Sidekick Offline Biosensor Immobilization Station User Guide
P/N 41-0100-PD Rev B

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CHAPTER 1: 
Welcome

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Welcome to the Sidekick Offline Biosensor Immobilization Station User Manual. This manual explains how to:

- Install the Sidekick Station
- Operate the Sidekick Station
- Set up and run batch loading and offline loading in advanced quantitation experiments
- Maintain the Sidekick Station
- Integrate the Sidekick Station to an automated laboratory system

For information on using the Octet systems for quantitation or kinetics experiments, please refer to the appropriate system user manuals.

ABOUT THE SIDEKICK STATION

The Sidekick Station is an accessory to Pall ForteBio’s Octet family of real-time, label-free biomolecular interaction analysis platforms. It is a specialized instrument that enables uniform loading of reagents across all 96 biosensors in a biosensor tray. Loading of analyte and other reagents on biosensors that do not require online monitoring of signal can be accomplished offline on the Sidekick Station, freeing up the Octet system for other users.

The Sidekick Station consists of the Sidekick instrument, software and an accessory kit which includes a power supply and a USB A-B cable. The Sidekick Station may be installed beside an Octet system and used in collaboration with the Octet system. Or, the Sidekick Station may be used independently to load reagents in batch mode on biosensors one full tray at once.

ABOUT THE MANUAL

The following conventions are used in this manual.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu commands are bold.</td>
<td>To start a new experiment, select Experiment - New Experiment on the main menu.</td>
</tr>
<tr>
<td>Document names are italicized.</td>
<td>Octet Data Acquisition User Guide</td>
</tr>
<tr>
<td>Numbered steps explain how to carry out a procedure.</td>
<td>1. To start the Data Analysis software, click the icon on the desktop.</td>
</tr>
</tbody>
</table>
NOTE: A note presents pertinent details on a topic. For example, general information about tips or alternate options.

IMPORTANT: An important message for instances where the assay or procedure will not work if not properly followed.

WARNING: A warning informs the user that specific actions could cause irreversible consequences or damage.

Table 2 shows labels found on the Sidekick Station that provide important safety and user information.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat/hot</td>
<td></td>
</tr>
</tbody>
</table>

PALL FORTEBIO TECHNICAL SUPPORT

You can contact Pall ForteBio technical support at:

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E-mail: fortebio_support@pall.com
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Installation Instructions

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NOTE: Installation should be performed in accordance with the following instructions.

SIDEKICK STATION PACKAGE CONTENTS
The Sidekick Station package consists of the following components. Please ensure upon opening the package that all items are present.

- Sidekick Station
- Power Supply
- USB Cable
- Sidekick Software CD

INSTALLING THE SIDEKICK STATION AND SOFTWARE
Perform the tasks outlined below to install the Sidekick Station and software.

1. Insert the Sidekick CD into the CD drive of a computer. The following screen with a clickable menu will display.

   ![Sidekick Installation Menu](image)

   *Figure 2-1: Sidekick Installation Menu*

2. Click on Install Serial Port Driver to install the driver for the Sidekick Station. A pop up window will display Driver Installed. Press the OK button.

3. Click on the Install Sidekick Software button next. Follow the steps as directed by the pop up windows to install the Sidekick software.
4. Connect the Sidekick Station to a power source using the supplied power cord. Connect the Sidekick Station to the computer using the supplied USB cable. On the window that displays, choose Yes, this time only and click Next.

5. In the Found New Hardware Wizard, click Next.

6. Click Finish.


8. Switch the Sidekick Station on using the button on the front panel. The green LED light will come on.

9. Double-click the Sidekick icon on the desktop to open the software program. Alternatively, click the Start button on the desktop and select Programs > ForteBio > Sidekick.

Figure 2-2: Sidekick Station Icon on the Desktop

10. The Sidekick software control window opens and displays the following. Click on the Options tab.

Figure 2-3: Sidekick Software Interface

11. The shaker and the heater elements of the Sidekick Station need to be assigned ports. Assign the shaker a COM port with a different number than the heater. Test each one until the word "success" shows up next to the Test button.

NOTE: Note: Assign the heater to a port number less than a value of 10.
Figure 2-4: Options Dialog in Sidekick Software. Assign COM Ports for the Shaker and Heater.

Now the Sidekick Station is ready for use.
CHAPTER 3:
Getting Started

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Starting the Sidekick Station and Software .......................... 13
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## SIDEKICK STATION SPECIFICATIONS

*Table 3-1: Sidekick Station Specifications*

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Environmental**     | • Storage Temperature: -20 to 70 °C  
                         • Optimum Operating Temperature: 22 ± 4 °C  
                         • Safe Operating Temperature: 15 to 30 °C  
                         • Humidity: Non-condensing, 10 to 80% Relative Humidity  
                         • Indoor Use Only  
                         • Operating Altitude: 0 to 2,000 meters |
| **Compliance**        | CE, CSA                                                                                                                                   |
| **Installation**      | Category 1                                                                                                                                |
| **Biosensor Type**    | Disposable, single-use fiber optic biosensors with optional reuse by regeneration and/or re-racking                                      |
| **Biosensor Tray Type** | 8 x 12 format 96-biosensor tip tray, green color                                    |
| **Sample Plate**      | Standard, 96-well, flat bottom microplate, 14 mm height                                                                                   |
| **Sampling Volume**   | 180–220 μL/well (96-well microplate)                                                                                                      |
| **Orbital Flow**      | Static or 100–1,500 rpm; maximum setting of 1000 rpm recommended for best results                                                         |
| **Temperature Range** | (Ambient + 4 °C)–40 °C, 1 °C increments                                                                                                  |
| **Dimensions**        | 6.5” H x 6.5” W x 9” D (17 cm H x 17 cm W x 23 cm D)                                                                                       |
| **Weight**            | 9.7 lb (4.4 kg)                                                                                                                           |
| **Electrical Requirements** | Mains: AC 100–240 V, 5.0–2.0 A, 50/60 Hz, single phase  
                         • Power consumption: 120 W (240 W peak)                                                                 |
| **Power Switch**      | Present on front panel of instrument for easy access                                                                                      |
| **Sample Spill Tray** | Protects Instrument electronics in lower compartment from sample spills                                                                  |
| **Automation**        | Controlled by software through an automation interface via TCP/IP or Serial Port; multiple microplates and biosensor trays; unattended operation |
| **Connection to CPU** | USB 2.0                                                                                                                                   |
| **Sample Plate Lock** | LOCK and UNLOCK buttons present and easily accessible; biosensor tray will not sit properly unless LOCK switch is pressed                   |
STARTING THE SIDEKICK STATION AND SOFTWARE

1. Double-click the Sidekick icon on the desktop to open the software program. Alternatively, click the Start button on the desktop and select Programs > ForteBio > Sidekick.

The Sidekick Station is now ready for use.

SETTING UP MULTIPLE SIDEKICK STATIONS ON ONE COMPUTER

To set up each Sidekick instrument, follow the protocol outlined in “Installation Instructions” on page 7. Once the Sidekick Station has been installed, follow the protocol described in “Starting the Sidekick Station and Software”.

In the Options window (Figure 3-2), use the New button to set up multiple Sidekick instrument profiles to operate using one software window.
In the New Instrument window (Figure 3-3), type in a desired name for the instrument. To change the name of an instrument, use the Rename button.

Up to four Sidekick Stations can be set up on one computer when the ports are not being shared by any other instruments. For each Sidekick Station, perform the Port Assignment tests to ensure that both ports show the text "success" next to them.

Experiments can be run on the Sidekick Stations independent of each other.
NOTE: Experiments can be run on the multiple Sidekick Stations independent of each other, even when operated through a single software interface.

SIDEKICK STATION EXPERIMENT SET UP OPTIONS

An experiment can be set up on the Sidekick Station in two ways. The first allows you to run an experiment on the Sidekick Station using parameters loaded directly from a method file created on an Octet system. To use this feature, click on the Read Params… button on the Sidekick software (Figure 3-4).

![Sidekick Software Interface](image)

Methods created on an Octet system that incorporate offline steps can be loaded in the Sidekick software and the offline parameters directly fed to the Sidekick interface. Once the method file is loaded using the window shown in Figure 3-5, press the SHAKE! button to start the experiment. When running multiple Sidekick Stations on a single computer, click the Options button to choose each Sidekick Station one after the other and load the appropriate method file to run on each instrument using the Read Params… button.
The second option to run an experiment on the Sidekick Station is an independent method that requires direct input of the various experimental parameters such as Shake Temperature, Shake Speed and Shake Time on the Sidekick software interface. After input, press the SHAKE! button to start the experiment. When running multiple Sidekick Stations on a single computer, click the Options button to choose each Sidekick Station one after the other and input the individual experimental parameters appropriate for each instrument.

For both methods described, pressing the STOP button at any time during the incubation will stop the shaking and heating of the plate.

**SETTING THE PLATE TEMPERATURE**

The plate temperature can be set to 1°C increments from a minimum temperature setting of 4°C above ambient up to a maximum setting of 40°C. The default plate temperature setting is 30°C. The current temperature is displayed in the software interface as Current Temperature (Figure 3-4). If the plate temperature is changed, click on the Apply button, place the microplate on the Sidekick Station and allow sufficient time for the microplate to equilibrate to the new temperature before the start of an experiment.

To change the plate temperature, enter the required temperature in the Shake Temperature field and press the Apply button. The temperature change on the plate holder will be implemented immediately.

**NOTE:** Closing the Sidekick software stops the heater. The heater will then equilibrate to ambient temperature.
INTEGRATING THE SIDEKICK STATION WITH A LABORATORY AUTOMATION SYSTEM

The Sidekick Station can be integrated with an automated robotic plate handling system and controlled by software through an automation interface via TCP/IP or Serial port. The biosensor tray and microplate can both be moved on and off the Sidekick Station. Experimental parameters such as shaking temperature, speed and time can all be controlled by the robot software. The automation parameters can be set up in Sidekick software in the Options window. For more information on the automation feature, see Appendix A.
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Setting Up an Experiment

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SETTING UP THE MICROPLATE AND BIOSENSOR TRAY

The Sidekick enables optimal loading of reagents on biosensor tips and the simultaneous loading of a full tray of 96 biosensors. Samples that contain the analyte or reagent are taken into a 96-well microplate and set up on the Sidekick. The biosensor tray containing biosensors is then placed over the microplate and the shaking started to accomplish loading of the analyte on the biosensors.

The Sidekick achieves efficient loading of reagents on biosensors by shaking the reagent containing microplate while the biosensors are stationary. This leads to efficient mixing of the liquid around the biosensor tip.

**IMPORTANT:** While handling biosensor trays, ensure that the biosensor tips do not come in contact with other surfaces.

The microplate containing the analyte or reagent to be loaded on the biosensors should be a flat-bottomed, round-shaped 96-well type or a similarly flat-bottomed, round-shaped half-area 96-well plate. They may be of any color, but it is strongly recommended that polypropylene plates be used to minimize loss of analyte from solution to the surface of the microplates. Please note that the Octet systems require the use of black, flat-bottomed, 96-well polypropylene microplates supplied by Greiner for use as the pre-wetting plate in the biosensor tray holder.

The microplate should be set up on the Sidekick such that the corner closest to well A1 sits on the side of the LOCK button and away from the button. This orientation is noted with the text A1 marked on this corner of the Sidekick's microplate holder. To set up the reagent-containing microplate and the biosensor tray on the Sidekick, the following steps need to be performed.

1. Press the UNLOCK button down.
2. Set the analyte-containing microplate on the holder.
3. Press the LOCK button down to lock the plate in position. It will not be possible to set the biosensor tray down on the microplate properly unless the LOCK button is pressed.
4. If a temperature different from ambient is needed, input the desired temperature in the Shake Temperature field and click on the Apply button. Wait for the Current Temperature field to show the desired temperature. If using ambient temperature for the sample microplate, skip this step and go to Step 5.
5. Input the desired Shake Speed and Shake Time.
6. Place the biosensor tray carefully on top of the microplate.
7. Click on the SHAKE! button to start the experiment.

The Sidekick will maintain the shaking speed for the time set in the software and the shaking will come to a stop after the incubation period. Allow shaking to come to a complete stop before removing the biosensor tray from the Sidekick. The Sidekick maintains the temperature setting even after the end of an incubation.
SETTING UP A BATCH LOADING EXPERIMENT

When immobilization parameters for a protein have been optimized online on an Octet system, batch immobilization offline on the bench top can be accomplished readily using the Sidekick Station. This is an ideal method for applications that require many biosensors with the immobilized ligand, can be performed on up to 96 biosensors simultaneously, and generates custom ligand-coated biosensors suitable for long term storage. Batch immobilization may be performed on Streptavidin (SA), Amine Reactive (AR2G) as well as Anti-Human IgG Capture (AHC) biosensors with an appropriate ligand.

For more information on batch immobilization on Amine Reactive biosensors, please read our technical note entitled Batch Immobilization of Protein Onto Amine Reactive Biosensors. For more information on batch immobilization on Streptavidin biosensors, please read our technical note entitled Batch Immobilization of a Biotinylated Ligand onto Streptavidin Biosensors. For more information on preparing biosensors for long-term storage, read the section entitled “Technical Tip: Preserving Biosensors for Long-term Storage” in the July 2008 (Volume 1, Issue 2) issue of our Interactions newsletter at http://www.fortebio.com/interactions/July_2008/biosensors.html.

SETTING UP OFFLINE INCUBATION FOR AN ADVANCED QUANTITATION EXPERIMENT

The Advanced Quantitation mode on the Octet systems can be used to perform multi-step sandwich and ELISA-type assays to measure analyte concentrations that are lower than the limits of direct measurement. In such assays, the ligand-coated biosensors are incubated with analyte samples for longer durations and then the analyte concentrations are measured in a subsequent step wherein a secondary binding reagent is added to amplify the signal.

Long assay steps involving incubation of biosensors in samples in the microplate can be performed on the Octet system. Optionally, when the assay parameters have been determined already, such steps can be performed offline on the Sidekick to free up the Octet system for other experiments.
For more information on performing Advanced Quantitation type assays, please read the “Protocol 1: Enzyme-Linked Bridging Assay” section of the technical note entitled *Dip and Read Immunogenicity Assay Kit*. The enzyme-linked bridging assays employ a 1-3 hour incubation step that can be performed on the Sidekick.
CHAPTER 5:
Maintenance

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CLEANING THE SIDEKICK STATION

The Sidekick Station is a two-tier system with the top half containing the shaker mechanism and the bottom half containing the electronic components. The two tiers are separated by a metal plate. This plate keeps the electronics insulated from the external environment, thus protecting it from accidental liquid spills.

There are no specific maintenance protocols recommended for the Sidekick Station. As a general guideline for operating the instrument, it is recommended that the instrument be completely shut down when long periods of inactivity are expected.

Liquid spills should be cleaned up immediately and the exposed surfaces wiped clean and kept dry.

Figure 5-1: Sidekick Station
APPENDIX A:
Integrating the Sidekick Station with an Automated Laboratory System

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INTRODUCTION

Sidekick.exe is the instrument control user interface application for controlling the offline Sidekick Station. It is most often used interactively using its Graphical User Interface (GUI), but it also supports an automation interface using either a COM port (RS323) or a TCP-IP socket/port.

Included in the applications and DLLs installed with the Sidekick Station is an example application for testing the automation interface called AutomationClient.exe, it should be located in the C:\Program Files\ForteBio\Sidekick directory.

DESIGN OF THE AUTOMATION INTERFACE

The automation interface is designed to be as universal as possible, making no assumptions about the communication medium or the language of the client application connecting to Sidekick.exe. All commands and responses are ASCII strings, one per line.

- All lines are terminated with both carriage-return and line-feed characters ("\r\n").
- Each command starts with the name of the command and may then be followed by required and optional parameters.
- Each parameter starts with a switch definition (a la dos/unix command line) followed by the parameter itself, which allows parameters to be sent in any order.
- The command or response is terminated with a new line (CR/LF) sequence.
- Parameters containing embedded spaces need to be enclosed in double quotes.

SETTING UP THE SIDEKICK STATION FOR AUTOMATION CONTROL

To control the Sidekick Station using the automation interface, the automation parameters in the Options dialog have to be set up. This will enable the Sidekick Station to monitor the interface that will control it. Options are available for controlling the Sidekick Station using either a Serial Port (RS232) or a TCP-IP socket (Figure A-1). The "localhost" option should be checked if the automation client is developed on the same computer that runs the Sidekick Station.
THE AUTOMATION CLIENT EXAMPLE APPLICATION

Automation Client can connect to the Sidekick Station over either a serial (RS323) port connection or a TCP-IP socket connection. To connect locally using "localhost", leave the Machine field blank. Ensure that the port selected corresponds to the one designated in the Sidekick software options dialog.

All examples in this document will be illustrated using a TCP-IP connection, but the serial port connection behaves identically. Once you have the configuration setup correctly for both ends of the connection click the Connect button - if the port is opened successfully it will stay down indicating that the connection succeeded and the port is open; otherwise it will come up again indicating that the connection attempt failed.

Figure A-1: Setting the Automation Parameters in the Options Dialog
Once a successful connection has been established, send the default “Version” command (by selecting it in the Command combo box and clicking the Send button). A response similar to the following should display:

The response indicates that Automation Client has connected to Sidekick 1.1.0.16 controlling a Sidekick instrument using version 1.0 of the Automation Interface. Note that the version numbers used here are examples, the version number of your software may be different.
AUTOMATION COMMANDS

The following is a summary of the commands supported by the Sidekick.exe automation interface. The symbolic names are given for C++ clients connecting using the interface as defined in the AutomationAPI.h header file.

Table 4: Supported Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Symbolic Name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Version&quot;</td>
<td>AUT_CMD_VERSION</td>
<td>Returns the version of the application being automated, the type of instrument it is controlling, and the automation API version.</td>
</tr>
<tr>
<td>&quot;Run&quot;</td>
<td>AUT_CMD_RUN</td>
<td>Runs an experiment using a given method file.</td>
</tr>
<tr>
<td>&quot;Stop&quot;</td>
<td>AUT_CMD_STOP</td>
<td>Stops a running experiment, ejecting the sensors if necessary.</td>
</tr>
<tr>
<td>&quot;Status&quot;</td>
<td>AUT_CMD_STATUS</td>
<td>Returns status during a running experiment: <strong>OK</strong>=ready, <strong>Busy</strong>=running, <strong>Waiting</strong>=waiting for a condition to be resolved, <strong>Error</strong>=Experiment was terminated by an error <strong>Busy</strong> is followed by descriptive information on the progress of the experiment (% complete)</td>
</tr>
</tbody>
</table>

A TYPICAL AUTOMATION SESSION

The following is a typical automation session that illustrates the use of the automation commands to run an experiment. Commands sent from the client application are designated **SEND**; responses received from Sidekick.exe are designated **RECV**:

1. **Connect to Sidekick**
   
   **SEND:** Version
   
   **RECV:** 1.1.0.16 Sidekick 1.0
   
   **SEND:** Status
   
   **RECV:** OK

2. **Start the Experiment**
   
   **SEND:** Run-mC:\MethodFiles\Q001.fmf
   
   **RECV:** OK
3. **Monitor the Experiment**

```c
bool bBusy = true;
while (bBusy)
{
    Send("Status\n");
    response = Recv();

    if (response==OK)
        bBusy = false;
    else
        Sleep(1000); // sleep for a second
}
SEND: Status
RECV: Running (5%)
SEND: Status
RECV: Running (25%)
SEND: Status
RECV: Running (45%)
SEND: Status
RECV: Running (75%)
SEND: Status
RECV: Running (95%)
SEND: Status
RECV: OK
```
4. Stop the Experiment

SEND: Stop\n
RECV: OK

AUTOMATION API.H

//****************************************************************************
*
//    Copyright (c) 2009 ForteBio.
//    All rights reserved.
//*****************************************************************************
*
// HEADER: AutomationAPI.h
// PURPOSE: Defines the commands supported by the automation API.
// AUTHOR: BHI Oct 2008
//
#define INC_AUTOMATIONAPI_H

// NOTES:
// * The automation interface is string based. Commands and responses are strings, one per line.
// * Each command starts with the name of the command and may then be followed by required and optional parameters.
// * Each parameter starts with a switch definition (a la dos/unix command line) followed by the parameter itself. This allows parameters to be sent in any order.
// * The command or response is terminated with a new line (CR/LF) sequence.
// * Parameters containing embedded spaces must be enclosed in double quotes.
// * Response items containing embedded spaces will be enclosed in double quotes.

// Version of the API described in this header file.
const char AUT_API_VERSION[] = "1.0";

// Status return values
const char AUT_OK[] = "OK";
const char AUT_STOPPED[] = "Stopped";
const char AUT_RUNNING[] = "Running";
const char AUT_PAUSED[] = "Paused";
const char AUT_BUSY[] = "Busy";
const char AUT_ERROR[] = "ERROR";
const char AUT_EOL[] = "\r\n";

const char AUT_SWITCH_METHODPATH = 'm';
const char AUT_SWITCH_TEMPERATURE = 't';
const char AUT_SWITCH_SPEED = 's';
const char AUT_SWITCH_DURATION = 'd';

const char AUT_CMD_VERSION[] = "Version";
// Returns the version of the app being automated, the hardware
// platform it controls, and the API version.
// Args: (none)
// Response: App product version (e.g. "1.0.0.5 Sidekick 1.0\r\n")

const char AUT_CMD_RUN[] = "Run";
// Runs the shaker
// Args:
// -m <method path>  UNC path to a method file that contains the Tem-
// perature/Speed/Duration parameters
// or
// -t <temp>   Temperature to shake at (in DegC)
// -s <rpm>   Speed to shake at   (in RPM)
// -d <duration>   Duration to shake for  (in seconds)
// Response:
//  "OK\r\n"
//  "Error: not ready\r\n"

const char AUT_CMD_STOP[] = "Stop";
// Stops a running experiment
// Args: (none)
// Response:
//  "OK\r\n"
//  "Error: <reason>\r\n"

const char AUT_CMD_STATUS[] = "Status";
// Returns status: OK=ready, Busy=running, Error=Experiment was termi-
// nated by an error.
// Busy is followed by descriptive information on the progress of the
// experiment (% complete)
// Args: (none)
// Response:
//  "OK\r\n"
//  "Paused\r\n"
//  "Busy\r\n"
//  "Running (nn%)\r\n"
//  "Error: <reason>\r\n"

#endif // INC_AUTOMATIONAPI_H