dialog in FILLit Software.
2. Make sure that the selected communication settings (USB or COM) match the communication port in use.

Also check that the serial connector or USB cable is securely connected to the computer and instrument and that the instrument is defined in FILLit Software (see “Communicating with instruments” on page 21).

You can also try switching the instrument OFF and ON again.

Glossary

backflush The operation of discharging the contents of the tubing of fluid.
See Also empty.

calibrate To create a calibration curve for the combination of a liquid and a speed setting to ensure accurate volumetric dispensing of the liquid into the plate. Calibrations are instrument-specific.

calibration A series of calibration points for a liquid. The dispensed liquids may have significantly different properties, which affect the valve open time needed to achieve the same volume.

COM port Serial RS-232 port.

dispense To distribute liquid into the wells of the preselected strips or microplate.

dispensing height The valve position on top of the microplate. The distance between the bottom surface of the plate carrier to the tip of the dispensing valve.

dispensing valve A normally-closed 2/2-way fluid valve for high precision and high speed dispensing of liquids.

empty To draw back to the reagent reservoir all the liquid in the hoses and valves (i.e., the dead volume). A vacuum is produced for the emptying function.

error message Indication that an error has been detected.

instrument protocol A dispensing protocol which can only contain one dispense step and one additional shake step. The protocol can be downloaded to the instrument or run on the workstation when connected to the instrument.

multistep protocol A dispensing protocol which can contain any of the available steps with no limitations. Multistep protocols are only stored in the workstation and run from there when connected to the instrument.

plate A plate containing microwells.

predispense The volume that is automatically dispensed before filling each plate.

pressurize To raise the air pressure of the pressure/vacuum system to a predefined level at instrument startup before any dispensing can be carried out. The instrument uses air pressure to push the liquid through the dispensing tubings and valves from the reagent reservoir into the plate.

prime To fill the liquid path with solution to be dispensed.

priming vessel An external waste container of propylene for excess priming liquid. The vessel can also be equipped with a tube drain or a cap.

protective cover The blue sliding cover that is pulled over the dispensing valve head when the instrument is on. To pause operation and hold the instrument on standby, the protective cover is pushed in to release the pressure.

remote control Running mode allowing a remote computer to operate the dispenser.

protocol A sequence of steps that performs desired function(s). A protocol contains all the information required by the instrument to dispense a plate, such as plate type, plate settings, steps and their parameters.
See Also instrument protocol, multistep protocol.

step A protocol consists of a number of steps. One step performs a specific function, such as priming, dispensing or shaking. Each step also has a set of parameters according to which the step is carried out.

strip A strip of wells in a row.

target well A well which is selected to be dispensed on a plate.

USB Universal serial bus.

well An individual reaction vessel in a plate.

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