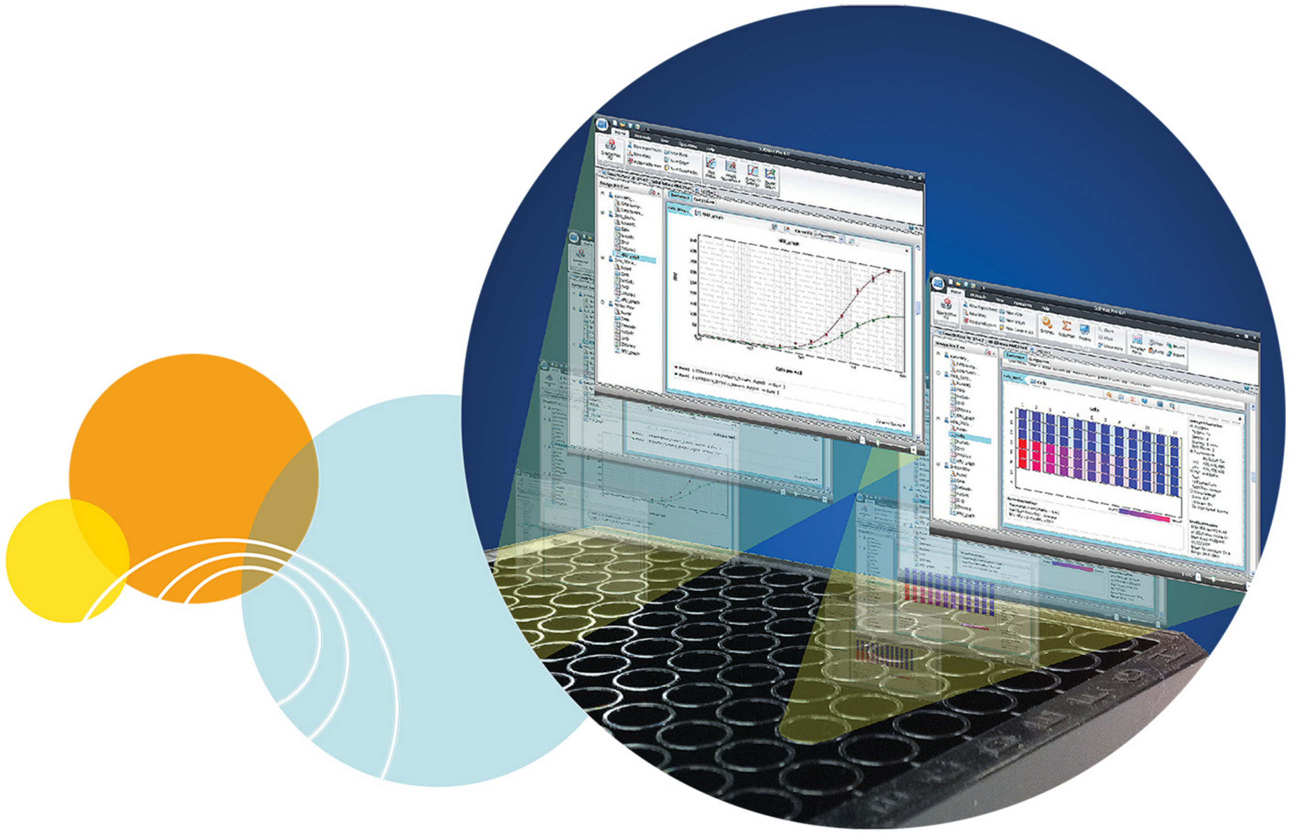


SoftMax® Pro

Microplate Data Acquisition and Analysis Software Automation

Version 6.5

API Reference Guide

5014638 J
June 2015

Foreword

Who This Guide is For

This guide is written for those who want to build an automation application that interacts with an instance of the SoftMax® Pro Microplate Data Acquisition and Analysis Software Version 6 using the automation interface to control the operation of a Molecular Devices® instrument. This reference guide documents version 6.5 of the SoftMax Pro Automation Interface.

This version of the automation interface can run scripts written for version 6.0 and newer.

Reader Prerequisites

To use this guide, the reader must:

- Understand the basic concept of object-oriented programming and programming using Microsoft .NET including the use of delegates and events.
- Understand assemblies in Microsoft .NET.
- Understand namespaces in Microsoft .NET.
- Have access to and knowledge of development tool to create and customize an assembly.

Changes to SoftMax Pro Software Automation

The technology used for SoftMax Pro Software Automation 6.0 has changed compared to previous versions.

Technology

The underlying communication mechanism is now Windows Communication Foundation (WCF) rather than Windows messaging, which allows:

- Connections to the SoftMax Pro Software over a network, rather than requiring the automation application to be located on the same computer as the SoftMax Pro Software installation.
- A strongly-typed interface, so that the compiler can catch potential issues instead of discovering errors at runtime.
- Improved error reporting.

Enhancements

In addition, the following enhancements have been made:

- Commands are now queued, so that you no longer have to wait for a command to complete before sending the next one.
- The SoftMax Pro Software application GUI is now blocked when it is being controlled by an automation application, preventing another person from interfering while automation is in progress.
- There are more comprehensive documentation and samples, including a sample application which can be used to prototype programs.

Commands

The commands available in the API are the same, although the names of some commands have changed.

The following commands are not available in this version, and will be added in future versions:

- Copy, SelectAll, SetFolderAs, TrayLock
- CDrawer, CloseCDrawer, OpenCDrawer, OpenTDrawer, TDrawer (FlexStation instruments only)

This version of the automation interface can run scripts written for version 6.0 and later.

Contents

4 Automation Interface Overview

Introduction

To integrate Molecular Devices® readers and the SoftMax® Pro Software version 6 with robotic systems from other manufacturers, or to automate the export of data from the SoftMax Pro Software to a desired Laboratory Information Management System (LIMS) package, the SoftMax Pro Software supports an automation interface. Molecular Devices has tested the interface but does not provide technical support for specific integration needs. Molecular Devices strongly recommends that customers consult a third-party automation company if internal software resources or expertise are not available.

All leading automation vendors have integrated the SoftMax Pro Software and Molecular Devices instruments with their robotics systems. A list of approved robotics partners can be found on the Molecular Devices web site.

Automation Interface Components

This SoftMax Pro Automation Interface version 6 is a Microsoft .NET Framework assembly, which can be used with any .NET Language (C#, Visual Basic, etc). This reference guide documents version 6.5 of the SoftMax Pro Automation Interface.

This version of the automation interface can run scripts written for version 6.0 and newer.

The Automation Interface API components are shown in the following figure.

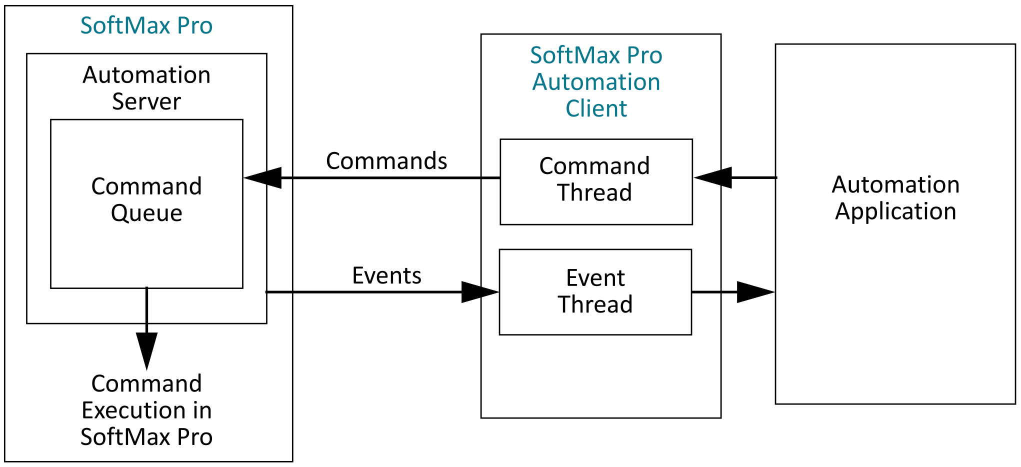


Figure 4-1: SoftMax Pro Automation API

The .NET assembly **SoftMax Pro AutomationClient** supplies the interface that can be used to control the SoftMax Pro Software. This interface contains commands that can be called, as well as Event Handlers that are used to notify the automation application of the status of the SoftMax Pro Software, execution of queued commands, and errors. Any application that wants to control the SoftMax Pro Software must connect through the AutomationClient.

The AutomationClient connects to the **AutomationServer**, which is contained within the SoftMax Pro Software. The AutomationServer maintains a queue of commands that have been sent through the Automation Client, and executes them sequentially.

Commands are sent to the SoftMax Pro Software by calling functions in the automation interface (the client). All commands in the automation interface are asynchronous, meaning that the functions will return control to the application immediately and will not block until complete.

Command results and errors are obtained by subscribing to events on the automation interface.

The Automation Server and the Automation Client are both multi-threaded:

- Commands are sent by the client and received by the server on one thread.
- Events are published by the server and passed on by the client on a second thread.

Using the Automation Interface

You use the Automation Interface to control the SoftMax Pro Software. To connect to the SoftMax Pro Software using the automation interface, call the **Initialize()** function. After the automation interface is initialized, the SoftMax Pro Software enters "automation mode." While in this automation mode, user input by way of the SoftMax Pro Software user interface is disabled.

Automation mode can be ended from the automation interface by calling **Dispose()** or from the SoftMax Pro Software user interface by clicking the **Terminate** button.

After initialization is complete, events that the application would like to monitor must be hooked up. If events are connected, they should be disconnected when the **CommandCompleted** event indicates that the command queue is empty.

All commands in the automation interface return a command ID. The command IDs are generated by the automation interface and maintained in a command queue, as shown in Figure 4-2 on page 8.   Each command ID should be stored, and used to obtain command results when the command completes. An application obtains the results of a command by subscribing to the **CommandCompleted** event, and matching the command ID in the event with the one that was returned when the command was sent.

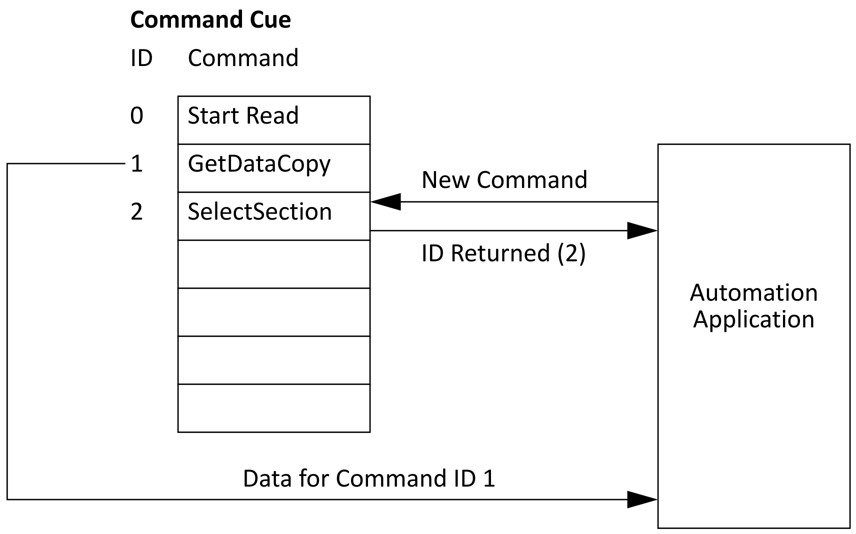


Figure 4-2: Command Queue

In addition, the following two events are published and should be considered when designing and writing an automation application:

ErrorReport event: When an error is detected by the automation server an Error event is published, followed by a CommandComplete event. Additionally, all commands in the automation server command queue are flushed.

InstrumentStatus Event: When the instrument changes state, for example from Idle to Busy, an InstrumentStatus event is published.

For more information about event messages, see Events on page 85.

For help with creating an environment able to run C# and Visual Basic .NET clients, see Creating a New Project in Visual Studio on page 14.

The following example shows a basic code structure. This includes a call to **Initialize(),** subscription to an event, and a **Dispose()** call to terminate the connection. The following examples assumes that the Automation Sample Application is being used.

```
// An instrument must be connected to SoftMax Pro
// before running this code

int lastCommandId = -999;
bool connected = false;

public void Main()
{
   // Initialize the interface
   connected = AutomationObject.Initialize();

   if ( connected )
   {
      // Hook up the CommandCompleted event
      AutomationObject.CommandCompleted+= CommandCompleted;
      // Open the reader drawer
      lastCommandId = AutomationObject.OpenDrawer();
   }
}

private void CommandCompleted( object sender,
         SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
   // report on the command being completed
   Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );

   // Disconnect from the automation server
   if( lastCommandId == e.QueueID )
   {
     Results.AppendResult("Command execution complete, disconnecting from server");
     AutomationObject.CommandCompleted -= CommandCompleted;
     AutomationObject.Dispose();
   }
}
```

The output generated should be as follows:

```
Command complete Command ID = 0Command execution complete, disconnecting from server
```

The following example is similar logic written in C#.

```
private int                 lastCommandId = -999;
private bool                connected = false;
private SMPAutomationClient client;

public void OpenDrawerExample()
{
   // Create an instance of the automation client
   client = new SMPAutomationClient();

   // Initialize the interface
   connected = client.Initialize();

   if (connected)
   {
      // Hook up the CommandCompleted event
      client.CommandCompleted += CommandCompleted;
      // Open the reader drawer
      lastCommandId = client.OpenDrawer();
   }
}

private void CommandCompleted(object sender, SMPAutomationClient.CommandStatusEventArg e)
{
   // report on the command being completed
   Console.WriteLine("Command complete Command ID = " + e.QueueID.ToString());

   // Disconnect from the automation server
   if (lastCommandId == e.QueueID)
   {
      Console.WriteLine("Command execution complete, disconnecting from server");
      client.CommandCompleted -= CommandCompleted;
      client.Dispose();
   }
}
```

The following example is similar logic written in Visual Basic .NET.

```
Imports System.Threading
Imports SoftMaxPro.AutomationClient

Module OpenDrawerExample
    Dim lastCommandId = -999
    Dim client As SMPAutomationClient

    Sub Main()
        REM Create an instance of the automation client
        client = New SMPAutomationClient

        REM Initialize the interface
        Dim connected = client.Initialize()

        If (connected) Then
            REM Hook up the CommandCompleted event
            AddHandler client.CommandCompleted, AddressOf CommandCompleted

            REM Open the reader drawer
            WaitForCommandCompletion(client.OpenDrawer())

            REM Disconnect from the automation server
            Console.WriteLine("Command execution complete, disconnecting from server")
            RemoveHandler client.CommandCompleted, AddressOf CommandCompleted
            client.Dispose()
        End If
    End Sub

    Private Sub CommandCompleted(ByVal sender As Object, _
                                 ByVal e As SMPAutomationClient.CommandStatusEventArg)
        Console.WriteLine("Command complete Command ID = " + e.QueueID.ToString())
        lastCommandId = e.QueueID
    End Sub

    Private Sub WaitForCommandCompletion(ByVal commandId As Integer)
        While commandId > lastCommandId
            Thread.Sleep(10)
        End While
    End Sub

End Module
```

Get() Functions

Commands that return information, that are prefixed with Get..., like **GetVersion()** or **GetNumberPlateSections()**. They are queued like all other commands and the information of the command is returned by way of the **CommandStatusEventArgs** class in the **CommandCompleted** event.

The CommandStatusEventArg class

```
public class CommandStatusEventArg : EventArgs

{

        public CommandStatusEventArg( int queueID, bool queueEmpty, int commandID, int intResult, String
stringResult)

        {

                QueueID = queueID;
                QueueEmpty = queueEmpty;
                CommandID = commandID;
                IntResult = intResult;
                StringResult = stringResult;
        }

        public int QueueID;

        public bool QueueEmpty;

        public int CommandID;

        public int IntResult;

        public String StringResult;

}
```

The following example demonstrates how to use functions that return information.

```
int mStatusID;

public void Main()
{

        AutomationObject.Initialize();
        AutomationObject.CommandCompleted+= CommandCompleted;

        mStatusID = AutomationObject.GetVersion();
        Results.AppendResult("Status Command ID = " + mStatusID .ToString() );
}

private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)

{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );

        if( mStatusID== e.QueueID )
        {
                Results.AppendResult( "Result: " +e.StringResult);
        }

        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");

                AutomationObject.CommandCompleted -= CommandCompleted;

                AutomationObject.Dispose();
        }

}
```

Installing the Automation API

The Automation SDK is automatically installed with the SoftMax Pro Software, and can be found in the file system where the SoftMax Pro Software application is installed.

The default installation path for the automation SDK is in a sub-folder of the **Program Files** folder where the SoftMax Pro Software is installed:

- For a 32-bit installation:
  C:\Program Files\Molecular Devices\SoftMax Pro 6.5 Automation SDK
- For a 64-bit installation:
  C:\Program Files (x86)\Molecular Devices\SoftMax Pro 6.5 Automation SDK

Computer System Requirements

The minimum and recommended computer system requirements are listed in the SoftMax Pro Software application help and user guide.

- When running both automation and the SoftMax Pro Software on the same computer, use at least the recommended system configuration, not the minimum requirements.
- Molecular Devices recommends that the files used in the automation workflow have a small number of sections, and that documents should be closed when they are no longer needed.
- An Experiment with many plates of data could adversely affect SoftMax Pro Software efficiency. If increasing the computer memory is not an option, Molecular Devices recommends using only one plate per Experiment and also ensuring that the computer is not being used for other purposes while SoftMax Pro Software is running.

Using Automation with the SoftMax Pro Software GxP Edition

If the target application is the SoftMax Pro GxP Software, /R is required in the program command line (for example, "SoftMaxProApp.exe /R") when launching the application to avoid the Log On dialog that requires manual entry of user ID and password. Instead, the Logon remote command can be sent to log the user on through the robotic interface. See Logon on page 66.

Sample Source Code and Applications

Sample automation scripts and the command example scripts shown in this guide are included as a part of the SoftMax Pro Automation API installation package and can be found in the **Scripts** folder in the **SoftMax Pro 6.5 Automation SDK** folder.

The default installation path for the sample automation scripts is:

**C:\Program Files (x86)\Molecular Devices\
SoftMax Pro 6.5 Automation SDK\Scripts**

You can use the sample application to load, view, and run the script examples.

Creating a New Project in Visual Studio

To use the automation interface in the development of custom applications:

1. Create a new project in Visual Studio using your preferred programming language.
2. Select one of the relevant templates (for example, Windows Form Application, WPF application, or Console application).
3. In the new project, add a reference to each of the following assemblies:
   - SoftMax Pro AutomationClient.dll
   - SoftMaxPro.AutomationInterface.dll
   - SoftMaxPro.AutomationExtensions.dll

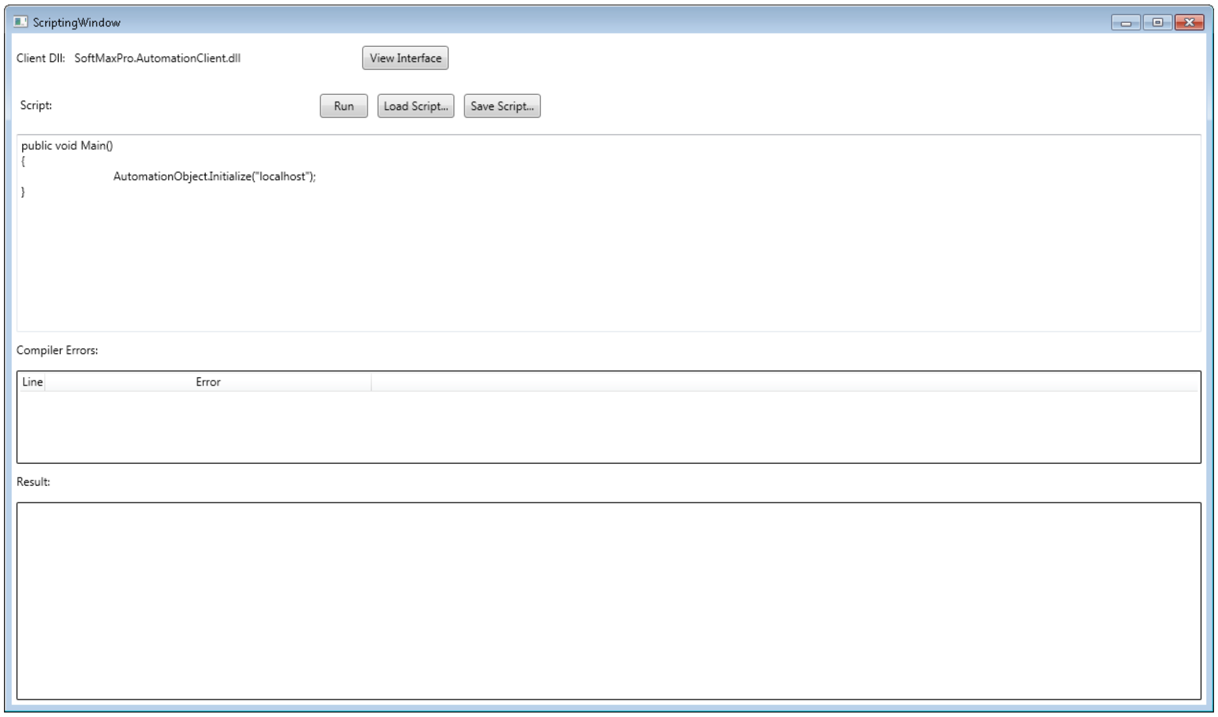
   These assembles are contained in a sub-folder of the **Program Files** folder where the SoftMax Pro Software is installed:
   - For a 32-bit installation, the assemblies are in the following folder:
     C:\Program Files\Molecular Devices\SoftMax Pro 6.5 Automation SDK
   - For a 64-bit installation, the assemblies are in the following folder:
     C:\Program Files (x86)\Molecular Devices\SoftMax Pro 6.5 Automation SDK

Note: The provided Automation Sample Application does not show the referenced assembly because it is loaded dynamically at run time and injected into the scripting interface. Referencing this assembly is required for normal application development.

Automation Sample Application

A Sample Application has been provided which can be used to quickly prototype and test code. The application binds the automation interface to a Microsoft scripting control.

Note: The Sample Application is not intended to be used in an actual laboratory or research environment.



```
public void Main()
{
                AutomationObject.Initialize("localhost");
}
```

Figure 4-3: Sample Application Scripting Window

The Sample Application is launched by executing the SMP AutomationSampleApp shortcut from the Windows Start Menu. The scripting window that appears is shown in Figure 4-3.

The Sample Application scripting window has buttons that let you view the available interface commands and to load, run, and save scripts. Errors are displayed in Compiler Errors and any output information that is relevant to the script are shown in Results.

To prototype sample code quickly, the scripting engine of the Sample Application has already created the object instance for the automation component, called **AutomationObject**, behind the scenes. In the script, you can use this object to access all automation commands and events to be monitored. If the code is transferred to a stand-alone application, code must be added to create the automation object instance.

The Sample Application also has a “Result” object that can be used to append text data. This can also be used to monitor the execution of commands and the progress in the command queue.

After programming code has been prototyped in the Script section of the Sample Application, it can be used to create a stand-alone robotic/automation application that directly controls SoftMax Pro Software.

Developing SoftMax Pro Excel Visual Basic Macros

This section describes how Visual Basic developers can write Excel Visual Basic macros that access the SoftMax Pro Software through its Automation API. A working knowledge of Excel Visual Basic is required.

SoftMax Pro Excel macro development requires the installation of the same Excel Add-In as is described in Installing the Excel Add-In on page 19.

Note: The development process described in this section is significantly different from the Visual Basic NET example on page 11. Excel Visual Basic macros and Visual Basic .NET are very different software development environments.

Accessing the SoftMax Pro Software Automation API

The SoftMax Pro Software Automation API described in Automation Interface Overview on page 7 is accessed from Excel Visual Basic by using a tool called Excel-DNA. To learn more, go to http://exceldna.codeplex.com/. Excel-DNA enables developers to create a wrapper around the SoftMax Pro Software Automation interface, resulting in the following differences.

Automation Command Names

To invoke an automation command from Excel Visual Basic, prefix the SoftMax Pro Software Automation command name with **SMP**.

For example, to invoke the **GetInstrumentStatus** automation API command from Excel Visual Basic, you must invoke **SMPGetInstrumentStatus**.

Invocation Mechanism

Instead of invoking methods directly (for example, **AutomationObject.OpenDrawer()** as shown in the example on page 9), commands are passed as arguments to an invocation of **Application.Run**.

For example, **Application.Run "SMPCloseDrawer"** as shown in SoftMax Pro Excel VBA Example on page 17.

Synchronous Method Calls

Instead of checking the contents of an event for the result of an automation command, the result is returned directly to the Excel Visual Basic statement issuing the command.

For example, **drawerStatus = Application.Run("SMPGetDrawerStatus")** as shown in SoftMax Pro Excel VBA Example on page 17.

Error Detection

Two new methods are available to Excel Visual Basic for error handling.

- CommandError = Application.Run("SMPHasError")
- ErrorMessage = Application.Run("SMPGetErrorMessage")

Both are included in SoftMax Pro Excel VBA Example on page 17.

Instrument Status

No events are generated. Instead, invoke **SMPGetInstrumentStatus**.

New Command Names

To work within the constraints of the technology employed in this solution, some Excel Macro Commands do not conform exactly to the SMP prefix mechanism detailed in Invocation Mechanism on page 16.

- The automation API command **SelectSection** has two Excel Visual Basic equivalents:
  - SMPSelectSectionByName(string sectionName)
  - SMPSelectSectionByNumber(int sectionNumber)
- The automation api command **Initialize** has three Excel Visual Basic equivalents:
  - SMPInitialize()
  - SMPInitializeByServer(string server)
  - SMPInitializeByServerAndPort(string server, int port)

SoftMax Pro Excel VBA Example

A working spreadsheet called **VbaMacroExample.xlsm** is included under the **SoftMax Pro 6.5 Automation SDK\ExcelAddIn** folder, as described in Installing the Excel Add-In on page 19. Please read the notes within the spreadsheet before executing the Visual Basic macro it contains.

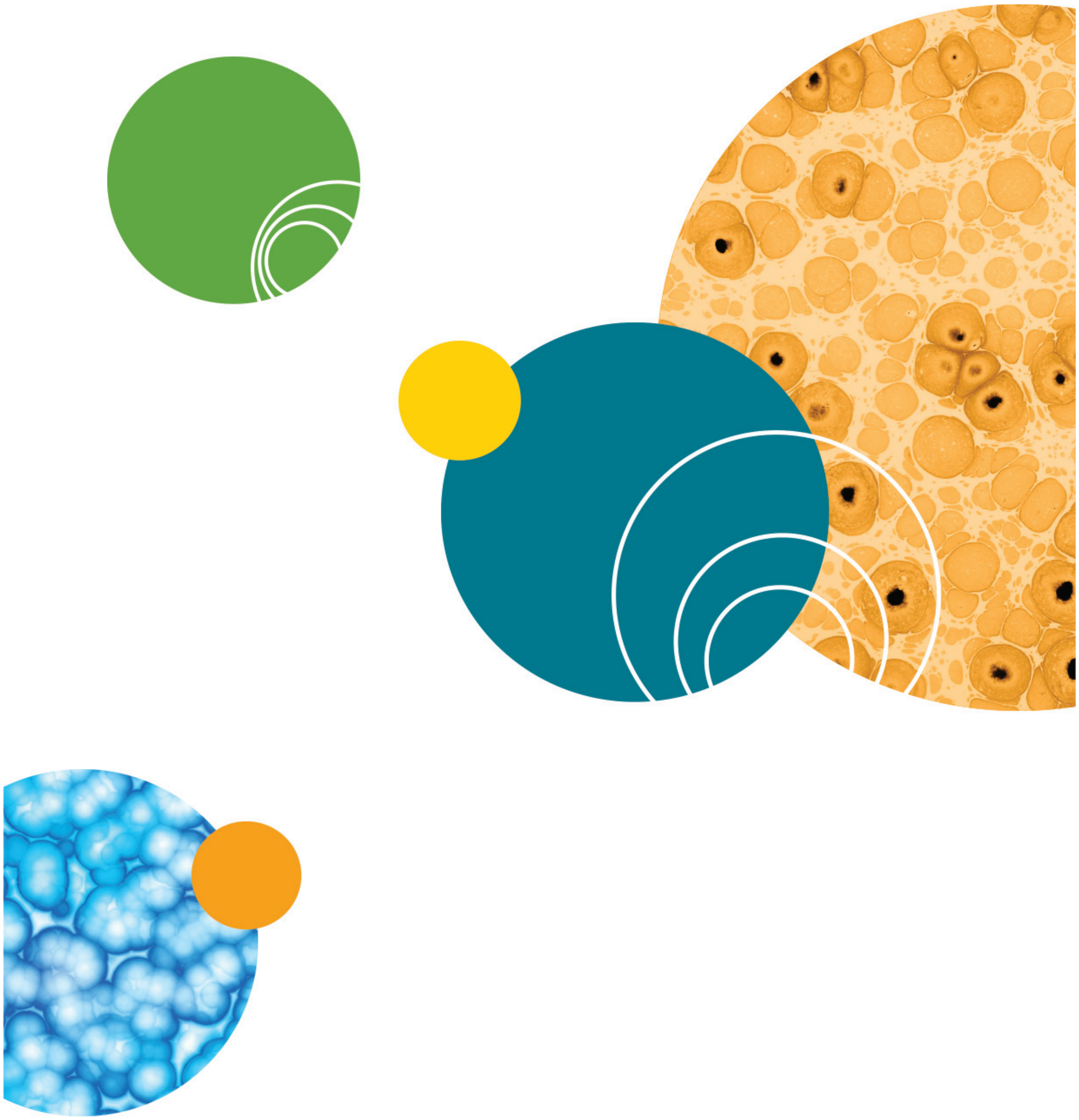
The following shows the code for example Visual Basic macro.

```
Sub AcquireData()
   Dim initialized As Boolean
   Dim disposed As Boolean
   Dim drawerStatus As String
   Dim plateData As String
   Dim commandError As Boolean
   Dim errorMessage As String

   Rem Connect to a running instance of SMP
   initialized = Application.Run("SMPInitializeByServer", "localhost")

   If initialized Then
      Rem For testing purposes turn on the simulator
      Application.Run "SMPSetSimulationMode", True
      Rem Execute some sample/example commands
      Application.Run "SMPCloseDrawer"
      drawerStatus = Application.Run("SMPGetDrawerStatus")

      Rem Select an initial plate section to make sure we have the experiment selected
      Application.Run "SMPSelectSectionByName", "Plate1@Expt1"
       Rem Check the plate section selection completed correctly, 'HasError' checks the last command executed
      commandError = Application.Run("SMPHasError")
      If commandError Then
        Rem An error has occurred
        errorMessage = Application.Run("SMPGetErrorMessage")
      Else
        Rem Add a new Plate section
        Application.Run "SMPNewPlate"
        numberPlateSections = Application.Run("SMPGetNumberPlateSections")
        Rem Read the plate in the reader
        Application.Run "SMPStartRead"
        Rem Get the data from the plate
        plateData = Application.Run("SMPGetDataCopy")
        Rem Put the data into Excel
        Dim dataArray As Variant
        dataArray = Split(plateData, Chr(9))
        ActiveWorkbook.Sheets("Sheet1").Select
        For iRow = 0 To 8
          For iCol = 0 To 14
            Cells(iRow + 1, iCol + 1) = dataArray(iRow * 15 + iCol)
          Next iCol
        Next iRow
      End If
      Rem tidy up
      Application.Run "SMPSetSimulationMode", False
      disposed = Application.Run("SMPDispose")
   End If
End Sub
```



Using SoftMax Pro Excel Workflows

5

Introduction

The SoftMax® Pro Excel workflows are designed to augment the industry-leading handling of Plate Format Data by the SoftMax Pro Software with Excel-based handling of List Format Data. You can use SoftMax Pro Excel workflows to run discontinuous kinetic reads, multiplexed reads, kinetic well scan reads, and temperature-triggered reads.

The SoftMax Pro Automation SDK is the underlying mechanism used by SoftMax Pro Excel workflows to access SoftMax Pro Software functionality. If you want to write your own workflows, you need to be familiar with the available Automation Commands. See SoftMax Pro Automation Commands on page 47.

The SoftMax Pro Excel workflow feature is provided as a standard Excel Add-In and can be used effectively through the application of the Excel Charting & Trend Line features along with the following Microsoft Add-Ins:

- Analysis ToolPak
- Solver

The Excel Add-In is compatible with the following versions of Microsoft Excel:

- Microsoft Excel 2007 (version 12)
- Microsoft Excel 2010 (version 14)
- Microsoft Excel 2013 (version 15)

A supported version of Microsoft Excel must be installed on the same computer as the SoftMax Pro Software.

The Excel Add-In has been tested on 32-bit and 64-bit versions of Windows 7, Windows 8, and Windows 8.1.

Before you can use Excel to create and run automated workflows, you must install the custom Add-In in Excel. With the Add-In installed and macros enabled you can run or edit the provided workflows or create your own.

You can write a new custom formula provided you have knowledge of Excel Visual Basic. All custom formulas can be used in a SoftMax Pro Excel workflow. See Custom Excel Formulas on page 42.

Installing the Excel Add-In

1. Start Microsoft Excel.
2. Click the **Developer** tab in the ribbon and then click **Add-Ins**.

   If the **Developer** tab is not enabled, right-click the ribbon and then select **Customize the Ribbon**. In the **Excel Options** dialog, enable the **Developer** tab.
3. In the **Add-Ins** dialog, click **Browse**.
4. In the **Browse** dialog, navigate to the Program Files folder where the SoftMax Pro Software is installed:
   - For a 32-bit installation, go to **C:\Program Files\Molecular Devices**.
   - For a 64-bit installation, go to **C:\Program Files (x86)\Molecular Devices**.
5. Navigate to **SoftMax Pro 6.5 Automation SDK\ExcelAddIn**.
6. Select the add-in file for your version of Microsoft Office:
   - For a 32-bit version of Office, click the **SoftMaxPro6.xll** file.
   - For a 64-bit version of Office, click the **SoftMaxPro6x64.xll** file.
7. Click **OK**.
8. In the **Add-Ins** dialog, select the **SoftMaxPro6** or **SoftMaxPro6x64** check box.
9. Click **OK**.

Using the Provided Excel Workflows

With the Add-In installed you can run or edit the provided Excel workflows.

Accessing the Provided Excel Workflows

The provided Excel workflows are installed in the same folder as the Add-In files.

- For a 32-bit installation, the workflows are in the following folder:
  C:\Program Files\Molecular Devices\SoftMax Pro 6.5 Automation SDK\ExcelAddIn\Examples
- For a 64-bit installation, the workflows are in the following folder:
  C:\Program Files (x86)\Molecular Devices\SoftMax Pro 6.5 Automation SDK \ExcelAddIn\Examples

The Excel workflow files have an extension of **.xlsm**.

Note: Before running or editing a provided Excel workflow, save a copy of the workflow on your computer.

Layout of an Excel Workflow

All SoftMax Pro workflows must be contained in one Excel Workbook, including the supplied workflows and any customized workflows.

The supplied workflows are color coded for readability. The different Workflow Statement Types each have their own colors. The color coding does not affect the execution of workflows.

- Initialization statements are in orange.
- Automation Command statements are in yellow.
- Worksheet Formatting statements are in green.
- Workflow Flow Control statements are in gray.

Free-format statement arguments are in pink for each statement type. See Workflow Statement Types on page 23.

Additionally, a list of valid instrument types is provided, so that you can copy and paste the appropriate instrument name into place in the workflow that you are editing. This helps prevent mismatches in the format of the name of the instrument. See Instrument Connectivity on page 44.

Features of the SMPWorkflow Worksheet

The **SMPWorkflow** worksheet contains an **Execute** button that you click to start the workflow.

Each statement of the workflow is on a single row that starts in column B and can continue in the columns to the right with parameters or formatting information. Workflow Loop Control statements start in column A.

After you click **Execute**, the first statement is read and executed.

- The first blank column in the statement row indicates the end of the statement, and then the next statement in the following row is executed.
- The first blank row indicates the end of the workflow.

See Running Excel Workflows on page 21.

Excel Visual Basic Components

A Visual Basic module called SMPWorkflow contains logic to initiate the invocation of Workflow Statements, worksheet formatting logic, and custom Excel formulas. See Custom Excel Formulas on page 42.

Visual Basic message can appear with the following types of information:

- The workflow is being validated before execution.
- The workflow is being executed.
- The workflow is paused, and the reason for the pause is stated.
- An error was detected.

Running Excel Workflows

To run a new workflow, you need an open SoftMax Pro Excel workflow with no saved data in the worksheet. The Excel Add-In must be installed with macros enabled. The SoftMax Pro Software must be running.

There are three operations you can perform in a workflow:

- Executing a Continuous Workflow, see page 21
- Continuing a Discontinuous Workflow, see page 21
- Canceling a Workflow, see page 22

In most workflows, the user running the SoftMax Pro Software connects to the instrument before starting the workflow. If you want the workflow to connect to the instrument without user intervention, then see Instrument Connectivity on page 44.

Executing a Continuous Workflow

This procedure runs the workflow once and saves the acquired data in the Excel worksheet.

1. Make sure that the instrument is connected to the computer and that the instrument is powered on.
2. Start the SoftMax Pro Software.
3. Open the Excel workflow that you want to run.
4. In the SMPWorkflow worksheet, click **Execute**.
5. When the workflow completes, save your worksheet.

Continuing a Discontinuous Workflow

This procedure uses the example of running a fluorescence read followed once every hour. The List Format saves the acquired data in separate rows after each read. See Data Management with Excel-Based List Format Data on page 22.

1. Make sure that the instrument is connected to the computer and that the instrument is powered on.
2. Start the SoftMax Pro Software.
3. In the SoftMax Pro Software, connect to the instrument.
4. Open the Excel workflow that you want to run.
5. In the SMPWorkflow worksheet, click **Execute**.
6. When the workflow completes save and close your Excel workbook. The data worksheet has one row of data.
7. After the correct amount of time has passed, open the Excel workflow again.
8. Make sure that the instrument is connected to the computer and that the instrument is powered on.
9. Start the SoftMax Pro Software.
10. In the SoftMax Pro Software, connect to the instrument.
11. In the SMPWorkflow worksheet, click **Execute**.
12. When the workflow completes save and close your Excel workbook. Each worksheet has now has two rows of data.

You can continue these step for as many reads as you require.

Data Management with Excel-Based List Format Data

After executing an Excel workflow to acquire data with the SoftMax Pro Software, the data is written to Excel in List Format style and does not overwrite existing data in Excel worksheets. This can allow for kinetic reads with variable intervals, such as in a discontinuous workflow.

For example, if you execute a read once every hour, then after the first read the worksheet would have one row of data similar to the following:

Table 5-1:

Date/Time	Elapsed Time	Temperature	A1	A2
2/20/2013 18:57	0	31.5	0.30	0.21

After the second read, the worksheet would have two rows of data similar to the following:

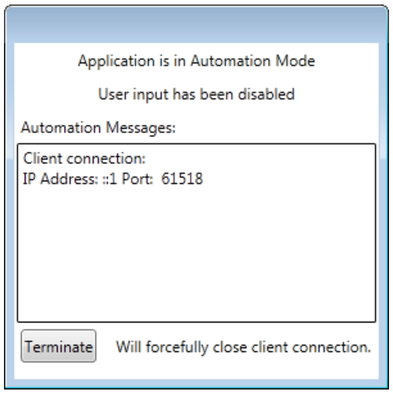
Table 5-2:

Date/Time	Elapsed Time	Temperature	A1	A2
2/20/2013 18:57	0	31.5	0.30	0.21
2/20/2013 19:57	3600	31.5	0.31	0.25

See Continuing a Discontinuous Workflow on page 21.

Canceling a Workflow

When you run a SoftMax Pro Excel workflow, a dialog appears in front of the main SoftMax Pro Software window, to show that the software is in automation mode.


Application is in Automation Mode

User input has been disabled

Automation Messages:

```
Client connection:
IP Address: ::1 Port:  61518
```

Figure 5-1: SoftMax Pro Software Automation Mode

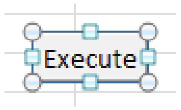
If you need to stop the automation process and regain control of the SoftMax Pro Software, click **Terminate**. Then in the Excel workflow, close all open dialogs.

Creating a New Excel Workflow

To create a new SoftMax Pro Excel workflow, open an existing workflow and then save it as new workbook. This process ensures that all required macros and dialogs are in place for the new workflow.

Moving the Execute Button

When you create a long workflow, you might want to move the **Execute** button.



To move the **Execute** button, right-click the button and then drag it to its new location.

Editing Excel Workflows

When editing workflows, keep in mind how workflow statements are interpreted when the workflow is run.

- The first blank column in the statement row indicates the end of the statement, and then the next statement in the following row is executed.
- The first blank row indicates the end of the workflow.

Workflow Statement Types

To help understand how to read and write workflows, consider each Workflow Statement to be one of four statement types.

Table 5-3: Workflow Statement Types

Statement Type	Description
Initialization Statements	Initialization statements augment available Automation Commands when setting up the workflow execution environment.
Automation Command Statements	Automation command statements are available as part of the SoftMax Pro Software Automation API.
Worksheet Formatting Statements	Worksheet formatting statements define the format of data to be written to worksheets, and can retrieve the data from the SoftMax Pro Software and write it to the Excel worksheet.
Workflow Flow Control Statements	Workflow flow control statements cause the workflow to repeat a section of statements or pause until a given condition is satisfied.

Initialization Statements

Initialization statements augment available Automation Commands when setting up the workflow execution environment.

In the provided example workbooks, initialization statements are color coded orange.

PlateSize Statement

Purpose

Define the size of the microplate used on the instrument.

Arguments

PlateSize has one argument:

- The number of wells in the microplate.

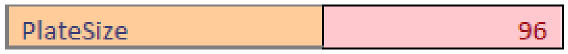
  The following microplate sizes are supported.

  - 24-well microplates
  - 48-well microplates
  - 96-well microplates
  - 384-well microplates

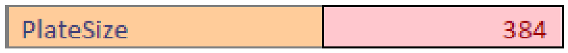
Defaults

If the PlateSize Statement is not coded, the microplate size defaults to 96 wells.

PlateSize Statement Examples



PlateSize	96



PlateSize	384

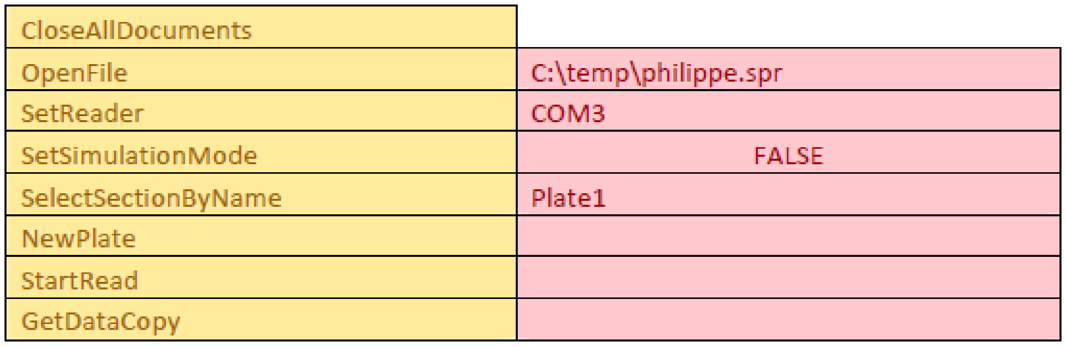
Automation Command Statements

Automation command statements are available as part of the SoftMax Pro Software Automation API.

In the provided example workbooks, automation command statements are color coded yellow.

For descriptions of and parameters for the available automation commands, see SoftMax Pro Automation Commands on page 47.

The following figure shows examples of some automation command statements. The first column contains the command name, and the columns to the right contain the parameter values for the command.



CloseAllDocuments	
OpenFile	C:\temp\philippe.spr
SetReader	COM3
SetSimulationMode	FALSE
SelectSectionByName	Plate1
NewPlate	
StartRead	
GetDataCopy	

Most automation commands perform an action. However, some commands retrieve data from the SoftMax Pro Software. These commands make their data available to be written to worksheets or used to control the flow of a workflow.

- Worksheet formatting statements define the format of data to be written to worksheets, and can retrieve the data from the SoftMax Pro Software and write it to the Excel worksheet. For an example, see ProcessCommandResult Statement on page 37.
- Workflow flow control statements cause the workflow to repeat a section of statements or pause until a given condition is satisfied. For an example, see WaitUntil Statement on page 40.

Worksheet Formatting Statements

Worksheet formatting statements define the format of data to be written to worksheets, and can retrieve the data from the SoftMax Pro Software and write it to the Excel worksheet.

In the provided example workbooks, formatting statements are color coded green.

There are three categories of worksheet formatting statements.

Table 5-4: Worksheet Formatting Statement Categories

Statement Type	Description
Creating and Selecting Worksheets	As your workflow retrieves data from the SoftMax Pro Software you need to create worksheets in which to save or write this data. This section describes how to create new worksheets and then target these worksheets to receive specific data from within the workflow.
Defining Write Formats	Writing to a worksheet is broken into two parts. First, a workflow has to define the format in which the data is written. Next, the data is written to the worksheet. This section describes how to define formats.
Writing to Worksheets	When a workflow has data to write to an Excel worksheet it is directed to perform the write by defining which Write Format to use. The section describes how to write fixed values, calculated values, and acquired data to a worksheet.

Creating and Selecting Worksheets

As your workflow retrieves data from the SoftMax Pro Software you need to create worksheets in which to save or write this data. This section describes how to create new worksheets and then target these worksheets to receive specific data from within the workflow.

Worksheet Statement

Purpose

This statement can create a new Excel worksheet and select an existing Excel worksheet. When a worksheet is added it is automatically selected. Worksheet formatting statements work mostly against the worksheet currently selected.

Arguments

Worksheet has two arguments:

- Operation

  This is either one of two values:

  - Select
  - Add
- Name (optional)

  This is the name of the worksheet to be selected or added. This is optional.

Defaults

If the Name argument is not given, a new worksheet will be added. The name of the worksheet will be **Sheetx** where **x** is the lowest number required to create a new worksheet with a unique name in the workbook.

Worksheet Statement Examples

Create a new worksheet named Summary:

Worksheet	Add	Summary

Select an existing worksheet named Summary:

Worksheet	Select	Summary

Add a new worksheet named Sheet1 in an almost empty workbook:

Worksheet	Add

Add a worksheet named Sheet3 in a workbook that already has worksheets named Sheet1 and Sheet2:

Worksheet	Add

Defining Write Formats

Writing to a worksheet is broken into two parts. First, a workflow has to define the format in which the data is written. Next, the data is written to the worksheet. This section describes how to define formats.

CellFormat Statement

Purpose

Defines a format in which to write data into one Excel worksheet cell. It is used in conjunction with the following two workflow statements:

- FormatWorksheet Statement, see page 36
- ProcessCommandResult Statement, see page 37

Arguments

CellFormat has up to four arguments:

- Format Name

  This must be unique within the workflow. Both the FormatWorksheet and ProcessCommandResult statements reference this name.
- Target Worksheet Column

  Defines which worksheet column will be written into in the following format:

  worksheet-name:worksheet-column or worksheet-column

  If only the worksheet column is specified, then the worksheet row to be used is determined to be the next empty cell in the column, working down from the top of the target worksheet.
- Row Number (optional)

  Allows output to always be written to a specific row. If omitted, then the output is written to next free row in the target column. It can be useful for making that sure headings are written out only once in discontinuous reads.
- Cell Content (sometimes not required, see defaults below)

  Optionally defines what will be written into the worksheet column. When writing an Excel formula (e.g. '=Sum(A1:A5)' the following keywords can be used and will be substituted automatically immediately prior to the formula being written to a worksheet,

  - #Column: The workflow keeps track of where it writes plate data into a worksheet. This keyword should be used in conjunction with the FormatWorksheet WriteRow statement to apply operations to whole columns of data. See the following examples.
  - #RowCount: This provides the number of rows containing data values. As per #Column, this keyword should be used in conjunction with the FormatWorksheet WriteRow statement. See the following examples.
  - #Worksheet: This references the currently selected worksheet. However, this keyword can be used in conjunction with both the FormatWorksheet WriteRow and FormatWorksheet WriteCell statements. See the following examples.

  A formula entered in the workflow evaluates before it is run if not entered with a single quotation mark prefix. For example,. instead of entering **=SUM(A1: A5)** enter **'=SUM(A1: A5)**.

Defaults

If the worksheet name is omitted from the Target Worksheet Column argument, the currently selected worksheet is used as the target for the write. See Worksheet Statement on page 26.

Cell content can be omitted if the value to be written to the cell is the result from a previously issued Automation Command. See ProcessCommandResult Statement on page 37.

CellFormat Statement Example 1

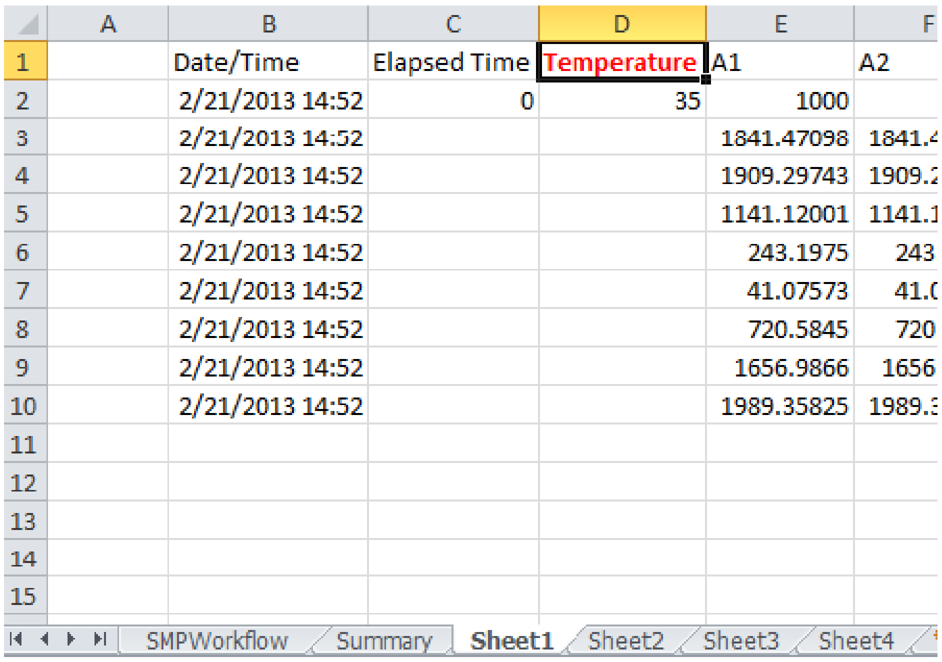
This example shows how to write the word “Temperature” into cell D1 of the Excel worksheet, which is selected when a subsequent FormatWorksheet statement is executed. The name of the format is MyTemperatureHeading.

CellFormat	MyTemperatureHeading	D	1	Temperature

. . .

Worksheet	Add	
FormatWorksheet	WriteCell	MyTemperatureHeading

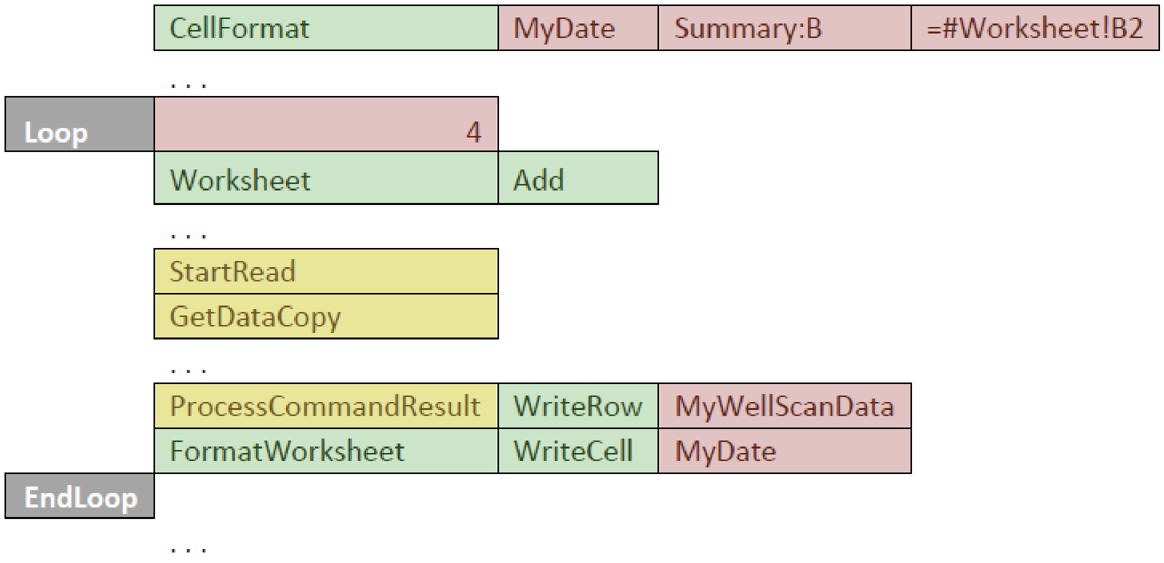
The output written to Excel is highlighted in red in the following figure.



	A	B	C	D	E	F
1		Date/Time	Elapsed Time	Temperature	A1	A2
2		2/21/2013 14:52	0	35	1000	
3		2/21/2013 14:52			1841.47098	1841.4
4		2/21/2013 14:52			1909.29743	1909.2
5		2/21/2013 14:52			1141.12001	1141.1
6		2/21/2013 14:52			243.1975	243
7		2/21/2013 14:52			41.07573	41.0
8		2/21/2013 14:52			720.5845	720
9		2/21/2013 14:52			1656.9866	1656
10		2/21/2013 14:52			1989.35825	1989.3
11						
12						
13						
14						
15						

Cell Format Statement Example 2

In this example, the workflow performs four Well Scan reads, writing one result into each of Sheets 1 through 4. The CellFormat statement in this example is responsible for putting a reference in the Summary worksheet to the date and time recorded in each of Sheets 1 through 4.

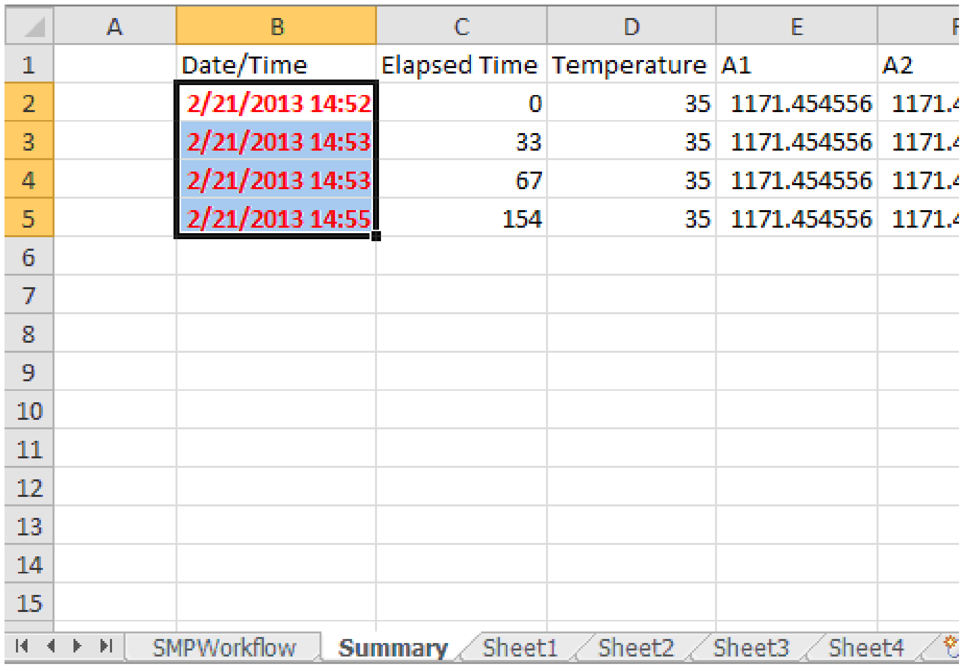


```
        CellFormat            MyDate     Summary:B     =#Worksheet!B2
        . . .
Loop                       4
        Worksheet             Add
        . . .
        StartRead
        GetDataCopy
        . . .
        ProcessCommandResult  WriteRow   MyWellScanData
        FormatWorksheet       WriteCell  MyDate
EndLoop
        . . .
```

The two most significant CellFormat arguments are interpreted as follows:

- **Summary:B**
  Write output to the next free or empty cell in column B of the Summary worksheet.
- **=#Worksheet!B2**
  The information written into column B where **#Worksheet** will be the name of the currently active worksheet, for example, **Sheet1**.

The output written to Excel is highlighted in red in the following figure.



	A	B	C	D	E	F
1		Date/Time	Elapsed Time	Temperature	A1	A2
2		2/21/2013 14:52	0	35	1171.454556	1171.4
3		2/21/2013 14:53	33	35	1171.454556	1171.4
4		2/21/2013 14:53	67	35	1171.454556	1171.4
5		2/21/2013 14:55	154	35	1171.454556	1171.4
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

CellFormat Statement Example 3

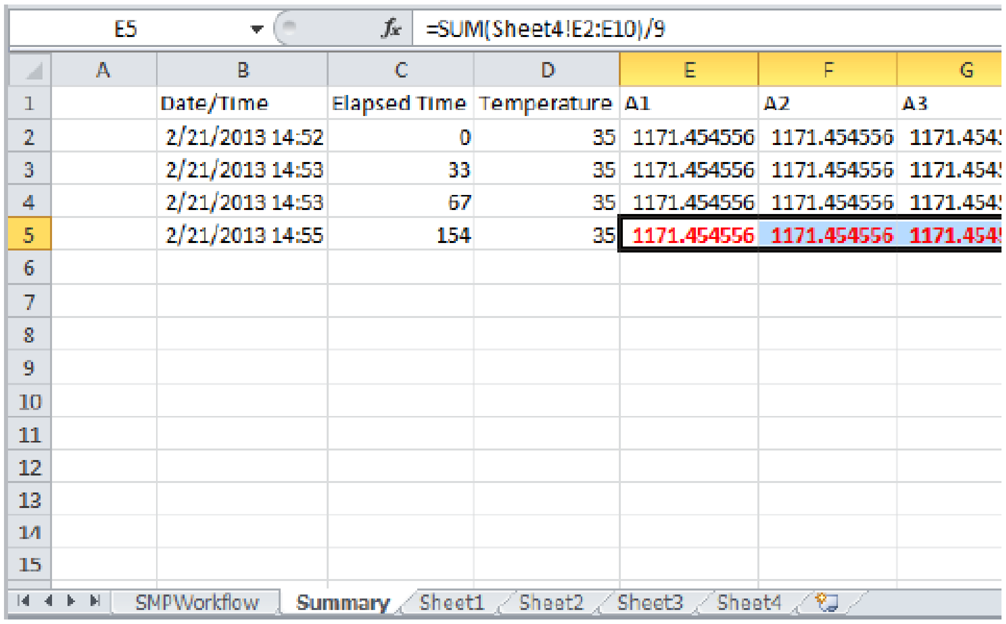
In this example, the workflow performs four Well Scan reads, writing one result into each of Sheets 1 through 4. The CellFormat statement in this example is responsible for putting calculating the mean value of each point in a well, for one read, into the Summary worksheet.

	CellFormat	MyMean	Summary:E	=Sum(#Column)/#RowCount
	. . .			
Loop	4			
	Worksheet	Add		
	. . .			
	StartRead			
	GetDataCopy			
	. . .			
	ProcessCommandResult	WriteRow	MyWellScanData	
	FormatWorksheet	WriteCell	MyMean	
EndLoop				
	. . .			

The two most significant CellFormat arguments are interpreted as follows:

- **Summary:B**
  Start writing write output to the next free or empty row starting in column E of the Summary worksheet.
- **=Sum(#Column)/#RowCount**
  The SoftMax Pro Software has tracked where acquired data has been written in each worksheet. Because of this the workflow is able to substitute the #Column and #RowCount with real values that match the currently active worksheet. The substitution is shown in the 'fx' cell in the following figure.

The output written to Excel the final time through the loop is highlighted in red in the following figure.



E5 | =SUM(Sheet4!E2:E10)/9

	A	B	C	D	E	F	G
1		Date/Time	Elapsed Time	Temperature	A1	A2	A3
2		2/21/2013 14:52	0	35	1171.454556	1171.454556	1171.454
3		2/21/2013 14:53	33	35	1171.454556	1171.454556	1171.454
4		2/21/2013 14:53	67	35	1171.454556	1171.454556	1171.454
5		2/21/2013 14:55	154	35	1171.454556	1171.454556	1171.454
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

SMPWorkflow | Summary | Sheet1 | Sheet2 | Sheet3 | Sheet4

CellFormat Statement Example 4

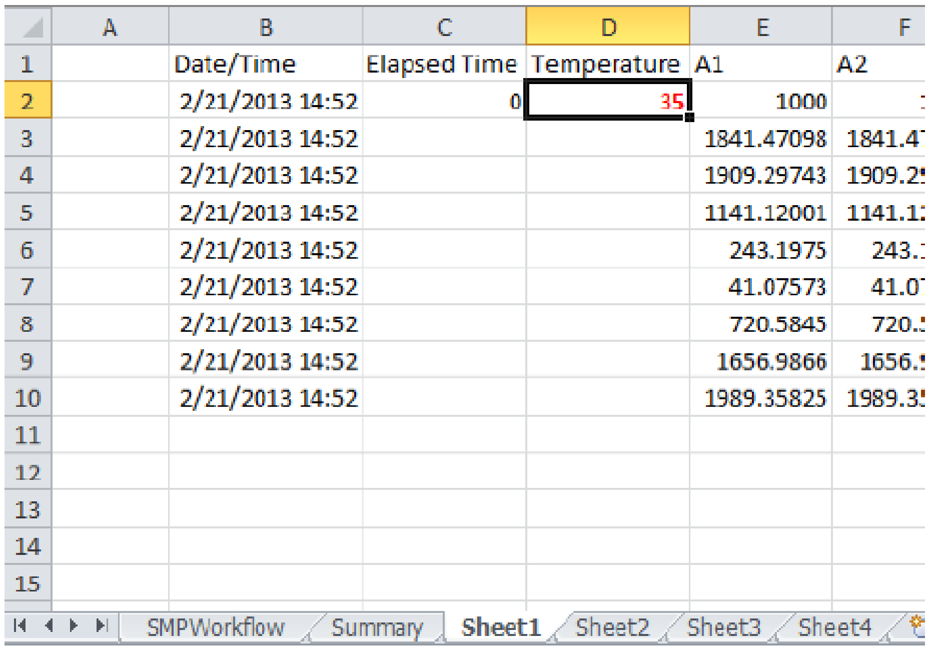
In this example, when subsequent ProcessCommandResult statements reference MyTemperature, they write the returned value of the last executed Automation Command into the first blank cell found in Column D of the Excel worksheet that is selected at the time the ProcessCommandResult is executed.

CellFormat	MyTemperature	D

. . .

GetTemperature		
ProcessCommandResult	WriteCell	MyTemperature

The output written to Excel is highlighted in red in the following figure.



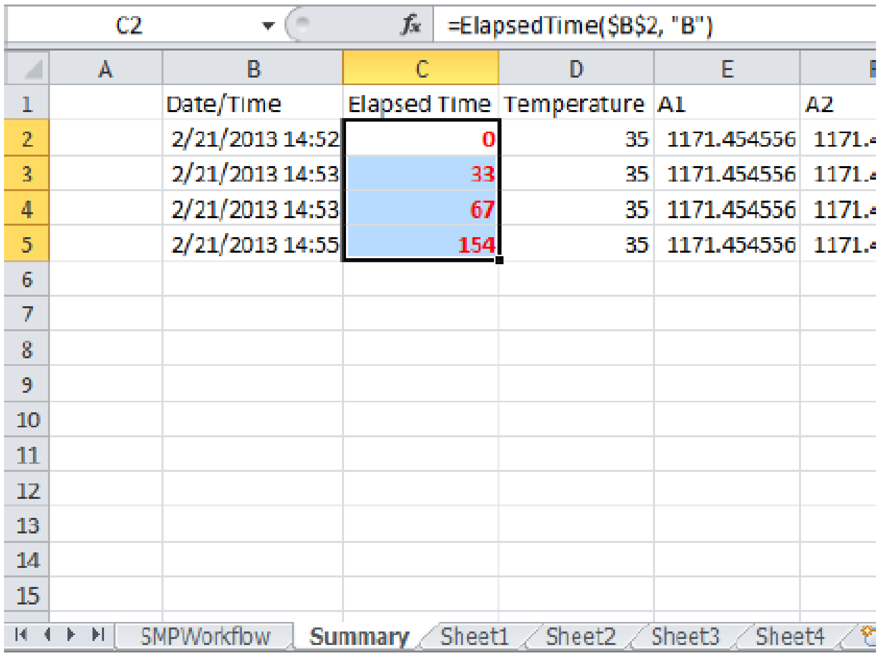
	A	B	C	D	E	F
1		Date/Time	Elapsed Time	Temperature	A1	A2
2		2/21/2013 14:52	0	35	1000	
3		2/21/2013 14:52			1841.47098	1841.4
4		2/21/2013 14:52			1909.29743	1909.2
5		2/21/2013 14:52			1141.12001	1141.1
6		2/21/2013 14:52			243.1975	243.
7		2/21/2013 14:52			41.07573	41.0
8		2/21/2013 14:52			720.5845	720.
9		2/21/2013 14:52			1656.9866	1656.
10		2/21/2013 14:52			1989.35825	1989.3
11						
12						
13						
14						
15						

CellFormat Statement Example 5

In this example, instead of writing a standard Excel formula to Column C of the selected Excel worksheet, the following statement writes in a call to a custom Visual Basic function called ElapsedTime. For details, see Custom Excel Formulas on page 42.

CellFormat	MyElapsedTime	C	=ElapsedTime(B2, "B")

The output written to Excel is highlighted in red in the following figure.



C2 =ElapsedTime(B2, "B")

	A	B	C	D	E	F
1		Date/Time	Elapsed Time	Temperature	A1	A2
2		2/21/2013 14:52	0	35	1171.454556	1171.4
3		2/21/2013 14:53	33	35	1171.454556	1171.4
4		2/21/2013 14:53	67	35	1171.454556	1171.4
5		2/21/2013 14:55	154	35	1171.454556	1171.4
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

RowFormat Statement

Purpose

Defines a format in which to write data into one Excel worksheet row. It is used in conjunction with the following two workflow statements:

- FormatWorksheet Statement, see page 36
- ProcessCommandResult Statement, see page 37

The RowFormat statement is designed to make it easy to write a plate of data as a row in an Excel worksheet. It is also useful in writing ancillary information related to plate data, such as well names (A1, A2, and so on) and Group Name Assignments (Control, Unknown, and so on).

As the Automation Command GetDataCopy returns a date followed by the well data, the simplest, default form of this command formats that data. See RowFormat Statement Example 1 on page 34.

Arguments

RowFormat has a variable number of arguments.

- Format Name

  This must be unique within the workflow. Both the FormatWorksheet and ProcessCommandResult statements reference this name.
- Start Column (optional)

  RowFormat always writes to the currently selected Excel worksheet.
- Row Number (optional)

  Allows output to always be written to a specific row. If omitted, then the output is written to next free row in the target column. It can be useful for making that sure headings are written out only once in discontinuous reads.
- Row Contents (optional)

  The number of subsequent arguments is variable. There are three keywords that can be used to control what is written in a row:
  - Date/Time: This causes the Date/Time to be written.
  - Wells: This causes the well related information to be written. For example, 96 columns of data in a 96-well microplate.
  - Blank: This leaves a column in the row blank, typically to be populated with a CellFormat related entry such as temperature or elapsed time.

Defaults

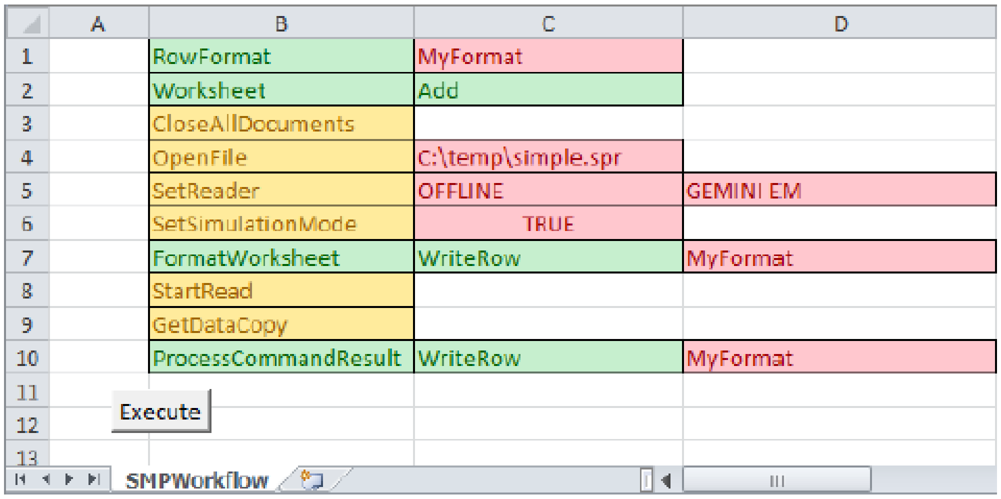
If no Start Column is given, then the row starts being written in Column A.

If no Row Contents are given, then the default is Date/Time followed by Wells.

For a full workflow using default RowFormat values, see RowFormat Statement Example 1 on page 34.

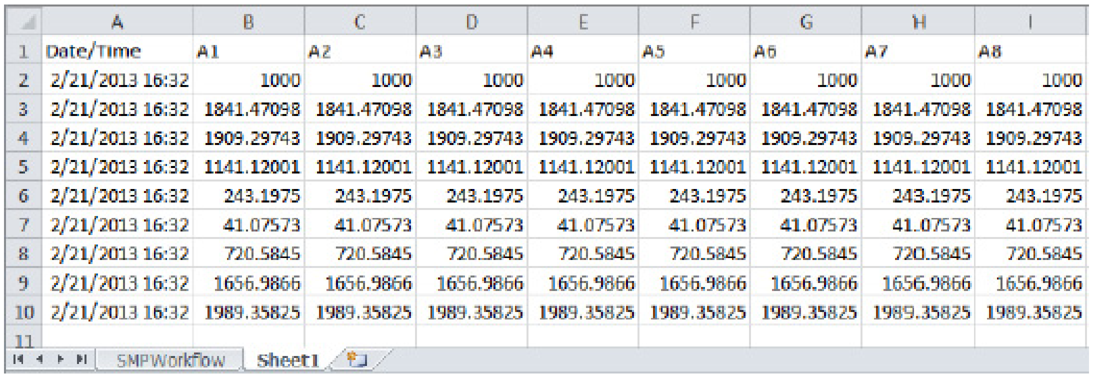
RowFormat Statement Example 1

This example shows the simplest definition of a RowFormat statement where all default values are taken. The worksheet heading line (row 1) and the data itself (rows 2 through 10) use the same row format.



	A	B	C	D
1		RowFormat	MyFormat	
2		Worksheet	Add	
3		CloseAllDocuments		
4		OpenFile	C:\temp\simple.spr	
5		SetReader	OFFLINE	GEMINI EM
6		SetSimulationMode	TRUE	
7		FormatWorksheet	WriteRow	MyFormat
8		StartRead		
9		GetDataCopy		
10		ProcessCommandResult	WriteRow	MyFormat

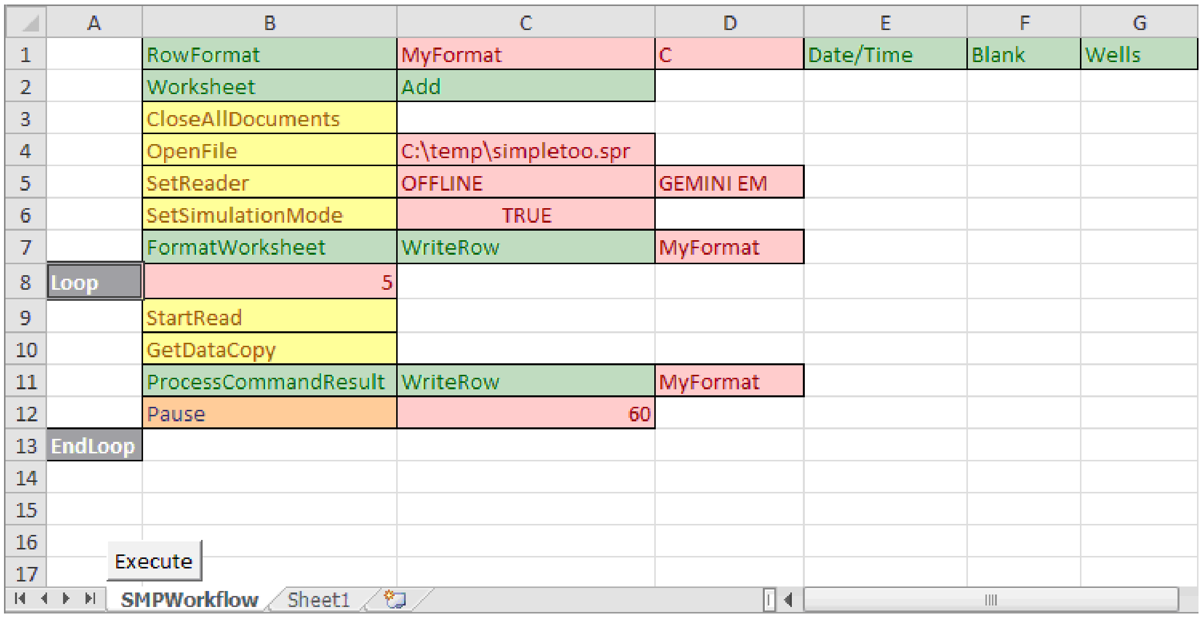
This complete workflow creates the following Excel worksheet data file from one nine-point well scan read using the instrument simulator.



	A	B	C	D	E	F	G	H	I
1	Date/Time	A1	A2	A3	A4	A5	A6	A7	A8
2	2/21/2013 16:32	1000	1000	1000	1000	1000	1000	1000	1000
3	2/21/2013 16:32	1841.47098	1841.47098	1841.47098	1841.47098	1841.47098	1841.47098	1841.47098	1841.47098
4	2/21/2013 16:32	1909.29743	1909.29743	1909.29743	1909.29743	1909.29743	1909.29743	1909.29743	1909.29743
5	2/21/2013 16:32	1141.12001	1141.12001	1141.12001	1141.12001	1141.12001	1141.12001	1141.12001	1141.12001
6	2/21/2013 16:32	243.1975	243.1975	243.1975	243.1975	243.1975	243.1975	243.1975	243.1975
7	2/21/2013 16:32	41.07573	41.07573	41.07573	41.07573	41.07573	41.07573	41.07573	41.07573
8	2/21/2013 16:32	720.5845	720.5845	720.5845	720.5845	720.5845	720.5845	720.5845	720.5845
9	2/21/2013 16:32	1656.9866	1656.9866	1656.9866	1656.9866	1656.9866	1656.9866	1656.9866	1656.9866
10	2/21/2013 16:32	1989.35825	1989.35825	1989.35825	1989.35825	1989.35825	1989.35825	1989.35825	1989.35825

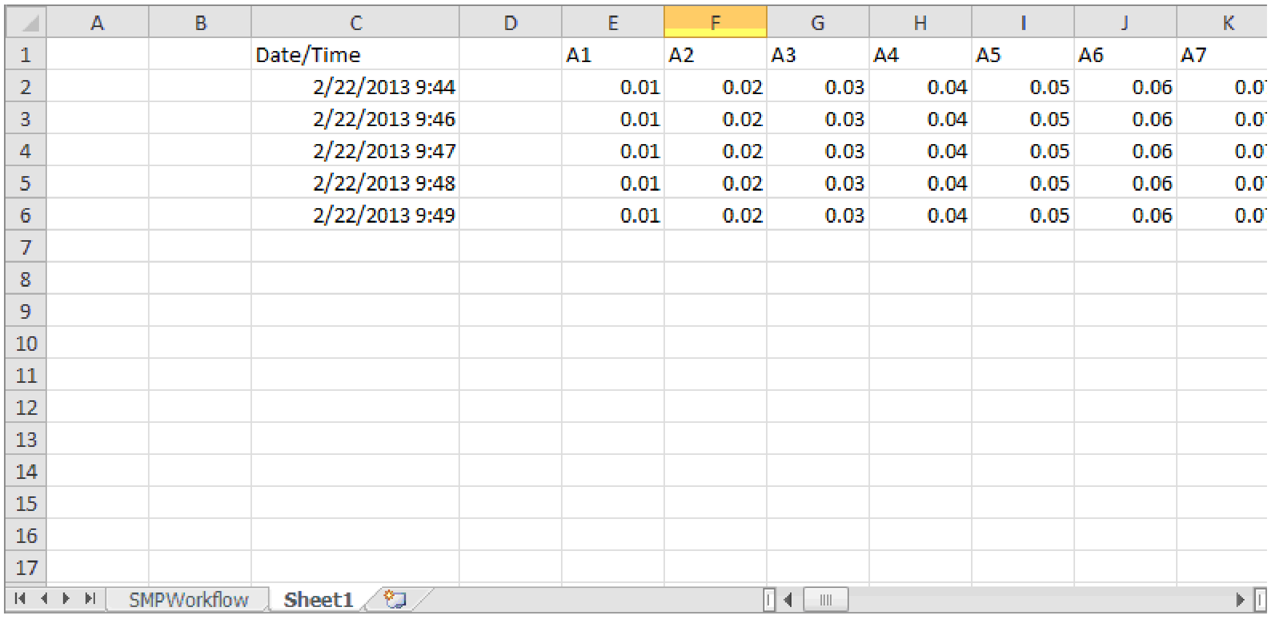
RowFormat Statement Example 2

In this example, the RowFormat starts writing its rows of data in column C and leaves a blank column between the date/time and the well data.



	A	B	C	D	E	F	G
1		RowFormat	MyFormat	C	Date/Time	Blank	Wells
2		Worksheet	Add				
3		CloseAllDocuments					
4		OpenFile	C:\temp\simpletoo.spr				
5		SetReader	OFFLINE	GEMINI EM			
6		SetSimulationMode	TRUE				
7		FormatWorksheet	WriteRow	MyFormat			
8	Loop	5					
9		StartRead					
10		GetDataCopy					
11		ProcessCommandResult	WriteRow	MyFormat			
12		Pause	60				
13	EndLoop						
14							
15							
16							
17							

This complete workflow creates the following Excel worksheet data file from five endpoint reads using the instrument simulator.



	A	B	C	D	E	F	G	H	I	J	K
1			Date/Time		A1	A2	A3	A4	A5	A6	A7
2			2/22/2013 9:44		0.01	0.02	0.03	0.04	0.05	0.06	0.0
3			2/22/2013 9:46		0.01	0.02	0.03	0.04	0.05	0.06	0.0
4			2/22/2013 9:47		0.01	0.02	0.03	0.04	0.05	0.06	0.0
5			2/22/2013 9:48		0.01	0.02	0.03	0.04	0.05	0.06	0.0
6			2/22/2013 9:49		0.01	0.02	0.03	0.04	0.05	0.06	0.0
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											

Writing to Worksheets

When a workflow has data to write to an Excel worksheet it is directed to perform the write by defining which Write Format to use. The section describes how to write fixed values, calculated values, and acquired data to a worksheet.

When writing into an Excel worksheet there are two types of write statements that can be placed in a SoftMax Pro Excel workflow.

Table 5-5: Write Statements

Statement Type	Description
FormatWorksheet Statement	This statement writes fixed or calculated values to a worksheet. The running instance of the SoftMax Pro Software does not directly provide data for this type of write.
ProcessCommandResult Statement	This statement takes data returned from a SoftMax Pro Software Automation API command and writes it into a worksheet.

When writing to a worksheet the information to be written should already have been defined by a Write Format. See Defining Write Formats on page 27.

FormatWorksheet Statement

Purpose

This statement writes fixed or calculated values to a worksheet. The running instance of the SoftMax Pro Software does not directly provide data for this type of write.

Examples include writing worksheet column headings and writing Excel formulas into worksheet cells.

Arguments

FormatWorksheet has two arguments:

- Type of Write

  This is either one of two values:

  - WriteCell
  - WriteRow
- Name of Format
  - If the first argument specifies WriteCell, then argument this must reference a previously defined CellFormat.
  - If the first argument specifies WriteRow, then this argument usually references a previously defined RowFormat.
    The exception is when a formula using keywords appears in a CellFormat. See CellFormat Statement Example 3 on page 30.

Defaults

No default values

Examples

See the examples given in the CellFormat Statement on page 27 and RowFormat Statement on page 33.

ProcessCommandResult Statement

Purpose

This statement takes data returned from a SoftMax Pro Software Automation API command and writes it into a worksheet.

Examples of commands which return data are GetTemperature, GetGroupNameAssignments, and GetDataCopy.

The last automated command that was executed prior to the ProcessCommandResult statement is the command that is processed.

For descriptions of and parameters for the available automation commands, see SoftMax Pro Automation Commands on page 47.

Arguments

ProcessCommandResult has two arguments:

- Type of Write

  This is either one of two values:
  - WriteCell
  - WriteRow
- Name of Format
  - If the first argument specifies WriteCell, then argument this must reference a previously defined CellFormat.
  - If the first argument specifies WriteRow, then this argument this must reference a previously defined RowFormat.

Defaults

No default values

Examples

See the examples given in the CellFormat Statement on page 27 and RowFormat Statement on page 33.

Workflow Flow Control Statements

Workflow flow control statements cause the workflow to repeat a section of statements or pause until a given condition is satisfied.

In the provided example, Workbooks control statements are color coded gray.

Loop and EndLoop Statements

Purpose

To repeat a series of workflow statements a fixed number of times, **Loop** marks the start of the series and **EndLoop** marks the end of the series.

Note: Loop and EndLoop statements should always written in worksheet column A to make them easy to detect. All other statements are written in worksheet column B.

Arguments

Loop has one argument:

- The number of times the series of statements should be repeated.

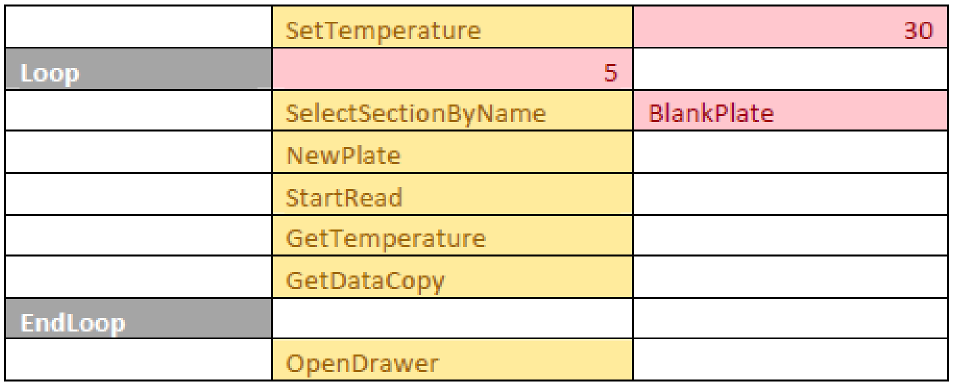
EndLoop has no arguments.

Defaults

No default values.

Example

In this example, the series of statements between Loop and EndLoop repeats five (5) times. The SetTemperature and OpenDrawer statements execute only once each.

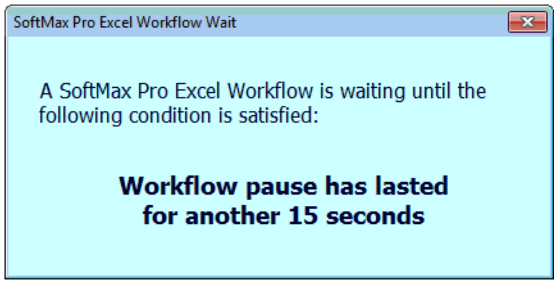


	SetTemperature	30
Loop	5	
	SelectSectionByName	BlankPlate
	NewPlate	
	StartRead	
	GetTemperature	
	GetDataCopy	
EndLoop		
	OpenDrawer	

Pause Statement

Purpose

This statement pauses workflow execution for a fixed number of seconds. When a workflow is paused a dialog appears.



SoftMax Pro Excel Workflow Wait

A SoftMax Pro Excel Workflow is waiting until the following condition is satisfied:

Workflow pause has lasted for another 15 seconds

Arguments

Pause has one argument:

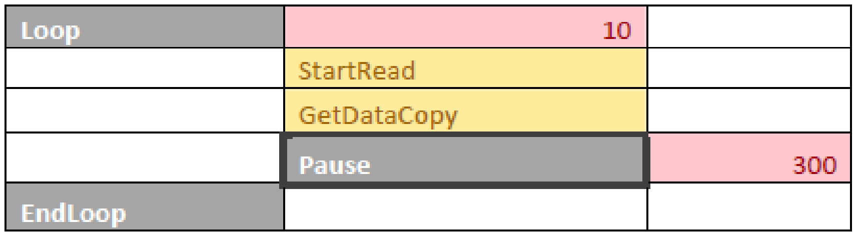
- The number of seconds the workflow should pause

Defaults

No default values

Example

In this example, the Pause within the Loop pauses the workflow for 300 seconds (5 minutes) after each read.



Loop	10	
	StartRead	
	GetDataCopy	
	Pause	300
EndLoop		

WaitUntil Statement

Purpose

This statement pauses workflow execution until a given condition has been satisfied. A dialog appears describing the condition that needs to be satisfied to allow the workflow to continue.

Arguments

WaitUntil has four arguments:

- Automation Command

  This command must return a result that can be tested in combination with the second and third arguments.
- Operator

  This can be one of the following values:
  - **EQ** meaning equals
  - **LT** meaning less than
  - **GT** meaning greater than
  - **LE** meaning less than or equals
  - **GE** meaning greater than or equals
- Target Value

  The target value against which the result from argument one is tested.
- Description

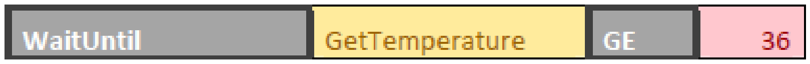
  This gives the reason the workflow is waiting and is displayed to the user while the pause is in effect. This optional argument can be used to make the wait reason more descriptive by adding context or using a local language.

Defaults

If a description argument is not supplied the first three arguments are concatenated into a default description.

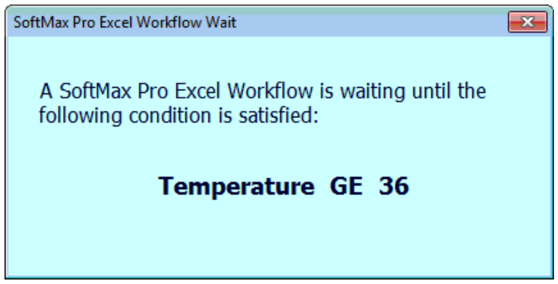
Examples

The following WaitUntil statement pauses until the instrument incubator is equal to, or greater than, 36 degrees.



WaitUntil	GetTemperature	GE	36

While the workflow is paused the following dialog appears.

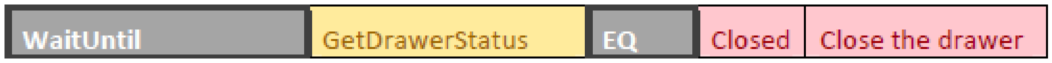


SoftMax Pro Excel Workflow Wait

A SoftMax Pro Excel Workflow is waiting until the following condition is satisfied:

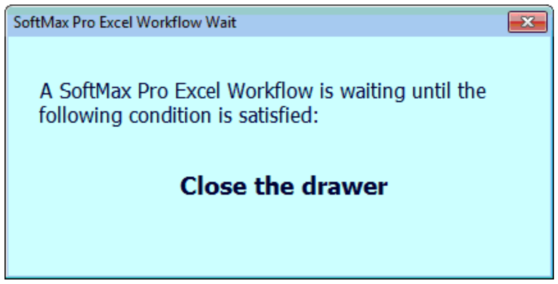
Temperature GE 36

The following WaitUntil statement pauses until the instrument drawer is closed.



WaitUntil	GetDrawerStatus	EQ	Closed	Close the drawer

While the workflow is paused the following dialog appears.



SoftMax Pro Excel Workflow Wait

A SoftMax Pro Excel Workflow is waiting until the following condition is satisfied:

Close the drawer

Custom Excel Formulas

You can write a new custom formula provided you have knowledge of Excel Visual Basic. All custom formulas can be used in a SoftMax Pro Excel workflow. See CellFormat Statement on page 27.

The ElapsedTime custom formula is already provided with the SoftMax Pro Excel workflows.

Additional custom formula should be added to the SoftMax Pro Excel Visual Basic module called SMPWorkflow.

ElapsedTime Custom Formula

Purpose

This custom formula writes a column of elapsed time values, in seconds, between successive instrument reads. This can be used to assist in plotting a graph of data collected from instrument reads over time.

Dependency

The date/time of each read must be recorded in the Excel Worksheet.

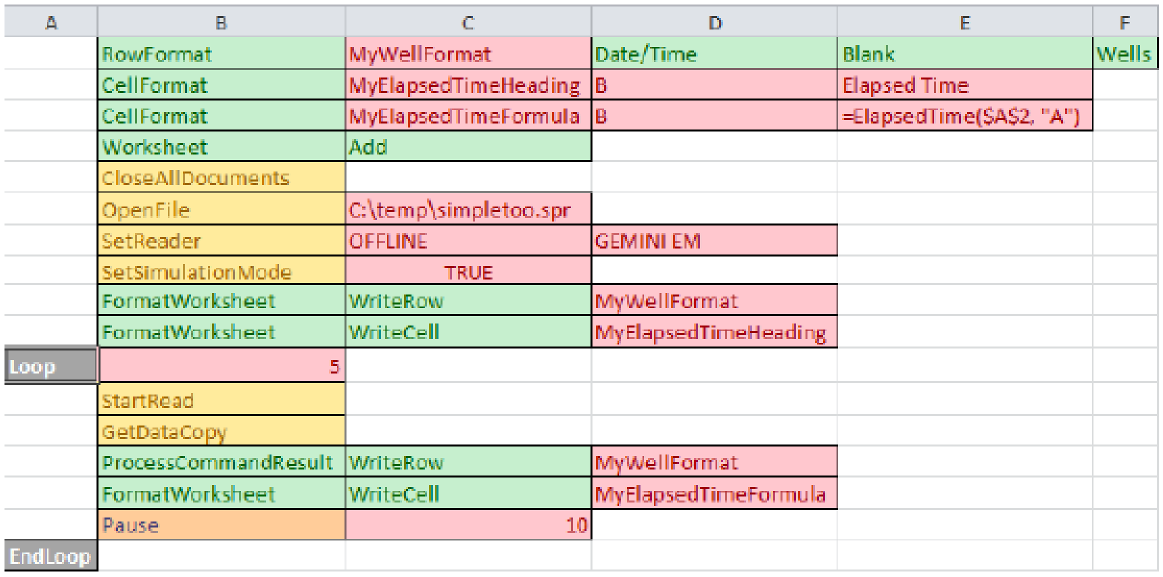
Usage

=ElapsedTime(Base Date Cell, Date Column)
where:

- **Base Date Cell** is the Excel worksheet cell containing start date/time against which all other dates are compared against
- **Date Column** is the column containing the dates to be compared against the Base Date. The Date Column must be in quotation marks, for example, “C” for column C of the worksheet.

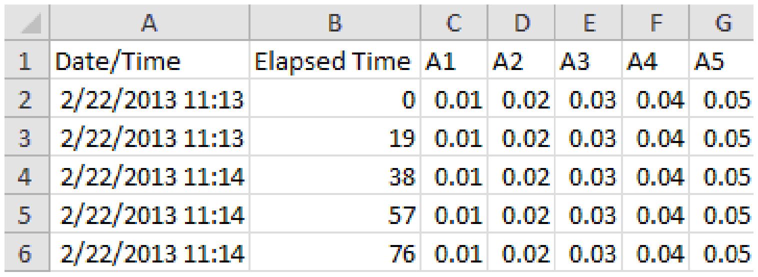
ElapsedTime Example

In this example, the workflow uses the ElapsedTime custom formula to write the elapsed time between runs in Column B of the Sheet1 worksheet.



A	B	C	D	E	F
	RowFormat	MyWellFormat	Date/Time	Blank	Wells
	CellFormat	MyElapsedTimeHeading	B	Elapsed Time	
	CellFormat	MyElapsedTimeFormula	B	=ElapsedTime(A2, "A")	
	Worksheet	Add			
	CloseAllDocuments				
	OpenFile	C:\temp\simpletoo.spr			
	SetReader	OFFLINE	GEMINI EM		
	SetSimulationMode	TRUE			
	FormatWorksheet	WriteRow	MyWellFormat		
	FormatWorksheet	WriteCell	MyElapsedTimeHeading		
Loop	5				
	StartRead				
	GetDataCopy				
	ProcessCommandResult	WriteRow	MyWellFormat		
	FormatWorksheet	WriteCell	MyElapsedTimeFormula		
	Pause	10			
EndLoop					

The output written to Excel appears in the following figure.



	A	B	C	D	E	F	G
1	Date/Time	Elapsed Time	A1	A2	A3	A4	A5
2	2/22/2013 11:13	0	0.01	0.02	0.03	0.04	0.05
3	2/22/2013 11:13	19	0.01	0.02	0.03	0.04	0.05
4	2/22/2013 11:14	38	0.01	0.02	0.03	0.04	0.05
5	2/22/2013 11:14	57	0.01	0.02	0.03	0.04	0.05
6	2/22/2013 11:14	76	0.01	0.02	0.03	0.04	0.05

Visual Basic Code

```
Function ElapsedTime(ByVal startDate As Date, ByVal compareDateCol As String) As Long
    Dim compareDateColIndex As Long
    compareDateColIndex = ColumnLetterToNumber(compareDateCol)
    Cells(ActiveCell.row, compareDateColIndex).NumberFormat = "dd/mm/yy"
    Dim compareDate As Date
    compareDate = Cells(ActiveCell.row, compareDateColIndex)
    ElapsedTime = DateDiff("s", startDate, compareDate)
End Function
```

Instrument Connectivity

In most workflows, the user running the SoftMax Pro Software connects to the instrument before starting the workflow. If you want the workflow to connect to the instrument without user intervention, then see read this section.

To connect to either an instrument or an instrument simulator, use the following Automation commands in the workflow:

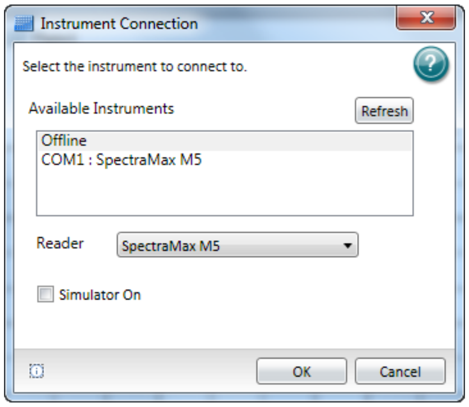
- SetReader
- SetSimulationMode

As the automation API requires the name of the instrument be in a very specific format, each model of instrument is included in the supplied example Excel workbooks. When writing or changing a workflow, you can copy and paste the appropriate instrument name into place in the workflow that you are editing. This helps prevent mismatches in the format of the name of the instrument.

Instrument Connectivity Examples

Connecting to a Real Instrument

The port connected to the instrument should be coded as part of the SetReader command, and the instrument should be taken out of simulation mode.



Instrument Connection

Select the instrument to connect to.

Available Instruments

Offline
COM1 : SpectraMax M5

Reader: SpectraMax M5

Simulator On [ ]

SetReader	COM1	SPECTRAmax M5
SetSimulationMode	FALSE	

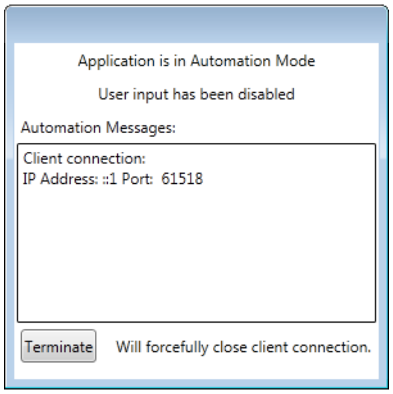
Using a Simulator

The instrument should be set as OFFLINE, and the SetSimulation command should say TRUE.

SetReader	OFFLINE	SPECTRAmax M5
SetSimulationMode	TRUE	

Troubleshooting Excel Workflows

- Make sure that the SoftMax Pro Excel Add-In is enabled in Excel.
- Make sure that the SoftMax Pro Software is started and that the Automation Mode dialog is not displayed.



Application is in Automation Mode

User input has been disabled

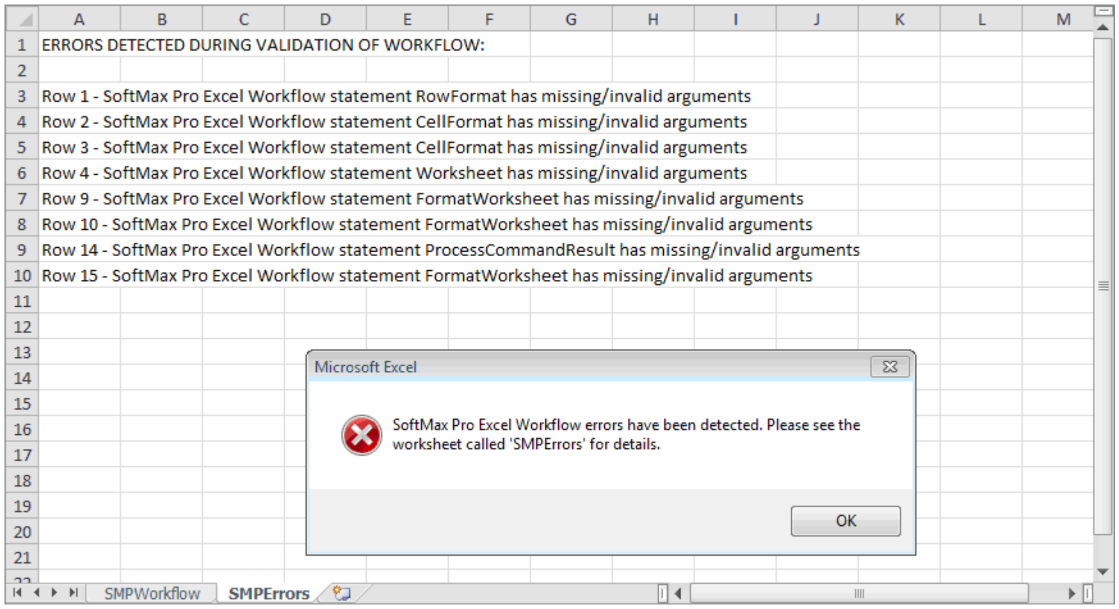
Automation Messages:

Client connection:
IP Address: ::1 Port: 61518

- If a formula entered in the workflow evaluates before it is run then enter with a single quotation mark prefix. For example, instead of entering **=SUM(A1: A5)** enter **'=SUM(A1: A5)**.

Workflow Errors

Any errors that are detected by the workflow are reported in the **SMPErrors** worksheet as shown in the following figure.

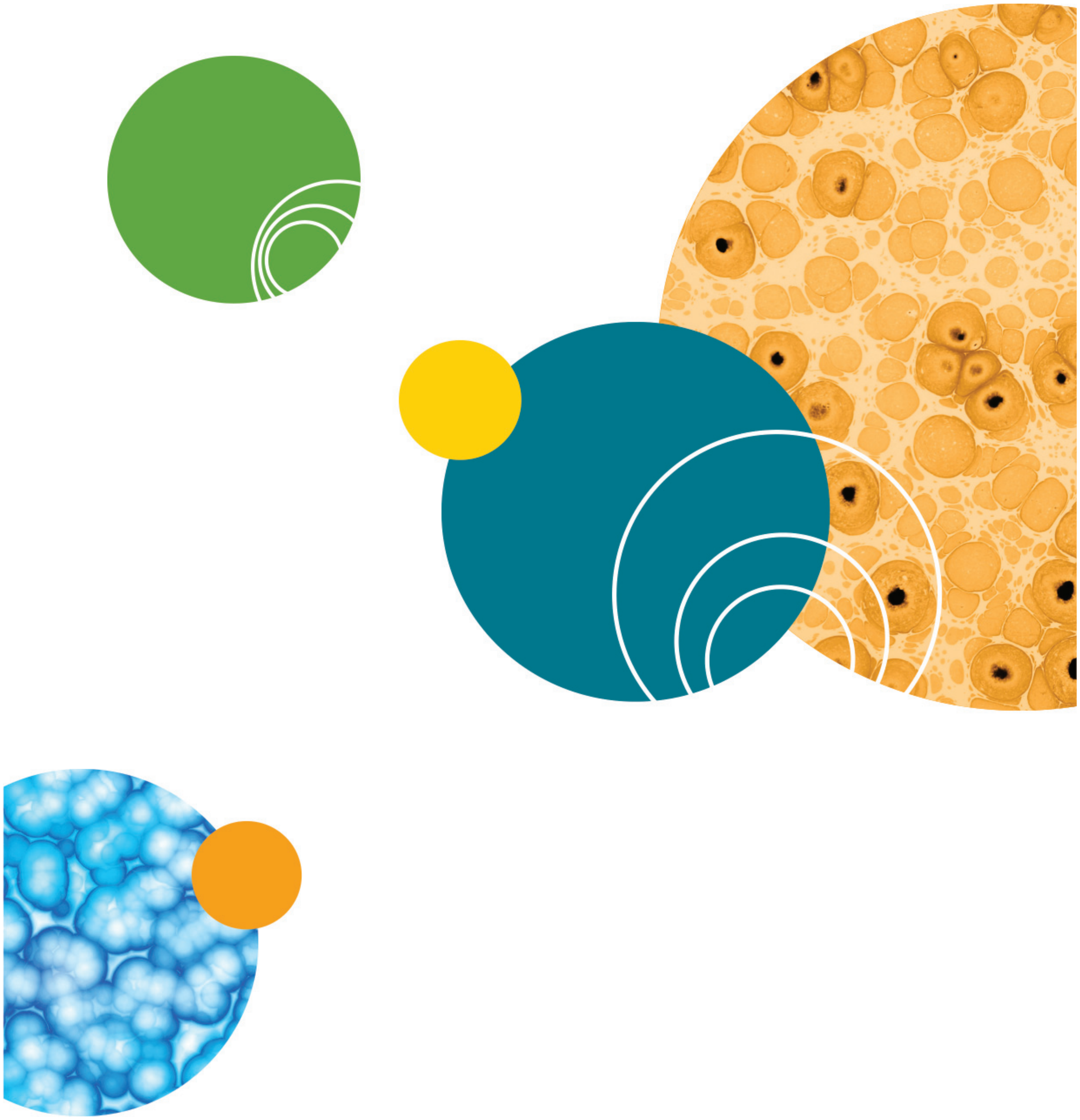


	A
1	ERRORS DETECTED DURING VALIDATION OF WORKFLOW:
2	
3	Row 1 - SoftMax Pro Excel Workflow statement RowFormat has missing/invalid arguments
4	Row 2 - SoftMax Pro Excel Workflow statement CellFormat has missing/invalid arguments
5	Row 3 - SoftMax Pro Excel Workflow statement CellFormat has missing/invalid arguments
6	Row 4 - SoftMax Pro Excel Workflow statement Worksheet has missing/invalid arguments
7	Row 9 - SoftMax Pro Excel Workflow statement FormatWorksheet has missing/invalid arguments
8	Row 10 - SoftMax Pro Excel Workflow statement FormatWorksheet has missing/invalid arguments
9	Row 14 - SoftMax Pro Excel Workflow statement ProcessCommandResult has missing/invalid arguments
10	Row 15 - SoftMax Pro Excel Workflow statement FormatWorksheet has missing/invalid arguments

Microsoft Excel

SoftMax Pro Excel Workflow errors have been detected. Please see the worksheet called 'SMPErrors' for details.

You should also check for additional error messages in the SoftMax Pro Software Automation Mode dialog under Automation Messages. The errors reported in this dialog might not be reported to the workflow.



SoftMax Pro Automation Commands

6

SoftMax Pro automation commands are one or more concatenated words with no spaces and a closing set of parenthesis. If parameters are required, the parameters are including within the closing set of parenthesis.

Table 6-1: SoftMax Pro Commands

Command	Description
AppendTitle	Appends text to the title of the specified section.
CloseDocument	Closes the current document.
CloseAllDocuments	Closes all the currently open documents.
CloseDrawer	Closes the instrument drawer.
Dispose	Closes the final automation application dialog.
ExportAs	Exports data in the Columns, Plate, or XML format.
ExportSectionAs	Exports the currently selected section.
GetAutosaveState	Returns the current autosave setting for the active document.
GetDataCopy	Copies data to the client by way of an event.
GetDrawerStatus	Returns the state of the instrument's microplate drawer.
GetFormulaResult	Returns the result from the specified formula.
GetGroupNameAssignments	Returns the group name assignments of the currently selected plate section.
GetInstrumentStatus	Returns the currently connected instrument status.
GetNumberPlateSections	Returns the number of plate sections in the active experiment.
GetTemperature	Returns the currently connected instrument incubator temperature.
GetVersion	Returns the version of the SoftMax Pro Automation Interface.
ImportPlateData	Imports data from a file into a Plate section in the current data file.
ImportPlateTemplate	Imports a template from a file into the current plate section.
Initialize	Initializes the Automation Interface.
NewDocument	Creates a new document.
Logon	Log a user onto the SoftMax Pro GxP Software.
Logoff	Log a user off from the SoftMax Pro GxP Software.
NewExperiment	Creates a new Experiment section.
NewNotes	Creates a new Notes section within the current Experiment.
NewPlate	Creates a new Plate section within the current Experiment.
OpenDrawer	Opens the instrument drawer.
OpenFile	Opens a protocol file or data file.
Quit	Exits the SoftMax Pro Software application.
SaveAs	Saves the current document as a data file or a protocol file.
SelectNextPlateSection	Selects the next plate section from the current Experiment.
SelectSection	Selects a section by name or by the order of the section within the experiment.

Table 6-1: SoftMax Pro Commands (cont'd)

Command	Description
SetReader	Selects a reader type and sets the reader status.
SetShake	Shakes the microplate.
SetSimulationMode	Sets SoftMax Pro software into simulation mode.
SetTemperature	Sets the current instrument incubator temperature.
SetTitle	Sets the title of the selected section.
SetUserName	Used with GxP systems to set the user name for a shielded protocol.
StartRead	Reads the current Plate or CuvetteSet section.
StopRead	Stops the current Plate or CuvetteSet section read.

AppendTitle

`Int32 AppendTitle(String` ***`titletext`*****`)`**

Purpose

Appends text to the title of the specified section.

Parameters

titletext

Type: String

The text to be appended to the section title.

Example

The following example demonstrates appending text to the title of a plate section.

```
int mAppenTitleID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.SelectSection("Plate01");
        mAppenTitleID = AutomationObject.AppendTitle("- YeOld Append");
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}

private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mAppenTitleID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
```

CloseDocument

```
Int32 CloseDocument()
```

Purpose

Closes the current document.
If the data has not been saved, the document is closed anyway with no user warning.

Parameters

None

CloseAllDocuments

```
Int32 CloseAllDocuments()
```

Purpose

Closes all the currently open documents.

Parameters

None

CloseDrawer

```
Int32 CloseDrawer()
```

Purpose

Closes the instrument drawer.

Parameters

None

Dispose

`Void Dispose()`

Purpose

Closes the final automation application dialog.

The termination dialog containing the “Terminate” button that appears on the SoftMax Pro 6 Software application after the script has completed execution.

Parameters

None

Example

The following example demonstrates how to use the Dispose function to close the automation dialog and exit the automation application. In The following example the code used to complete command execution and dispose the interface dialog box is included.

```
public void Main()
{
        AutomationObject.Initialize();
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.ErrorReport+= Error;
        AutomationObject.OpenDrawer();
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.CommandCompleted  -=  CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

ExportAs

`Int32 ExportAs(String` ***`path`*****`, ExportAsFormat`** ***`exportAsFormat`*****`)`**

Purpose

Exports data in the Columns, Plate, or XML format.
The **ExportAs** command overwrites any existing file without warning.

Parameters

path

Type: String

Fully qualified path name

exportAsFormat

Type: ExportAsFormat

TIME exports data in a single column of text for each well.

COLUMNS exports data in a single column of text for each well.

PLATE exports data in a text matrix corresponding to a microplate grid.

XML exports data in an XML file format.

Example

The following example demonstrates using the ExportAs function to output data in XML, Plate, and Columns formats. In this example, TIME is used in the ExportAsFormat parameter to export in Columns format.

```
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.SelectSection("Plate1");
        AutomationObject.SetReader("Offline", "SPECTRAmax M2");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.StartRead();
        var commandID = AutomationObject.ExportAs("C:\\test.xml",
SoftMaxPro.AutomationClient.SMPAutomationClient.ExportAsFormat.XML );
        Results.AppendResult("Command ID = " + commandID.ToString() );
        commandID = AutomationObject.ExportAs("C:\\Plate.txt",
SoftMaxPro.AutomationClient.SMPAutomationClient.ExportAsFormat.PLATE );
        Results.AppendResult("Command ID = " + commandID.ToString() );
        commandID = AutomationObject.ExportAs("C:\\COLUMNS.txt",
SoftMaxPro.AutomationClient.SMPAutomationClient.ExportAsFormat.TIME);
        Results.AppendResult("Command ID = " + commandID.ToString() );
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}

private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );

        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
```

ExportSectionAs

`Int32 ExportSectionAs(String *path*, ExportAsFormat *exportAsFormat*, Bool *append*)`

Purpose

Exports the currently selected section.

Parameters

path

Type: String

Fully qualified path name

exportAsFormat

Type: ExportAsFormat

TIME exports data in a single column of text for each well.

COLUMNS exports data in a single column of text for each well.

PLATE exports data in a text matrix corresponding to a microplate grid.

XML exports data in an XML file format.

append

Type: Boolean

Specify whether to append the data to an existing file.

If append is set to *false*, the command will overwrite any existing file without warning.

GetAutosaveState

`Int32 GetAutosaveState()`

Purpose

Returns the current autosave setting for the active document.

Parameters

None

Returns

This function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Return type: String
Returns the AutoSave state.
The return string is one of the following properties:

- SMPAutomationClient.AutoSaveState.OFF = AutoSave is turned off
- SMPAutomationClient.AutoSaveState.ON = AutoSave is turned on

GetDataCopy

`Int32 GetDataCopy()`

Purpose

Copies data to the client by way of an event.

The format of the copied data copied can vary based on the display settings for the current plate section (normally Raw Data), the read mode, the read type, and the number of wavelengths.

Parameters

None

Returns

This function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Return type: String

Returns the data for the selected plate section.

Example

The following example demonstrates how to copy data to the client by way of an event.

```
int mCopyID;
public void Main()
{
        string now = System.DateTime.Now.ToString();
        Results.AppendResult(now);
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.SetReader("Offline", "SPECTRAmax M2");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.SelectSection("Plate1");
        int read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        mCopyID = AutomationObject.GetDataCopy();
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mCopyID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
                AutomationObject.Dispose();
        }
}
private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

GetDrawerStatus

`Int32 GetDrawerStatus()`

Purpose

Returns the state of the instrument's microplate drawer.

Parameters

None

Returns

This function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Return type: String

Returns the status of the drawer.

The return string is one of following properties:

- SMPAutomationClient.DrawerStatus.OPENED = The drawer is open
- SMPAutomationClient.DrawerStatus.CLOSED = The drawer is closed

Example

The following example demonstrates how to find out if the drawer is open or closed.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        mStatusID = AutomationObject.GetDrawerStatus();
        Results.AppendResult("Status Command ID = " + mStatusID .ToString());
}
private void Error(object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void CommandCompleted(object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID== e.QueueID )
        {
                Results.AppendResult( "Drawer Status: " +e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.ErrorReport -= Error;
                AutomationObject.Dispose();
        }
}
```

GetFormulaResult

```
Int32 GetformulaResult(String results)
```

Purpose

Returns the result from the specified formula.

This command requires the name of the formula, name of either Notes or Group section, and the name of the Experiment. If the name of the Experiment is not specified, it will search from the first Experiment of the document.

Note: The returned value is the calculated value for the formula, not the formula string.

Parameters

results

Type: String

fully qualified formula name, including section and experiment identifiers

Example: *formulaName@sectionName@experimentName*

Returns

This function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Type: String

Calculated value for the formula

Example

The following example shows getting information from a Notes section. If the Notes section does not have a field titled Summary1, the command fails.

```
int mID;
int bAutomix;
System.Collections.Generic.Dictionary<int, string> commandResultFormatter = new
System.Collections.Generic.Dictionary<int, string>();
public void Main()
{
        string now = System.DateTime.Now.ToString();
        Results.AppendResult(now);
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.SelectSection("Notes1");
        mID = AutomationObject.GetFormulaResult("Summary1");
        commandResultFormatter.Add(mID, "Formula Result of Summary1 :- {0}");
        AutomationObject.SelectSection("Notes1");
        mID = AutomationObject.GetFormulaResult("Summary2");
        commandResultFormatter.Add(mID, "Formula Result of Summary2 :- {0}");
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}

private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( !string.IsNullOrEmpty(e.StringResult) )
        {
                if(commandResultFormatter.ContainsKey(e.QueueID))
                        Results.AppendResult(string.Format(commandResultFormatter[e.QueueID],
e.StringResult));
                else
                        Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
```

GetGroupNameAssignments

Int32 GetGroupNameAssignments

Purpose

Returns the group name assignments of the currently selected plate section.

Parameters

None

Returns

The function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Return Type: String

Returns a tab-delimited list of group names assigned to wells for all the wells in the plate.

Wells without a group assignment are returned as blank.

GetInstrumentStatus

Int32 GetInstrumentStatus

Purpose

Returns the currently connected instrument status.

Parameters

None

Returns

The function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Return Type: String

For the possible values, see InstrumentStatusChanged on page 86.

GetNumberPlateSections

`Int32 GetNumberPlateSections()`

Purpose

Returns the number of plate sections in the active experiment.

Parameters

None

Returns

This function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Return Type: Int32
Returns the number of plate sections in the active experiment.

Example

The following example shows how to determine the number of plate sections in the active experiment.

```
int NumPlateSectionsID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        NumPlateSectionsID = AutomationObject.GetNumberPlateSections();
        Results.AppendResult("Status Command ID = " + NumPlateSectionsID .ToString());
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( e.QueueID == NumPlateSectionsID )
        Results.AppendResult("Number of Plate Sections : " + e.IntResult.ToString() );
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

GetTemperature

Int32 GetTemperature()

Purpose

Returns the currently connected instrument incubator temperature.

Parameters

None

Returns

The function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Return Type: Double
Current instrument incubator temperature

GetVersion

```
Int32 GetVersion()
```

Purpose

Returns the version of the SoftMax Pro Automation Interface.

Parameters

None

Returns

This function returns the command id which can be used to retrieve the returned data from the CommandCompleted Event.

Data Returned Through the CommandCompleted Event

Return Type: String
Returns the version of the SoftMax Pro Software application.
The return string is the following property:
SMPAutomationClient.Version.VERSION6300

Example

The following example demonstrates getting the Version level of the SoftMax Pro Software application.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.ErrorReport += Error;
        mStatusID = AutomationObject.GetVersion();
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID== e.QueueID )
        {
                Results.AppendResult( "Version: " +e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.ErrorReport -= Error;
                AutomationObject.Dispose();
        }
}
```

ImportPlateData

`Int32 ImportPlateData(string` *`importType`*`, params string[]` *`importParameter`*`)`

Purpose

Imports data from a file into a Plate section in the current data file.

Parameters

importType

Type: String

Must be one of the following format strings:

- “Plate Format"
- "XML Format"

importParameter

Type: Params String

Fully qualified path name of the file containing the data to be imported. The file must match the format used for manual data imports.

Example

The following example imports microplate data in Plate format from a file named data_import.txt.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.SetReader("Offline", "SPECTRAmax M5");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.SelectSection("Plate1");
        mStatusID = AutomationObject.ImportPlateData("Plate Format”, "C:\\Program Files\\Molecular
Devices\\Import Templates\\data_import.txt");
        Results.AppendResult("Import Plate Data Status="+mStatusID.ToString());
}

private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

ImportPlateTemplate

`Int32 ImportPlateTemplate(string *path*)`

Purpose

Imports a template from a file into the current plate section.

Parameters

path

Type: String

Fully qualified path name of the file containing the template to be imported. The file must match the format used by for manual template imports.

Example

The following example imports a plate template named platetemplate.txt.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.SetReader("Offline", "SPECTRAmax M5");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.SelectSection("Plate1");
        mStatusID = AutomationObject.ImportPlateTemplate("C:\\Program Files\\Molecular Devices\\SoftMax Pro
6.5 Automation SDK\\Scripts\\PlateTemplate.txt");
        Results.AppendResult("Import Plate Template Status="+mStatusID.ToString());
}

private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

Initialize

```
Boolean Initialize ()
Boolean Initialize (String server)
Boolean Initialize (String server, Int32 port)
```

Purpose

Initializes the Automation Interface.

Parameters

server

Type: String

the computer name or IP address of the server

port

Type: Int32

the port address of the server

Returns

Return Type: Boolean

- True = initialization was successful
- False = initialization failed

Examples

There are three ways to use the Initialize command.

- bool Initialize()
- bool Initialize(String server)
- bool Initialize(String server, int port)

bool Initialize()

With no parameters, the Initialize function uses the default host 'localhost' and default port of 9000.

```
bool mInitialize;
public void Main()
{
        mInitialize = AutomationObject.Initialize(); // Replace the target machine IP Address here
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        Results.AppendResult("Inirialized : " + mInitialize.ToString());
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if(mInitialize)
        {
                Results.AppendResult(e.StringResult);
        }

        Results.AppendResult("Queue empty - disconnecting events");
        AutomationObject.ErrorReport -= Error;
        AutomationObject.CommandCompleted -= CommandCompleted;
        AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
        AutomationObject.Dispose();
}

private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}

private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

bool Initialize(String *server*)

The *server* parameter can be either the computer name or IP address and default port.

```
bool mInitialize;
public void Main()
{
        mInitialize = AutomationObject.Initialize("127.0.0.1"); // Replace the target machine IP Address here
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        Results.AppendResult("Inirialized : " + mInitialize.ToString());
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if(mInitialize)
        {
                Results.AppendResult(e.StringResult);
        }

        Results.AppendResult("Queue empty - disconnecting events");
        AutomationObject.ErrorReport -= Error;
        AutomationObject.CommandCompleted -= CommandCompleted;
        AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
        AutomationObject.Dispose();
}

private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}

private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

bool Initialize(String *server*, *int port*)

You can use the computer name or IP and port.

```
public void Main()
{
        AutomationObject.Initialize("10.212.11.175", 9901)
        AutomationObject.CloseDocument();
        AutomationObject.NewDocument();
}
```

When the default port is not available for SoftMax Pro, then the you can add a registry key in HLM\SOFTWARE\Molecular Devices\Readers\SMP with key "Port" and a 32bit DWORD that contains the port address.

Logon

`Int32 Logon(String *userID*, String *password*)`

Purpose

Log a user onto the SoftMax Pro GxP Software.

To prevent the Log On dialog from appearing when the application starts, use /R in the program command line (for example, "SoftMaxProApp.exe /R"). See Computer System Requirements on page 13.

Parameters

userID

Type: String

The user ID for the account

password

Type: String

The password for the account

Logoff

`Int32 Logoff()`

Purpose

Log a user off from the SoftMax Pro GxP Software.

Parameters

None.

NewDocument

`Int32 NewDocument()`

Purpose

Creates a new document.

This command also reads into the new document the values contained in the “Default Protocol.spr” protocol file.

Parameters

None

Example

The following example demonstrates creating a new document containing the values in the default protocol.

```
int mStatusID;
public void Main()
 {
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        mStatusID = AutomationObject.NewDocument();
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

NewExperiment

`Int32 NewExperiment()`

Purpose

Creates a new Experiment section.

Parameters

None

Example

The following example shows creating a new experiment section.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.NewDocument();
        AutomationObject.NewNotes();
        AutomationObject.NewPlate();
        AutomationObject.NewNotes();
        mStatusID = AutomationObject.NewExperiment();
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

NewNotes

`Int32 NewNotes()`

Purpose

Creates a new Notes section within the current Experiment.

Parameters

None

Example

The following example shows creating a notes section.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.NewDocument();
        mStatusID = AutomationObject.NewNotes();
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

NewPlate

`Int32 NewPlate()`

Purpose

Creates a new Plate section within the current Experiment.

Parameters

None

Example

The following example demonstrates the use of NewPlate command.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.NewDocument();
        AutomationObject.NewPlate();
        AutomationObject.NewNotes();
        mStatusID = AutomationObject.NewPlate();
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

OpenDrawer

`OpenDrawer()`
`OpenDrawer(Int32 *xPosition*, Int32 *yPosition*, Bool *locked*)`

Purpose

Opens the instrument drawer.

Note: For instruments with temperature control, the drawer cannot be opened while the incubator is on. See SetTemperature on page 80.

Parameters

The OpenDrawer parameters are recognized by the SpectraMax i3x, SpectraMax i3, SpectraMax Paradigm, and FilterMax Instruments only. For all other instruments, the parameters are ignored.

xPosition

Type: Int32

This parameter defines the left-right offset for the position of the open microplate drawer.

- Range for the SpectraMax i3x and i3 Instruments: 0 to 2900
- Range for the SpectraMax Paradigm Instrument: 0 to 2950
- Range for the FilterMax Instruments: 0 to 2950

yPosition

Type: Int32

This parameter defines the front-rear offset for the position of the open microplate drawer.

- Range for the SpectraMax i3x and i3 Instruments: 5200 to 6900
- Range for the SpectraMax Paradigm Instrument: 5200 to 6900
- Range for the FilterMax Instruments: 5200 to 6900

locked

Type: Bool

When this parameter is true, the microplate is held in a fixed position to allow operations such as dispensing.

Example

The following example shows opening the instrument drawer.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.OpenDrawer();
        mStatusID = AutomationObject.GetDrawerStatus();
        Results.AppendResult("Status Command ID = " + mStatusID .ToString() );
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID== e.QueueID )
        {
                Results.AppendResult( "Result: " +e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.CommandCompleted -= CommandCompleted;AutomationObject.Dispose();
        }
}
```

OpenFile

`Int32 OpenFile(String` *`pathname`*`)`

Purpose

Opens a protocol file or data file.
If the file is not found, the SoftMax Pro application does nothing.

Parameters

pathname

Type: String

Fully qualified path to protocol file or protocol name

Example

In the following example, the file that is to be opened must exist in the file system. If it does not exist, the command fails.

```
int mStatusID;
string mPath="C:\\Users\\All Users\\Application Data\\Molecular Devices\\SMP6\\Default
Protocols\\Basics\\Spectrum.spr";

public void Main()
 {
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        mStatusID = AutomationObject.OpenFile(mPath);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

Quit

`Int32 Quit()`

Purpose

Exits the SoftMax Pro Software application.

Parameters

None

Example

The following example demonstrates quitting the SoftMax Pro Software application.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.NewDocument();
        AutomationObject.NewPlate();
        mStatusID = AutomationObject.Quit();
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

SaveAs

`Int32 SaveAs(String` *`pathname`*`)`

Purpose

Saves the current document as a data file or a protocol file.

Define the file type for the saved file by the file extension in the path statement. Use the *.sda extension for data files and *.spr for protocol files. If you are using the SoftMax Pro GxP Software, use the *.sdax extension for data files and *.sprx for protocol files.

If a file with the same name already exists, the SoftMax Pro Software automatically overwrites the file with no warning. The SoftMax Pro GxP Software does not allow overwriting existing files, and generates an error message if an overwrite is attempted.

Parameters

pathname

Type: String

Fully qualified path and name of file to be saved, including the file extension.

Example

The following example shows saving the file to an undefined “Temp” path. To define the path, the mPath string needs to be defined with an absolute or relative path that includes the name of the file and its file extension.

```
int mStatusID;
string mPath="C:\\temp\mydata.sda";
public void Main() {
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        mStatusID = AutomationObject.SaveAs(mPath);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

SelectNextPlateSection

`Int32 SelectNextPlateSection()`

Purpose

Selects the next plate section from the current Experiment.

Parameters

None

Example

The following example shows selecting the next plate after Plate1.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.CloseDocument();
        AutomationObject.NewDocument();
        AutomationObject.NewPlate();
        AutomationObject.SelectSection("Plate1");
        mStatusID= AutomationObject.SelectNextPlateSection();
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}

private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

SelectSection

`Int32 SelectSection(String` ***`sectionName`*****`)`**

`Int32 SelectSection(Int32` ***`sectionNumber`*****`)`**

Purpose

Selects a section by name or by the order of the section within the experiment.

SelectSection using the System.String parameter can be useful for multi-plate protocols or for selecting Group tables for copying.

Parameters

sectionName

Type: String

The name of the section.

Either the name of a section within the currently selected experiment or a fully qualified section name, including section and experiment identifiers

Examples: sectionName or sectionName@experimentName

sectionNumber

Type: Int32

The order number of the section.

Example

The following example demonstrates using the SelectSection function using the System.String parameter.

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.NewExperiment();
        mStatusID = AutomationObject.SelectSection("Exp02");
        AutomationObject.NewExperiment();
        mStatusID = AutomationObject.SelectSection(2);
        AutomationObject.AppendTitle("_&&^^**%%$$##@@");
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }



        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

SetReader

```
Int32 SetReader(String port, String instrument)
```

Purpose

Selects a reader type and sets the reader status.

Parameters

Note: The parameters are case-sensitive.

communication port

Type: String

The name of the communication port to look for the instrument (for example, *COM1*).

Offline sets the reader state to offline.

instrument

Type: String

340PC384

DTX 800

DTX 880

Emax

FilterMax F3

FilterMax F5

GEMINI EM

GEMINI XPS

PLUS190PC

PLUS384

SpectraMax i3

SpectraMax i3x

SPECTRAmax M2

SPECTRAmax M2e

SPECTRAmax M3

SPECTRAmax M4

SPECTRAmax M5

SPECTRAmax M5e

SpectraMax Paradigm

VersaMaxPLUS

Vmax

Example

See the Example on page 79.

SetShake

`Int32 SetShake(Boolean *shakestate*)`

Purpose

Shakes the microplate.

When this command is set to *true*, starts shaking the microplate tray until the *Shake(false)* command is sent. By default, the shake will stop after 30 seconds in most instruments.

Note: The SetShake command is not supported for the SpectraMax i3x, SpectraMax i3, SpectraMax Paradigm, and FilterMax instruments.

Parameters

shakestate

Type: Boolean

true turns Shake on.

false turns Shake off.

Example

The following example demonstrates turning the shake function on and then off.

```
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.Initialize();

        AutomationObject.SetReader("Offline", "SPECTRAmax M2");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.SelectSection("Plate1");

        AutomationObject.CloseDrawer();
        AutomationObject.SetShake(true);

        AutomationObject.StartRead();

        AutomationObject.SetShake(false);
        AutomationObject.OpenDrawer();

}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
```

SetSimulationMode

`Int32 SetSimulationMode(Boolean` *`modestate`*`)`

Purpose

Sets SoftMax Pro software into simulation mode.

Parameters

modestate

Type: Boolean

true enables simulation mode.

false disables simulation mode.

Example

The following example demonstrates selecting a reader, enabling simulation mode and starting a read.

```
int mStatusID;
public void Main()
{
        string now = System.DateTime.Now.ToString();
        Results.AppendResult(now);
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.SetReader("Offline", "SPECTRAmax M5");
        mStatusID = AutomationObject.SetSimulationMode(true);
        Results.AppendResult("Simulation Mode Status = " +mStatusID.ToString());
        AutomationObject.SelectSection("Plate1");
        int read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        if( mStatusID  == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
                AutomationObject.Dispose();
        }
}
private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

SetTemperature

`Int32 SetTemperature(Double temperature)`

Purpose

Sets the current instrument incubator temperature.
Setting temperature to zero turns off the incubator.

Parameters

Temperature

Type: Double

The number of degrees centigrade

Example

The following example demonstrates setting the incubator temperature to 20°C.

```
int ID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.ErrorReport += Error;
        AutomationObject.SetReader("Offline", "SPECTRAmax M2");
        AutomationObject.SetSimulationMode(true);
        ID = AutomationObject.SetTemperature(20.0);
        Results.AppendResult("Set Temperature Status = " + ID.ToString());
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if(ID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

SetTitle

`Int32 SetTitle()`

Purpose

Sets the title of the selected section.

Checks for uniqueness of the specified section name within the current experiment. If there is a conflict, no change is made.

Parameters

None

Example

```
int mStatusID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.SetReader("Offline", "SPECTRAmax M5e");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.SelectSection("Plate1");
        mStatusID = AutomationObject.SetTitle("Plate-100");
        Results.AppendResult("Set Title Result : "+mStatusID.ToString());
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
                AutomationObject.Dispose();
        }
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}

private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

SetUserName

`Int32 SetUserName()`

Purpose

Used with GxP systems to set the user name for a shielded protocol.

Parameters

User name

StartRead

`Int32 StartRead()`

Purpose

Reads the current Plate or CuvetteSet section.
If the current section is neither a Plate nor CuvetteSet section, the next Plate or CuvetteSet section is read.

Parameters

None

Example

The following example shows starting a read operation.

```
int mCopyID;
public void Main()
{
        string now = System.DateTime.Now.ToString();
        Results.AppendResult(now);
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.CloseDocument();
        AutomationObject.NewDocument();
        AutomationObject.SetReader("Offline", "SPECTRAmax M2");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.SelectSection("Plate1");
        int read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        mCopyID = AutomationObject.GetDataCopy();
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mCopyID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
                AutomationObject.Dispose();
        }
}
private void InstrumentStatus( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.InstrumentStatusEventArgs e)
{
        Results.AppendResult("Status changed to " + e.Status);
}
```

StopRead

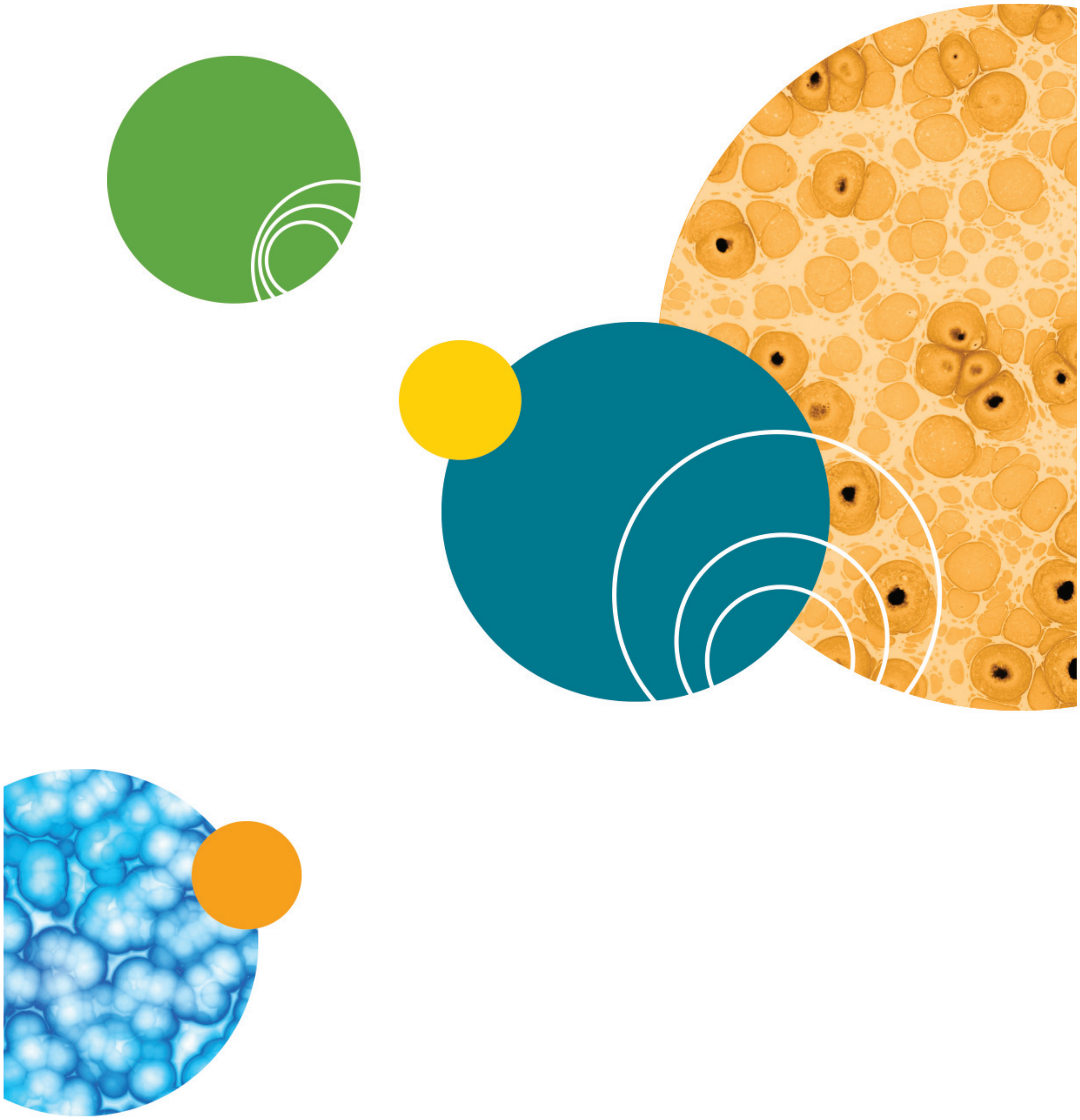
```
Int32 StopRead()
```

Purpose

Stops the current Plate or CuvetteSet section read.
This command is not queued.

Parameters

None



Events

7

The .NET server generates events which the client application can “listen” for by way of an event handler.

CommandCompleted

```
event EventHandler(object sender,
SoftMaxPro.Automation.SMPAutomationclient.CommandStatusEventArgs) CommandCompleted
```

Purpose

To generate a client callback when a command has completed.

Table 7-1: CommandStatusEventArgs Properties

Name	Type	Description
DoubleResult	Double	Returns a double result from a get command, such as GetTemperature()
IntResult	Int32	Provides the integer result from a get command, such as GetNumberPlateSections()
QueueEmpty	Boolean	True indicates the command queue on the server is empty False indicates the command queue on the server still contains commands
QueueId	Int32	The id of the completed command
StringResult	String	Provides the string result from a get command, such as GetDrawerStatus()

Example

See Multiple Read and Copy Events Script on page 91.

InstrumentStatusChanged

```
event EventHandler(object sender,
SoftMaxPro.Automation.SMPAutomationclient.InstrumentStatusEventArgs)
InstrumentStatusChanged
```

Purpose

To generate a client callback when the status of the connected instrument changes.

Table 7-2: InstrumentStatusEventArgs Property

Name	Type	Description
Status	String	Provides the new status of the instrument. See the possible values listed below.

Returns

The following properties can be used for testing which state has been returned:

- SMPAutomationClient.InstrumentStatus.IDLE
- SMPAutomationClient.InstrumentStatus.INITIALIZING
- SMPAutomationClient.InstrumentStatus.BUSY
- SMPAutomationClient.InstrumentStatus.STOPPING
- SMPAutomationClient.InstrumentStatus.ERROR
- SMPAutomationClient.InstrumentStatus.TIMEOUT
- SMPAutomationClient.InstrumentStatus.OFFLINE

Example

See Multiple Read and Copy Events Script on page 91.

ErrorReport

```
event EventHandler(object sender,
SoftMaxPro.Automation.SMPAutomationclient.ErrorEventArgs)
ErrorReport
```

Purpose

To generate a client callback when an error condition occurs.

Table 7-3: ErrorEventArgs Properties

Name	Type	Description
Error	String	A description of the error
QueueId	Int32	The id of the command with the error

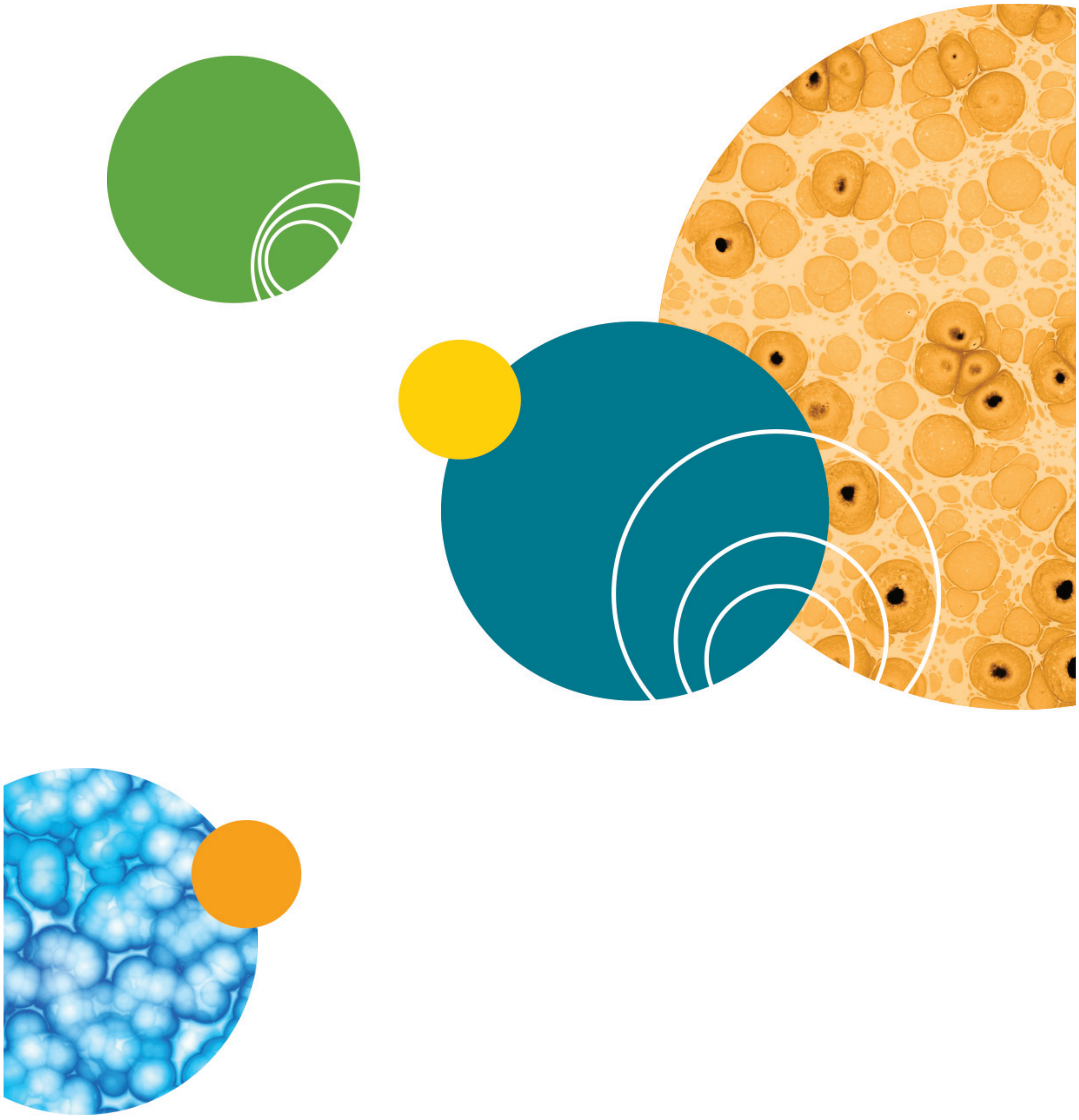
Error Event Related Processing

When an Error event is generated, it is always followed by a CommandComplete event for the command that caused the error.

All commands waiting in the automation server command queue are deleted so that the automation client can control exactly what commands are executed when an error has been reported.

Example

```
public void Main()
{
        AutomationObject.Initialize();
        AutomationObject.ErrorReport += Error;
        AutomationObject.CloseDrawer();
        AutomationObject.SetShake(true);
        AutomationObject.OpenDrawer();
}
private void Error( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " +
        e.QueueID.ToString() + " - " + e.Error);
}
```



Examples

This chapter contains some sample scripts.

Append Title Script

```
int mAppenTitleID;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.SelectSection("Plate01");
        mAppenTitleID = AutomationObject.AppendTitle("- YeOld Append");
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}

private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mAppenTitleID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
```

Get Commands Script

```
public int AutosaveStateID;
public int NumPlateSectionsID;
public int DrawerStatusID;
public void Main()
{
        string now = System.DateTime.Now.ToString();
        Results.AppendResult(now);
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.CloseDrawer();
        AutosaveStateID = AutomationObject.GetAutosaveState();
        Results.AppendResult("AutosaveStateID= " + AutosaveStateID.ToString());
        NumPlateSectionsID = AutomationObject.GetNumberPlateSections();
        Results.AppendResult("NumPlateSectionsID= " + NumPlateSectionsID.ToString());

        DrawerStatusID = AutomationObject.GetDrawerStatus();
        Results.AppendResult("NumPlateSectionsID= " + DrawerStatusID.ToString());

}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - + e.Error);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( e.QueueID == AutosaveStateID)
        Results.AppendResult("AutosaveState: " + e.IntResult.ToString() );
        if( e.QueueID == NumPlateSectionsID )
        Results.AppendResult("NumPlateSections: " + e.IntResult.ToString() );
        if( e.QueueID == DrawerStatusID )
        Results.AppendResult("DrawerStatus: " + e.IntResult.ToString() );
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
```

Multiple Read and Copy Events Script

```
int mCopyID;
int read1;
public void Main()
{
        string now = System.DateTime.Now.ToString();
        Results.AppendResult(now);
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.InstrumentStatusChanged += InstrumentStatus;
        AutomationObject.SetReader("Offline", "SPECTRAmax M2");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.SelectSection("Plate1");
        read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        read1 = AutomationObject.StartRead();
        Results.AppendResult("Read ID = " + read1.ToString());
        mCopyID = AutomationObject.GetDataCopy();
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );

        if( read1 == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.InstrumentStatusChanged -= InstrumentStatus;
                AutomationObject.Dispose();
        }
}
```

Multiple Read With ID Script

```
public void Main()
{
        string now = System.DateTime.Now.ToString();
        Results.AppendResult(now);
        AutomationObject.Initialize("localhost");
        AutomationObject.CommandCompleted+= CommandCompleted;
        AutomationObject.SetReader("Offline", "SPECTRAmax M2");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.SelectSection("Plate1");
        int read1 = AutomationObject.StartRead();
        Results.AppendResult("Read 1 ID = " + read1.ToString());
        int read2 = AutomationObject.StartRead();
        Results.AppendResult("Read 2 ID =  " + read2.ToString());
        int read3 = AutomationObject.StartRead();
        Results.AppendResult("Read 3 ID = " + read3.ToString());
}

private void PrintCurrentTime()
{
        string now =  System.DateTime.Now.ToString();
        Results.AppendResult("Read completed at: " + now);
}

private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        PrintCurrentTime();
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
```

ExportAs Script

```
int mStatusID ;
public void Main()
{
        AutomationObject.Initialize("localhost");
        AutomationObject.ErrorReport += Error;
        AutomationObject.CommandCompleted += CommandCompleted;
        AutomationObject.SelectSection("Plate1");
        AutomationObject.SetReader("Offline", "SPECTRAmax M2");
        AutomationObject.SetSimulationMode(true);
        AutomationObject.StartRead();
        mStatusID = AutomationObject.ExportAs("C:\\Automation_Test\\Results\\test.xml",
SoftMaxPro.AutomationClient.SMPAutomationClient.ExportAsFormat.XML );
        Results.AppendResult("Status Command ID = " + mStatusID .ToString() );
        mStatusID = AutomationObject.ExportAs("C:\\Automation_Test\\Results\\Plate.txt",
SoftMaxPro.AutomationClient.SMPAutomationClient.ExportAsFormat.PLATE );
        Results.AppendResult("Status Command ID = " + mStatusID .ToString() );
        mStatusID = AutomationObject.ExportAs("C:\\Automation_Test\\Results\\COLUMNS.txt",
SoftMaxPro.AutomationClient.SMPAutomationClient.ExportAsFormat.TIME);
        Results.AppendResult("Status Command ID = " + mStatusID .ToString() );
}
private void Error( object sender, SoftMaxPro.AutomationClient.SMPAutomationClient.ErrorEventArgs e)
{
        Results.AppendResult("Error: Command ID = " + e.QueueID.ToString() + " - " + e.Error);
}
private void CommandCompleted( object sender,
SoftMaxPro.AutomationClient.SMPAutomationClient.CommandStatusEventArg e)
{
        Results.AppendResult("Command complete Command ID = " + e.QueueID.ToString() );
        if( mStatusID == e.QueueID )
        {
                Results.AppendResult(e.StringResult);
        }
        if( e.QueueEmpty)
        {
                Results.AppendResult("Queue empty - disconnecting events");
                AutomationObject.ErrorReport -= Error;
                AutomationObject.CommandCompleted -= CommandCompleted;
                AutomationObject.Dispose();
        }
}
```

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