AVEVA™

InTouch HMI

formerly Wonderware

Scripting and Logic Guide

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CHAPTER 1

Introduction to Scripting

About Scripting

You can use the InTouch scripting language, QuickScript, to build more robust applications. There are eight types of scripts and many built-in script functions available.

Scripts can be classified by when they are run and whether they run independently of other ongoing application processes. Scripts can generally be run in two different ways:

- Event-based scripts run once when an event occurs. For example, an event-based script can run after an operator presses a key or a tag value changes.
- Time-based scripts run periodically while a condition is fulfilled. For example, a time-based script can run while a window is open or a button is kept pressed.

You can configure multiple event-based and time-based scripts to run with the same trigger. For example, you can configure a script to run once when a key is pressed and another script to run periodically every 5 seconds while the same key remains pressed.

You can use conditional statements, loops, and local variables in the scripting language to create complex effects in your application.

For condition scripts you can either run a script synchronously or asynchronously.

- When a synchronous script runs, all InTouch animation and tag value updating stops. Then, animation and tag value updating resumes after the script stops.
- When an asynchronous script runs, all InTouch animation and tag value updating continues during the period when the script runs.

The built-in script functions include mathematical functions, trigonometric functions, string functions, and others. Using these functions saves you time in developing your application.

InTouch scripts can include Object Linking and Embedding (OLE) objects and ActiveX controls.

Basic Scripting Concepts

Before you start scripting, you should understand:

- A script is a set of instructions that direct an application to do something.
- QuickScript is the InTouch HMI scripting language.
- A function is a script that can be called by another script. The InTouch HMI comes with a set of predefined functions for your use.
- QuickFunctions are re-usable functions written in QuickScript and stored in the QuickFunction library. To create a QuickFunction, you simply create a QuickScript and name it. A QuickFunction can be called by another script or from animation link expressions.

Types of Scripts

In InTouch, scripts are categorized based on what causes the script to run. For example, you would create a "key script" if you want a script to execute when the operator presses a certain key on the keyboard.

After you have chosen the script type, you can then further define the criteria, or conditions, that make the script execute. For example, you might want the script to execute when the key is released, not when the key is pressed.

The script types are:

- **Application** scripts execute either continuously while WindowViewer is running or one time when WindowViewer is started or shut down.
- **Window** scripts execute periodically when an InTouch window is open or one time when an InTouch window is opened or closed.
- **Key** scripts execute one time or periodically when a certain key or key combination is pressed or released.
- **Condition** scripts execute one time or periodically when a certain condition is fulfilled or not fulfilled.
- **Data change** scripts execute one time when the value of a certain tag or expression changes.
- **Action** scripts execute one time or periodically when an operator clicks on an InTouch HMI graphic object. Action scripts often are used for pushbuttons.
- **ActiveX event** scripts execute one time when an ActiveX event occurs, such clicking the ActiveX control.

Advanced Scripting Concepts

Some advanced scripting capabilities allow you to achieve sophisticated functions beyond those of the basic InTouch HMI.

OLE objects and ActiveX controls allow you to access your native computer system functions and interact with other programs such as the Manufacturing Engineering Module.

OLE Objects

In your custom scripts, you can call OLE objects. OLE objects allow you to access your native computer system functions and to interact with other programs such as the Manufacturing Engineering Module.

For example, using OLE, you can:

- Produce random numbers.
- Create user interface dialog boxes.
- Open the Windows date and time properties panel.
- Read and write to the registry.
- Minimize windows.

Scripting with ActiveX Controls

Several ActiveX controls are provided with the InTouch HMI in the Wizards menu. Because the InTouch HMI is based on the Windows operating environment, you can use nearly any ActiveX control with the InTouch HMI.

CHAPTER 2

Creating and Editing Scripts

About Creating and Editing Scripts

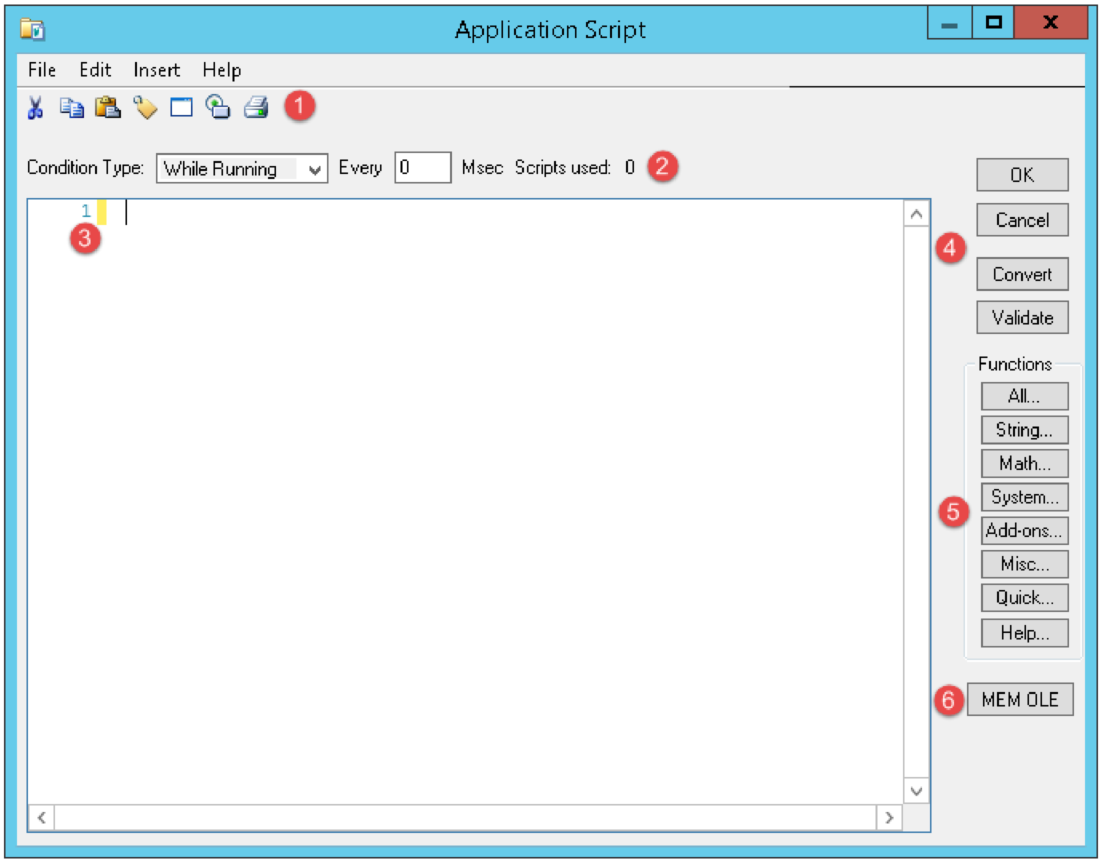
The steps to create a new script vary according to the script type. In general, you open the Script Editor, select a condition type, enter statements, and then save the script.

For detailed information on creating scripts of each type, see the following sections:

- *Configuring Application Scripts* on page 30.
- *Configuring Window Scripts* on page 31.
- *Configuring Key Scripts* on page 32.
- *Configuring Condition Scripts* on page 34.
- *Configuring Data Change Scripts* on page 36.
- *Configuring Action Scripts* on page 36.
- *Configuring ActiveX Event Scripts* on page 39.

Working with the InTouch Script Editor

Use the InTouch HMI Script Editor to create and edit scripts within InTouch WindowMaker.



Area	Description
1	Toolbars
2	Condition definition area The **Condition Type** box provides the available execution conditions for the type of script you are writing.
3	Script text window
4	Command buttons
5	Built-in script function buttons
6	MEM OLE button The **MEM OLE** button in the lower right corner only appears if the Manufacturing Engineering Module (MEM) is installed with the InTouch HMI installation. Clicking this button allows you to script with MEM.

This example is for an application script. Each type of script has its own version of the script dialog box, with options and selections that are unique to that type of script.

The title bar of the editor identifies which type of script you are working with. For information about types of scripts, see *Types of Scripts* on page 11.

There are text, equivalency and mathematical operator buttons available in a context-sensitive pop-up window that you can click to insert that keyword, function, or symbol into your script at the cursor location.

Color Indicators for InTouch Script Elements

The InTouch script editor uses different text colors to identify different script elements. The following table shows the text colors associated with script elements.

Element	Color
Keywords	Blue Syntax highlighted while typing.
Comments (both single line and multi-line)	Green Syntax highlighted while typing.
Strings	Purple Syntax highlighted while typing.
Function names, numeric constants, operators, semicolons, dim variables, alias variables, and so on	Black See descriptions for Attribute names and Reserved words.
Attributes, InTouch Tags, Reference Strings	Maroon, bold face
Reserved words	Red, non-bold face
.NET type names	Teal, non-bold face

InTouch Script Editor Autocomplete Features

The InTouch Script Editor autocomplete incorporates several features for use while authoring InTouch scripts:

- Provides an autocomplete tag reference in a selectable list box.
- Provides method parameter help in an autocomplete list box including context-specific suggestions covering definitions, keywords, script elements, and programmatic constructs.
- Automatic word completion of tags, dotfields, methods, programmatic constructs, and other script elements.

These features serve as convenient documentation of method parameters and scripting syntax as well as an enhanced input method.

Autocomplete displays a context-sensitive list of options for script elements, keywords, object and attribute names, and programmatic constructs. Press **Ctrl+Space** to display all available autocomplete options and variables for the selected location in the script. You can identify the context from the icons displayed at the bottom of the autocomplete pop-up window.

Icon	Represents
◆	Method
▬	Keywords
☰	Operators
◆	Variables
🏷	Tag
▭	Windows
●	ActiveX Instances

Accepting InTouch Script Editor Autocomplete Suggestions

Insert an item at the editor caret from the autocomplete list box—without an end line or tab appended—by doing one of the following:

- Double-click the item
- Highlight (select) the item and press the **Enter** key or the **Tab** key.

Type a space, period, comma, open or closed parenthesis, or other punctuation used in the programming language (: ; [ ] = < > - + / *), and the item highlighted in the autocomplete list box will be inserted at the editor caret with the additional character appended.

Multi-level Undo and Redo in InTouch Scripting

You can selectively undo a sequence of changes made to your script. The number of changes that can be undone is limited only by the amount of available memory.

- Use main menu options **Edit**, then **Undo** or **Ctrl+Z** to undo edits. You can also use context menu options to undo and redo.
- Use main menu options **Edit**, then **Redo** or **Ctrl+Y** to redo edits. You can also use context menu options to undo and redo.

An undone change can be redone. Redo mirrors undo changes.

A single undo typically is comprised of sequences of typing or deleting, which can be interrupted by interaction with an autocomplete list or by moving the cursor with the mouse, or by clicking elsewhere in the script.

All pending undo and redo actions are lost if you close the Script Editor or switch to another script within the Script Editor.

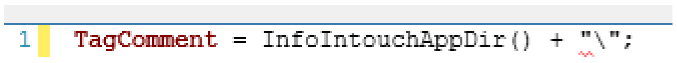
Visual Indication of InTouch Script Errors

Errors in InTouch script text are marked with a red "squiggly" underline.

Hovering over the error with the mouse cursor will display the error message as a tooltip. The tooltip error message provides the same information as the message shown when clicking the script verification button.

In some cases, more than one error will be underlined. This is not always possible because some errors prevent the compiler from continuing past the error.

When the "\" character is used to concatenate two strings to form a path, the script editor displays a red underline under "\". This is an exception and can be ignored. The path is constructed correctly in runtime.



```
TagComment = InfoIntouchAppDir() + "\";
```

Managing InTouch Script Edits

The InTouch Script Editor offers tools and visual references to find and manage edits.

Script Line Numbers

The Script Editor displays line numbers at the left margin.

- Line numbers up to four digits appear when the Script Editor is not zoomed.
- Use the right-click context menu **Go To** option to go to a specific line in a script.
- Delete the current line of text by pressing **Ctrl+L**.
- You can select and drag a line of text to a different line.

Change Bars

As a visual reference for script changes in-progress, yellow change bars on the left margin of the script text window indicate additions and line insertions and edits.

Tag Definition

You can enter a new tagname in the InTouch Script Editor, then press **Ctrl+T** or click **Edit** on the main menu to define a tag. The **Tagname Dictionary** appears so you can complete the tagname definition.

Find and Replace

The InTouch Script Editor provides customizable find and replace functionality. For information on how to use the find and replace feature, see *Searching Within a Script* on page 19.

Opening a Script for Editing

The steps to open an existing script vary slightly depending on the script type.

To open an application script

1. Do either of the following:
    - Using the **Classic View**, in the **Scripts** pane, double-click **Application**.
    - On the **Special** menu, point to **Scripts**, and then click **Application Scripts**.
2. In the **Condition Type** list, click the type of script to edit.

To open a window script

1. Do any of the following:

- Using the **Classic View**, in the **Windows** pane, right-click the window name, and then click **Window Scripts**.
- Using the **Project View**, expand **Scripts**, and then double-click the script.
- Open the window that the script is associated with. On the **Special** menu, point to **Scripts**, and then click **Window Scripts**.
- Open the window that the script is associated with. Right-click on a blank area in the window, and then click **Window Scripts**.

2. In the **Condition Type** list, click the condition to cause the script to run.

To open an ActiveX event script

- Do any of the following:
  - Using the **Classic View**, in the **Scripts** pane, expand **ActiveX Event**, and then double-click the script name.
  - Using the **Project View**, expand **Scripts**, and then double-click the script.
  - Double-click the ActiveX control instance that the script is associated with. Click the **Events** tab, and then double-click the cell that contains the script name.

To open an action script

1. Open the window that contains the graphic element that the action script is associated with. A typical use for an action script would be to script an action on a button.
2. Double-click the graphic element that the action script is associated with.
3. In the **Touch Pushbuttons** area, click **Action**. The Script Editor appears.
4. In the **Condition Type** list, click the action to cause the script to run.

To open key, condition, or data change scripts

1. Do any of the following:
   - Using the **Classic View**, in the **Scripts** pane, expand the script category, and then double-click the script name.
   - Using the **Project View**, expand **Scripts**, and then double-click the script.
   - On the **Special** menu, point to **Scripts**, and then click the relevant script type. The Script Editor appears. Click the **Browse** button, and click the script name.
2. If applicable, in the **Condition Type** list, click the condition to cause the script to run.

Saving or Discarding Changes to a Script

While working in the Script Editor, or when finished, you can save your script either manually or automatically. Or you can discard it altogether.

The restore option is not available for window and application scripts.

Note: Saving and discarding changes always applies to all condition types for a type of script, not just the condition type that is currently visible.

To save changes and keep the script open

- On the **Script** menu, click **Save**.

To save changes and close the script

- Click **OK**.

To discard changes and keep the script open

- Click **Restore**.

To discard changes and close the script

- Click **Cancel**.

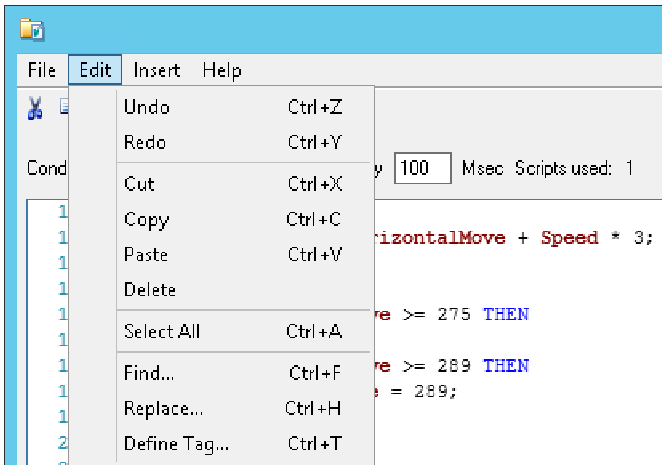
Copying, Cutting and Pasting Text

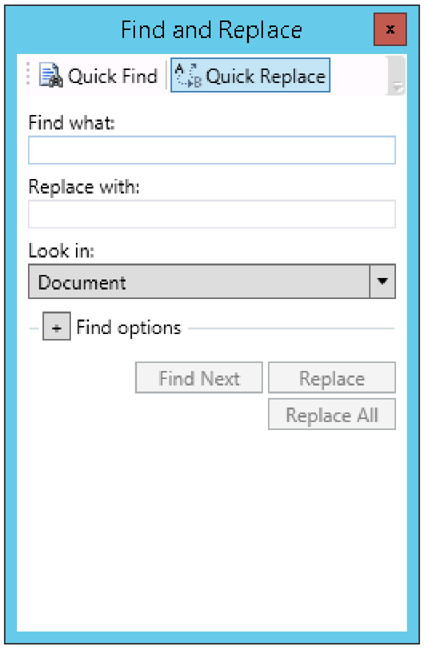
Copying, cutting and pasting text in the Script Editor works the same way as in any other Windows application. Use either the standard keyboard shortcuts Ctrl-C, Ctrl-X, and Ctrl-V, or the toolbar buttons.

You can also select a line and drag the text in that line to a new position in the script.

Searching Within a Script

The InTouch Script Editor provides the functionality to find and replace text within an open script based on a search string and a set of customizable search options. You can access **Find** and **Replace** as **Edit** options on the Script Editor's menu bar.

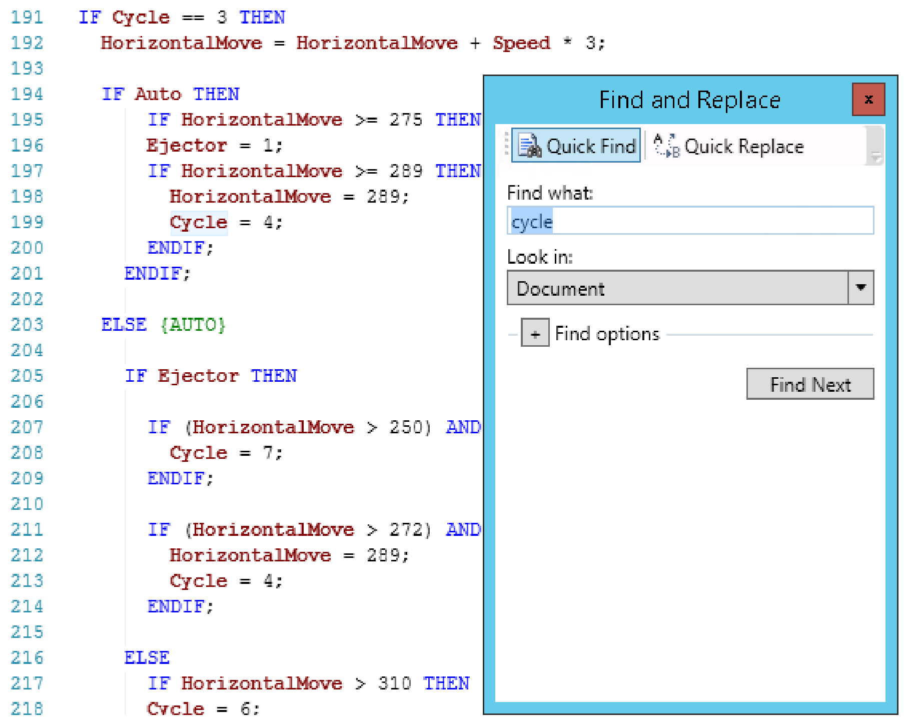




You can also use keyboard shortcuts **Ctrl+F** (Quick find) and **Ctrl+H** (Quick replace) to display the **Find and Replace** dialog box.

- In a simple search using default search options, select the **Quick Find** tab and type a word or phrase in the **Find what** field.

Select **Find Next** to start a search. A light blue background identifies a word or phrase in the script that matches the search string



```
IF Cycle == 3 THEN
  HorizontalMove = HorizontalMove + Speed * 3;

  IF Auto THEN
      IF HorizontalMove >= 275 THEN
      Ejector = 1;
      IF HorizontalMove >= 289 THEN
        HorizontalMove = 289;
        Cycle = 4;
      ENDIF;
    ENDIF;

  ELSE {AUTO}

    IF Ejector THEN

      IF (HorizontalMove > 250) AND
        Cycle = 7;
      ENDIF;

      IF (HorizontalMove > 272) AND
        HorizontalMove = 289;
        Cycle = 4;
      ENDIF;

    ELSE
      IF HorizontalMove > 310 THEN
      Cycle = 6;
```

Find and Replace

Quick Find | Quick Replace

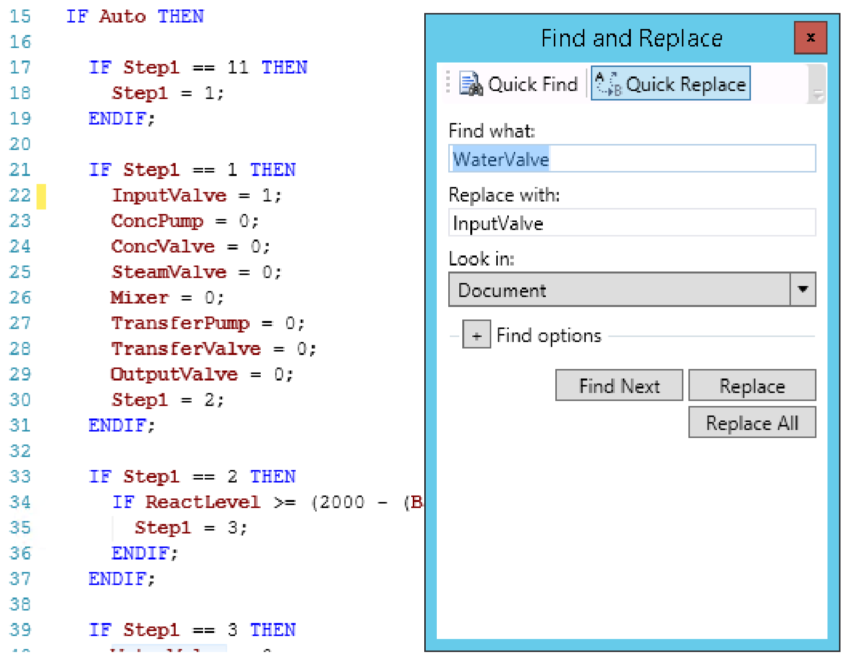
Find what: cycle

Look in: Document

Find options

Find Next

- In a simple replace operation using default options, select the **Quick Replace** tab, type a word or phrase in the **Find what** field, and also type a replacement word or phrase in the **Replace with** field.



```
IF Auto THEN

  IF Step1 == 11 THEN
    Step1 = 1;
  ENDIF;

  IF Step1 == 1 THEN
    InputValve = 1;
    ConcPump = 0;
    ConcValve = 0;
    SteamValve = 0;
    Mixer = 0;
    TransferPump = 0;
    TransferValve = 0;
    OutputValve = 0;
    Step1 = 2;
  ENDIF;

  IF Step1 == 2 THEN
    IF ReactLevel >= (2000 - (B
      Step1 = 3;
    ENDIF;
  ENDIF;

  IF Step1 == 3 THEN
```

Find and Replace

Quick Find | Quick Replace

Find what: WaterValve

Replace with: InputValve

Look in: Document

Find options

Find Next | Replace | Replace All

Select **Find Next** to start a replacement operation. A light blue background identifies a word or phrase in the script that matches the search string entered in the **Find what** field. You have three replacement options after locating a matching word or phrase.

- Select **Find Next** to ignore the current matching word or phrase and continue searching for the next match in the script.

- Select **Replace** to replace the current matching word or phrase with the string entered in the **Replace with** field.
- Select **Replace All** to replace all matching words or phrases with the string entered in the **Replace with** field.

Configuring a Find or Replace

The **Find and Replace** dialog box provides a set of options to configure a set of search options

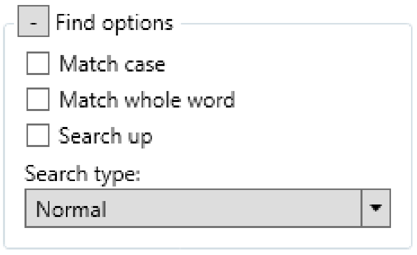
Look in

The **Look in** field includes options to search the entire script (**Document**) or only a selected portion of a script (**Selection**). **Document** is the default.

When you want to search only within a selected portion of a script, select the search area within the script using your mouse before conducting the search. A blue background identifies the selected script lines, which can be searched. The search results only show matching items within the portion of the script you selected.

Find Options

You can expand or collapse the **Find options** section. The following options can be selected or cleared to filter search results more precisely.



- **Match case**

  When selected, the search results only display instances of the **Find what** string that are matched both by content and by case. For example, a search for Triangle4 with **Match case** selected returns Triangle4 but not triangle4.

- **Match whole word**

  When selected, the search results only display instances of the **Find what** string that are matched in complete words. For example, a search for LogicBit will return LogicBit but not LogicBits.

- **Search up**

  When selected, a search is conducted from the current position within a script to the top of the script. By default, a search is conducted from the current position within a script to the bottom.

Search type

The **Search type** field provides options to conduct a script search based on the type of search.

- **Normal**

  The default search type, which requires an exact match between the characters in a search string and text in a script.

- **Search by Regular Expressions** on page 22

  A regular expression describes one or more strings to match when you search a script. A regular expression consists of ordinary characters that serve as a template for matching a character pattern to the string being searched.

- **Search by Wildcard Characters** on page 24

A wildcard search uses keyboard characters like an asterisk (*) or a question mark (?) to represent one or more characters when searching within a script.

- **Search by Acronym** on page 25

  An acronym search matches a character at the start of a word, then every capital letter or character following an underscore.

- **Search by Shorthand** on page 26

  A shorthand search extends the 'Search by Acronym' option by allowing non-whitespace characters between the search pattern characters.

You must type a search string that complies with the syntax and supported characters of the selected search type.

Search by Regular Expressions

A regular expression describes one or more strings to match when you search a script using alphanumeric characters and special characters known as metacharacters.The regular expression serves as character pattern to compare with the script text being searched.

Regular expressions are constructed much like arithmetic expressions are created. Small expressions are combined by using a variety of metacharacters and operators to create larger expressions.

The components of a regular expression can be individual characters, sets of characters, ranges of characters, or choices between characters. Components can also be any combination of these components.

Script Regular Expressions

Regular Expression	**Purpose**	**Example**
.	Match any single character (except a line break)	s.e matches "ste" in "step" and "sfe" in "transfer" but not "acro" in "across".
*	Match zero or more occurrences of the preceding expression (match as many characters as possible)	a*rÂ matches "r" in "rack", "ar" in "ark", and "aar" in "aardvark"
.*	Match any character zero or more times (Wildcard *)	c.*e matches "cke" in "racket", "comme" in "comment", and "code" in "code"
+	Match one or more occurrences of the preceding expression (match as many characters as possible)	e.+eÂ matches "eede" in "feeder" but not "ee".
.+	Match any character one or more times (Wildcard ?)	e.+e matches "eede" in "feeder" but not "ee".
*?	Match zero or more occurrences of the preceding expression (match as few characters as possible)	e.*?eÂ matches "ee" in "feeder" but not "eede".
+?	Match one or more occurrences of the preceding expression (match as few characters as possible)	e.+?eÂ matches "ente" and "erprise" in "enterprise", but not the whole word "enterprise".

^	Anchor the match string to the beginning of a line or string	^carÂ matches the word "car" only when it appears at the beginning of a line.
\r?$	Anchor the match string to the end of a line	End\r?$Â matches "end" only when it appears at the end of a line.
[abc]	Match any single character in a set	b[abc]Â matches "ba", "bb", and "bc".
[a-f]	Match any character in a range of characters	be[n-t]Â matches "bet" in "between", "ben" in "beneath", and "bes" in "beside", but not "below".
()	Capture and implicitly number the expression contained within parenthesis	([a-z])X\1Â matches "aXa"and "bXb", but not "aXb". ". "\1" refers to the first expression group "[a-z]".
(?!abc)	Invalidate a match	real (?!ity)Â matches "real" in "realty" and "really" but not in "reality." It also finds the second "real" (but not the first "real") in "realityreal".
[^abc]	Match any character that is not in a given set of characters	be[^n-t]Â matches "bef" in "before", "beh" in "behind", and "bel" in "below", but not "beneath".
|	Match either the expression before or the one after the symbol.	(sponge&#124;mud) bathÂ matches "sponge bath" and "mud bath."
|\^	Escape the character following the backslash	
{x},	Specify the number of occurrences of the preceding character or group	x(ab){2}xÂ matches "xababx", andÂ x(ab){2,3}xmatches "xababx" and "xabababx" but not "xababababx".
\p{X}	Match text in a Unicode character class, where "X" is the Unicode number.	\p{Lu}Â matches "T" and "D" in "Thomas Doe".
\b	Match a word boundary	\binÂ matches "in" in "inside" but not "pinto".
\r?\n	Match a line break (ie a carriage return followed by a new line).	End\r?\nBeginÂ matches "End" and "Begin" only when "End" is the last string in a line and "Begin" is the first string in the next line.
\w	Match any alphanumeric character	a\wdÂ matches "add" and "a1d" but not "a d".
(?[^\r\n])\s	Match any whitespace character.	Public\sInterfaceÂ matches the phrase "Public Interface".
\d	Match any numeric character	\dÂ matches and "3" in "3456", "2" in 23", and "1" in "1".

\uXXXX where XXXX specifies the Unicode character value	Match a Unicode character	\u0065Â matches the character "e".
\b(\w+|[\w-[0-9\]]\w*)\b	Match an identifier	Matches "type1" but not &type1" or "#define".
((\".+?\")|('.+?'))	Match a string inside quotes	Matches any string inside single or double quotes.
\b0[xX]([0-9a-fA-F])\b	Match a hexadecimal number	Matches "0xc67f" but not "0xc67fc67f".
\b[0-9]\.\[0-9]+\b	Match integers and d	Matches "1.333".

Order of Precedence

A regular expression is evaluated from left to right and follows an order of precedence.

The following table contains the order of precedence of regular expression operators, from highest to lowest.

Operator or operators	**Description**
\	Escape
(), (?:), (?=), []	Parentheses and brackets
*, +, ?, {*n*}, {*n*,}, {*n*,*m*}	Quantifiers
^, $, \anymetacharacter	Anchors and sequences
|	Alternation

Characters have higher precedence than the alternation operator, which, for example, allows "m|food" to match "m" or "food".

Search by Wildcard Characters

A wildcard search uses a single keyboard character, which can be interpreted as a number of literal characters or an empty string when you are searching for a string in a script.

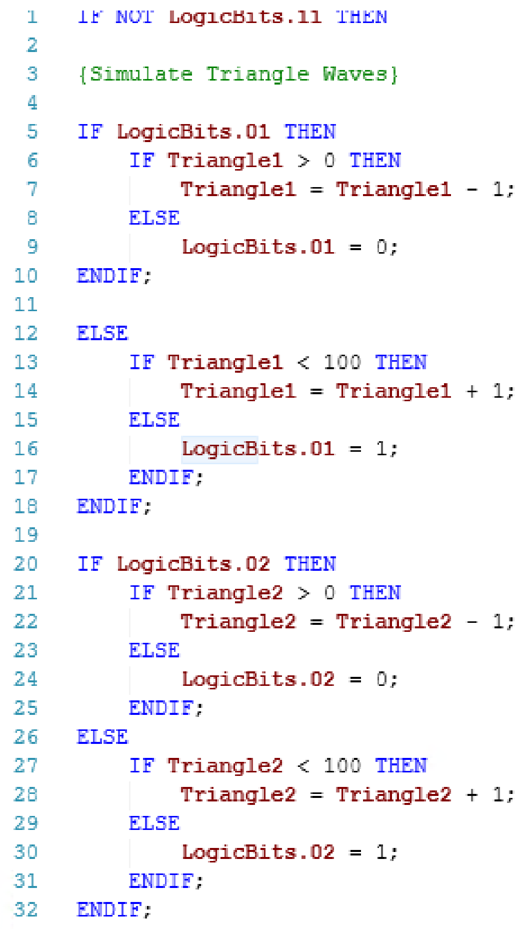
Wildcard characters are often used in place of one or more characters when you do not know what the real character is or you do not want to type the entire search string.

Wildcard character	**Uses**
Asterisk (*)	An asterisk in a search string matches any sequence of characters. Use the asterisk as a substitute for zero or more characters. **Examples** • Logic* Finds Logic1, LogicTest, but not ALogicTest • *Test* Finds LogicTest1, PumpTestABC, but not LogicTst1
Question mark (?)	A question mark in a search string matches any character at a

	single position within a search string. **Examples** • LogicTest? Finds LogicTest1, LogicTestA, but not ALogicTest1 • LogicTest?2 Finds LogicTest12, but not LogicTest13

Search by Acronym

Acronym searching matches a character at the start of a word, then every capital letter or character following an underscore.



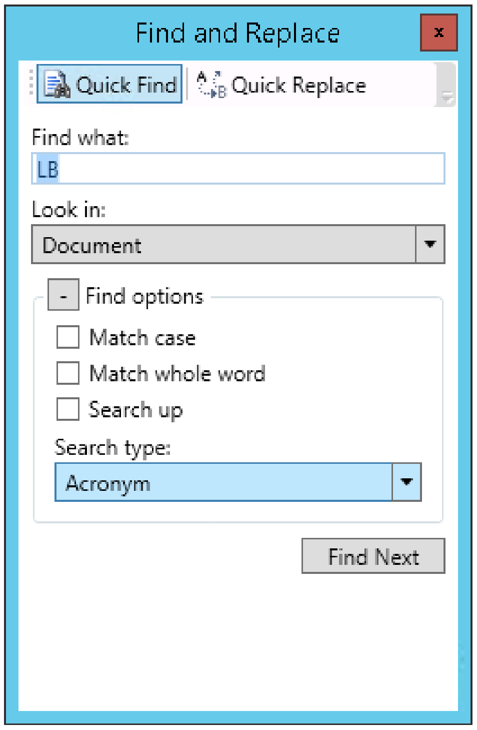
```
IF NOT LogicBits.11 THEN

{Simulate Triangle Waves}

IF LogicBits.01 THEN
    IF Triangle1 > 0 THEN
        Triangle1 = Triangle1 - 1;
    ELSE
        LogicBits.01 = 0;
ENDIF;

ELSE
    IF Triangle1 < 100 THEN
        Triangle1 = Triangle1 + 1;
    ELSE
        LogicBits.01 = 1;
    ENDIF;
ENDIF;

IF LogicBits.02 THEN
    IF Triangle2 > 0 THEN
        Triangle2 = Triangle2 - 1;
    ELSE
        LogicBits.02 = 0;
    ENDIF;
ELSE
    IF Triangle2 < 100 THEN
        Triangle2 = Triangle2 + 1;
    ELSE
        LogicBits.02 = 1;
    ENDIF;
ENDIF;
```



Find what: LB

Look in: Document

Find options

☐ Match case

☐ Match whole word

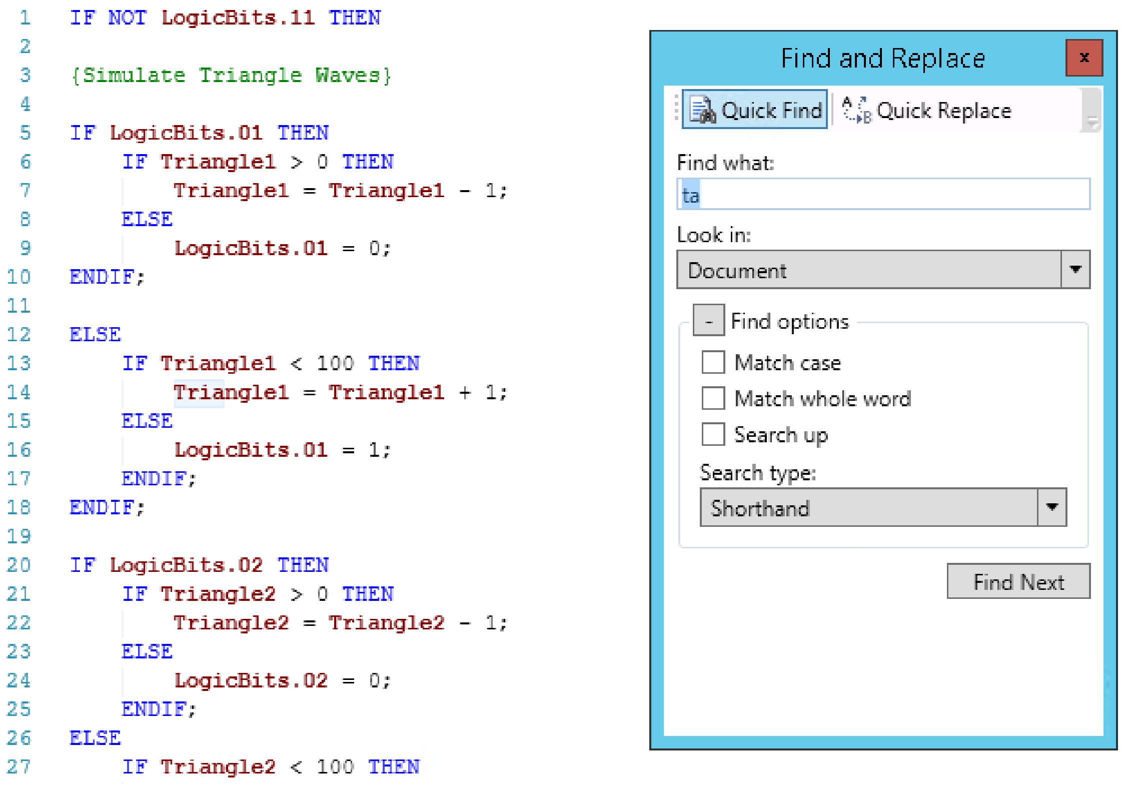
☐ Search up

Search type: Acronym

Examples: The search term "LB" finds instances of "LogicBits".

Search by Shorthand

The shorthand search extends the 'Search by Acronym' option, by allowing any number of non-whitespace characters between the search pattern characters.



```
IF NOT LogicBits.11 THEN

{Simulate Triangle Waves}

IF LogicBits.01 THEN
    IF Triangle1 > 0 THEN
        Triangle1 = Triangle1 - 1;
    ELSE
        LogicBits.01 = 0;
ENDIF;

ELSE
    IF Triangle1 < 100 THEN
        Triangle1 = Triangle1 + 1;
    ELSE
        LogicBits.01 = 1;
    ENDIF;
ENDIF;

IF LogicBits.02 THEN
    IF Triangle2 > 0 THEN
        Triangle2 = Triangle2 - 1;
    ELSE
        LogicBits.02 = 0;
    ENDIF;
ELSE
    IF Triangle2 < 100 THEN
```

Find and Replace

Find what: ta

Look in: Document

Find options

☐ Match case

☐ Match whole word

☐ Search up

Search type: Shorthand

Examples: The search term "ta" finds instances of "Triangle".

Inserting Code Elements

You can automatically insert various code elements into your script by selecting them from lists. This saves you time and reduces the risk of typing errors. Access the code elements one of two ways: using the main menu **Insert** options, or by using the autocomplete pop-up windows and selecting your element from the list.

Code elements you can insert, both from autocomplete pop-up windows and from the Script Editor menu items include:

- Functions
- Tagnames and Dotfields For a dotfield, type a tagname followed by a period to open an autocomplete pop-up window.
- Variable
- Window name
- ActiveX instances
- Keyword
- Operator

The autocomplete pop-up windows include a row of icons at the bottom of the pop-up for direct access to the available elements.

Accessing Help for Script Functions

If you are looking for help on a specific script function, you can access it directly from the Script Editor.

To view help on a specific script function

1. In the bottom right corner of the Script Editor, click **Help**.

   A list of functions appears.

2. Click the name of the function from the list to show its help.

   The corresponding Help topic appears.

Validating Scripts for Correct Syntax

When you save a script, the Script Editor automatically checks it for correct syntax. If an error is discovered, a message with more information appears. You must fix all syntax errors before you can save the script. You can also start the validation manually while you are editing the script.

To manually validate script syntax

- Click **Validate**.

Highlighting Script Errors

The InTouch Script Editor also highlights script errors. For more information, see *Visual Indication of InTouch Script Errors*.

Printing Scripts

You can print scripts individually from the Script Editor, or you can print all scripts of a specific type using the print feature in WindowMaker.

You can print scripts individually from the Script Editor, or you can print all scripts of a specific type using the print feature in WindowMaker.

To print an individual script

1. Open the script in the Script Editor.
2. Click **Print** in the toolbar. The script is printed to the Windows default printer.

To print all scripts of a specific type

1. On the **File** menu in WindowMaker, click **Print**. The **WindowMaker Printout** dialog box appears.
2. To print window scripts, do the following:
   a. Select **Windows**.
   b. Select the windows to print:

      All prints the information for all windows in the application.

      Selected prints only the information for specific windows. The **Windows to Print** dialog box appears. Select the windows in your application you want to print and click **OK**.

      Batch prints only the information for windows specified in a .csv file.
   c. Select **Window Scripts** to print the scripts associated with the windows.
3. To print other types of scripts, select the appropriate check boxes. To print all scripts, click **All Scripts**.
4. Click **Next**. The **Select Output Destination** dialog box appears.
5. Do one of the following

   - Click **Send output to Printer**.
   - Click **Send output to Text File**.

6. Click **Browse** to select a printer or to find a file.
7. Click **Print**.

To print all scripts

1. Select **All Scripts** to print all scripts used in the application.

   You can restrict printing to only selected types of scripts by clearing the **All Scripts** check box. Then, select the check box for each type of script that you want to print.
2. Click **Next**. The **Select Output Destination** dialog box appears.
3. Select the option to print the contents of the Tagname Dictionary or send the output to a text or .html file.
4. Click **Print**.

Deleting Scripts

The steps to delete a script vary depending on the script type. See the following sections:

- *Configuring Application Scripts* on page 30.
- *Configuring Window Scripts* on page 31.
- *Configuring Key Scripts* on page 32.
- *Configuring Condition Scripts* on page 34.
- *Configuring Data Change Scripts* on page 36.
- *Configuring Action Scripts* on page 36.
- *Configuring ActiveX Event Scripts* on page 39.

CHAPTER 3

Script Triggers

About Script Triggers

All InTouch HMI scripts are executed by script triggers. Each script type has one or more triggers to launch it.

In the Script Editor, you can select which script trigger you want to use to execute your script. You select a script trigger based on when and how a script is executed.

You can configure various triggers based on user actions, internal states, and changes of tagname values. User actions include pressing keys and clicking on graphic elements. Internal state triggers can include starting WindowViewer.

Scripts are triggered by these kinds of actions:

- Starting and shutting down WindowViewer. See *Configuring Application Scripts* on page 30.
- Opening and closing a window. See *Configuring Window Scripts* on page 31.
- Pressing a key or key combination. See *Configuring Key Scripts* on page 32.
- Fulfilling a certain condition, such as tagname or an expression value. See *Configuring Condition Scripts* on page 34.
- Changing tagname values or tagname field values. See *Configuring Data Change Scripts* on page 36.
- Clicking a graphic object. See *Configuring Action Scripts* on page 36.
- Events that occur in an ActiveX control, such as clicking on the control. See *Configuring ActiveX Event Scripts* on page 39.

Also, you can pause script execution. By default, when WindowViewer is started, logic is running and scripts are executed. You can pause script execution at run time by halting logic. After pausing you can resume script execution. For more information, see *Pausing Script Execution at Run Time* on page 41.

Types of Script Triggers

In the InTouch HMI, scripts are divided into seven types. Each type of script has one or more triggers you can select to launch a script.

- An application script has three triggers: on startup, on shutdown, and while running. Each trigger can execute a different script.
- A window script has three triggers: on show, on hide, and while showing. Each trigger can execute a different script.
- A key script has three triggers: on key up, on key down, or while down. Each trigger can execute a different script.
- A condition script has four triggers: on true, while true, on false, and while false. Each trigger can execute a different script.
- A data change script executes when the value of a certain tag or expression changes.
- An action script executes one time or periodically when an operator clicks on an InTouch HMI graphic object.

- An ActiveX event script executes one time when a certain ActiveX event occurs, such as a click on the ActiveX control.

Using Multiple Triggers

For most script types you can use multiple triggers and associate different scripts with each trigger.

For example, you can configure an application script to execute one script when WindowViewer is started, and another script periodically while WindowViewer is running.

Select the trigger in the **Condition Type** list to view the existing script for a trigger.

Periodic Script Execution

Scripts that execute periodically do not execute immediately after triggering, but after the specified period for the first time.

For example, if you configure a key script to execute every 5000 ms while a specific key is pressed, it executes 5 seconds after the key is pressed and held down and then every 5 seconds afterwards.

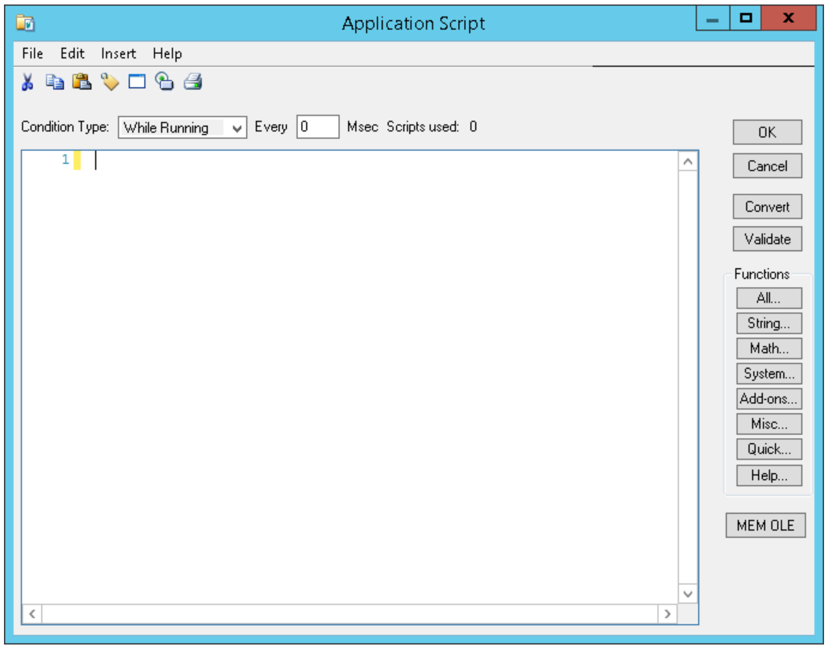
Configuring Application Scripts

Application scripts are linked to the entire InTouch HMI application. You can use application scripts to:

- Execute a script one time when WindowViewer is started.
- Execute a script periodically while WindowViewer is running.
- Execute a script one time when WindowViewer is shut down.

To configure an application script

1. Using the **Classic View**, in the **Scripts** pane, right-click on **Application** and then click **Open**. The **Application Script** dialog box appears.



Condition Type: While Running Every 0 Msec Scripts used: 0

2. In the **Condition Type** list, click the condition for the script execution:
   - Click **On Startup** to configure a script to execute one time when WindowViewer is started.
   - Click **While Running** to configure a script to execute periodically while WindowViewer is running.

   - Click **On Shutdown** to configure a script to execute one time when WindowViewer is shut down.

3. If you selected **While Running** in the previous step, type a time interval between 1 and 360000 milliseconds in the **Every** box. The time interval specifies how often the script is executed.
4. Type your script in the window.
5. Click **OK**.

To delete an application script

1. Using the **Classic View**, in the **Scripts** pane, right-click on **Application** and then click **Open**. The **Application Script** dialog box appears.
2. In the **Condition Type** list, click the condition for the script to delete. The script appears in the main section of the **Application Script** dialog box.
3. On the **Edit** menu, click **Clear**. The script from the main section clears and the associated script is deleted.

Limitations of Application Scripts

Application scripts that are executed when WindowViewer starts or shuts down have limitations on their interaction with other objects.

You cannot use On Startup application scripts to:

- Reference ActiveX methods, properties, or events.
- Read from or write to controls and I/O tagnames or remote references.
- Run data change scripts and condition scripts.

You cannot use On Shutdown application scripts to:

- Read from or write to controls and I/O tagnames or remote references.
- Start other applications.

Configuring Window Scripts

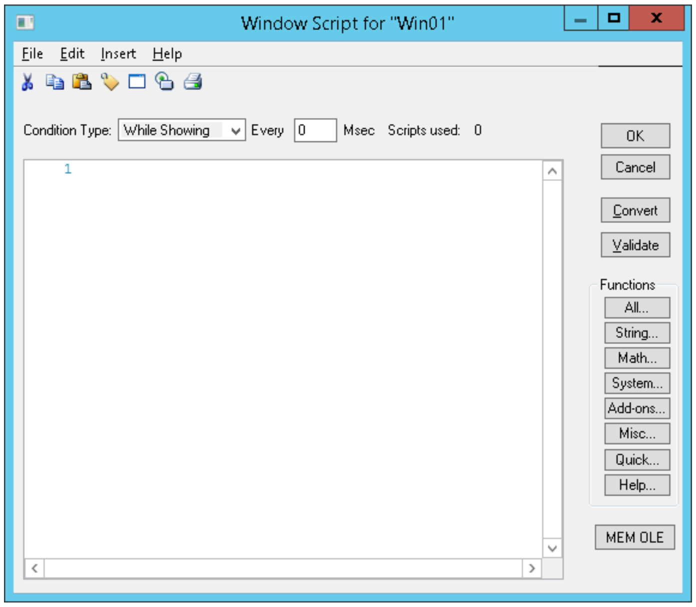
Window scripts are scripts that are linked to specific windows. You can use the **GetWindowName** script function to help the run-time environment reduce scripting necessary to load windows. You can use window scripts to:

- Execute a script one time when an InTouch window is opened.
- Execute a script periodically while an InTouch window is open.
- Execute a script one time when an InTouch window is closed.

Note: Opening an InTouch window is also referred to as "showing an InTouch window." Closing an InTouch window is also referred to as "hiding an InTouch window."

To configure a window script

1. Using the **Classic View**, in the **Windows** pane, right-click on a window and then click **Window Scripts**. The **Window Script for Window Name** dialog box appears.



Condition Type: While Showing Every 0 Msec Scripts used: 0

2. In the **Condition Type** list, do one of the following:
   - Click **On Show** to configure a script to execute one time when the associated window is started.
   - Click **While Showing** to configure a script to execute periodically while the associated Window is open.
   - Click **On Hide** to configure a script to execute one time when the associated window is closed.
3. If you select **While Showing** in the previous step, type a time interval between 1 and 360000 milliseconds in the **Every** box.
4. Type your script in the window.
5. Click **OK**.

To delete a window script

1. Using the **Classic View**, in the **Windows** pane, right-click on a window and click **Window Scripts**. The **Window Script for Window Name** dialog box appears.
2. In the **Condition Type** list, click the script trigger for the script to delete. The script appears in the main section of the **Window Script for Window Name** dialog box.
3. On the **Edit** menu, click **Clear**.

Important: Do not use on hide scripts to read from or write to I/O tagnames. The I/O value update does not necessarily complete before the window is hidden.
To read from or write to I/O tagnames when a window closes, configure a data change script and activate it from an on hide script.

Configuring Key Scripts

Key scripts are scripts that are linked to the pressing of a specific key or key combination. You can use key scripts to:

- Execute a script one time when a key or key combination is pressed.

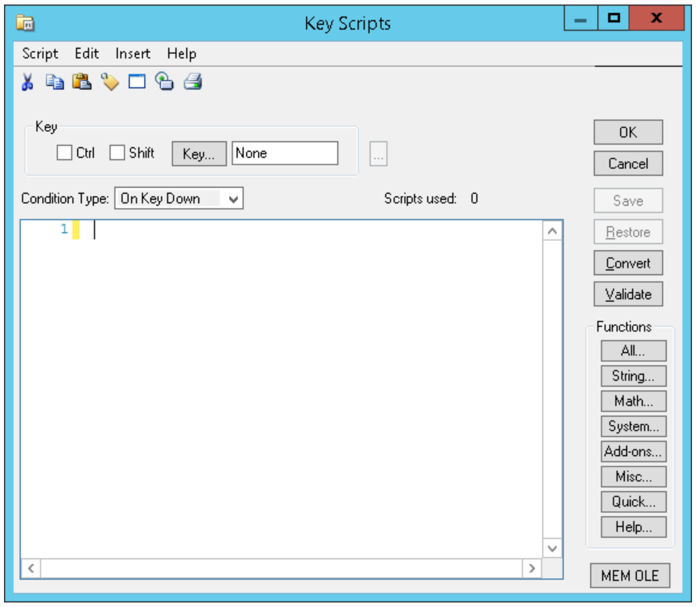
- Execute a script periodically while a key or key combination is pressed and not released.
- Execute a script one time when a key or key combination is released.

A key script is identified by the name of key that initiates the script. For example: Ctrl+q.

Note: If you have configured an action script that uses the same key or key combination to trigger it, the key script is ignored and instead the action script is executed.

To configure a key script

1. Using the **Classic View**, in the **Scripts** pane, do one of the following:
   - To configure a new key script, right-click **Key**, and then click **New**. The **Key Scripts** dialog box appears.



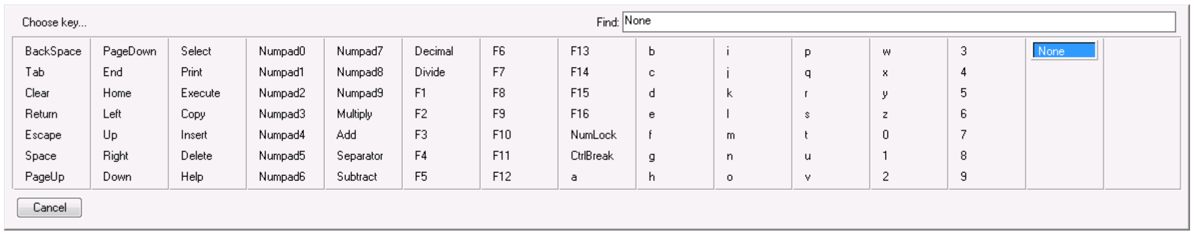
Key: Ctrl Shift None

Condition Type: On Key Down

Scripts used: 0

   - To configure an existing key script, expand **Key**, right-click the script name, and then click **Edit**. The **Edit Key Script** dialog box appears.

2. Click **Key** and select a key from the **Choose Key** dialog box.



Choose key...

Find: None

BackSpace	PageDown	Select	Numpad0	Numpad7	Decimal	F6	F13	b	i	p	w	3	None	
Tab	End	Print	Numpad1	Numpad8	Divide	F7	F14	c	j	q	x	4		
Clear	Home	Execute	Numpad2	Numpad9	F1	F8	F15	d	k	r	y	5		
Return	Left	Copy	Numpad3	Multiply	F2	F9	F16	e	l	s	z	6		
Escape	Up	Insert	Numpad4	Add	F3	F10	NumLock	f	m	t	0	7		
Space	Right	Delete	Numpad5	Separator	F4	F11	CtrlBreak	g	n	u	1	8		
PageUp	Down	Help	Numpad6	Subtract	F5	F12	a	h	o	v	2	9		

Cancel

3. Select the **Ctrl** and/or **Shift** check boxes to assign a control key and/or shift key combination with your selected key.

4. In the **Condition Type** list, do one of the following:
   - Click **On Key Down** to configure a script to execute one time when the associated key or key combination is pressed.
   - Click **While Down** to configure a script to execute periodically while the associated key or key combination is pressed.
   - Click **On Key Up** to configure a script to execute one time when the associated key or key combination is released.

5. If you selected **While Down** in the previous step, type a time interval between 1 and 360000 milliseconds in the **Every** box.
6. Type your script in the window.
7. Click **OK**.

To delete all key scripts associated with a key

- Using the **Classic View**, in the **Scripts** pane, expand **Key**, right-click the key script name, and then click **Delete**. When a message appears, click **Yes**.

To delete a key script that is associated with a key

1. Using the **Classic View**, in the **Scripts** pane, expand **Key**, right-click the key script name, and then click **Edit**. The **Edit Key Script** dialog box appears.
2. In the **Condition Type** list, click the script trigger for the script to delete. The script appears in the main section of the **Edit Key Script** dialog box.
3. On the **Edit** menu, click **Clear**. The script from the main section clears and the associated script is deleted.

Configuring Condition Scripts

Condition scripts are triggered depending on when certain logical conditions are fulfilled. Use condition scripts to execute a script:

- One time when a condition is fulfilled.
- One time when a condition is not fulfilled.
- Periodically while a certain condition is fulfilled.
- Periodically while a certain condition is not fulfilled.

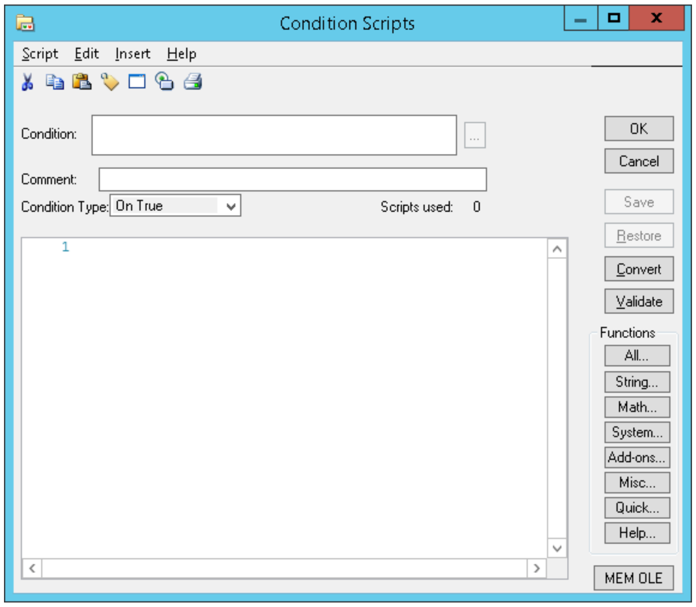
A condition script is identified by the condition syntax that initiates the script. For example: tag1>=13.

Note: A script that is assigned the On True condition type only executes if the condition transitions from False to True. A script that is assigned the On False condition type only executes if the condition transitions from True to False.

To configure a condition script

1. Using the **Classic View**, in the **Scripts** pane either:

- Right-click **Condition** and click **New**. The **Condition Scripts** dialog box appears.



- To edit an existing condition script, click the plus sign next to **Condition**, right-click the condition script name, and click **Edit**. The **Edit Condition Script** dialog box appears.

2. In the **Condition** box, type the expression that you want to use as the condition.

   You can type the expression to a maximum length of 1024 characters.

3. You can enter a comment in the **Comment** box.
4. In the **Condition Type** list, do one of the following:
   - Click **On False** to configure a script to execute one time when the condition becomes false.
   - Click **While False** to configure a script to execute periodically while the condition is false.
   - Click **On True** to configure a script to execute one time when the condition becomes true.
   - Click **While True** to configure a script to execute periodically while the condition is true.
5. If you selected **While False** or **While True** in the previous step, type a time interval between 1 and 360000 milliseconds in the **Every** box.

Note: The conditional WindowViewer timers will stop themselves if the condition is no longer true. For example, While Mouse Button Down events will not trigger if the mouse button is no longer down, and key scripts will stop if keys are no longer down.

6. Type your script, or modify the existing script in the window.
7. Click **OK**.

To delete all condition scripts that are associated with a condition

- Using the **Classic View**, in the **Scripts** pane, expand **Condition**, right-click the condition script name and click **Delete**. When a message appears, click **Yes**.

To delete individual condition scripts that are associated with a condition

1. Using the **Classic View**, in the **Scripts** pane, expand **Condition**, right-click the key script name and click **Edit**. The **Edit Condition Script** dialog box appears.
2. In the **Condition Type** list, click the script trigger for the script to delete. The script appears in the main section of the **Edit Condition Script** dialog box.

3. On the **Edit** menu, click **Clear**. The script from the main section clears and the associated script is deleted.

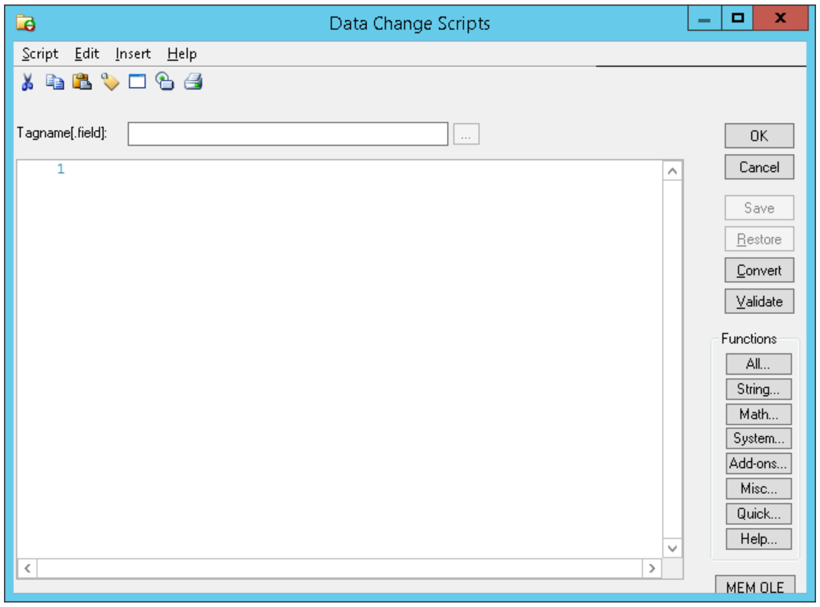
Configuring Data Change Scripts

You can use data change scripts to execute a script one time when a certain tagname or dot field changes by more than its defined dead band.

A data change script is identified by the tagname or tagname field that initiates the script. For example: Tag1 or Tag2.HiHiLimit.

To configure a data change script

1. Using the **Classic View**, in the **Scripts** pane, right-click **Data Change** and click **New**. The **Data Change Scripts** dialog box appears.



2. To create a new script, in the **Tagname[.field]** box, enter a tagname or tagname field.

   To edit an existing script, click the ellipsis button to the right of the **Tagname[.field]** box and select the script from the list that appears.

3. Type your script in the window.

4. Click **OK**.

To delete a data change script

- Using the **Classic View**, in the **Scripts** pane, expand **Data Change**, right-click the data change script name and click **Delete**. When a message appears, click **Yes**.

Configuring Action Scripts

Use action scripts to associate operator actions with graphic objects. You can configure one or more of the following events with a graphic object:

- Clicking the left, center, or right mouse button.
- Clicking and holding the left, center, or right mouse button.
- Releasing the left, center, or right mouse button.
- Double-clicking the left, center, or right mouse button.

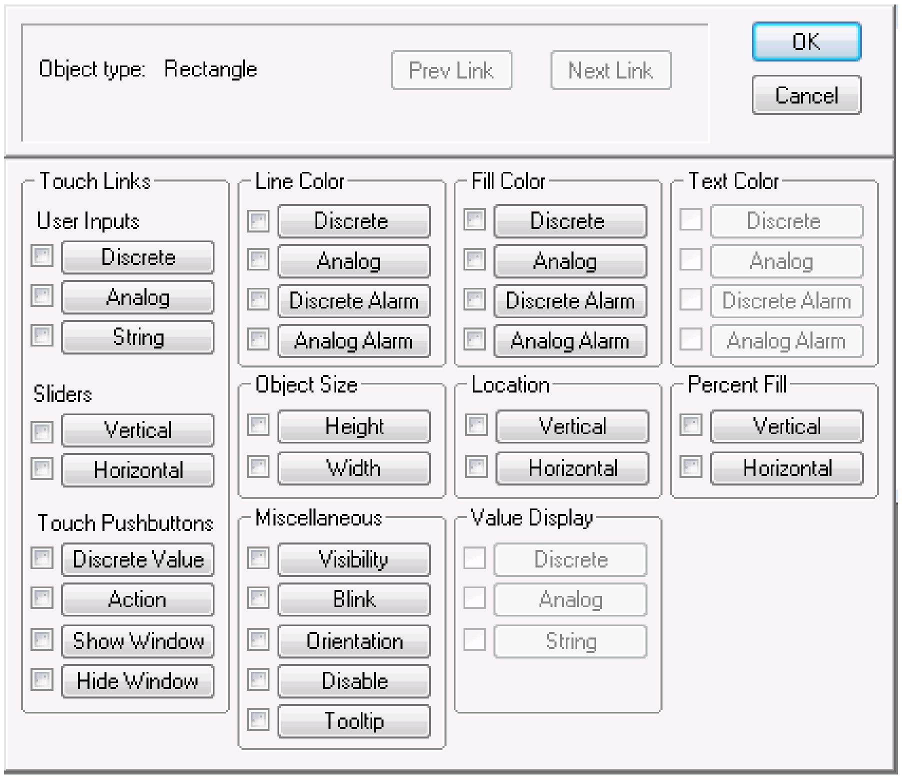
- Pressing a key or key combination.
- Pressing and holding a key or key combination.
- Releasing a key or key combination.
- Moving a mouse pointer over an object.

An action script can only be configured in the **Animation Link Selection** panel of the object itself.

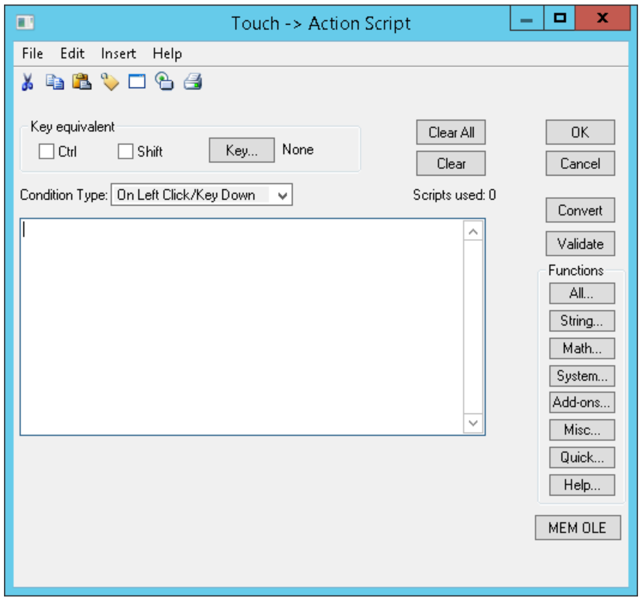
Important: If a key script exists that is triggered by the same key or key combination as the action script, the action script is executed and the key script is ignored.

To configure an action script

1. Double-click the graphic object. The **Animation Links Selection** panel appears.



2. Click **Action**. The **Touch -> Action Script** dialog box appears.



3. In the **Condition Type** list, click one of the following:

To configure a script that executes on this condition	Click
One time when the left mouse button or a certain key or key combination is pressed	**On Left Click/Key Down**
Periodically while the left mouse button or a certain key or key combination is pressed	**While Left/Key Down**
One time when the left mouse button or a certain key or key combination is released	**On Left/Key Up**
One time when the left mouse button is double-clicked	**On Left Double Click**
One time when the right mouse button is pressed	**On Right Click**
Periodically while the right mouse button is pressed	**While Right Down**
One time when the right mouse button is released	**On Right Up**
One time when the right mouse button is double-clicked	**On Right Double Click**
One time when the center mouse button is pressed	**On Center Click**
Periodically while the center mouse button is pressed	**While Center Down**
One time when the center mouse button is released	**On Center Up**
One time when the center mouse button is double-clicked	**On Center Double Click**
One time when the mouse moves over the object	**On Mouse Over**

4. If you select **On Left Click/Key Down**, **While Left/Key Down**, or **On Left/Key Up**:
   a. Click **Key**. The **Choose Key** dialog box appears.

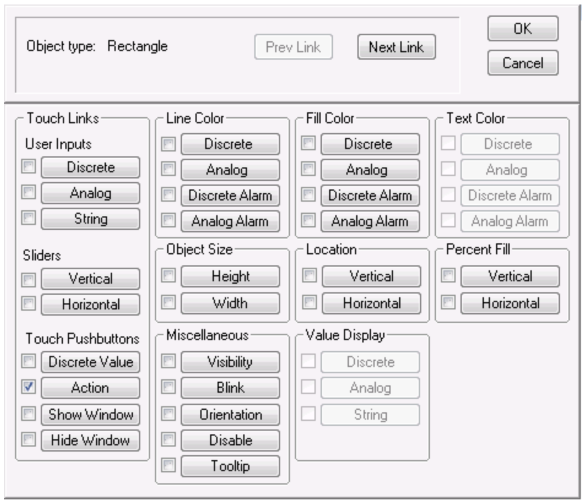
b. Click a key.

c. Select the **Ctrl** and/or **Shift** check boxes to assign a control key and/or shift key combination to your selected key.

5. If you select **While Left/Key Down** or **While Right Down**, type a time interval between 1 and 360000 milliseconds in the **Every** box.
6. If you select **On Mouse Over**, in the **After** box, type the number of milliseconds between 1 and 360000 to pass after the mouse has moved over the object before the script is executed.
7. Type your script in the window.
8. Click **OK**.

To delete all action scripts associated with an InTouch graphic object

1. Double-click the graphic object. The object properties panel appears.



Object type: Rectangle

☑ Action

2. Click to clear the **Action** check box. The action scripts will not be executed during run time. If you click the **Action** button, the editor opens with the last action script that you saved for any object.

To delete an individual action script

1. Double-click the graphic object that has the action script to delete. The object properties panel appears.
2. Click the **Action** button. The **Touch -> Action Script** dialog box appears.
3. In the **Condition Type** list, click the script trigger.
4. On the **Edit** menu, click **Clear**. The script from the main section clears and the associated script is deleted.

Configuring ActiveX Event Scripts

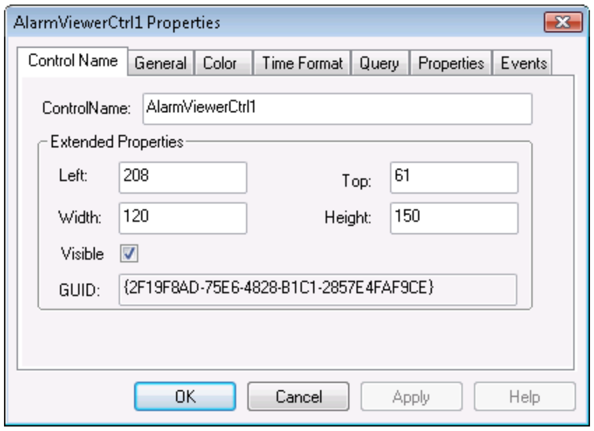
Use ActiveX event scripts to run a script when an ActiveX event occurs. Depending on the ActiveX control, such events can include:

- ActiveX control is started: Startup
- ActiveX control is closed: Shutdown
- User clicks on ActiveX control: Click
- User double-clicks on ActiveX control: Doubleclick

An ActiveX event script is identified by a name. By default, the InTouch HMI automatically adds the control name and event that the script is associated with. For example: MyActiveXScript (AlarmViewerCtrl1::Click).

To configure a new ActiveX event script

1. Double-click on the ActiveX control to configure. The ActiveX control properties dialog box appears.



ControlName: AlarmViewerCtrl1

Extended Properties

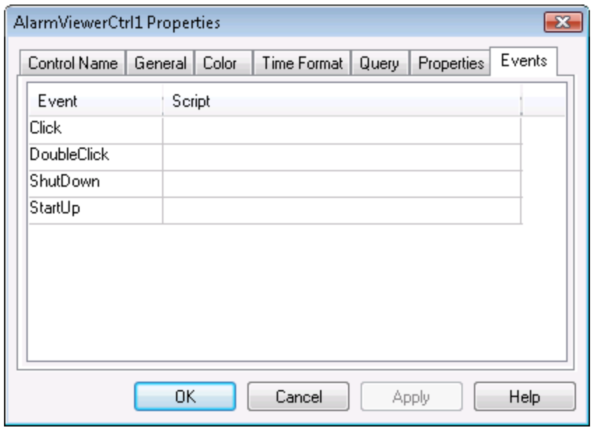
Left: 208 Top: 61

Width: 120 Height: 150

Visible ✓

GUID: {2F19F8AD-75E6-4828-B1C1-2857E4FAF9CE}

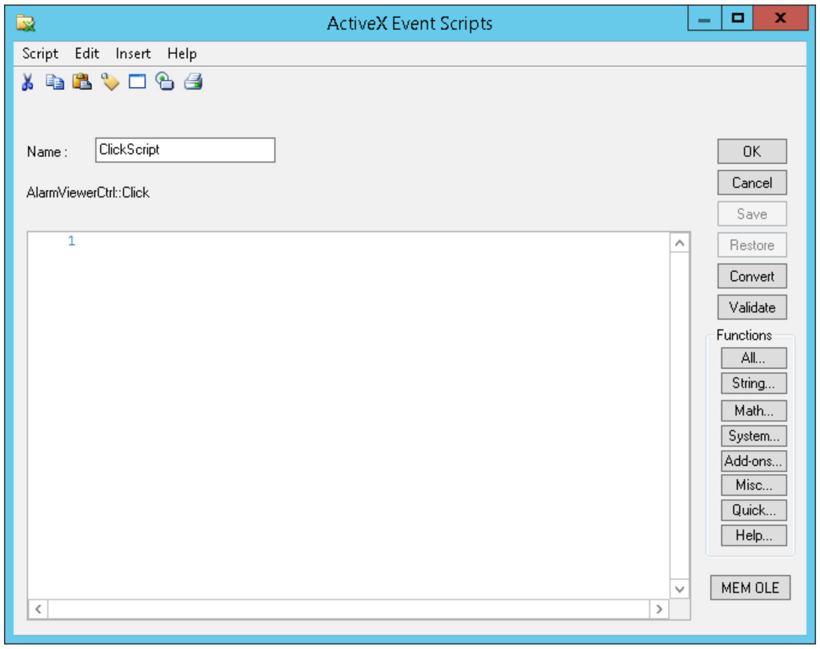
2. Click the **Events** tab.



Event	Script
Click	
DoubleClick	
ShutDown	
StartUp	

3. Select an event such as click, double-click, shut down, or start up.
4. Click in the **Scripts** cell for that event. Square brackets appear.

5. Type in a new name for an event script and click **OK**. When a message appears, click **OK** to create a new script. The **ActiveX Event Scripts** dialog box appears.



6. In the **Name** box, you can make changes to the ActiveX event script name.
7. Type your script in the window.
8. Click **OK**.

To edit an existing ActiveX event script

1. Using the **Classic View**, in the **Scripts** pane, expand **ActiveX Event**, right-click the ActiveX script name and click **Edit**. The **ActiveX Event Scripts** dialog box appears.
2. Make any necessary changes to the script and click **OK**.

To delete an existing ActiveX event script

1. Make sure that no ActiveX controls are using the ActiveX event script to delete. If there are ActiveX controls using the script, do the following first:
   a. Remove the ActiveX event script references in the **Events** panel of every ActiveX control that may be using it.
   b. Close all windows and update the use counts.
2. Using the **Classic View**, in the **Scripts** pane, expand **ActiveX Event**, right-click the ActiveX script name and click **Delete**. When a message appears, click **Yes**. The ActiveX event script is deleted.

Pausing Script Execution at Run Time

By default, when WindowViewer is started, logic is running and synchronous scripts are executed. You can pause script execution at run time by halting logic. After pausing you can resume script execution.

To pause script execution at run time from the menu

- On the **Logic** menu, click **Halt Logic**. The synchronous scripts stop running. Asynchronous scripts continue running but no new asynchronous scripts are started.

To pause script execution at run time with scripting

- Write the value 0 to the discrete system tag $LogicRunning. The synchronous scripts stop running. Asynchronous scripts continue running but no new asynchronous scripts are started.

To resume script execution at run time

- On the **Logic** menu, click **Start Logic**. The script execution is resumed.

To resume script execution at run time with scripting

- Write the value 1to the discrete system tag $LogicRunning. The $LogicRunning system tag must be contained in an asynchronous script that is executing at the time the logic is paused.

$LogicRunning System Tag

This system tag monitors and/or controls the running of scripts.

Usage

$LogicRunning

Remarks

Setting the value to 1 starts the script running. Setting the value to 0 stops the script running.

This system tag is equal to selecting **Start Logic** or **Halt Logic** on the **Logic** menu in WindowViewer.

You cannot stop asynchronous scripts that are currently running. However, you can prevent new scripts from running.

Data Type

Discrete (read / write)

CHAPTER 4

The Script Language

About the Script Language

Use these concepts, techniques, and syntax rules for writing scripts using the InTouch HMI script language.

- Basic syntax rules. See *Basic Syntax Rules* on page 43.
- Calling pre-defined or custom functions. See *Calling Standard Functions* on page 44 and *Calling Custom Functions (QuickFunctions)* on page 45.
- Using value assignments and the various operators. See *Value Assignments and Operators* on page 46.
- Using conditional statements. See *Using Conditional Program Branching Structures* on page 54.
- Using loops. See *Using Program Loops* on page 56.
- Using local variables. See *Using Local Variables* on page 58.

For more information on the general operation of the script editor, see *Creating and Editing Scripts* on page 13.

For more information on the various types of script triggers, see *Script Triggers* on page 29.

For a reference of standard script functions, see *Built-In Functions* on page 65.

Basic Syntax Rules

Basic syntax rules cover these aspects of the InTouch HMI script language:

- Subroutines
- Statements
- Indentation
- Comments
- Tag references
- Literal data values
- Value expressions
- Syntax validation

Subroutines

There is no concept of separate subroutines within the same script, such as "Sub" procedures in Visual Basic. To structure a script into multiple subroutines, you must create a custom QuickFunction for each subroutine. See *Custom Script Functions* on page 61.

Statements

- A statement can be a value assignment, a function call, or a control structure.
- Each statement in a script must end with a semicolon (;).

- You can have multiple statements in the same line, as long as each statement ends with a semicolon.
- You can spread a statement across multiple lines by using line breaks (pressing Enter).

Indentation

You can indent your script code in any manner. Indents have no functional relevance.

Comments

To mark text as a comment, enclose it in braces `{ }`. Comments can span multiple lines.

Tag References

There are several ways to make tag references.

- To refer to a tag that is defined in the local Tagname Dictionary, simply use the tagname.
- To refer to a specific dot field, use the regular reference format (`Tagname.Dotfield`).
- To refer to a data item on a remote node, use a regular remote tag reference (`AccessName:Item`).
- You can also define local variables whose scope is limited to the current script. See *Using Local Variables* on page 58.

Literal Data Values

- You can specify integer values in decimal or hexadecimal notation. For example, `255` or `0xFF`.
- You can specify floating-point values in decimal or scientific notation. For example, `0.001` or `1E-3`.
- To specify a Boolean value, use the numerical values 0 for FALSE and 1 for TRUE.
- To specify a string value, enclose it in double quotation marks. For example: `"This is a string."`

Value Expressions

Value expressions can include literal values, tag references and function calls, all linked together by suitable operators. See *Value Assignments and Operators* on page 46.

Syntax Validation

When you save a script, the Script Editor automatically checks it for correct syntax. You can also start this validation manually by clicking the **Validate** button. See *Validating Scripts for Correct Syntax* on page 27.

Calling Standard Functions

Standard functions come predefined with the InTouch HMI. See *Calling Custom Functions (QuickFunctions)* on page 45.

Syntax for Calling Standard Functions

The syntax to call a predefined script function depends on whether and how the function returns a result.

Some functions do not return any result; some functions return an optional result that can be assigned to a tag or used in an expression; some functions return a result that must be assigned to a tag or used in an expression.

To determine the function type, look at the function description. Each function description has a syntax listing that shows whether the function returns a result and whether that result is optional.

To call a function that does not return a result

- Use only the function name (and parameters, if any) in a statement. For example:
```
FunctionName(Parameters);
```

To call a function that requires its result to be assigned

- Use the function name (and parameters, if any) anywhere in a script where you could use a literal value or a tagname of the relevant data type. For example, in a value assignment:
```
ResultsTagname = FunctionName(Parameters);
```
  Or in a nested function call, using it as a parameter for another standard function:
```
OtherStandardFunction(FunctionName(Parameters));
```

To call a function that returns an optional result

- Use either of the preceding procedures.

Passing Parameters to a Function

Parameters to standard predefined functions are usually passed by *value*. This means that you can pass any valid expression as a parameter, as long as the expression evaluates to the data type that is required for the parameter. Such expressions can include literal values, tag references, and function calls, all linked together by suitable operators. For more information on expressions and operators, see *Value Assignments and Operators* on page 46.

When the script calls the function, the expression is evaluated and the resulting value passed to the function.

However, there are some functions that require a tag *reference* as a parameter. For example:
```
RecipeSelectRecipe(Filename, RecipeName, Number);
```

In this example, the RecipeName parameter must be a tag reference (that is, you must use a literal tagname for the RecipeName parameter). You cannot pass a string expression instead, even if that expression evaluates to a valid tagname.

Note: Some legacy predefined functions with only one parameter (for example, the Ack() function) do not follow the standard syntax of passing parameters in parentheses. Instead, the parameter is separated from the function name by a space. Check the syntax description in the function documentation if you are in doubt about a particular function.

Calling Custom Functions (QuickFunctions)

Calling a custom QuickFunction differs slightly from calling a predefined standard function:

- The keyword `CALL` must precede the QuickFunction name.
- Results returned by QuickFunctions are always optional; you can use them, but you do not have to.

To call a QuickFunction that does not return a result

- Use the function name (and parameters, if any) preceded by the keyword `CALL` in a statement. For example:
```
CALL QuickFunctionName(Parameters);
```

To call a QuickFunction that returns a result

- Do either of the following:
  - Call the QuickFunction as if it did not return a result (see the preceding procedure).

- Use the function name (and parameters, if any) preceded by the keyword `CALL` anywhere in a script where you could use a literal value or a tagname of the relevant data type. For example, in a value assignment:

  ```
  ResultsTagname = CALL QuickFunctionName(Parameters);
  ```

  Or in a nested function call, using it as a parameter for a standard function:

  ```
  OtherStandardFunction(CALL FunctionName(Parameters));
  ```

Note: You cannot nest QuickFunction calls so that a QuickFunction is used as a parameter for another QuickFunction. For example, `Call QF1(Call QF2());` is not a valid statement.

Passing Parameters to a QuickFunction

Parameters to QuickFunctions are always passed by value. You cannot pass parameters to QuickFunctions by reference.

You can pass any valid expression as a parameter, as long as the expression evaluates to the data type that is required for the parameter. Such expressions can include literal values, tag references, and function calls, all linked together by suitable operators. For more information on expressions and operators, see *Value Assignments and Operators* on page 46. When the script calls the function, the expression is evaluated and the resulting value passed to the function.

Note: You cannot nest QuickFunction calls so that a QuickFunction is used as a parameter for another QuickFunction. For example, `CALL QF1(CALL QF2());` is not a valid statement.

Value Assignments and Operators

In a script, you use value assignments to write values to a tag. The syntax for a value assignment is as follows:

```
Tagname = ValueExpression;
```

When this statement is executed, `ValueExpression` is written to the tag referred to by `Tagname`. `ValueExpression` can be any valid expression whose data type matches the tag data type. Value expressions can include literal values, tag references, and function calls, all linked together by suitable operators.

See *Supported Operators* on page 46.

See *Setting the Evaluation Order of Operators* on page 52.

See *Examples for Expressions* on page 54.

Supported Operators

The following table lists all supported operators. For information on the use of a specific operator, see the relevant section.

Operator	More information
+	*Addition or Concatenation:* + on page 47
-	*Subtraction:* - on page 47
*	*Multiplication:* * on page 48
/	*Division:* / on page 48
**	*Power:* ** on page 48

Operator	More information
MOD	*Modulo: MOD* on page 48
~	*Complement: ~* on page 49
SHL	*Shift Left: SHL and Shift Right: SHR* on page 49
SHR	*Shift Left: SHL and Shift Right: SHR* on page 49
&	*Bitwise AND: &* on page 49
|	*Bitwise OR: |* on page 50
^	*Bitwise XOR: ^* on page 50
AND	*Logical Conjunction: AND* on page 51
OR	*Logical Disjunction: OR* on page 51
NOT	*Logical Negation: NOT* on page 51
<	*Comparisons: <, >, <=, >=, ==, <>* on page 52
>	*Comparisons: <, >, <=, >=, ==, <>* on page 52
<=	*Comparisons: <, >, <=, >=, ==, <>* on page 52
>=	*Comparisons: <, >, <=, >=, ==, <>* on page 52
==	*Comparisons: <, >, <=, >=, ==, <>* on page 52
<>	*Comparisons: <, >, <=, >=, ==, <>* on page 52

Note: For numeric calculations, always select the operands so that the result of the calculation is still within the value range of a Real number. Otherwise, the result will not be correct.

Addition or Concatenation: +

Adds two numeric operands or concatenates two string operands.

Valid operands

For addition: Any Integer or Real value

For concatenation: Any Message value

Data type of return value

For addition: Integer or Real

For concatenation: Message

Example

```
MessageTag = "Setpoint value: " + Text(SetpointTag, "#.##");
```

Subtraction: -

When used with two operands, performs a regular numeric subtraction.

Valid operands

Any Integer or Real value

Data type of return value

Integer or Real

Example

In this example, if TemperatureSetpoint is 70, after the script executes TemperatureSetpoint is 65.

```
TemperatureSetpoint = TemperatureSetpoint - 5;
```

Multiplication: *

Regular numeric multiplication.

Valid operands

Any Integer or Real value

Data type of return value

Integer or Real

Division: /

Regular numeric division. If you try to divide by 0 at run time, 0 is returned as the result.

Valid operands

Any Integer or Real value

Data type of return value

Integer or Real

Power: **

Raises the left operand (the base) to the power of the right operand (the power).

Valid operands

Integer or Real values. It is not possible to combine a base of 0 with a negative power, or a negative base with a fractional power. In these cases, 0 is returned as the result.

Data type of return value

Integer or Real

Example

`8 ** (1/3)` returns 2 (the cubic root of 8)

Modulo: MOD

Returns the remainder of the division of two integer values.

Valid operands

Any Integer value.

Data type of return value

Integer

Example

`37 MOD 4` returns 1

Complement: ~

Returns the one's complement of an integer value. That is, converts each zero-bit to a one-bit and vice versa.

Valid operands

Any Integer value.

Data type of return value

Integer

Shift Left: SHL and Shift Right: SHR

Shifts the binary representation of an integer value to the right or left by a specified number of bit positions. The left operand is the value to be shifted, the right operand is the number of bit positions. Bits shifted out of the word are lost. Bit positions vacated by the shift are set to 0.

Valid operands

Any Integer value.

Data type of return value

Integer

Example

`IntTag = IntTag SHL 1;` has the following results when executed repeatedly for an initial tag value of 5:

Iteration	Binary pattern	Tag value
Initial value	`0[...]00000101`	5
Execution 1	`0[...]00001010`	10
Execution 2	`0[...]00010100`	20

Bitwise AND: &

Compares the binary representations of two integer numbers, bit for bit, and returns a result according to the following table:

Bit in first operand	Bit in second operand	Bit in result
0	0	0
0	1	0
1	0	0
1	1	1

You can use this operator to quickly "mask out" (set to 0) certain parts of a bit pattern. For example, the following statement masks out the upper 24 bits of the `IntTag` tag:

```
IntTag = IntTag & 255;
```

As shown in the table, the result bit is always 0 if one of the operand bits is 0. In the binary representation of 255, only the lower 8 bits are 1, so the 24 remaining 0-bits cause all the corresponding bits in the result to be set to 0.

Valid operands

Any Integer value.

Data type of return value

Integer

Bitwise OR: |

Compares the binary representations of two integer numbers, bit for bit, and returns a result according to the following table:

Bit in first operand	Bit in second operand	Bit in result
0	0	0
0	1	1
1	0	1
1	1	1

This operation is also called "inclusive OR."

Valid operands

Any Integer value.

Data type of return value

Integer

Bitwise XOR: ^

Compares the binary representations of two integer numbers, bit for bit, and returns a result according to the following table:

Bit in first operand	Bit in second operand	Bit in result
0	0	0
0	1	1
1	0	1
1	1	0

This operation is also called "exclusive OR."

Valid operands

Any Integer value.

Data type of return value

Integer

Logical Conjunction: AND

Returns TRUE if both discrete operands are TRUE; otherwise, returns FALSE. The truth table for this operator is as follows:

p	q	p AND q
F	F	F
F	T	F
T	F	F
T	T	T

Valid operands

Any Discrete value.

Data type of return value

Discrete

Logical Disjunction: OR

Returns TRUE if at least one of the discrete operands is TRUE; otherwise, returns FALSE. The truth table for this operator is as follows:

p	q	p OR q
F	F	F
F	T	T
T	F	T
T	T	T

Valid operands

Any Discrete value.

Data type of return value

Discrete

Logical Negation: NOT

Returns TRUE if the discrete operand is FALSE, and vice versa. The truth table for this operator is as follows:

p	NOT p
F	T
T	F

Valid operands

Any Discrete value.

Data type of return value

Discrete

Comparisons: <, >, <=, >=, ==, <>

These operators compare two values and return TRUE if the condition specified by the operator is met. The operands can be of any data type. For string operands, the comparison is based on alphabetical, non-case-sensitive ordering, with b being greater than a, c greater than b, and so on. For discrete operands, TRUE is considered greater than FALSE. The following table lists all comparison operators along with their conditions:

Operation	Example	Condition
Less than	a < b	a is less than b
Greater than	a > b	a is greater than b
Less than or equal	a <= b	a is less than or equal to b
Greater than or equal	a >= b	a is greater than or equal to b
Equal	a == b	a is equal to b
Not equal	a <> b	a is not equal to b

Valid operands

Values of any data type (both values must be of the same data type).

Data type of return value

Discrete

Setting the Evaluation Order of Operators

In any expression, you can use parentheses to force operators to be evaluated in a certain order. This works the same way as in any mathematical expression. If you do not use parentheses, your expression is evaluated based on the default precedence rules for operators. The operation with the highest precedence level is executed first, followed by the operation with the second-highest precedence level, and so on.

The following table shows the precedence level of each operator. Operators on the same row have the same precedence level.

-, NOT, ~	Highest precedence
**	

*, /, MOD	
+, -	
SHL, SHR	
<, >, <=, >=	
==, <>	
&	
^	
|	
AND	
OR	
=	Lowest precedence

Implicit Data Type Conversion

The InTouch HMI scripting language provides implicit value conversion in assignments between certain data types. However, this can lead to unexpected results, so you should only use this feature with caution.

The following table shows what happens when you assign a value of a certain type to a tag of a different type.

Expected data type	Used data type	Remarks
Discrete	Integer	A value of 0 is interpreted as FALSE. Any other value is interpreted as TRUE.
Discrete	Real	A value of 0 is interpreted as FALSE. Any other value is interpreted as TRUE.
Integer	Discrete	A value of FALSE is converted to 0. A value of TRUE is converted to 1.
Integer	Real	Only the value before the decimal separator is used. All decimal places are discarded.
Real	Discrete	A value of FALSE is converted to 0. A value of TRUE is converted to 1.
Real	Integer	The value is preserved without changes.

For information on using script functions to convert between other data types, see *Converting Data Types* on page 81

Examples for Expressions

The following table shows some valid expressions, along with the expression's result and the result's data type.

Expression	Data type of result	Result
`37 MOD 4`	Integer	1
`37 MOD 4 == 1`	Discrete	TRUE
`NOT (37 MOD 4 == 1)`	Discrete	FALSE
`InfoAppActive(InfoAppTitle("xyz")) == 1`	Discrete	TRUE if a process called "xyz" is running
`"Batch " + Text(IntTag, "000")`	Message	"Batch 010" if `IntTag` has a value of 10

The following table shows some invalid expressions, along with the reason why they are invalid.

Expression	Problem
`NOT (37 MOD 4)`	NOT requires a discrete operand.
`NOT 37 MOD 4 == 1`	NOT has a higher precedence than the other operators, so the InTouch HMI tries to apply NOT to the integer value of 37 instead of the discrete result of the comparison.
`"Batch " + IntTag`	When using the + operator to concatenate strings, both operands must be strings.

Using Conditional Program Branching Structures

You can dynamically control the execution path of a script based on certain conditions being met. The InTouch HMI supports `IF-THEN-ELSE` control structures for this purpose.

The basic syntax for an `IF-THEN-ELSE` control structure is as follows:

Syntax

```
IF Condition THEN
    ... statements and/or another IF-THEN-ELSE structure
[ELSE
    ... statements and/or another IF-THEN-ELSE structure]
ENDIF;
```

Remember the following rules when working with `IF-THEN-ELSE` structures:

- `IF-THEN-ELSE` structures can be nested, both in the `THEN` section and in the `ELSE` section.
- For every `IF` statement, there must be a closing `ENDIF` statement. An `ENDIF` statement always applies to the nearest prior `IF` statement on the same nesting level.

- `Condition` must be a valid discrete expression. The `THEN` section is executed if `Condition` is TRUE. The `ELSE` section is executed if `Condition` is FALSE.
- The `ELSE` section is optional.
- Some other programming languages allow you to check multiple conditions on the same hierarchy level of an `IF-THEN-ELSE` structure and have one general `ELSE` section that is executed if all of the conditions evaluate to FALSE. (The `If-ElseIf-Else` structure in Visual Basic is an example of this.) This is not possible in the InTouch HMI. For every condition to check, you must open a new `IF-THEN-ELSE` structure. Therefore, to have a single section of code to act as the `ELSE` code for all conditions, you must place it in the `ELSE` section of the `IF-THEN-ELSE` structure at the last nesting level.

Simple Conditional Structure

The following script shows a simple conditional structure. If `SuccessTag` is TRUE, the "Success" window opens, otherwise the "Failure" window opens.

```
IF SuccessTag == 1 THEN
   Show "Success";
ELSE
   Show "Failure";
ENDIF;
```

Nested Conditional Structure

The following script shows how to check for multiple conditions and have one general `ELSE` section with code that is executed if none of the conditions are met.

```
IF ChoiceTag == 1 THEN
   Show "Procedure 1";
ELSE
   IF ChoiceTag == 2 THEN
      Show "Procedure 2";
   ELSE
      IF ChoiceTag == 3 THEN
         Show "Procedure 3";
      ELSE
         Show "Default Procedure";
      ENDIF;
   ENDIF;
ENDIF;
```

Invalid Scripting Example (Missing ENDIF)

If you are familiar with Visual Basic, you might try to write a simple `IF` statement like this:

```
IF OpenThisWindow == 1 THEN Show "This Window";
```

This does not work in the InTouch HMI. For every `IF` statement, there must be a closing `ENDIF` statement.

Invalid Scripting Example (Incorrect Nesting)

If you are familiar with a language like Visual Basic, you might want to write a conditional structure with multiple conditions and a default condition like this:

```
IF ChoiceTag == 1 THEN
   Show "Procedure 1";
ELSE IF ChoiceTag == 2 THEN
   Show "Procedure 2";
ELSE IF ChoiceTag == 3 THEN
```

```
    Show "Procedure 3";
ELSE
    Show "Default Procedure";
ENDIF;
```

This does not work in the InTouch HMI. Each `IF` opens a new nesting level and must have a corresponding `ENDIF` statement. For a correct version of this example, see *Nested Conditional Structure* on page 55.

Using Program Loops

Loops allow you to execute a section of code repeatedly. The InTouch HMI only supports `FOR` loops. A `FOR` loop works by monitoring the value of a numeric loop variable that is incremented or decremented with each loop iteration. The loop is executed until the value of the loop variable reaches a fixed limit.

Syntax

```
FOR LoopTag = StartExpression TO EndExpression [STEP ChangeExpression]
... statements or another FOR loop ...
NEXT;
```

- `StartExpression`, `EndExpression` and `ChangeExpression` together define the number of iterations.
- `StartExpression` sets the start value of the loop range. `EndExpression` sets the end value of the loop range.
- `STEP ChangeExpression` optionally sets the value by which the loop tag is incremented or decremented during each loop iteration; if you do not specify this, a default of 1 is used.

When you execute a `FOR` loop, the InTouch HMI:

1. Sets `LoopTag` to the value of `StartExpression`.
2. Tests whether `LoopTag` is greater than `EndExpression`. If so, the InTouch HMI exits the loop. (If `ChangeExpression` is negative, the InTouch HMI tests whether `LoopTag` is less than `EndExpression`.)
3. Executes the statements within the loop.
4. Increments `LoopTag` by the value of `ChangeExpression` (1 unless otherwise specified).
5. Repeats steps 2 through 4.

Remember the following rules when working with `FOR` loops:

- `FOR` loops can be nested. The maximum number of nesting levels depends on the available memory and system resources.
- For every `FOR` statement, there must be a closing `NEXT` statement. A `NEXT` statement always applies to the nearest prior `FOR` statement on the same nesting level.
- `LoopTag` must be a numeric tag (or local variable).
- `StartExpression`, `EndExpression` and `ChangeExpression` must be valid expressions that evaluate to a numeric result.
- If `ChangeExpression` is positive, `EndExpression` must be greater than `StartExpression`; if `ChangeExpression` is negative, `StartExpression` must be greater than `EndExpression`. Otherwise, the loop does not start.
- To exit a loop, use the `EXIT FOR` statement. For more information, see *Forcing the End of a Loop* on page 57.
- There is a time limit for loops. See *Time Limit for Loop Execution* on page 57.

Caution: Loop execution affects other run-time processes. For more information, see *Effect of Loops on Other Run-Time Processes* on page 57.

Forcing the End of a Loop

You can exit a loop at any time by calling the following statement:

```
EXIT FOR;
```

This statement causes script execution to continue at the statement immediately following the loop `NEXT` statement.

Example

The following code fragment uses a loop to insert a large number of dummy records into a database table. If there is an error inserting a record, the loop is aborted to prevent creating more errors.

```
FOR Counter = 1 TO 1000
    ResultCode = SQLInsert(ConnectionID, "BatchDetails", "BindList1");
    IF ResultCode <> 0 THEN
        LogMessage("Error creating records! Aborting...");
        EXIT FOR;
    ENDIF;
NEXT;
```

Effect of Loops on Other Run-Time Processes

While a `FOR` loop is executing, all other run-time processes in WindowViewer are paused. This includes the following areas:

- Screen updates (animation links, value displays, trends, etc.). This means that you cannot use `FOR` loops to animate objects, because no movement will occur until after the loop has completed.
- I/O communications. For example, if you modify the value of an I/O tag in a `FOR` loop, only the value after the final iteration is written to the I/O device.
- Other scripts, including asynchronous QuickFunctions.

You can avoid pausing other run-time processes by placing the `FOR` loop in an asynchronous QuickFunction.

Time Limit for Loop Execution

To avoid infinite loops, there is a time limit during which `FOR` loops must complete execution. If a loop does not complete execution after this time span, WindowViewer automatically terminates it and writes a message about the termination to the Log Viewer.

The default time limit is 5 seconds. You can customize it by adding the following line to the intouch.ini file in your application directory:

```
LoopTimeout=x
```

Replace `x` with the time limit in seconds.

Note: The time limit is checked only at the `NEXT` statement of the loop. Therefore, the first iteration of the loop is always executed, even if it takes longer than the time limit.

Examples of Loops

The following script uses a simple loop and an indirect tag to re initialize 100 tags (Tag001 to Tag100) with a value of 0.

```
DIM Counter AS INTEGER;
```

```
FOR Counter = 1 TO 100
   IndirectInteger.Name = "Tag" + Text(Counter, "000");
   IndirectInteger.Value = 0;
NEXT;
```

The following script uses two nested loops and an indirect tag to reinitialize 1000 tags (Line01_Tag001 to Line10_Tag100) with a value of 0.

```
DIM LineCounter AS INTEGER;
DIM TagCounter AS INTEGER;
FOR LineCounter = 1 TO 10
   FOR TagCounter = 1 TO 100
      IndirectInteger.Name = "Line" + Text(LineCounter, "00") + "_Tag" +
      Text(TagCounter, "000");
      IndirectInteger.Value = 0;
   NEXT;
NEXT;
```

Using Local Variables

You can declare local variables in a script to store temporary or intermediate results. This increases performance and helps to keep your tag count low. You can use local variables just like tagnames in your script. However, there are certain differences:

- Local variables only exist within the scope of the script in which they are declared. They lose their value when script execution finishes. They cannot be referenced by any other scripts in your application.
- Local variables do not have dotfields.
- Local variables do not count towards the tag count.

Before you can use a local variable in a script, you must declare it; otherwise, the reference is considered a tagname. See *Declaring a Local Variable* on page 58.

You can declare local variables that have the same names as tags. See *Naming Conflicts between Local Variables and Tags* on page 59.

Declaring a Local Variable

You can declare local variables anywhere in your script, as long as you declare them before their first use. To declare a local variable, use the following statement:

```
DIM LocVarName [AS DataType];
```

`LocVarName` is the name of the local variable. The name must follow the naming conventions for tagnames. For more information, see Tag Name Conventions in the InTouch® HMI Data Management Guide.

`DataType` is the data type of the local variable. Valid values are `Discrete`, `Integer`, `Real`, and `Message`. If you do not specify this option, `Integer` is used as the default.

You must use a separate `DIM` statement for each local variable to declare.

You can declare any number of local variables. The number is only limited by the available memory.

Examples

To declare an Integer variable:

```
DIM MyLocalIntVar AS Integer;
```

To declare multiple Real variables:

```
DIM MyLocalRealVar1 AS Real;
DIM MyLocalRealVar2 AS Real;
```

The following statement is *not* valid:

```
DIM MyLocalRealVar1, MyLocalRealVar2 AS Real;
```

Naming Conflicts between Local Variables and Tags

You can declare a local variable with the same name as an existing tag. However, when you refer to that name in a script, the local variable always takes precedence over the tag. For example, assume you have an existing Integer tag called "iTag," and you run the following script:

```
DIM iTag as Integer;
iTag = 20;
```

In this scenario, the value assignment writes a value to the local variable only. The value of the tag with the same name remains unchanged.

CHAPTER 5

Custom Script Functions

About Custom Script Functions

InTouch HMI QuickFunctions are scripts that in other environments might be known as macros, subroutines, or procedures.

About QuickFunctions

QuickFunctions are scripts that you can call from other scripts and animation links. The main advantage of QuickFunctions is a reduction in duplicate code.

You can pass values to QuickFunctions, which can use the values and return results.

QuickFunctions can run asynchronously. Unlike other scripts, they can run in the background without disrupting the main program flow. A QuickFunction running asynchronously can be used for time-consuming operations, such as SQL database calls.

Note: Plan QuickFunctions and their arguments carefully, because if you want to modify the arguments in a QuickFunction, you must first delete all calls to that QuickFunction from every script that uses the QuickFunction. After the change is made, you must then add the QuickFunction call back to the scripts. See the note in *Configuring QuickFunctions* on page 61.

There are three basic parts of a QuickFunction:

- Name
- Arguments (optional)
- Script body with optional return values

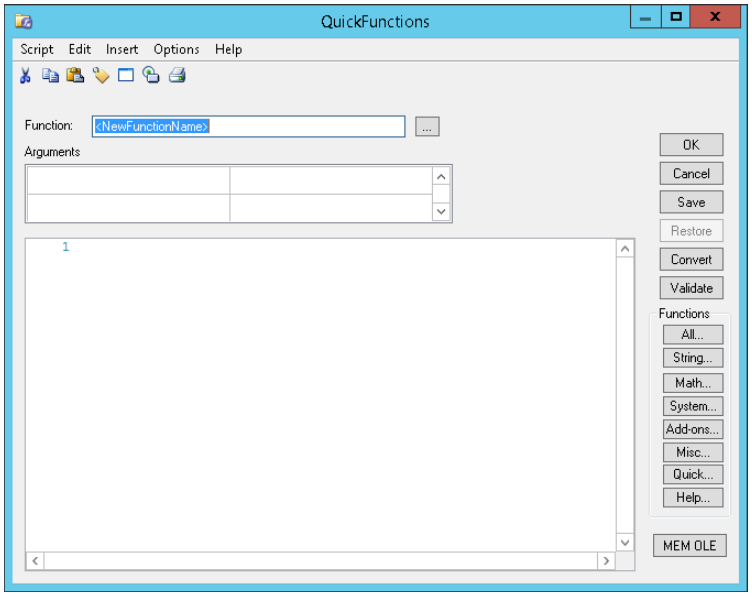
QuickFunctions are executed by using the CALL function in either an animation link or another script. See *Calling QuickFunctions* on page 62.

Configuring QuickFunctions

You can create, modify, or delete QuickFunctions.

To create a QuickFunction

1. In the **Scripts** pane, right-click **QuickFunctions,** and then click **New**. The **QuickFunctions** dialog box appears.



2. In the **Function** box, enter a name for the QuickFunction.
3. In the **Arguments** area, for each argument, enter a name on the left and a data type on the right.

   Arguments are local variables that exist only within the QuickFunction in which they are defined. You can have up to 16 arguments per QuickFunction. Argument names can have 31 characters but no spaces. The argument names must begin with an alpha character. Argument names must be unique.
4. Type your script in the window.
5. To cause the QuickFunction to return a result, add to your script: RETURN value

   Value can be a literal value, a local variable, or global tagname or calculated expression. The script terminates at the RETURN command and continues at the calling function.
6. Click **OK**.

To modify a QuickFunction

1. In the **Scripts** pane, expand **QuickFunctions**, right-click the QuickFunction to modify and click **Edit**. The **QuickFunctions** dialog box appears.
2. Make modifications to the script body and click **OK**.

Note: You cannot make modifications to the argument list if there are calls to the QuickFunction in the InTouch application. You must delete those calls first, close all InTouch windows, and update the use counts.

To delete a QuickFunction

1. Delete all calls to the QuickFunction, close all InTouch windows, and update the use counts.
2. In the **Scripts** pane, expand **QuickFunctions**, right-click the QuickFunction to delete and click **Delete**. When a message appears, click **Yes**.

Calling QuickFunctions

You can configure scripts and animation links to call QuickFunctions and to process or show a possible return value.

A QuickFunction is not called if the parameter values have not changed. You can use $second as a parameter to insure a QuickFunction is executed at least every second.

For more information, see *Calling Custom Functions (QuickFunctions)* on page 45.

Creating Asynchronous QuickFunctions

You can define QuickFunctions to run asynchronously (that is, parallel) to the main program flow.

To create an asynchronous QuickFunction

1. In the Script Editor, create a QuickFunction.
2. On the **Options** menu, click **Asynchronous**.

Limitations of Asynchronous QuickFunctions

You cannot:

- Return a value from an asynchronous QuickFunction.
- Run more than one instance of the same QuickFunction at the same time.
- Stop asynchronous QuickFunctions after they start executing.

You should not:

- Run more than three different asynchronous QuickFunctions at the same time. Running more than three QuickFunctions at the same time reduces system performance significantly.
- Use asynchronous functions as part of expressions for animation links, e.g. Tool Tips.

Checking if any Asynchronous QuickFunctions are Running

You can check if any asynchronous QuickFunctions are running with the IsAnyAsyncFunctionBusy() function. You can use this function to make the QuickScript that calls an asynchronous QuickFunction wait for all other asynchronous QuickFunctions to complete processing.

IsAnyAsyncFunctionBusy() Function

Returns a discrete value indicating if any asynchronous QuickFunctions are running.

Syntax

```
result = IsAnyAsyncFunctionBusy (timeout)
```

Arguments

result
The discrete value that indicates if asynchronous QuickFunctions are running with following meaning:

- 0 = No asynchronous QuickFunctions are running.
- 1 = Asynchronous QuickFunctions are running.

timeout
The number of seconds to wait before checking if any asynchronous QuickFunctions are running. A literal integer value, integer tagname or integer expression.

Example(s)

Assume you want to connect to several SQL databases using asynchronous QuickFunctions, and you know that it takes 2 minutes to make those connections.

First, execute the asynchronous QuickFunctions to connect to the SQL databases.

Next, use the IsAnyAsyncFunctionBusy(120) function in a QuickScript to allow enough time for SQL to make the connections before completing the QuickFunction.

If after 2 minutes the connections have not been made and the asynchronous QuickFunctions are still busy trying to make the connections, a value of 1 (true) is returned by the IsAnyAsyncFunctionBusy() function.

You can now show an error message telling the operator that the SQL connections were unsuccessful.

The following script implements the scenario:

```
IF IsAnyAsyncFunctionBusy(120) == 1 THEN
   SHOW "SQL Connection Error Dialog";
ENDIF;
```

Stopping Asynchronous QuickFunctions from Running

You cannot stop asynchronous QuickFunctions after they are started, but you can stop further asynchronous QuickFunctions from being started by stopping the script logic. This affects all QuickScripts in your InTouch application.

For more information on stopping script execution, see *Pausing Script Execution at Run Time* on page 41.

CHAPTER 6

Built-In Functions

About Built-In Functions

InTouch QuickScript functions allow you to execute commands and logical operations based on specified criteria being met. You can use QuickScript functions by themselves and have them executed whenever a certain condition is met, or use them in animation display links. Predefined functions are organized by functional groups. After you select a group, then you select the predefined function to insert in your script. You use the **Choose function** dialog box that appears after selecting the predefined math functions group. The predefined function is placed in your script at the current position of your pointer when you select the function.

Important: This chapter includes legacy InTouch QuickScript functions designed to work only on 32-bit versions of the Windows operating system. These functions should not be included in any InTouch QuickScript designed to run on a 64-bit version of Windows. Notes within this chapter identify these legacy 32-bit only functions.

Forcing Updates in Animation Display Links

If you use QuickScripts in animation links, the animation links are only updated if a tag is associated with them. This tag acts as a trigger whenever its value changes. A good choice is to use the $Second or $Minute system tag to update animation links.

To force an update in an animation display link

1. Open the animation link in the object property window.
2. Add a trigger tag (for example $Second) to the calculation. For example:
    - If the animation link is real or integer, you can multiply the expression with $Second/$Second.
    - If the animation link is string, you can add StringMid($TimeString, 0, 0) to the expression.
    - If the animation link is discrete you can add ($second.00 - $second.00) to the expression.

Mathematical Calculations

The InTouch HMI supports basic mathematical functions that you can use in scripts and in animation links, such as functions to:

- Round and truncate numbers.
- Calculate sine and cosine.
- Calculate logarithms and exponentials.
- Calculate the square root.

Rounding, Truncating, and Determining Sign

In a script, you can use the following functions to round numbers, truncate numbers, and determine the sign of numbers:

Use	To
Abs()	Calculate the absolute of a value or expression.
Int()	Calculate the integer of a value or expression.
Round()	Round a value or expression.
Sgn()	Determine the sign (minus, plus, zero) of a value or expression.
Trunc()	Return the decimal point prefix of a value or expression.

Abs() Function

Returns the absolute value of a specified number. You can use this to convert a negative number to a positive number.

Syntax

```
result = Abs (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

Example(s)

`Abs(14)` returns 14.

`Abs(-7.5)` returns 7.5.

Int() Function

Returns the integer less than (or equal to) a specified number.

Syntax

```
result = Int (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

Example(s)

`Int(4.7)` returns 4.

`Int(-4.7)` returns -5.

Note: For negative real numbers, this function returns an integer that is smaller than the specified number. For example, Int(-4.7) is not -4, but -5. To have the integer part returned, use the Trunc() function. See *Trunc() Function* on page 67.

Round() Function

Rounds a number to a specified precision. The result is a real number.

Syntax

```
result = Round (number, precision)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

precision
The precision to which the number is rounded. Can be a literal number, analog tagname, or numeric expression.

Example(s)

`Round(4.3, 1)` returns 4.

`Round(4.3, 0.01)` returns 4.30.

`Round(4.5, 1)` returns 5.

`Round(-4.5, 1)` returns -4.

`Round(106, 5)` returns 105.

`Round(43.7, 0.5)` returns 43.5.

Sgn() Function

Returns the sign of a number. Use it to determine if a number, tagname, or expression is negative, positive, or zero.

Syntax

```
result = Sgn (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

Example(s)

`Sgn(425)` returns 1.

`Sgn(0)` returns 0.

`Sgn(-37.3)` returns -1.

Trunc() Function

Returns the truncated value of a number. The truncated value is the part before a decimal point. Use it to work with the integer part of a real number.

Syntax

```
result = Trunc (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

Example(s)

`Trunc(4.3)` returns 4.

`Trunc(-4.3)` returns -4.

Note: You can also use this function to work with the fractional part of a number. To return the fractional part of a specified number use the Trunc() function as follows:
result = number - trunc(number);

Using Trigonometric Functions

In a script, you can use the following functions to do trigonometric calculations.

Use	To
Sin()	Calculate the sine of an angle.
ArcSin()	Calculate the arcus sine of a value or expression.
Cos()	Calculate the cosine of an angle.
ArcCos()	Calculate the arcus cosine of a value or expression.
Tan()	Calculate the tangent of an angle.
ArcTan()	Calculate the arcus tangent of a value or expression.

Note: Trigonometric QuickScript functions in the InTouch HMI use angles in degrees (0 - 360). To work with radians instead you must perform the corresponding calculation before passing the parameter to the function or after retrieving the result from the function.

Sin() Function

Returns the sine of a number. For trigonometric functions the number is the angle in degrees.

Syntax

```
result = Sin (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

Example(s)

`Sin(90)` returns 1.

`Sin(0)` returns 0.

`Sin(30)` returns 0.5.

`100 * Sin (6 * $second)` returns a sine wave with an amplitude of 100 and a period of one minute.

ArcSin() Function

Returns the arc sine of a number. It is the reciprocal function to the Sin() function. Use the ArcSin() function to calculate the angle from -90 to 90 degrees whose sine is equal to that number.

Syntax

```
result = ArcSin (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression in the range of -1 to 1.

Example(s)

`ArcSin(1)` returns 90.

`ArcSin(0)` returns 0.

`ArcSin(0.5)` returns 30.

Cos() Function

Returns the cosine of a number. For trigonometric functions the number is the angle in degrees.

Syntax

```
result = Cos (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

Example(s)

`Cos(90)` returns 0.

`Cos(0)` returns 1.

`Cos(60)` returns 0.5.

```
20 + 50 * Cos(6 * $second)
```

produces a sine wave oscillating around 20 with an amplitude of 50 and a period of one minute.

ArcCos() Function

Returns the arcus cosine of a number. It is the reciprocal function to the Cos() function. Use the ArcCos() function to calculate the angle from 0 to 180 degrees whose cosine is equal to that number.

Syntax

```
result = ArcCos (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression in the range of -1 to 1.

Example(s)

`ArcCos(1)` returns 0.

`ArcCos(-0.5)` returns 120.

Tan() Function

Returns the tangent of a specified number. For trigonometric functions the number is the angle in degrees.

Syntax

```
result = Tan (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

Example(s)

`Tan(45)` returns 1.

`Tan(0)` returns 0.

ArcTan() Function

Returns the arcus tangent of a number. It is the reciprocal function to the Tan() function. Use the ArcTan() function to calculate the angle whose tangent is equal to that number.

Syntax

```
result = ArcTan (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression.

Example(s)

`ArcTan(1)` returns 45.

`ArcTan(0)` returns 0.

Returning the Value of Pi

In a script, you can use the Pi() function to use the constant Pi in mathematical calculations. The Pi() function is exact to 7 digits after the decimal point.

Syntax

```
result = Pi ()
```

Example(s)

`Pi()` returns 3.1415927.

Calculating Logarithms

In a script, you can use the following functions to run calculations with logarithms and exponential functions.

Use	To
Log()	Calculate the natural logarithm of a value or expression.
Exp()	Calculate the exponential of a value or expression.
LogN()	Calculate the logarithm of a value or expression to the base of another value or expression.

Log() Function

Returns the natural logarithm of a specified positive number. This is the reciprocal function to the Exp() function.

Note: The natural logarithm of 0 and negative numbers is undefined. If you pass 0 or a negative number to the Log() function, it returns a result of -99.0000000.

Syntax

```
result = Log (number)
```

Parameters

number
A positive literal number, analog tagname, or numeric expression.

Example(s)

`Log(100)` returns 4.6051702.

`Log(1)` returns 0.

Exp() Function

Returns the exponential of a specified number. This is the reciprocal function to the Log() function and is equivalent to e raised to a power.

Note: If you pass values outside the range of -88.72 to 88.72 to the Exp() function, it returns a result of -99.0000000.

Syntax

```
result = Exp (number)
```

Parameters

number
A literal number, analog tagname, or numeric expression in the range of -88.72 to 88.72.

Example(s)

`Exp(1)` returns 2.7182818.

`Exp(0)` returns 1.

LogN() Function

Returns the logarithm of a positive number to a specified base. This is the reciprocal function to the base to the power of the logarithm.

Example(s)

Syntax

```
result = LogN (number, base)
```

Parameters

number
A positive literal number, analog tagname, or numeric expression.

base
A positive literal number, analog tagname, or expression unequal to 1.

Example(s)

`LogN(8,2)` returns 3.

`LogN(num,btag)` returns the logarithm of num to the base btag.

Note: If you pass invalid parameters to the LogN() function, it returns a result of -99.0000000.

Calculating the Square Root

In a script, you can use the Sqrt() function to calculate the square root of a specified non-negative number.

Note: If you pass a negative value to the Sqrt() function, it returns a result of -99.0000000.

Syntax

```
result = Sqrt (number)
```

Parameters

number
A non-negative literal number, analog tagname, or numeric expression

Example(s)

`Sqrt(36)` returns 6.

`Sqrt(perftag)` returns the square root of the value held by the tagname perftag.

String Operations

You can use many basic string functions in scripts and animation links. You can use these functions to:

- Return parts of strings.
- Change the case of strings.
- Remove and add spaces to strings.
- Handle ASCII values in strings.
- Search and replace in strings.
- Compare strings with each other.
- Return other information about strings, such as their length.

Returning Parts of Strings

In a script, you can use the StringLeft(), StringMid() and StringRight() functions to return parts of strings.

StringLeft() Function

Returns a specified number of characters from the beginning of a string.

Syntax

```
result = StringLeft (string, length)
```

Parameters

string
A literal text, message tagname, or string expression.

length
The numbers of characters to return. A literal number, analog tagname, or numeric expression.

Example(s)

`StringLeft("Hello World",5)` returns "Hello".

`StringLeft("Hello World",20)` returns "Hello World".

`StringLeft("Hello World",0)` returns "Hello World".

Note: If you pass 0 as length to the StringLeft() function, it returns the entire string.

StringRight() Function

Returns a specified number of characters from the end of a string.

Syntax

```
result = StringRight (string, length)
```

Parameters

string
A literal text, message tagname, or string expression.

length
The number of characters to return. A literal number, analog tagname, or numeric expression.

Example(s)

`StringRight("Hello World",5)` returns "World".

`StringRight("Hello World",20)` returns "Hello World".

`StringRight("Hello World",0)` returns "Hello World".

Note: If you pass 0 as length to the StringRight() function, it returns the entire string.

StringMid() Function

Returns a part of a string. You can specify the starting point and how many characters to return.

Syntax

```
result = StringMid (string, startpos, length)
```

Parameters

string
A literal text, message tagname, or string expression.

startpos
The starting position in the string. A literal number, analog tagname, or numeric expression.

length
The number of characters to return. A literal number, analog tagname, or numeric expression.

Example(s)

`StringMid("Hello World",5,4)` returns "o Wo".

`StringMid("Hello World",7,50)` returns "World".

`StringMid("Hello World",4,0)` returns "lo World".

Note: If you pass 0 as length to the StringMid() function, it returns the entire string after the starting position.

Changing Case of Strings

In a script, you can use the StringLower() and StringUpper() functions to return a specified string in lowercase and uppercase. You can assign the result to the specified string to perform a conversion from upper to lowercase or vice versa.

StringLower() Function

Returns the lowercase equivalent of a string.

Syntax

```
result = StringLower (string)
```

Parameters

string
A literal text, message tagname, or string expression.

Example(s)

`StringLower("TURBINE")` returns "turbine".

`StringLower("The Value Is 22.2")` returns "the value is 22.2".

`mtag = StringLower(mtag)` converts the message value of mtag to lowercase.

StringUpper() Function

Returns the uppercase equivalent of a string.

Syntax

```
result = StringUpper (string)
```

Parameters

string
A literal text, message tagname, or string expression.

Example(s)

`StringUpper("abcd")` returns "ABCD".

`StringUpper("The Value Is 22.2")` returns "THE VALUE IS 22.2".

`mtag = StringUpper(mtag)` converts the message value of mtag to uppercase.

Removing Spaces from Strings

In a script, you can trim leading and trailing spaces (blanks) from strings by using th e StringTrim() function. You can use this to remove unwanted spaces from a string, for example after a user input.

StringTrim() Function

Rrim leading and trailing spaces (blanks) from strings. You can use this to remove unwanted spaces from a string, for example after a user input.

Syntax

```
result = StringTrim (string, trimtype)
```

Parameters

string
A literal text, message tagname, or string expression.

trimtype
A literal value, analog tagname, or numeric expression that determines which spaces to remove:

- 1 = Leading spaces.
- 2 = Trailing spaces.
- 3 = Leading and trailing spaces.

Remarks

This function removes all leading and trailing white spaces from a string. White spaces are spaces (ASCII 0x20) and control characters in the range from ASCII 0x09 to 0x0D.

Example(s)

To remove all spaces in a message tag, mtag, with an action script, use the following script:

```
DIM i AS INTEGER;
DIM tmp AS MESSAGE;
mtag = StringTrim(mtag,3);     {mtag is trimmed}
FOR i = 1  TO StringLen(mtag)      {run variable i over the characters of mtag}
  IF StringMid(mtag, i, 1)<>" " THEN       {i-th character is not space}      tmp
= tmp + StringMid(mtag, i, 1);        {
add that character to tmp}
  ENDIF;
NEXT;
mtag = tmp;       {pass tmp back to mtag}.
```

Other examples:

`StringTrim(" Joe ",1)` returns "Joe ".

`StringTrim(" Joe ",2)` returns " Joe".

This script removes all spaces from the left and the right of the mtag value:

```
mtag = StringTrim(mtag,3)
```

Formatting Strings with Spaces

In a script, you can use the StringSpace() function to add spaces (blanks) to strings.

Syntax

```
result = StringSpace (number)
```

Parameters

number
A literal number, numeric tagname, or numeric expression.

Example(s)

`StringSpace(4)` returns a string consisting of 4 blanks.

"`Pump`"+`StringSpace(1)`+"`Station`" returns "Pump Station".

Converting Between Characters and ASCII Codes

In a script, you can convert characters of a string to ASCII codes and ASCII codes back to characters by using the StringChar() and StringASCII() functions.

These functions do not support multiple byte character sets. Only characters in the range of 0-255 are supported.

Using ASCII codes is useful if you wish to perform some numeric calculation on a string (for example for encoding a string).

StringChar() Function

Returns a single character corresponding to a specified ASCII code.

Syntax

```
result = StringChar (ASCIICode)
```

Parameters

ASCIICode
A literal number, numeric tagname, or numeric expression in the range of 0 to 255.

Remarks

This function is very useful for passing control characters to external devices (such as printers or modems) or double quotes to SQL queries.

Example(s)

```
StringChar(65) returns "A".
```

This script returns "Hello World" enclosed by double quotes:

```
StringChar(34)+"Hello World"+StringChar(34)
```

This script returns "Hello World" where both words are separated by a carriage return and a line feed:

```
"Hello"+StringChar(13)+StringChar(10)+"World"
```

StringASCII() Function

Returns the ASCII code of the first character of a string.

Syntax

```
result = StringASCII (string)
```

Parameters

string
A literal string, message tagname, or string expression.

Example(s)

```
StringASCII("A") returns 65.
StringASCII("hello world") returns 104.
```

Searching and Replacing Text in Strings

For languages that use single-byte character sets (such as English) you can use the StringInString() and StringReplace() functions in a script to perform limited search and replace functionality on message tags.

Use	To
StringInString()	Search for a certain string in another string and return the result as a position.
StringReplace()	Replace certain characters or words with other characters or words in a specified string and return the result as a new string.

StringInString() Function

Returns the first position of a specified string in another string.

Syntax

```
result = StringInString (string, searchfor, startpos, casesens)
```

Parameters

string
This is the string to searched. A literal string, message tagname, or string expression.

searchfor
This is the string that is to be searched for. A literal string, message tagname, or string expression.

startpos
This is the starting position in string of the search. A literal value, numeric tagname, or numeric expression.

casesens
Determines whether the search is case sensitive. Can be 0 or 1, discrete tagname, or Boolean expression.

0 - search is not case sensitive (uppercase and lowercase are considered the same).

1 - search is case sensitive (uppercase and lowercase are considered to be different).

Remarks

Use this function to determine if a certain string is contained in a message tag. You can specify the starting position for the search and whether the letter case is to be respected.

Example(s)

This script returns 5—because the first "M" in "MTX" is in the fifth position of the string:

```
StringInString("DBO MTX-010","MTX",1,0)
```

This script returns 3—because the first "M" in "MTX" is in the third position in the string:

```
StringInString("T-MTX 010 MTX","MTX",1,0)
```

This script returns 11—because the first "M" in "MTX" after the 8th position is in the 11th position in the string:

```
StringInString("T-MTX 010 MTX","MTX",8,0)
```

This script returns 11—because the first string that matches MTX in the correct case is in the 11th position:

```
StringInString("t-mtx 030 MTX", "MTX",1,1)
```

This script returns 0—because there is no "Mty" in the string:

```
StringInString("t-mtx 030 MTY-Mtx","Mty",1,1)
```

StringReplace() Function

Searches for a string within another string and, if found, replaces it with yet another string. You can specify:

- Case-sensitivity - This determines if uppercase letters and lowercase letters are to be treated as identical letters or not.
- Number of occurrences to replace - This is useful if more than one occurrence of the search string is found.
- Match whole words - Use this if the search string is a whole word.

Note: This function does not support double byte character sets.

Syntax

```
result = StringReplace (string, searchfor, replacewith, casesens, numtoreplace,
matchwholewords)
```

Parameters

string
The string to search within. A literal string, message tagname, or string expression.

searchfor
The string that is to be searched for. A literal string, message tagname, or string expression.

replacewith
The string that is used as replacement. A literal string, message tagname, or string expression.

casesens
Determines whether the search is case sensitive. Can be 0 or 1, discrete tagname or Boolean expression.

0 - search is not case sensitive (uppercase and lowercase are considered the same)

1 - search is case sensitive (uppercase and lowercase are considered to be different)

numtoreplace
The number of replacements to make. Set it to -1 to replace all occurrences of the found search string. A literal integer value, integer tagname, or integer expression.

matchwholewords
Determines whether only whole words are matched. Can be 0 or 1, discrete tagname, or Boolean expression.

0 - the function looks for the search string characters anywhere in the string

1 - only whole words are matched

Example(s)

This statement replaces only the first occurrence and returns "MTY 030 MTX".

```
StringReplace("MTX 030 MTX","MTX","MTY",0,1,0)
```

This statement replaces all occurrences and returns "MTY 030 MTY".

```
StringReplace("MTX 030 MTX","MTX","MTY",0,-1,0)
```

This statement replaces all occurrences that match the case and returns "MTY 030 mtx".

```
StringReplace("MTX 030 mtx","MTX","MTY",1,-1,0)
```

This statement replaces all occurrences that are whole words and returns "MTY 030 QMTX".

```
StringReplace("MTX 030 QMTX","MTX","MTY",0,-1,1)
```

Returning Information about Strings

In a script, you can use the StringLen() and StringTest() functions to return the length of a specified string and to test whether a character is in a certain group of characters.

StringLen() Function

Returns the length of a specified string, including non-visible characters.

Syntax

```
result = StringLen (string)
```

Parameters

string
A literal string, message tagname, or string expression.

Example(s)

```
StringLen("Twelve percent") returns 14.
StringLen("12%") returns 3.
StringLen("The end." + StringChar(13)) returns 9.
```

StringTest() Function

Tests whether the first character of a string is in a certain group of characters.

Syntax

```
result = StringTest (string, group)
```

Parameters

string
A literal string, message tagname, or string expression.

group
The number of the group to test the character against. A literal value, integer tagname, or integer expression in the range of 1 to 11.

1 - alphanumeric characters (A-Z, a-z, 0-9)

2 - numeric characters (0-9)

3 - alphabetic characters (A-Z, a-z)

4 - uppercase characters (A-Z)

5 - lowercase characters (a-z)

6 - punctuation characters (ASCII 0x21 - 0x2F), for example !,@,#,$,%,^,&,* and so on

7 - ASCII characters (ASCII 0x00 - 0x7F)

8 - Hexadecimal characters (0-9, A-F, a-f)

9 - Printable characters (ASCII 0x20 - 0x7E)

10 - Control characters (ASCII 0x00 - 0x1F and 0x7F)

11 - White space characters (ASCII 0x09 - 0x0D and 0x20)

Example(s)

This string returns a 1—because "A" is an alphanumeric character:
```
StringTest("ACB123",1)
```

This string returns a 0—because "A" is not a lowercase character:
```
StringTest("ABC123",5)
```

Comparing Strings

In a script, you can use the StringCompare(), StringCompareNoCase() and StringCompareEncrypted() functions to compare two strings.

Use	To
StringCompare()	Make a case-sensitive comparison.
StringCompareNoCase()	Make a case-insensitive comparison.
StringCompareEncrypted()	Compare an encrypted string with an unencrypted string.

StringCompare() Function

Compares two strings with each other and returns a Boolean result (0 = strings are equal). The case of each letter is respected so that, for example, ‘A’ is considered not equal to ‘a’.

Syntax

```
result = StringCompare (string1, string2)
```

Parameters

string1
A literal string, message tagname, or string expression.

string2
A literal string, message tagname, or string expression.

Example(s)

```
StringCompare ("Apple","Apple") returns 0.
StringCompare ("Apple","apple") returns 1.
```

This string compares the two message tags and returns a discrete result (0 or 1):

```
StringCompare (mtag1, mtag2)
```

StringCompareNoCase() Function

Compares two strings with each other and returns an integer result. The case of each letter is not respected so that, for example, 'A' is considered equal to 'a'.

The integer result returns:

- 0 if both strings are identical (ignoring case).
- Non-zero otherwise. The result is the difference of ASCII values between the differentiating character (ignoring case).

Note: The result of the StringCompareNoCase() function can be used as a discrete result, as all non-zero values are considered to equal TRUE in InTouch scripting.

Syntax

```
result = StringCompareNoCase (string1, string2)
```

Parameters

string1
A literal string, message tagname, or string expression.

string2
A literal string, message tagname, or string expression.

Example(s)

This string returns 0—because the strings are considered identical:

```
StringCompareNoCase("Apple","apple")
```

This string returns -6—because the strings are considered not identical and the ASCII values of the first differentiating character "p" minus the ASCII value of the corresponding letter "v" equals -6:

```
StringCompareNoCase("Apple","Avocado")
```

StringCompareEncrypted() Function

Compares an encrypted string with an unencrypted string and returns a Boolean result. You can use this function for password verification. For more information on password encryption, see Animating Objectsin the InTouch® HMI Visualization Guide.

Syntax

```
result = StringCompareEncrypted (plain, encrypted)
```

Parameters

plain
A literal string, message tagname, or string expression.

encrypted
An encrypted message tagname.

Example(s)

This script returns 1 when the plain text and the encrypted text are identical, otherwise it returns 0. Passwd is a message tag containing a value from an encrypted user input. PlainTxt is a message tag against which the user input is to be compared.

```
StringCompareEncrypted(PlainTxt, Passwd)
```

Converting Data Types

In a script, you can convert values contained in tagnames to other data types by using conversion QuickScripts. This allows you to manipulate string data with mathematical functions or to log values to the ArchestrA® Log Viewer for debugging purposes.

- *Text() Function* on page 81
- *StringFromIntg() Function* on page 82
- *StringFromReal() Function* on page 82
- *StringToIntg() Function* on page 83
- *StringToReal() Function* on page 83
- *DText() Function* on page 84

Text() Function

The Text() function returns the value of a number as a string according to a specified format. You may want to do this to format a value in a certain way or to combine the result with other string values for further processing.

Syntax

```
result = Text (number, format)
```

Parameters

number
A literal numeric value, analog tagname, or numeric expression.

format
Use "#", "0", ".", or ",".
Use "#" to represent a digit, "." to represent the decimal separator, "0" to force a leading zero, and "," to insert a comma.
If you use a zero in the format, it must be followed by zeros. All places to the right of the decimal point must always be zeros. For example, 000.00 is correct, while #0#0.0# is incorrect.
The function rounds the value, if necessary. A literal string, message tagname, or string expression.

Example(s)

`Text(66,"#.00")` returns "66.00".

`Text (1234,"#")` returns "1234".

`Text (123.4, "#,##0.0")` returns "123.4".

`Text (12.3, "0,000.0")` returns "0,012.3".

`Text(3.57,"#.#")` returns "3.6".

This script returns the string "Reactor Pressure is 1690.3 mbar" if the analog tagname "pressure" contains the value 1690.2743.

```
"Reactor Pressure is "+Text(pressure,"#.#")+" mbar"
```

StringFromIntg() Function

In a script, you can convert an integer value to a string value by using the StringFromIntg() function.

This function returns the string value of an integer value and performs a base conversion at the same time. This can be used, for example, to show text together with integer values or for converting integer values to hexadecimal numbers.

Syntax

```
result = StringFromIntg (number, base)
```

Parameters

number
A literal integer value, integer tagname, or integer expression.

base
The base of the conversion. This is used for converting the value to a different base, such as binary (2), decimal (10) or hexadecimal (16). A literal integer value, integer tagname, or integer expression.

Example(s)

`StringFromIntg(26,2)` returns "11010" (binary.

`StringFromIntg(26,8)` returns "32"—because
(base 8: 26 = 3*8 + 2)

`StringFromIntg(26,10)` returns "26" (decimal).

`StringFromIntg(26,16)` returns "1A" (hexadecimal).

StringFromReal() Function

In a script, you can convert an real value to a string value by using the StringFromReal() function.

You can also specify to:

- Round the value to a specified precision.
- Pass the value in exponential notation.

This can be used, for example, to show text together with real values or for showing real numbers with exponential notation.

Syntax

```
result = StringFromReal (number, precision, type)
```

Parameters

number
A literal value, analog tagname, or numeric expression.

precision
Specifies how many decimal places are to be used. A literal integer value, integer tagname, or integer expression.

type
Specifies if the exponential notation is to be used. A literal string, message tagname, or string expression.

"f" - Use floating point notation.

"e" - Use exponential notation with lowercase "e".

"E" - Use exponential notation with uppercase "E".

Example(s)

`StringFromReal(263.355, 2,"f")` returns "263.36".

`StringFromReal(263.355, 2,"e")` returns "2.63e2".

`StringFromReal(263.55, 3,"E")` returns "2.636E2".

`StringFromReal(0.5723, 2,"E")` returns "5.72E-1".

StringToIntg() Function

In a script, you can convert a value contained in a string to an integer value by using the StringToIntg() function.

You can use this to read a value contained at the beginning of a string into an integer tag for further mathematical operations.

Syntax

```
result = StringToIntg (string)
```

Parameters

string
A literal string, message tagname, or string expression.

Remarks

The function checks the first character of the string. If it is a number, it attempts to read this and the following characters as an integer number until a non-numeric character is met. The function ignores leading spaces in the string.

Example(s)

`StringToIntg("ABCD")` returns 0.

`StringToIntg("13.4 mbar")` returns 13.

`StringToIntg("Pressure is 13.4")` returns 0.

To extract the first integer from a string (mtag) that is not at the beginning and to store it in the integer tag itag, use the following action script:

```
DIM i AS INTEGER;
DIM tmp AS INTEGER;
FOR i = 1  TO StringLen(mtag)      {run variable i over the characters of mtag}
  tmp = StringASCII(StringMid(mtag, i, 1)) - 48;    {detect ASCII value}
  IF (tmp>=0 AND tmp<10) THEN {if ASCII value represented "0" - "9"}
    itag = StringToIntg(StringMid(mtag, i, 0));    {set itag to value from that
position and exit loop}
    EXIT FOR;
  ENDIF;
NEXT;
```

StringToReal() Function

In a script, you can convert a value contained in a string to a real value by using the StringToReal() function.

You can use this to read a value contained at the beginning of a string into a real tag for further mathematical operations.

Note: This function also supports the exponential notation and converts a string expression 1e+6 correctly to 1000000.

Syntax

```
result = StringToReal (string)
```

Parameters

string
A literal string, message tagname, or string expression.

Remarks

The function checks the first character of the string. If it is a number, it attempts to read this and the following characters as a real number until a non-numeric character is met. The function ignores leading spaces in the string.

To extract the first real number from a string (message tag mtag) that is not at the beginning and store it in the real tag rtag1, use the following script:

```
DIM i AS INTEGER;
DIM tmp AS INTEGER;
FOR i = 1  TO StringLen(mtag)      {run variable i over the characters of mtag}
  tmp = StringASCII(StringMid(mtag, i, 1)) - 48;    {detect ASCII value}
  IF (tmp>=0 AND tmp<10) THEN {if ASCII value represented "0" - "9"}
    rtag = StringToReal(StringMid(mtag, i, 0));    {set rtag to value from that position
and exit loop}
    EXIT FOR;
  ENDIF;
NEXT;
```

Example(s)

```
StringToReal("ABCD") returns 0.
StringToReal("13.4 mbar") returns 13.4.
StringToReal("Pressure is 13.4") returns 0.
```

DText() Function

In a script, you can convert a Boolean value to a string value by using the DText() function. You can use this function to use customized message display animation links.

This function returns different string values depending on the value of a Boolean value.

Syntax

```
result = Dtext (Boolean, stringtrue, stringfalse)
```

Parameters

Boolean
A literal Boolean value, discrete tagname, or Boolean expression.

stringtrue
The string to be returned if Boolean is true. A literal string value, message tagname, or string expression.

stringfalse
The string to be returned if Boolean is false. A literal string value, message tagname, or string expression.

Example(s)

This script returns "Running" if the discrete tagname switch is TRUE, otherwise it returns "Stopped".

```
DText(switch,"Running","Stopped")
```

This script returns the On and Off Messages of another discrete tag switch2 depending on the value of the discrete tag switch1.

```
DText(switch1,switch2.OnMsg,switch2.OffMsg)
```

Working with InTouch Windows at Run Time

In a script, you can control the behavior and appearance of InTouch windows. You can also write a script using QuickScripts to print individual InTouch windows or the entire screen.

Expose Window Name Property

You can use **GetWindowName** script function to help the run-time environment reduce scripting necessary to load windows with the current implementation. It enables you to retrieve the name of the window under which the function has been called.

GetWindowName() Function

Retrieves the name of the window under which the function has been called.

Syntax

The syntax of the script function is as follows:

```
resultcode = GetWindowName(tagname);
```

Resultcode indicates the success or failure of the script function. The resultcode can be a Discrete/Integer/Real data type. Resultcode will be 1 or 0, based on the success or failure of the script function:

- Resultcode is 1 when the script function is called103 from window context.
- Resultcode is 0 when the script function is called from non-window context.

Note: Configuration of the return value for the script function is optional. This is similar to the existing script functions in InTouch.

Parameter

TagName
The tagname is the out parameter for this function. This will be a message tag to retrieve the window name.

The parameter for the function can be any of the following:

- InTouch tag
- Dot field
- Local variable in the script
- Remote tag reference
- Galaxy reference

The default text loaded by the script browser is:

GetWindowName(*TagName*);

Note: "TagName" is a message tag or Remote Tag Reference (RTR) which is of message type.

Return Value

The **GetWindowName** script function returns the window name with the return value of 1 in the following scenarios:

- Window scripts (All Condition Types)
- Push button action scripts (All Condition Types)

The **GetWindowName** script function returns an empty string with return value of 0 in the following scenarios:

- Application scripts
- Key scripts
- Condition scripts
- Data change scripts
- ActiveX event scripts
- Quick script functions (Synchronous and Asynchronous)

Showing a List of Open Windows

In a script, you can show a dialog box containing the list of InTouch windows that are currently open using the OpenWindowsList() function.

OpenWindowList() Function

Shows a dialog box containing the list of InTouch windows that are currently open.

You can not use this function in an animation link.

Syntax

```
[result = ]OpenWindowsList();
```

Example(s)

This script opens the **Open Windows List** dialog box and shows all InTouch windows that are currently open.

```
OpenWindowsList()
```

Note: When the **Use In-Memory Window Cache** WindowViewer option is enabled, closed windows may appear in the list created by the OpenWindowList() function.

Checking If a Window is Open, Closed, or Exists

In a script, you check if an InTouch window is open, is closed, or does not exist by using the WindowState() function.

WindowState() Function

Checks if an InTouch window is open, is closed, or does not exist.

Syntax

```
result = WindowState (windowname)
```

Parameters

windowname
Name of the window. A literal string value, message tagname, or string expression.

Return Value

An integer value with the following meaning:

0 - InTouch window exists and is currently closed

1 - InTouch window exists and is currently open

2 - InTouch window does not exist

Example(s)

This script returns 0, if the InTouch window Main exists, but is not open.

```
WindowState("Main")
```

Opening InTouch Windows

In a script, you can open an InTouch window by using one of the following QuickScript functions:

Use	To
Show	Open an InTouch window at the position defined in its location settings.
ShowAt()	Open an InTouch window at a specified position. The opened window is centered on the position. This function can also be used to move an opened window.
ShowHome	Open the InTouch window(s) you specified in the **Home Windows** tab in the WindowViewer **Properties** dialog box and closes any other windows.
ShowTopLeftAt()	Open an InTouch window at a specified position. The opened window aligns its top left corner to the position. This function can also be used to move an opened window.

Show() Function

Opens an InTouch window at its default position.

Syntax

```
Show windowname
```

Parameters

windowname
The name of the window to be opened. A literal string value, message tagname, or string expression.

Example(s)

This script opens the window Main.

```
Show "Main";
```

This script opens the window with the name that is stored in the wname message tag.

```
Show wname;
```

ShowAt() Function

Opens an InTouch window at a specified position. It also can move an already open InTouch window to a specified position. The position is the center point of the window.

Note: The window will not be centered if one of its edges is off-screen.

Syntax

```
ShowAt (windowname, xpos, ypos)
```

Parameters

windowname
The name of the window to be opened or moved.

xpos
The horizontal position in pixels that the window center is to be moved to. A literal value, analog tagname, or numeric expression.

ypos
The vertical position in pixels that the window center is to be moved to. A literal value, analog tagname, or numeric expression.

Example(s)

This script opens the window Main so that it is centered at the position x:450, y:130.

```
ShowAt("Main",450,130);
```

This script opens the window called UserDialog and positions it, so that its center is over the center position of the object that called this function (for example a button).

```
ShowAt("UserDialog",$ObjHor,$ObjVer);
```

ShowHome() Function

Opens the InTouch window(s) you specified in the **Home Windows** tab in the WindowViewer **Properties** dialog box and closes any other windows.

Syntax

```
ShowHome;
```

ShowTopLeftAt() Function

Opens an InTouch window at a specified position. Can also be used to move an open window.

Syntax

```
ShowTopLeftAt (windowname, xpos, ypos)
```

Parameters

The name of the window to be opened or moved.

xpos
The horizontal position in pixels that the window left edge is to be moved to. A literal value, analog tagname, or numeric expression.

ypos
The vertical position in pixels that the window top edge is to be moved to. A literal value, analog tagname, or numeric expression.

Example(s)

This script opens the window Main so that its top left corner is positioned at x:450, y:130.

```
ShowTopLeftAt("Main",450,130);
```

Moving and Resizing a Window

In a script, you can move and resize an opened InTouch window with the WWMoveWindow() function. The new position and new size apply temporarily while the specified window is open.

WWMoveWindow() Function

Moves and resizes an opened InTouch window to a specified position and specified size. The new position and new size apply temporarily while the specified window is open.

Syntax

```
WWMoveWindow (windowname, xpos, ypos, xsize, ysize)
```

Parameters

windowname
The name of the window to be opened or moved.

xpos
The horizontal position in pixels that the window left edge is to be moved to. A literal value, analog tagname, or numeric expression.

ypos
The vertical position in pixels that the window top edge is to be moved to. A literal value, analog tagname, or numeric expression.

xsize
The horizontal size in pixels for the specified window. A literal value, analog tagname, or numeric expression.

ysize
The vertical size in pixels for the specified window. A literal value, analog tagname, or numeric expression.

Hiding InTouch Windows

In a script, you can hide InTouch windows by using either of the following functions.

Use	To
Hide	Hide a specified window.
HideSelf	Hide the currently active window.

Hide() Function

Hides (closes) an InTouch window.

Syntax

```
Hide windowname;
```

Parameters

windowname
The name of the window to be hidden. A literal string value, message tagname, or string expression.

Example(s)

This script hides the window called UserConfirmation.

```
Hide "UserConfirmation";
```

HideSelf() Function

Hides (closes) the currently active InTouch window.

Note: This function can only be used in an action QuickScript.

Syntax

```
HideSelf;
```

Example(s)

```
HideSelf;
```

Changing the Color of a Window

In a script, you can change the color of an open InTouch window by using the ChangeWindowColor() function.

ChangeWindowColor() Function

Changes the color of an open InTouch window and returns a result code.

Syntax

```
Result = ChangeWindowColor (windowname, rValue, gValue, bValue)
```

Parameters

windowname
The name of the window for which the color is to be changed. A literal string value, message tagname, or string expression.

rValue
The intensity of the red color. A literal integer value, integer tagname, or integer expression in the range of 0 to 255.

gValue
The intensity of the green color. A literal integer value, integer tagname, or integer expression in the range of 0 to 255.

bValue
The intensity of the blue color. A literal integer value, integer tagname, or integer expression in the range of 0 to 255.

Return Value

A value with the following meaning:

0 - Failure, window is not defined or RGB value is out of range.

1 - Success.

2 - Failure. The window exists, but it is not open.

Printing Windows at Run Time

In a script, you can print individual InTouch windows or the entire WindowViewer screen by using the PrintWindow() or PrintScreen() functions. You can also set the printer you want to use with the SetWindowPrinter() function.

SetWindowPrinter() Function

At run time, you can set the printer you want to use with the SetWindowPrinter() function.

Note: The printer set with this function is also the printer that is used with the PrintHT() function.

Syntax

```
SetWindowPrinter (printername)
```

Parameters

printername
The name of the printer, either as network share or as printer name as it appears in its property window. A literal string value, message tagname, or string expression.

Example(s)

In this example, PRTSRV1 is the node name and PRT22SW1 is the share name given to the printer.

```
SetWindowPrinter("\\PRTSRV1\PRT22SW1");
```

In this example, Epson LX-300 is the name of the printer as seen in the Properties window of the printer.

```
SetWindowPrinter("Epson LX-300");
```

In this example, MyPrinter is a message tag containing the name of an installed windows printer or the path to a shared network printer.

```
SetWindowPrinter(MyPrinter);
```

Recommendations for Printing

The following list contains some issues to consider when printing. These are applicable to printing a single window or printing the WindowViewer screen.

- Open the window(s) to be printed before printing it. Otherwise Windows and ActiveX Controls may not print correctly.
- You cannot print to the same printer that is currently printing alarms.
- Avoid overlapping of windows and objects on the window when printing.
- Use True Type fonts whenever possible. The default InTouch font (System) is not a True Type font.
- For faster printing consider using a white background, fewer objects, and text instead of graphics.
- WindowViewer waits a certain amount of time before the window is sent to the printer queue. During this time, WindowViewer updates any I/O values for that window in the background. To change this waiting time, open the intouch.ini file and change or add the following line (in milliseconds):
  ```
  PrintWindowWait=10000
  ```

PrintWindow() Function

In a script, you can print an InTouch window with the PrintWindow() function.

Note: Scripts containing the PrintWindow() function cannot print the following Industrial graphic controls within an InTouch window: ListBox, DateTimePicker, CalenderControl, EditBox, CheckBox, RadioButtonGroup, ComboBox, AlarmClient or TrendClient.

Syntax

```
[result = ] PrintWindow (windowname, leftmargin, topmargin, width, height,
options);
```

Parameters

windowname
The name of the window to be printed. A literal string value, message tagname, or string expression.

leftmargin
Left margin offset (in inches). A literal numeric value, analog tagname, or numeric expression.

topmargin
Top margin offset (in inches). A literal numeric value, analog tagname, or numeric expression.

width
Printout width (in inches). Set this value to 0 for largest aspect ratio. A literal numeric value, analog tagname, or numeric expression.

height
Printout height (in inches). Set this value to 0 for largest aspect ratio. A literal numeric value, analog tagname, or numeric expression.

options
A discrete value, 0 or 1, that is only used if width and height are 0. A literal Boolean value, discrete tagname or Boolean expression. Set to:

1 - The window is printed with the largest aspect ratio that is an integer multiple of the window size.

0 - The window is printed with the largest aspect ratio that fits on the page.

Note: If the window contains a bitmap, set options to 1 to prevent the bitmap from being stretched.

Return Value

0 - Printing job is not queued successfully, or window does not exist

1 - Printing job is queued successfully

PrintScreen() Function

You can write a script to print the entire WindowViewer screen with the PrintScreen() function.

Syntax

```
PrintScreen (ScreenOption, PrintOption)
```

Parameters

ScreenOption
Determines how much of the WindowViewer screen is to be printed. A literal integer value, integer tagname, or integer expression.

1 - Print the client area, no menus (default)

2 - Print the entire window area, including menus

PrintOption
Determines how the printed image is to be stretched to fit on the printout.

- 1 - Best Fit:
  image is stretched so that it fits either horizontally or vertically on the printout without changing the aspect ratio. (default)
- 2 - Vertical Fit:
  image is stretched so that it fits vertically on the printout without changing the aspect ratio. The image may be cut off horizontally.
- 3 - Horizontal Fit:
  image is stretched so that it fits horizontally on the printout without changing the aspect ratio. The image may be cut off vertically.
- 4 - Stretch to Page:
  image is stretched so that it fits horizontally and vertically on the printout. The aspect ratio may change but the image is not truncated.
- Invalid options, including 0, default to Best Fit.

Note: Popup windows that extend beyond the WindowViewer screen area are cut off.

Example(s)

This script sends a printout of the current entire WindowViewer screen area without menus to the printer queue. The printout contains the screen area stretched so that it fills the printout dimensions.

```
PrintScreen(1,4);
```

PrintHT() Function

In a script, you can create a button to print the historical trend by linking it to an action QuickScript that executes the PrintHT QuickScript function.

Use the PrintWindow() function instead of the PrintHT() function when you want to print the entire window instead of just the trend chart.

Note: Printing the Historical Trend using the Print option or the PrintHT() function will not print the x & y values. Use PrintWindow() or PrintScreen() to print the x & y values.

Syntax

```
PrintHT(HistTrendTagname);
```

Parameter

HistTrendTagname
The history trend tag name for the history trend to be printed.

Starting Tag Viewer

Tag Viewer is a run-time application that allows you to watch and monitor tags and to modify tag values. For information about Tag Viewer and its use, see the InTouch HMI Tag Viewer Guide.

LaunchTagViewer() Function

You can start Tag Viewer only when WindowViewer is running, and only after Tag Viewer has been enabled in WindowMaker.

For information about enabling Tag Viewer, see Configuring General WindowViewer Properties in the *InTouch® HMI Application Management and Extension Guide.*

Syntax

```
LaunchTagViewer()
```

Remarks

The LaunchTagViewer() function can be executed from any script type except the application scripts OnStartup and OnShutdown.

If Tag Viewer has not been enabled in WindowMaker, calling the function will not start Tag Viewer and a warning message will appear in the logger.

You must have adequate security privileges to start Tag Viewer.

Working with Date and Time Information

In a script, you can use system tags and QuickScript functions to use system time and date settings in calculations. InTouch scripting also supports calculations involving multiple time zones and Daylight Saving Time.

Retrieving Numerical Date and Time Information

In a script, you can use a variety of numerical system tags and one script function to retrieve information on the system time and date. These tags and the script function can be used in other mathematical operations. The following system tags and script functions are available:

Use	To
$Year	Return the current year.

Use	To
$Month	Return the current month of the year.
$Day	Return the current day of the month.
$Hour	Return the current hour of the day.
$Minute	Return the current minute of the hour.
$Second	Return the current second of the minute.
$Msec	Return the current milliseconds.
$Time	Return the time in milliseconds that have passed since midnight in the local time zone.
$Date	Return the number of whole days that have passed since the 1st January 1970 in the local time zone.
$DateTime	Return the number of days (including fractions of a day) that have passed since the 1st January 1970 in the local time zone.
DateTimeGMT()	Return the number of days (including fractions of a day) that have passed since the 1st January 1970 in Coordinated Universal Time (UTC).

$Year System Tag

Returns the current year number.

Syntax

```
$Year
```

Data Type

```
Integer (read only)
```

Example(s)

This script assigns the string "Welcome to xxxx" to the string Welcome where xxxx is the current year.

```
Welcome = "Welcome to " + StringFromIntg($Year,10)
```

$Month System Tag

Returns the current month number.

Syntax

```
$Month
```

Data Type

```
Integer (read only)
```

Example(s)

This script assigns the string "October" to the string MonthName if the current month is 10.

```
IF $Month==10 THEN
   MonthName="October";
ENDIF;
```

$Day System Tag

Returns the current day of the month.

Syntax

```
$Day
```

Data Type

```
Integer (read only)
```

Example(s)

This script assigns the string "It is a leap year!" to the string Msg2User if the current date is the 29th February.

```
IF $Day==29 AND $Month==2 THEN
   Msg2Usr="It is a leap year!";
ENDIF;
```

$Hour System Tag

Returns the current hour of the day.

Syntax

```
$Hour
```

Data Type

```
Integer (read only)
```

Example(s)

This script checks if it is 8 PM and the backup has not run yet (expressed by the discrete tag BackupAlreadyRun), and if so, calls a QuickFunction script called RunBackup() and sets the BackupAlreadyRun flag to TRUE.

```
IF $Hour==20 AND BackupAlreadyRun==0 THEN
   CALL RunBackup();
   BackupAlreadyRun=1;
ENDIF;
```

$Minute System Tag

Returns the current minute of the hour.

Syntax

```
$Minute
```

Data Type

```
Integer (read only)
```

Example(s)

This script checks if it is 4:50 PM and if so, shows the window with the name Shift End.

```
IF $Minute==50 AND $Hour==16 THEN
   Show "Shift End";
ENDIF;
```

$Second System Tag

Returns the current second of the minute.

Syntax

```
$Second
```

Data Type

```
Integer (read only)
```

Example(s)

This script generates a sine wave function with an amplitude of 100 and a period of one minute.

```
100*Sin(6*$Second)
```

This script generates a series of 0's and 1's that change every second.

```
$second.00
```

$Msec System Tag

Returns the current milliseconds.

Note: By default the InTouch updates all tags every 1000 milliseconds. Because of this, the $Msec system tag seems not to change. If you increase the rate of update in the WindowViewer properties, you can see the $Msec tag updating.

Syntax

```
$Msec
```

Data Type

```
Integer (read only)
```

$Time System Tag

Returns the number of milliseconds that have passed since midnight in local time.

Syntax

```
$Time
```

Data Type

```
Integer (read only)
```

Example(s)

This script returns the number of seconds that have passed since midnight.

```
$Time/1000
```

$Date System Tag

Returns the number of whole days that have passed since the 1st January 1970.

Syntax

```
$Date
```

Data Type

```
Integer (read only)
```

Example(s)

This script returns the current time.

```
StringFromTime(($Date*86400)+($Time/1000),3);
```

$DateTime System Tag

Returns the number of days (including fractions) that have passed since the 1st January 1970.

Syntax

```
$DateTime
```

Data Type

```
Real (read only)
```

Example(s)

This script returns the current time.

```
StringFromTime($DateTime*86400,3);
```

DateTimeGMT() Function

Returns the number of days (including fractions of a day) that have passed since the 1st January 1970 in Coordinated Universal Time (UTC).

Note: This function cannot be used in animation display links.

Syntax

```
result = DateTimeGMT();
```

Return Value

Number of days since 1st January 1970 in UTC. A literal real value.

Example(s)

This script returns the current date/time in UTC.

```
StringFromTime(DateTimeGMT() * 86400.0, 3);
```

Retrieving String Date and Time Information

In a script, you can retrieve date and time information as strings. This is useful for showing date or time on the screen or when calculations on whole time/date strings are required.

You can use the following system tags and the script function.

Use	To
$DateString	Return the system date in short format.
$TimeString	Return the system time.
UTCDateTime	Return the UTC time and/or date and the time zone of the local computer.

$DateString System Tag

Returns the system date in short format as defined in the Regional Settings of the local operating system.

Syntax

```
$DateString
```

Data Type

```
String (read only)
```

Example(s)

This script may return 4/28/2006 depending on the short date format setting in the Regional Settings of the operating system.

```
$DateString
```

$TimeString System Tag

Returns the system time as defined in the Regional Settings of the local operating system.

Syntax

```
$TimeString
```

Data Type

```
String (read only)
```

Example(s)

This script may return 02:40:37 PM depending on the time format setting in the Regional Settings of the operating system.

```
$TimeString
```

UTCDateTime() Function

Returns the UTC time, the UTC date and time, or the local time zone.

Syntax

```
result = UTCDateTime (format)
```

Parameters

format
Determines what content is returned. A literal string value, message tagname, or string expression with the following possible values:

UTC_SHORT - the function returns the UTC time

UTC_LONG - the function returns the UTC date and time

UTC_LOCAL - the function returns the name of the time zone as set in the time zone settings of the local operating system

Any other values return the UTC date and time in default format (ddd mm dd hh:mm:ss yyyy).

Example(s)

At 09:24 AM Monday January 6th 2003 in the Pacific time zone, the UTCDateTime() function returns the following.

This script returns 17:24:05

```
UTCDateTime("UTC_SHORT")
```

This script returns 01/06/2003 17:24:05

```
UTCDateTime("UTC_LONG")
```

This script returns Pacific Standard Time -8:0: 1

```
UTCDateTime("UTC_LOCAL")
```

This script returns Mon Jan 06 17:24:05 2003.

```
UTCDateTime("Invalid")
```

Converting Date and Time Information to Strings

In a script, you can convert date and time information to strings for easier interpretation and display requirements. You can use the following functions.

Use	To
StringFromTime()	Convert a UTC timestamp to local time and to return as a time string.
wwStringFromTime()	Convert a local time timestamp to UTC time and returns it as a time string.
StringFromTimeLocal()	Convert a timestamp as a time string.

StringFromTime() Function

Converts a timestamp given in UTC time to local time and returns the result as a string. This function takes Daylight Saving Time into account.

Note: This function is equivalent to the StringFromGMTTimeToLocal() function.

Syntax

```
result = StringFromTime (timestamp, format)
```

Parameters

timestamp
The number of seconds that have passed since midnight of the 1st January 1970 in the UTC time zone. A literal integer value, integer tagname, or integer expression.

format
Determines how the string result is shown. A literal integer value, integer tagname, or integer expression in the range from 1 to 5 with following meaning:

1 - Shows the date according to the format set in the Regional Settings of the local operating system

2 - Shows the time according to the format set in the Regional Settings of the local operating system

3 - Shows the date and time as a 24 character string (ddd mmm dd hh:mm:ss yyyy)

4 - Shows the day of the week in short form

5 - Shows the day of the week in long form

Example(s)

This example assumes that the time zone on the local node is Pacific Standard Time (PST, UTC-0800). The UTC time passed to the function is 12:00:00 AM on Friday, January 2, 1970. Since PST is 8 hours behind UTC, the function returns the following results.

This script returns "1/1/70"
```
StringFromTime(86400,1)
```

This script returns "04:00:00 PM"
```
StringFromTime(86400,2)
```

This script returns "Thu Jan 01 16:00:00 1970"
```
StringFromTime(86400,3)
```

This script returns "Thu"
```
StringFromTime(86400,4)
```

This script returns "Thursday"
```
StringFromTime(86400,5)
```

wwStringFromTime() Function

Converts a timestamp given in local time to UTC time and returns the result as a string. This function takes Daylight Saving Time into account.

Syntax

```
result = wwStringFromTime (timestamp, format)
```

Parameters

timestamp
The number of seconds that have passed since midnight of January 1, 1970 in the local time zone. A literal integer value, integer tagname, or integer expression.

format
Determines how the string result is shown. A literal integer value, integer tagname, or integer expression in the range from 1 to 5 with following meaning:

1 - Shows the date according to the format set in the Regional Settings of the local operating system

2 - Shows the time according to the format set in the Regional Settings of the local operating system

3 - Shows the date and time as a 24 character string (ddd mmm dd hh:mm:ss yyyy)

4 - Shows the day of the week in short form

5 - Shows the day of the week in long form

Example(s)

This example assumes that the time zone on the local node is Pacific Standard Time (PST, UTC-0800). The local time passed to the function is 04:00:00 PM on Thursday, January 1, 1970. Since PST is 8 hours behind UTC, the function returns the following results.

This script returns "1/2/70"

```
wwStringFromTime(57600,1)
```

This script returns "12:00:00 AM"

```
wwStringFromTime(57600,2)
```

This script returns "Fri Jan 02 00:00:00 1970"

```
wwStringFromTime(57600,3)
```

This script returns "Fri"

```
wwStringFromTime(57600,4)
```

This script returns "Friday"

```
wwStringFromTime(57600,5)
```

StringFromTimeLocal() Function

Converts a timestamp to a time and returns the result as a string.

Syntax

```
result = StringFromTimeLocal (timestamp, format)
```

Parameters

timestamp
The number of seconds that have passed since midnight of January 1, 1970. A literal integer value, integer tagname, or integer expression.

format
Determines how the string result is shown. A literal integer value, integer tagname, or integer expression in the range from 1 to 5 with following meaning:

1 - Shows the date according to the format set in the Regional Settings of the local operating system

2 - Shows the time according to the format set in the Regional Settings of the local operating system

3 - Shows the date and time as a 24 character string (ddd mmm dd hh:mm:ss yyyy)

4 - Shows the day of the week in short form

5 - Shows the day of the week in long form

Example(s)

This script returns "1/2/70"

```
StringFromTimeLocal(86400,1)
```

This script returns "12:00:00 AM"

```
StringFromTimeLocal(86400,2)
```

This script returns "Fri Jan 02 00:00:00 1970"

```
StringFromTimeLocal(86400,3)
```

This script returns "Fri"

```
StringFromTimeLocal(86400,4)
```

This script returns "Friday"

```
StringFromTimeLocal(86400,5)
```

Checking the Daylight Savings Time Status

In a script, you can check if daylight savings time is active by using the wwIsDaylightSaving() function.

wwIsDaylightSaving() Function

Returns whether daylight savings time is currently active.

Syntax

```
result = wwIsDaylightSaving()
```

Return Value

A Boolean value with following meaning:

0 - Daylight savings time is not active.

1 - Daylight savings time is active.

Interacting with Other Applications

In a script, you can interact with other Windows applications by using various QuickScripts. For example, you can:

- Start an application, such as Notepad.
- Check an application title name.
- Check if a certain application is running.
- Activate a running application.
- Simulate keyboard strokes.
- Close, minimize or maximize an application window.
- Execute commands and exchange data with applications that support DDE.

Starting a Windows Application

In a script, you can start a Windows application using the StartApp command.

Syntax

```
StartApp appname;
```

Parameters

appname
Path and file name of the application you want to start. A literal string value, message tagname, or string expression.

Note: You need to know the path and file name of the application. If the application is in a directory that is part of the Windows PATH environment variable, you only need to pass the file name (without path).

Example(s)

This script starts Microsoft Calculator.

```
StartApp "calc"
```

Retrieving the Application Title of a Running Application

In a script, you can find the application title or Windows task list name of a specified running application by using the InfoAppTitle() function. This information is, for example, required by InTouch scripting for checking if the specified application is currently running or for activating it.

Note: This function will not return a value for Internet Explorer. As a workaround, use the Google Chrome browser.

InfoAppTitle() Function

Returns the application title or Windows task list name of a specified application that is running.

Syntax

```
result = InfoAppTitle (appname)
```

Parameters

appname
Name of the application without the .exe extension. A literal string value, message tagname, or string expression.

Example(s)

This script returns "Calculator"

```
InfoAppTitle("calc")
```

This script returns "Microsoft Excel"

```
InfoAppTitle("excel")
```

Checking If an Application is Running

In a script, you can check if a specific application is already running by using the InfoAppActive() function. You need to know the application title or Windows task list name first to be able to check if the specific application is running.

InfoAppActive() Function

Returns the running status of an application.

Syntax

```
result = InfoAppActive (apptitle)
```

Parameters

apptitle
The application title or Windows task list of the application for which you want to query the running status. A literal string value, message tagname, or string expression.

Return Value

A Boolean value indicating:

0 - The application is not running

1 - The application is running

Example(s)

This script queries for the application Notepad, and if it is already running, activates it. Otherwise it launches a new instance of Notepad. This way launching Notepad multiple times is avoided.

```
IF InfoAppActive(InfoAppTitle("Notepad"))==1
THEN
   ActivateApp InfoAppTitle( "Notepad" );
ELSE
   StartApp "Notepad";
ENDIF;
```

Activating a Running Windows Application

In a script, you can activate a running Windows application by using the ActivateApp() function. This brings the specified application to the foreground and gives it focus.

You need to do the following before activating a running Windows application:

- Find the application title or Windows task list name. See *Retrieving the Application Title of a Running Application* on page 102.
- Ensure the Windows application is running. See *Checking If an Application is Running* on page 102.

ActivateApp Function

Activates an already running Windows application.

Important: The ActivateApp() function does not work on 64-bit versions of the Windows operating system.

Syntax

```
ActivateApp apptitle;
```

Parameters

apptitle
The application title or Windows task list name of the running application you want to activate.

Example(s)

This script checks if a command prompt window is already open, and if so, activates it. Otherwise it starts the command prompt window.

```
IF InfoAppActive( InfoAppTitle("cmd")) == 1 THEN
   ActivateApp InfoAppTitle("cmd");
ELSE
   StartApp "cmd";
ENDIF;
```

Sending Simulated Key Strokes to an Application

In a script, you can simulate pressing a sequence of keys on the keyboard. You can use this, for example, to:

- Enter data automatically in an open application.
- Control any application (including the InTouch HMI).

SendKeys Function

Simulates a sequence of key strokes.

Important: The SendKeys() function does not work on 64-bit versions of the Windows operating system.

Syntax

```
SendKeys sequence;
```

Parameters

sequence
The sequence of keys strokes to be simulated. A literal string value, message tagname, or string expression.
In addition to regular characters on the keyboard (such as alphanumeric characters) you can also specify control keys as a code:

```
{BACKSPACE} - Simulates the Backspace key
{BREAK} - Simulates the Break key
{CAPSLOCK} - Simulates the Caps Lock key
{DELETE} - Simulates the Delete key (or {DEL})
{DOWN} - Simulates Arrow Down key
{END} - Simulates the End key
{ENTER} - Simulates the Enter key (or ~)
{ESCAPE} - Simulates the ESC key (or {ESC})
{F1} .. {F12} - Simulate the F1 .. F12 keys
{HOME} - Simulates the Home key
{INSERT} - Simulates the Insert key
{LEFT} - Simulates the Arrow Left key
{NUMLOCK} - Simulates the Num Lock key
{PGDN} - Simulates the Page Down Key
{PGUP} - Simulates the Page Up key
{PRTSC} - Simulates the Print Screen key
{RIGHT} - Simulates the Arrow Right key
{TAB} - Simulates the Tab key
{UP} - Simulates the Up key
+ - Simulates the Shift key
use with parenthesis surrounding the key(s) you want to press in combination
with the Shift key.
^ - Simulates the Ctrl key
use with parenthesis surrounding the key(s) you want to press in combination
with the Ctrl key.
% - Simulates the Alt key
use with parenthesis surrounding the key(s) you want to press in combination
with the Alt key.
```

Remarks

Use the StartApp and/or ActivateApp() commands to activate another application before sending simulated keys strokes to it.

Example(s)

This script simulates pressing the B key.

```
SendKeys "b";
```

This script simulates pressing the key combination Ctrl and P, which can be used to initiate the Printing dialog box in another application.

```
SendKeys "^(p)";
```

This script simulates pressing F1 (which may open the help function), pressing the Tab key (which may place the cursor in a search field), entering HAL, and pressing the Enter key (which may initiate the search).

```
SendKeys "{F1}{TAB}HAL{ENTER}";
```

This script simulates pressing Ctrl, Shift and the key 1, which is the same as switching to WindowMaker. This powerful combination can be used for developing self-modifying (dynamic) InTouch HMI applications.

```
SendKeys "^(+(1))";
```

Closing, Minimizing or Maximizing a Windows Application

In a script, you can close, minimize, or maximize another Windows application by using the WWControl() command.

You need to do the following before closing, minimizing or maximizing a Windows application:

- Find its application title or Windows task list name. See *Retrieving the Application Title of a Running Application* on page 102.
- Make sure that the Windows application is running. See *Checking If an Application is Running* on page 102.

WWControl() Function

Restores, minimizes, maximizes, or closes a Windows application.

Syntax

```
WWControl (apptitle, control);
```

Parameters

apptitle
The application title or Windows task list name of the running application you want to restore, minimize, maximize or close. A literal string value, message tagname, or string expression.

control
Determines the action you want to take on the specified Windows application. A literal string value, message tagname, or string expression with following values:

Restore - activates and shows the application window

Minimize - activates and minimizes the application window

Maximize - activates and maximizes the application window

Close - closes the application

Remarks

To use this function in Windows Server 2003, you must be a member of the Administrators group, the Performance Log Users group, or the Performance Monitor Users group on the local computer or you must have been delegated the appropriate authority to write to the registry.

Example(s)

This script restores the calculator application if it is already running.

```
WWControl ("Calculator","Restore");
```

This script closes the WindowViewer.

```
WWControl (InfoAppTitle("View"),"Close");
```

Executing Commands and Exchanging Data using DDE

You can write a script to interact with applications that support DDE.

Use	To
WWExecute()	Send and execute commands.
WWRequest()	Read data from DDE items.
WWPoke()	Write data to DDE items.

WWExecute() Function

Sends a command to an application, executes it, and returns a status result. You can use it to have Excel to run a macro.

Important: The WWExecute() function does not work on 64-bit versions of the Windows operating system.

Syntax

```
Result = WWExecute (appname, topic, command)
```

Parameters

appname
The name of the application the command is sent to. A literal string value, message tagname, or string expression.

topic
The name of the topic within the application that the command is sent to. A literal string value, message tagname, or string expression.

command
The command to be sent. A literal string value, message tagname, or string expression.

Return Value

A value of-1, 0, or 1 indicating the following:
-1 - command not executed successfully. Possible causes are the application not running, the topic does not exist or the command contains an error.
0 - command not executed successfully because the application is busy.
1 - command executed successfully.

Example(s)

This script instructs Microsoft Excel to execute the macro Macro1 by sending the command [Run("Macro1",0)] to Excel.

```
Macro="Macro1";
Command="[Run(" + StringChar(34) + Macro + StringChar(34) + ",0)]";
WWExecute("excel","system",Command);
```

WWRequest() Function

Reads data from an item of an application. You can use it, for example, to read the value of a spreadsheet cell in Microsoft Excel.

Important: The WWRequest() function does not work on 64-bit versions of the Windows operating system.

Syntax

```
Result = WWRequest(appname, topic, item, messagetag)
```

Parameters

appname
The name of the application. A literal string value, message tagname, or string expression.

topic
The name of the topic within the application. A literal string value, message tagname, or string expression.

item
The name of the item belonging to the topic and application. A literal string value, message tagname, or string expression.

messagetag
A message tagname to retrieve the value of the item. The message tagname value can be converted into an integer or real value by using the StringToIntg() or StringToReal() functions.

Return Value

A value of -1, 0, or 1 indicating the following:
-1 - data not read successfully. Possible causes are the application not running or the topic or item do not exist.
0 - data not read successfully because the application is busy.
1 - data read successfully.

Example(s)

This script reads the value contained in Microsoft Excel book Book1.xls, sheet Sheet1 in Row 1, Column 1 to the message tagname MTag and puts the value in the real tagname CellValue.

```
Result = WWRequest("excel","[Book1.xls]sheet1", "r1c1",Mtag);
CellValue=StringToReal(MTag);
```

If you are using a non-English operating system, you may need to use the StringReplace() function to change the contents of *MTag* before converting it to a different data type. For example, for operating systems that use a comma as a decimal separator, you may need to replace all commas with decimal dots in *MTag* before converting it to a real data type.

WWPoke() Function

Writes data to an item of an application. You can use it, for example, to write the value into a spreadsheet cell in Excel.

Important: The WWPoke() function does not work on 64-bit versions of the Windows operating system.

Syntax

```
result = WWPoke (appname, topic, item, string)
```

Parameters

appname
The name of the application. A literal string value, message tagname, or string expression.

topic
The name of the topic within the application. A literal string value, message tagname, or string expression.

item
The item name belonging to the topic and application. A literal string value, message tagname, or string expression.

string
The value to be written. A literal string value, message tagname, or string expression. You can use the StringFromIntg(), StringFromReal() or Text() functions to convert the value of an integer or real tagname to a message tagname.

Return Value

A value of-1, 0, or 1 indicating the following:
-1 - data not written successfully. Possible causes are the application not running or the topic or item do not exist.
0 - data not written successfully because the application is busy.
1 - data written successfully.

Remarks

Do not use the WWPoke() or WWRequest() function to read and write data between InTouch applications on different nodes or sessions. To read and write data between InTouch applications, use Access Names instead. See Setting Up Access Namesin the InTouch® HMI Data Management Guide.

Example(s)

This script puts the value of the real tagname CellValue in the message tagname Mtag and writes the value to the spreadsheet cell Row 1, Column 1 of sheet Sheet1 in Microsoft Excel book Book1.xls.

```
MTag = Text(CellValue,"0");
Result = WWPoke("excel","[Book1.xls]sheet1", "r1c1",Mtag);
```

Working with Files

You can write a script using various file management and access operations.

Use	To
FileCopy()	Copy files.
FileDelete()	Delete files.
FileMove()	Move files.
FileReadFields(), FileWriteFields()	Read/write csv data.
FileReadMessage(), FileWriteMessage()	Read/write text data.

Managing Files

In a script, you can copy, delete or move files.

FileCopy() Function

Copies a source file to a destination file and returns a status result. This function may take a longer time to execute and is executed in multiple stages:

1. FileCopy() function is called and an immediate result is returned, indicating success or failure of the file copy initialization.
2. FileCopy() function executes the copy procedure in the background, and InTouch scripting continues execution while the file copying is in progress. You can monitor the file copying progress with an integer tag.
3. FileCopy() function returns a file copy result, indicating success or failure of the file copy procedure.

If the destination folder is not available (i.e. another computer on the network), the function waits for up to 10 seconds to time out, and then posts a message in the Logger.

Note: Do not use the FileCopy() function in asynchronous QuickFunctions.

Syntax

```
result = FileCopy (sourcefile, destfile, progresstag)
```

Parameters

sourcefile
Full path and file name of the file to be copied. A literal string value, message tagname, or string expression. You can use the wildcard characters (* and ?) in this parameter to copy just files matching a specified criteria. The path name can also be a UNC path name.

destfile
Full path and file name (or just path name) of the destination. A literal string value, message tagname, or string expression. The path name can also be a UNC path.

progresstag
Name of an integer tag enclosed in double quotes that will contain a value indicating the file copy progress. A literal string value, message tagname (such as a message tag containing the value "IntTag.Name") or string expression. The values have following meaning:
0 - FileCopy() procedure is still in progress.
1 - FileCopy() procedure has completed successfully.
-1 - FileCopy() procedure completed with errors.

Return Value

A value of -1, 0, or 1 indicating the following:
1 - FileCopy() function successfully called.
0 - Error when calling the FileCopy() function because another FileCopy() procedure is already in progress.
-1 - Error when calling the FileCopy() function because of a non-existent source file or the destination is read only.

Example(s)

This script copies the file c:\MyData\output.log to the directory d:\archive and renames the file to output.txt. The progress of the file copy is written to the integer tag Monitor.

```
Status=FileCopy("c:\MyData\output.log","d:\archive\output.txt","Monitor");
```

This script copies all files with file ending .txt in the c:\ root directory to the destination directory c:\Backup.

```
Status=FileCopy("c:\*.txt", "c:\Backup", "Monitor");
```

This script copies a file whose full path and file name is contained in the message tag LogFile to the destination directory c:\results\ and renames it to logxxx.txt where xxx is a timestamp.

```
Status=FileCopy(LogFile, "c:\results\log" + $DateString + $TimeString + ".txt",
"Monitor");
```

FileDelete() Function

Deletes an individual file.

Syntax

```
result = FileDelete (filename)
```

Parameters

filename
The path name and file name of the file to delete. A literal string value, message tagname, or string expression. UNC path names are supported.

Remarks

Do not use the wildcard characters (* and ?) with the FileDelete() function and do not use the FileDelete() function in asynchronous QuickFunctions.

The FileDelete() function does not delete directories.

Return Value

A value indicating success or failure of the file deletion:

1 - file is deleted successfully
0 - file is not deleted successfully. Possible causes are attempts to delete a read only or a non-existent file.

Example(s)

This script deletes the file c:\Data.txt and returns 1 if the file was found and deleted successfully.

```
Status=FileDelete("c:\Data.txt");
```

FileMove() Function

Moves a source file to a destination file and returns a status result. It can be also used to rename a file. This function may take a longer time to execute and executes in multiple stages:

1. FileMove() function is called and an immediate result is returned, indicating success or failure of the file move initialization.
2. FileMove() function executes the move procedure in the background, InTouch scripting continues execution while the file moving is in progress. You can monitor the file moving progress with an integer tag.
3. FileMove() function returns a file move result, indicating success or failure of the file moving procedure.

Do not use the FileMove() function in asynchronous QuickFunctions.

Syntax

```
result = FileMove (sourcefile, destfile, progresstag)
```

Parameters

sourcefile
Full path and file name of the file to be moved. A literal string value, message tagname, or string expression. You can use the wildcard characters (* and ?) in this parameter to move just files matching a specified criteria. The path name can also be a UNC path name.

destfile
Full path and file name (or just path name) of the destination. A literal string value, message tagname, or string expression. The path name can also be a UNC path.

progresstag
Name of an integer tag enclosed in double quotes that will contain a value indicating the file moving progress. A literal string value, message tagname (such as a message tag containing the value "IntTag") or string expression. The values have following meaning:

0 - FileMove() procedure is still in progress

1 - FileMove() procedure has completed successfully

-1 - FileMove() procedure completed with errors

Return Value

A value of-1, 0, or 1 indicating the following:

1 - FileMove() function successfully called
0 - Error when calling the FileMove() function because another FileMove() procedure is already in progress
-1 - Error when calling the FileMove() function. Possible errors are attempts to move a non-existent file.

Example(s)

This script moves the file c:\MyData\output.log to the directory d:\archive and renames the file to output.txt. The progress of the file moving is written to the integer tag Monitor.

```
Status=FileMove("c:\MyData\output.log","d:\archive\output.txt","Monitor");
```

This script moves all files with file ending .txt in the c:\ root directory to the destination directory c:\Backup.

```
Status=FileMove("c:\*.txt", "c:\Backup", "Monitor");
```

This script moves a file whose full path and file name is contained in the message tag LogFile to the destination directory c:\results\ and renames it to logxxx.txt where xxx is a timestamp.

```
Status=FileMove(LogFile, "c:\results\log" + $DateString + $TimeString + ".txt",
"Monitor");
```

Reading and Writing CSV Data

You can write a script to read and write data contained in a csv (comma separated variable) file from and to a series of tagnames by using the function FileReadFields() and FileWriteFields().

The functions FileReadFields() and FileWriteFields() support only the comma as a delimiter.

FileReadFields() Function

Reads the values contained in a csv file into a series of tagnames. You can use this function to load a set of tagname values.

Commas are the only supported delimiter.

This function can only be used for synchronous calls.

Syntax

```
[result = ] FileReadFields (filename, offset, starttag, numberoffields)
```

Parameters

filename
Name of the csv file to read the data from. A literal string value, a message tagname or a string expression.

offset
Location (in bytes) in the file to start reading. A literal integer value, integer tagname, or integer expression.

starttag
Name of the first tagname that receives the first read data item. The tagname must be enclosed with double quotes and end in a number, such as "MyTag1". A literal string value, message tagname (such as a message tagname containing the value "MyTag1"), or a string expression.

numberoffields
Number of data items to read from the csv file. A literal integer value, integer tagname, or integer expression. The first data item is read into the tagname defined in the starttag parameter, subsequent data items into tagnames with the incremented numeral suffix of the starttag parameter (MyTag1, MyTag2, MyTag3, ...).

Return Value

Optional new file offset (in byte) after reading the data. This can be used to read the next set of data.

Example(s)

This script reads the values "Flour" to RecipeTag1, 27.23 to RecipeTag2, 14 to RecipeTag3, and 1 to RecipeTag4, and returns the new file offset—if the csv file c:\set.csv contains the following data: Flour, 27.23,14,1 and if the following tags are defined: RecipeTag1:message, RecipeTag2:real, Recipe3:integer, RecipeTag4:discrete.

```
FileReadFields("c:\set.csv",0,"RecipeTag1",4);
```

FileWriteFields() Function

Writes the values contained in a series of tagnames to a csv file. You can use this function to save a set of tagname values.

Commas are the only supported delimiter.

Syntax

```
[result = ] FileWriteFields (filename, offset, starttag, numberoffields)
```

Parameters

filename
Name of the csv file to write the data to. A new file is created if it does not previously exist. A literal string value, a message tagname, or a string expression.

offset
Location (in bytes) in the file to start writing to. Use -1 to write to the end of the file (append). A literal integer value, integer tagname, or integer expression.

starttag
Name of the first tagname that contains the first data item to be written. The tagname must be enclosed with double quotes and end in a number, such as "MyTag1". A literal string value, message tagname (such as a message tagname containing the value "MyTag1") or a string expression.

numberoffields
Number of data items to write to the csv file. A literal integer value, integer tagname, or integer expression. The first data item is written from the tagname defined in the starttag parameter to the file, subsequent data items from tagnames with the incremented numeral suffix of the starttag parameter (MyTag1, MyTag2, MyTag3, ...).

Return Value

Optional new file offset (in byte) after writing the data. This can be used to write the next set of data.

Example(s)

A series of InTouch tags is defined as follows:

Tagname	Data Type	Value
RecipeTag1	Message	Flour
RecipeTag2	Real	27.23

Tagname	Data Type	Value
RecipeTag3	Integer	14
RecipeTag4	Discrete	1

This script writes the values contained in RecipeTag1 to RecipeTag4 to the csv file c:\set.csv.

```
FileWriteFields("c:\set.csv",0,"RecipeTag1",4);
```

So that the file c:\set.csv will contain the following data:

```
Flour,27.23,14,1
```

Reading and Writing Text Data

You can write a script to read and write text data to and from a file by using the FileReadMessage() and FileWriteMessage() functions. You can either read/write a specified number of bytes or an entire line of text (demarcated by a line feed character).

FileReadMessage() Function

Reads a specified number of bytes (or one line) of string data from a file.

Syntax

```
[result = ] FileReadMessage (filename, offset, messagetag, charstoread)
```

Parameters

filename
Name of the file to read the data from. A literal string value, a message tagname, or a string expression.

offset
Location (in bytes) in the file to start reading from. A literal integer value, integer tagname, or integer expression.

messagetag
Message tagname that receives the first line or number of bytes from the file. Enclose the tagname with double quotes when using the function within the Industrial Graphics Editor Script Editor.

charstoread
Number of bytes to read from the file. Set it to 0 to read until the next line feed (LF) character. A literal integer value, integer tagname, or integer expression.

Return Value

Contains the new byte position after the read. You can use this for subsequent reads from the file.

Example(s)

This script reads the first line of data in the file c:\Data\File.txt to the message tagname MsgTag.

```
FileReadMessage ("c:\Data\File.txt",0,MsgTag, 0);
FileReadMessage ("c:\Data\File.txt",0,"InTouch:MsgTag", 0);
```

FileWriteMessage() Function

Writes a specified number of bytes (or one line) of string data to a file.

Syntax

```
[result = ] FileWriteMessage (filename, offset, messagetag, linefeed)
```

Parameters

filename
Name of the file to write the data to. A literal string value, a message tagname, or a string expression.

offset
Location (in bytes) in the file to start writing to. Set it to -1 to write data to the end of the file (append). A literal integer value, integer tagname, or integer expression.

messagetag
Message tagname that contains the data to be written to the file.v

linefeed
Specifies whether to write a line feed (LF) character after writing the data to the file. Set to 1 to write a line feed character; otherwise, set it to 0. A literal Boolean value, discrete tagname, or Boolean expression.

Return Value

Contains the new byte position after the write. You can use this for subsequent writes to the file.

Example(s)

This script writes the value of a message tagname MsgTag to the end of the file c:\Data\File.txt.

```
FileWriteMessage("c:\Data\File.txt",-1,MsgTag,1);
```

Retrieving System-Related Information

In a script, you can retrieve system-related information using the following QuickFunctions.

Use	To
GetNodeName()	Retrieve the node name of the computer.
InfoDisk()	Retrieve disk space information.
InfoFile()	Retrieve information about a file.

Retrieving the Node Name of the Computer

In a script, you can retrieve the node name of the computer with the GetNodeName() function. This can be used, for example, to keep your InTouch applications dynamic when working with access names.

GetNodeName() Function

Returns the node name of the computer.

Syntax

```
GetNodeName (messagetag, nodenum);
```

Parameters

messagetag
Message tagname that will contain the node name. Enclose the tagname with double quotes when using the function within the Industrial Graphics Editor Script Editor.

nodenum
Number of characters to retrieve from the node name. A literal integer value, integer tagname, or integer expression in the range of 0 to 131.

Example(s)

This script retrieves the node name and assigns it to the NodeName message tagname.

```
GetNodeName(NodeName,131);
GetNodeName("InTouch:NodeName",131);
```

Retrieving Disk Space Information

In a script, you can retrieve disk space information by using the InfoDisk() function. You can retrieve:

- The total size of the disk drive (in bytes or kilobytes).
- The available free space on the disk drive (in bytes or kilobytes).

You can also determine when or how often the information updates (in an animation link) by specifying a trigger tag.

InfoDisk() Function

Returns either the total or free space on a local or network disk drive.

Syntax

```
result = InfoDisk (drive, infotype, trigger);
```

Parameters

drive
The drive letter for which you want to retrieve information. Only the first character of a string is used. A literal string value, message tagname, string expression.

infotype
Specifies the information type. A literal integer value, integer tagname, or integer expression with following possible values:

1 - function returns total size of disk drive (in bytes)

2 - function returns free space of disk drive (in bytes)

3 - function returns total size of disk drive (in kilobytes)

4 - function returns free space of disk drive (in kilobytes)

trigger
A tagname (or expression) that acts as a trigger to recalculate the disk information. If the trigger value changes the disk information is recalculated. A discrete or analog taname, or a discrete or analog expression.

Remarks

The trigger tag only has meaning when the InfoDisk() function is used in an animation display link. If this function is used in a script, you can specify any literal numeric value, analog tagname, or numeric expression.

Example(s)

Use this script in an animation display link to show the free space of disk drive C and update the information every minute.

```
InfoDisk("C", 4, $Minute)
```

Retrieving Information on a File or Directory

In a script, you can retrieve information on a specific file or directory by using the InfoFile() function. By using different parameters you can find:

- If the file exists.

- If the specified file name is actually a directory.
- The size (in bytes) of the file.
- The timestamp of the file or directory.
- The number of files that match a wildcard search.

InfoFile() Function

Returns various information on a file or directory.

Syntax

```
result = InfoFile (filename, infotype, trigger)
```

Parameters

filename
The full file name or directory name you want to retrieve information about. A literal string value, message tagname, or string expression. Can also include wildcard characters, such as "*" and "?".

infotype
The type of information you want to retrieve about the specified file or directory. A literal integer value, integer tagname, or integer expression with following values and meaning:

1 - Existence. The InfoFile() function returns 1 if the file exists, 2 if the file is a directory and 0 if the file or directory does not exist.

2 - Size. The InfoFile() function returns the file size in bytes.

3 - Creation timestamp. The InfoFile() function returns the time stamp as seconds that have passed since midnight January 1st 1970. Use the StringFromTimeLocal() function to convert this value to a message timestamp.

4 - Wildcard Search Match. The InfoFile() function returns the number of files that match a specified wildcard search.

trigger
A tagname (or expression) that acts as a trigger to recalculate the file information. If the trigger value changes, the file information is recalculated. A discrete or analog taname, or a discrete or analog expression.

Remarks

The trigger tag only has meaning when the InfoFile() function is used in an animation display link. If this function is used in a script, you can specify any literal numeric value, analog tagname, or numeric expression.

Example(s)

This script returns 1 if the file c:\data\log.txt exists.

```
InfoFile("c:\data\log.txt",1,$minute)
```

This script returns 14223 if the file c:\data\log.txt has a file size of 14223 bytes.

```
InfoFile("c:\data\log.txt",2,$minute)
```

This script returns 1138245266 if the file c:\data\log.txt was created on 26th January 2006 at 11:14:26 AM.

```
InfoFile("c:\data\log.txt",3,$minute)
```

This script returns 14 if there are 14 files in the directory c:\data\ that have a txt ending.

```
InfoFile("c:\data\*.txt",4,$minute)
```

Retrieving InTouch Related Information

In a script, you can retrieve InTouch related information using these functions.

Use	To
InfoInTouchAppDir()	Get information on the directory of the InTouch application you are developing.
InTouchVersion()	Get information on the InTouch version.

Retrieving the Name of the InTouch Application Directory

In a script, you can retrieve the name of the directory that your InTouch application is running in with the InfoInTouchAppDir() function. This function is useful to locate any external files that you include to ship with your InTouch application.

InfoInTouchAppDir() Function

Returns the current InTouch application directory.

Syntax

```
result = InfoInTouchAppDir();
```

Return Value

A message tagname to contain the directory of the currently running InTouch application.

Remarks

The application directory name may be truncated when passed to a message tagname or shown in an animation link due to the 131 characters limitation.

Example(s)

This script may return c:\documents and settings\user1\my documents\my intouch applications\packaging.

```
InfoInTouchAppDir()
```

Retrieving the InTouch Version

In a script, you can retrieve the version number of the InTouch application you are currently running by using the InTouchVersion() function.

InTouchVersion() Function

Returns the complete InTouch version number or just parts of it.

Syntax

```
result = InTouchVersion (infotype);
```

Parameters

infotype
Specifies how the version information is returned. A literal integer value, integer tagname, or integer expression with the following meaning:

0- function returns the whole version number

1- function returns just the major version number

2- function returns just the minor version number

3- function returns just the patch level

4- function returns just the build level

Example(s)

Function	Possible result
InTouchVersion(0)	10.5.1626.0521.0045.0012
InTouchVersion(1)	10
InTouchVersion(2)	5
InTouchVersion(3)	0
InTouchVersion(4)	1626

Security-Related Scripting

You can add and manage security within your InTouch application with various QuickScript functions and system tags. For more information about security functions, see Securing InTouchin the InTouch® HMI Application Management and Extension Guide.

Logging On and Off

You can use the following functions and system tags to log on and log off.

Use	To
AttemptInvisibleLogon()	Log on a user by supplying authentication data in the parameters.
LogonCurrentUser()	Log on the currently logged on Windows user (if authentication mode is "OS").
PostLogonDialog()	Show the **Logon** dialog box.
Logoff()	Log off the current user.
$PasswordEntered	Set a password.
$OperatorEntered	Set a valid user name.
$OperatorDomainEntered	Set a valid user domain name (if authentication mode is "OS").

For more information about security functions, see Securing InTouchin the InTouch® HMI Application Management and Extension Guide.

Changing and Setting Password

You can use the following functions and system tags to change password:

Use	To
ChangePassword()	Call the **Change Password** dialog box for the currently logged on user.
$ChangePassword	Call the **Change Password** dialog box for the currently logged on user.

For more information about security functions, see Securing InTouchin the InTouch® HMI Application Management and Extension Guide.

Specifying and Configuring Users

You can use the following system tag to specify and configure users.

Use	To
$ConfigureUsers	Call the **Configure Users** dialog box.

For more information about security functions, see Securing InTouchin the InTouch® HMI Application Management and Extension Guide.

Managing Security and Other Information

You can use the following system tags and functions to manage security.

Use	To
$AccessLevel	Retrieve the access level of the currently logged in user.
AddPermission()	Assign access levels to a certain user group (local/domain).
GetAccountStatus()	Retrieve account information (password expiration, lock out, disable flags).
$InactivityTimeout	Indicate the time that elapses before the user is automatically logged off.
$InactivityWarning	Indicate the time for the time-out warning.
InvisibleVerifyCredentials()	Retrieve InTouch access level information of an OS user.

Use	To
IsAssignedRole()	See if the currently logged on user has the specified user role.
QueryGroupMembership()	See if the currently logged on user is a member of a specified user role.

For more information about security functions, see Securing InTouchin the InTouch® HMI Application Management and Extension Guide.

Miscellaneous Scripting

InTouch scripting supports sound output so that you can associate human machine interaction with sounds. InTouch scripting also supports getting and setting properties of Wizards.

Playing Sound Files from an InTouch Application

In a script, you can associate events and conditions with specific sounds. For example, you could associate a warning dialog box or a critical condition with a warning sound.

PlaySound() Function

Plays a sound from a wave file or a Windows default sound.

Syntax

```
Playsound (soundname, flag)
```

Parameters

soundname
The name of the sound or wave file. A literal string value, message tagname, or string expression. If the sound is defined as a name, it must be defined in the Win.ini file under the [Sounds] section, for example MC="c:\test.wav'

flag
Specifies how the sound is played. A literal integer value, integer tagname, or integer expression with the following meanings:
0 - Play sound one time synchronously (script execution waits until sound has finished playing).
1 - Play sound one time asynchronously (script execution does not wait until sound has finished playing).
9 - Play sound continuously (until the PlaySound() function is called again).

Example(s)

This script plays the sound of the file c:\welcome.wav one time and holds script execution until it has finished playing.

```
PlaySound("c:\welcome.wav",0);
```

This script plays the sound Alert continuously. In the win.ini file [Sounds] section you need to associate the sound name Alert with a sound file, such as:

```
Alert=c:\alert.wav.
PlaySound("Alert",9);
```

Getting and Setting Properties of Wizards

Some wizards such as the Distributed Alarm Object and Windows Controls contain set or read properties. These properties could be values in a text box or the check status of a check box.

In a script, you access these properties through the following functions.

Use	To
SetPropertyD(), GetPropertyD()	Set or read discrete properties.
SetPropertyI(), GetPropertyI()	Set or read integer properties.
SetPropertyM(), GetPropertyM()	Set or read message properties.

See the wizard description for a list of supported properties.

Here is how to set and read these properties in a generic way.

GetPropertyD() Function

Reads a discrete property in a wizard and returns a success code.

Syntax

```
result = GetPropertyD (controlname.property, dtag)
```

Parameters

controlname
The name of a wizard that supports properties. A literal string value, message tagname, or string expression.

property
The discrete property of the wizard that is to be read. Together with controlname can be a literal string value, message tagname, or string expression.

dtag
The discrete tagname that will receive the discrete property value.

Return Value

An integer error code. For more information about the error codes, see Understanding Windows Controls Error Messagesin the InTouch® HMI Visualization Guide.

Example(s)

With a check box wizard Checkbox1 and a discrete tagname dtag you can check the visibility of the check box with the following script function:

```
result=GetPropertyD("Checkbox1.visible",dtag);
```

This script sets dtag to 1, if the check box wizard is visible; otherwise, it sets dtag to 0.

SetPropertyD() Function

Sets a discrete property in a wizard and returns a success code.

Syntax

```
result = SetPropertyD(controlname.property, Boolean)
```

Parameters

controlname
The name of a wizard that supports properties. A literal string value, message tagname, or string expression.

property
The discrete property of the wizard that is to be set. Together with controlname can be a literal string value, message tagname, or string expression.

Boolean
The Boolean value to pass to the wizard property. A literal Boolean value, discrete tagname or Boolean expression.

Return Value

An integer error code. For more information about the error codes, see Understanding Windows Controls Error Messagesin the InTouch® HMI Visualization Guide.

Example(s)

With a check box wizard Checkbox1 and a discrete tagname dtag you can control the visibility of the check box with the following script function:

```
result=SetPropertyD("Checkbox1.visible",dtag);
```

If you set dtag to 0 and call the script function above, the check box wizard becomes invisible.

GetPropertyI() Function

Reads an integer in a wizard and returns a success code.

Syntax

```
result = GetPropertyI (controlname.property, itag)
```

Parameters

controlname
The name of a wizard that supports properties. A literal string value, message tagname, or string expression.

property
The integer property of the wizard that is to be read. Together with controlname can be a literal string value, message tagname, or string expression.

itag
The integer tagname that will receive the integer property value.

Return Value

An integer error code. For more information about the error codes, see Understanding Windows Controls Error Messagesin the InTouch® HMI Visualization Guide.

Example(s)

With a radio button wizard Radiobutton1 and an integer tagname itag you can check the currently selected item in the radio button group with the following script function:

```
result=GetPropertyI("Radiobutton1.value",itag);
```

This script sets itag to 1 (2, 3, ...) , if the first (second, third, ...) radio button is selected.

SetPropertyI() Function

Sets an integer property in a wizard and returns a success code.

Syntax

```
result = SetPropertyI (controlname.property, integer)
```

Parameters

controlname
The name of a wizard that supports properties. A literal string value, message tagname, or string expression.

property
The integer property of the wizard that is to be set. Together with controlname can be a literal string value, message tagname, or string expression.

integer
The integer value to pass to the wizard property. A literal integer value, integer tagname, or integer expression.

Return Value

An integer error code. For more information about the error codes, see Understanding Windows Controls Error Messagesin the InTouch® HMI Visualization Guide.

Example(s)

With a radio button wizard Radiobutton1 you can set the 2nd radio button with the following script function:

```
result=SetPropertyI("Radiobutton1.value",2);
```

GetPropertyM() Function

Reads a message property in a wizard and returns a success code.

Syntax

```
result = GetPropertyM (controlname.property, mtag)
```

Parameters

controlname
The name of a wizard that supports properties. A literal string value, message tagname, or string expression.

property
The message property of the wizard that is to be read. Together with controlname can be a literal string value, message tagname, or string expression.

mtag
The message tagname that will receive the message property value.

Return Value

An integer error code. For more information about the error codes, see Understanding Windows Controls Error Messagesin the InTouch® HMI Visualization Guide.

Example(s)

With a check box wizard Checkbox1 and a message tagname mtag you can check the caption of the check box with the following script function:

```
result=GetPropertyM("Checkbox1.caption",mtag);
```

This script sets mtag to the caption of the check box.

SetPropertyM() Function

Sets a message property in a wizard and returns a success code.

Syntax

```
result = SetPropertyM (controlname.property, message)
```

Parameters

controlname
The name of a wizard that supports properties. A literal string value, message tagname, or string expression.

property
The message property of the wizard that is to be set. Together with controlname can be a literal string value, message tagname, or string expression.

message
The message value to pass to the wizard property. A literal string value, message tagname, or string expression.

Return Value

An integer error code. For more information about the error codes, see Understanding Windows Controls Error Messagesin the InTouch® HMI Visualization Guide.

Example(s)

With a check box wizard Checkbox1 you can set the caption of the check box wizard dynamically with the following script function:

```
result=SetPropertyM("Checkbox1.caption","Start Engine 1");
```

This script sets the caption of the check box Checkbox1 to "Start Engine 1".

CHAPTER 7

Scripting with OLE Objects

About Scripting with OLE Objects

You can use OLE objects to extend the functionality of an InTouch HMI application. With OLE objects, you can:

- Create popup dialog boxes for the operator interface.
- Access operating system functions, such as the Control Panel.
- Make data from the Manufacturing Execution Module available for processing within the InTouch HMI. See the Manufacturing Execution Module documentation.

Creating, Validating, and Releasing OLE Objects

You can create and validate OLE objects for use in InTouch scripts. After using an OLE object you can release it to free up memory.

Use the following functions to create, validate, and release OLE objects.

- *OLE_CreateObject() Function* on page 125
- *OLE_IsObjectValid() Function* on page 126
- *OLE_ReleaseObject() Function* on page 126

OLE_CreateObject() Function

Before you can reference an OLE object in a script, you must create it. When you do this you receive a pointer that references the OLE object.

In a script, you can create an OLE object and assign a pointer by using the OLE_CreateObject() function.

Syntax

```
OLE_CreateObject(%pointer, classname);
```

Parameters

%pointer
The name of your choice for the pointer to the OLE object. It can contain alphanumeric characters (A-Z, 0-9) and underscore. It is case-insensitive.

classname
The name of the OLE class. The class name is case-sensitive. A literal string value, message tagname, or string expression.

Remarks

If you use the same object name to create another object, the object is updated to reference the new OLE class. It is released from the old OLE class.

Example(s)

This script creates an OLE object called %WShell that references the class Wscript.Shell.

```
OLE_CreateObject(%WShell, "Wscript.Shell");
```

OLE_IsObjectValid() Function

In a script, you can verify that an OLE object is valid by using the OLE_IsObjectValid() function. This is not a required step for working with OLE objects, but it is recommended to make sure that you do not come across problems when working with OLE objects.

Syntax

```
result = OLE_IsObjectValid(%pointer)
```

Arguments

%pointer
The pointer referencing an OLE object that is to be tested.

result
A Boolean value indicating the following:

0 - The OLE object the pointer is referencing is invalid.

1 - The OLE object the pointer is referencing is valid.

Example(s)

This script creates an OLE object based on the Wscript.Shell class and creates a pointer %WS to reference it. isvalid is a discrete tag that is TRUE if the OLE object is created successfully. Otherwise it is FALSE.

```
OLE_CreateObject(%WS, "Wscript.Shell");
isvalid = OLE_IsObjectValid(%WS);
```

OLE_ReleaseObject() Function

After you have used an OLE object in a script, you can release it and delete its pointer to free up system resources. After you release an OLE object you cannot use its pointer to access properties and methods of the associated OLE class.

Syntax

```
OLE_ReleaseObject(%pointer);
```

Arguments

%pointer
Name of the pointer that references the OLE Object. It can contain alphanumeric characters (A-Z, 0-9) and underscore. It is case-insensitive.

Example(s)

This script releases the OLE object associated with the pointer %WShell and deletes the pointer %WShell.

```
OLE_ReleaseObject(%WShell);
```

Using OLE Object Properties and Methods

In a script, you can use pointers to read and write values from and to OLE properties. You can also use the pointer to call OLE methods. The properties and methods available depend on the OLE object.

Accessing the Properties of an OLE Object

In a script, you can access the properties of an OLE object as you would in most programming languages. Properties are usually identified by using the dot "." operator.

Note: When you use OLE object properties in a script, make sure that their references do not exceed 98 characters, including leading "%". Keep OLE pointer names as short as possible.

Reading an OLE Object Property

In a script, you can read an OLE object property by assigning the property to a tag. You cannot use a direct reference to an OLE object property in an animation display link.

Syntax

```
tagname = %pointer.property;
```

Arguments

%pointer
The pointer that references the OLE object. Must be created with OLE_CreateObject() function or assigned to another pointer before reading a property.

property
The name of the property to be read.

tagname
The tag to write the value to.

Example(s)

This script creates an OLE object based on the System.Random OLE class, creates a pointer %SR to reference it, and assigns the value of the .NextDouble property of the Math.Random OLE object to a real tagname randtag.

At run time the real tagname Randtag receives a random double float value between 0 and 1.

```
OLE_CreateObject(%SR,"System.Random");
randtag = %SR.NextDouble;
```

Writing to an OLE Object Property

In a script, you can write a value to an OLE object property by assigning a value to the property.

Syntax

```
%pointer.property = value;
```

Arguments

%pointer
The pointer that references the OLE object. Must be created with OLE_CreateObject() function or assigned to another pointer before writing to a property.

property
The name of the property to be written to.

value
The value to be written to the property. It can be a literal value, tagname or expression. Writing to an OLE property from an animation input link directly is not supported.

Calling Methods of an OLE Object

In a script, you can call OLE object methods.

Syntax

```
%pointer.method(parameters);
```

Arguments

%pointer
The pointer that references the OLE object. Must be created with OLE_CreateObject() function or assigned to another pointer before calling a method.

method
The name of the method that is part of the OLE object.

parameters
A list of parameters to pass to the method. These parameters must be separated by comma. Literal values, tagnames or expressions.

Example(s)

This script creates an OLE object based on the OLE class Shell.Application, creates a pointer %sa to the OLE object and calls the method .MinimizeAll(). This method minimizes all windows on your desktop.

```
OLE_CreateObject(%SA,"Shell.Application");
%SA.MinimizeAll();
```

Note: Optional parameters are not allowed in OLE InTouch HMI scripting. All parameters must be specified.

Assigning Multiple Pointers to the Same OLE Object

In a script, you can assign multiple pointers to the same OLE object by using the equals sign.

Syntax

```
%newpointer = %pointer
```

Arguments

%pointer
The name of the pointer that already references a created OLE object.

%newpointer
The name of a new pointer that should reference the same OLE object. It can contain alphanumeric characters (A-Z, 0-9) and underscore. It is case-insensitive.

Example(s)

This script creates an OLE object based on the Wscript.Shell class and creates a pointer %WS to reference it. The pointer %WS2 when set to %WS points to the same OLE object. It can be used to read from or write to properties and call methods of the same OLE object.

```
OLE_CreateObject(%WS,"Wscript.Shell");
%WS2=%WS;
```

Note: You can use message tagnames in connection with pointers. If you assign a message tagname to a pointer, it can get an ID value. You can use it to create more pointers to the same OLE object.

Troubleshooting OLE Errors

In a script, you can use OLE functions to troubleshoot OLE errors.

Function	Description
OLE_GetLastObjectError() Function on page 129	Get the error number of the last OLE error.
OLE_GetLastObjectErrorMessage() Function on page 129	Get information on the last OLE error.
OLE_ResetObjectError() Function on page 129	Reset the last error.

Function	Description
OLE_ShowMessageOnObjectError() Function on page 129	Show or hide the OLE error message dialog box.
OLE_IncrementOnObjectError() Function on page 130	Count the number of OLE errors with an InTouch HMI tagname.

OLE_GetLastObjectError() Function

This function returns the error number of the last OLE error.

Syntax

```
errnum = OLE_GetLastObjectError();
```

Arguments

errnum
The number of the last OLE error.

OLE_GetLastObjectErrorMessage() Function

This function returns the error message of the last OLE error.

Syntax

```
errmsg = OLE_GetLastObjectErrorMessage();
```

Arguments

errmsg
The error message of the last OLE error.

OLE_ResetObjectError() Function

In a script, use the OLE_ResetObjectError() function to reset the last OLE error so that the last OLE error number is set to zero and last OLE error message is set to blank.

This can be used for identifying any errors in a batch of OLE functions.

Syntax

```
OLE_ResetObjectError()
```

OLE_ShowMessageOnObjectError() Function

By default, when an OLE error occurs, an error message dialog box is displayed.

In a script, you can specify whether or not to display the error message dialog box by using the function OLE_ShowMessageOnObjectError().

Syntax

```
OLE_ShowMessageOnObjectError(Boolean)
```

Arguments

Boolean
A value that determines if an OLE error message dialog box is displayed or not. A literal Boolean value, discrete tagname or Boolean expression with following meanings:

0 - no OLE error message dialog box is displayed when an OLE error occurs

1 - an OLE error message dialog box is displayed when an OLE error occurs

Example(s)

This script suppresses all OLE error message dialog boxes. When OLE errors occur, no error message dialog boxes are displayed.

```
OLE_ShowMessageOnObjectError(0);
```

OLE_IncrementOnObjectError() Function

In a script, you can use the OLE_IncrementOnObjectError() function to designate an integer tagname as counter for the number of OLE errors.

Syntax

```
OLE_IncrementOnObjectError(integertag)
```

Parameters

integertag
The tagname that acts as a counter.

Remarks

If OLE error message dialog boxes are displayed, the counter tagname is only incremented after the OLE error message dialog box is closed.

Example(s)

This script designates the integer tagname errorcount as error counter, hides the error message dialog boxes and attempts to create an OLE object based on an invalid OLE class name. This creates an error and the tagname value errorcount is incremented to 1.

```
errorcount = 0;
OLE_IncrementOnObjectError(errorcount);
OLE_ShowMessageOnObjectError(0);
OLE_CreateObject(%WS,"InVaLiD.cLaSs.nAmE");
```

Things You Can Do with OLE

You can use the following scripts to get an idea of the powerful functionality you can add to an application using OLE objects.

Produce Random Numbers

In a script, use the following commands to produce a random number between 0 and 255:

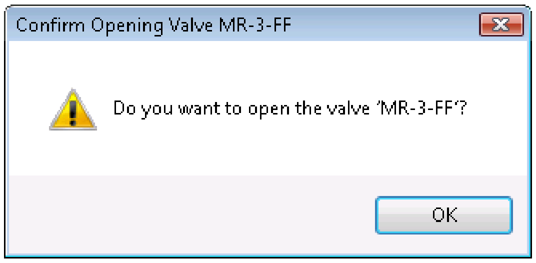
```
OLE_CreateObject(%SR,"System.Random");
randtag = (%SR.NextDouble)*255;
```

Create User Interface Dialog Boxes

In a script, use the following commands to produce a user interface dialog box:

```
dim DlgBody as message;
dim DlgTitle as message;
dim Style as integer;
dim Result as integer;
DlgBody = "Do you want to open the valve ’MR-3-FF’?";
DlgTitle = "Confirm Opening Valve MR-3-FF";
Style = 48;
OLE_CreateObject(%WS,"Wscript.Shell");
result = %WS.Popup(DlgBody,1,DlgTitle,Style);
```

This example creates the following user interface dialog box.


Confirm Opening Valve MR-3-FF

Do you want to open the valve 'MR-3-FF'?

The Style tagname determines which icon and which buttons appear on the dialog box. Use the following values:

Icon	Style	Value
(no icon)	no icon	0
✖	Error icon	16
❓	Question mark icon	32
⚠	Warning icon	48
ℹ	Information icon	64

To use a particular button, add one of the following values to the Style value:

Value	Style
0	Only **OK** button
1	**OK** and **Cancel** buttons
2	**Abort**, **Retry** and **Ignore** buttons
3	**Yes**, **No** and **Cancel** buttons
4	**Yes** and **No** buttons
5	**Retry** and **Cancel** buttons
6	**Cancel**, **Try Again** and **Continue** buttons

The Result tagname contains the button number the user clicked. This can be used for conditional branching in your InTouch script. Following result codes are possible:

Result Value	Meaning
1	**OK** button was pressed
2	**Cancel** button was pressed
3	**Abort** button was pressed
4	**Retry** button was pressed
5	**Ignore** button was pressed
6	**Yes** button was pressed
7	**No** button was pressed
10	**Try again** button was pressed
11	**Continue** button was pressed

Open Windows Date and Time Properties Panel

In a script, use the following commands to open the Windows Date/Time Properties panel:

```
OLE_CreateObject(%WP,"Shell.Application");
%WP.SetTime();
```

You can do similar tasks by calling different methods and passing them to the referenced OLE object:

This Method	Opens The Panel
TrayProperties()	**Tray** properties
FileRun()	**File Run** dialog box
FindFiles()	**Find Files** dialog box
FindComputer()	**Find Computer** dialog box
ShutdownWindows()	**Shutdown Windows** panel

Read and Write to the Registry

In a script, you can use OLE to read from and write to the Windows registry by:

- Creating an OLE object based on the Windows class Wscript.Shell.
- Using the RegRead() and RegWrite() methods of the OLE object.

For example, these commands read the installed version of the InTouch HMI directly from the registry key and store the value in the rkey message tagname:

```
OLE_CreateObject(%WS,"Wscript.Shell");
rkey = %WS.RegRead("HKLM\SOFTWARE\Wonderware\InTouch\Installation\Version");
```

These commands write the value 1 to the registry key that determines if file extensions are hidden for the currently logged on user:

```
OLE_CreateObject(%WS,"Wscript.Shell");
```

```
%WS.RegWrite("HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanc
ed\HideFileExt",1,"REG_DWORD");
```

Minimize Windows

In a script, you can use the following commands to minimize all windows on your desktop:

```
OLE_CreateObject(%WA,"Shell.Application");
%WA.MinimizeAll();
```

You can do similar tasks by calling these methods:

This Method	**Arranges Windows**
TileHorizontally()	Tiles all Windows horizontally
TileVertically()	Tiles all Windows vertically
CascadeWindows()	Cascades all Windows
UndoMinimizeALL()	Restores all Windows

CHAPTER 8

Scripting ActiveX Controls

You can use ActiveX controls to read from and write to tagnames and I/O references. In a script, you can reference ActiveX controls.

You can also create scripts that execute when an event occurs for the ActiveX control. These scripts can be re-used and imported into other applications.

About Scripting Active X Controls

You can use ActiveX controls to read from and write to tagnames and I/O references. In a script, you can reference ActiveX controls.

You can also create scripts that execute when an event occurs for the ActiveX control. These scripts can be re-used and imported into other applications.

Calling ActiveX Control Methods

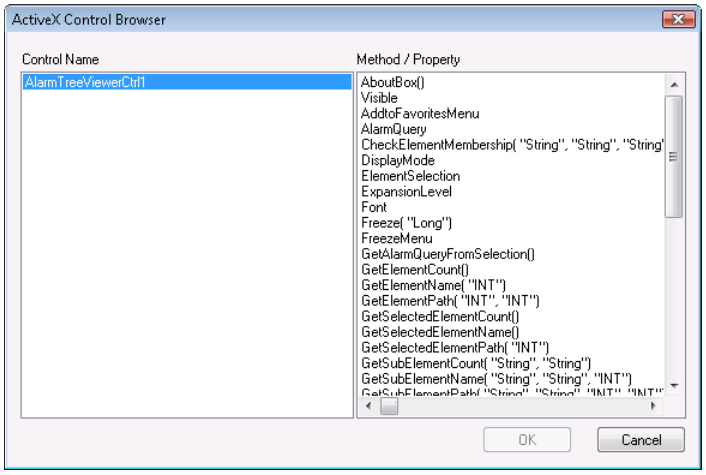
In a script, you can call methods of an ActiveX control to perform actions supported by the ActiveX control. ActiveX methods can be called from any type of InTouch QuickScript or ActiveX Event script.

Note: To call the ActiveX method when an ActiveX event occurs, there are some prerequisite things you need to do. See *Configuring ActiveX Event Scripts* on page 39.

To call an ActiveX control method

1. In a script dialog box, on the **Insert** menu, click **ActiveX**.

   The **ActiveX Control Browser** dialog box appears.



AlarmTreeViewerCtrl1

```
AboutBox()
Visible
AddtoFavoritesMenu
AlarmQuery
CheckElementMembership( "String", "String", "String"
DisplayMode
ElementSelection
ExpansionLevel
Font
Freeze( "Long")
FreezeMenu
GetAlarmQueryFromSelection()
GetElementCount()
GetElementName( "INT")
GetElementPath( "INT", "INT")
GetSelectedElementCount()
GetSelectedElementName()
GetSelectedElementPath( "INT")
GetSubElementCount( "String", "String")
GetSubElementName( "String", "String", "INT")
```

2. Click the name of the ActiveX control from the left pane. The right pane contains the names of properties and methods that are supported by the ActiveX control.

3. Click the name of the method to use from the right pane and then click **OK**. The method name and default parameters are pasted into the script window at the cursor position.

4. Configure the method parameters inside the parentheses, to your specifications.

Accessing ActiveX Control Properties from the InTouch HMI

In a script, you can read from and write to ActiveX control properties to exchange data between the ActiveX control and the InTouch tagnames and display links.

Configuring ActiveX Control Properties to Read and Write Data

In a script, you can read data from and write data to an ActiveX control. You use the ActiveX control properties associated with specific ActiveX controls.

There are two ways of doing this:

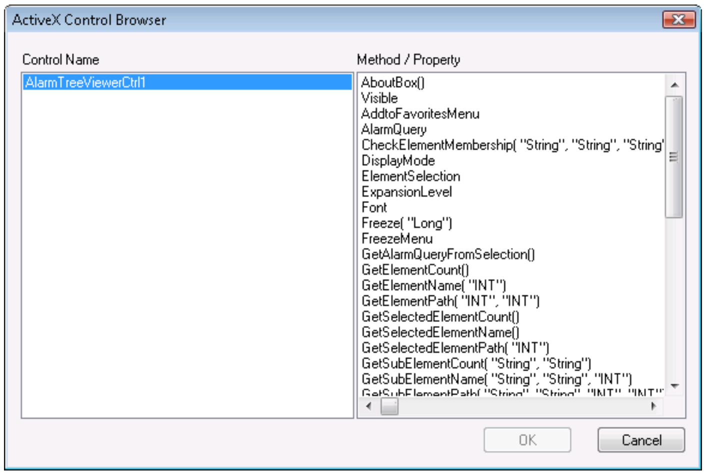
- Use the ActiveX control property in an InTouch HMI QuickScript or ActiveX event script. The property value is read or written every time the script is executed.
- Link the ActiveX control property directly to an InTouch HMI tag or I/O reference. The property value is read or written at every update interval.

Configuring Scripts to Read and Write ActiveX Control Properties

In a script, you can configure ActiveX control properties to either write values to or read values from InTouch HMI tagnames or other expressions.

To read data from or write data to an ActiveX control property

1. Open a script window, point to **Insert**, and click **ActiveX**. The **ActiveX Control Browser** dialog box appears.



2. Click the name of the ActiveX control from the left pane. The right pane contains the names of properties and methods of the selected ActiveX control.
3. Click the name of the property to use from the right pane. The property name is inserted into the script window at the cursor position.
4. Assign the property name to a tag or use according to your specifications.
5. Click **OK**.

Example(s)

The following script reads the ToPriority property of the ActiveX control instance AlarmViewerCtrl1 into the integer tagname topri.

```
topri = #AlarmViewerCtrl1.ToPriority;
```

The following script writes the value MS Comic to the Font property of the ActiveX control called AlarmViewerCtrl1. This example changes the display font of the AlarmViewer ActiveX control dynamically.

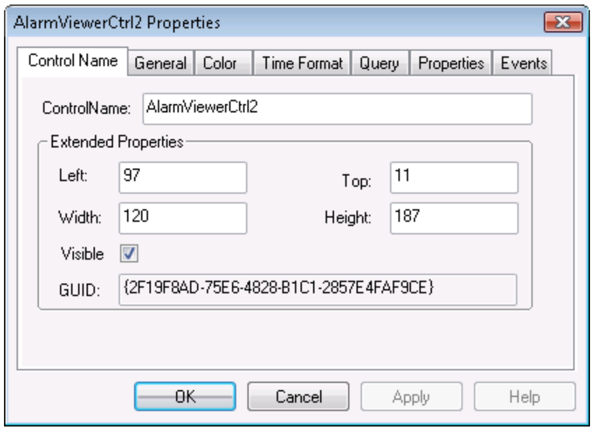
```
#AlarmViewerCtrl1.Font = "MS Comic";
```

Linking ActiveX Control Properties to Tag or I/O References

You can link ActiveX control properties to InTouch HMI tags or I/O references.

To link ActiveX control properties to tags or I/O references

1. Double-click the ActiveX control. The properties dialog box of the ActiveX control appears.



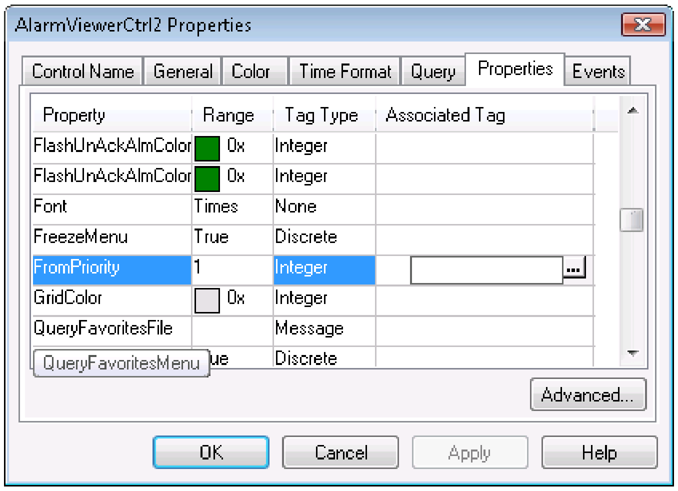
AlarmViewerCtrl2 Properties

ControlName: AlarmViewerCtrl2

Extended Properties

Left: 97
Top: 11
Width: 120
Height: 187
Visible ✓
GUID: {2F19F8AD-75E6-4828-B1C1-2857E4FAF9CE}

2. Click the **Properties** tab and scroll to the right.
3. Select the property in the list.



AlarmViewerCtrl2 Properties

Property	Range	Tag Type	Associated Tag
FlashUnAckAlmColor	🟩 0x	Integer	
FlashUnAckAlmColor	🟩 0x	Integer	
Font	Times	None	
FreezeMenu	True	Discrete	
FromPriority	1	Integer	...
GridColor	⬜ 0x	Integer	
QueryFavoritesFile		Message	
QueryFavoritesMenu	ue	Discrete	

4. Assign a tag or I/O reference. Do either of the following:
   - Type the tag or I/O reference directly into the **Associated Tag** column.
   - Click the ellipsis button in the **Associated Tag** column between the square parenthesis. The **Select Tag** dialog box appears. Select a tag and click **OK**.
5. Click **OK**.

Creating and Re-using ActiveX Event Scripts

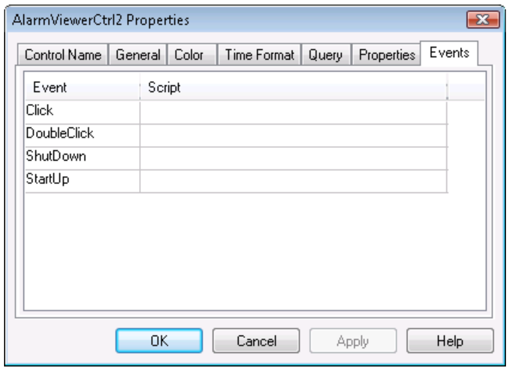
An ActiveX control can support events, such as single-clicking on the control, that you can use to associate certain actions with. These actions are stored in ActiveX event scripts.

Creating ActiveX Event Scripts

You can create or re-use an event script that is executed every time a specific ActiveX control event occurs, such as clicking on an ActiveX control.

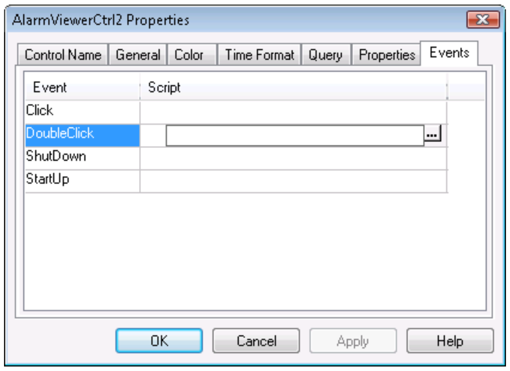
To create an ActiveX event script

1. Double-click the ActiveX control. The properties dialog box appears.
2. Click the **Events** tab.



Event	Script
Click	
DoubleClick	
ShutDown	
StartUp	

3. Click the event to associate. Brackets and ellipses appear in the **Script** column.



Event	Script
Click	
DoubleClick	...
ShutDown	
StartUp	

4. In the **Script** column of the corresponding row, click between the brackets.
5. Enter a new name and click **OK**. When a message appears, click **OK**. The **ActiveX Event Scripts** dialog box appears.
6. Create the script according to your specifications.

Re-using ActiveX Event Scripts

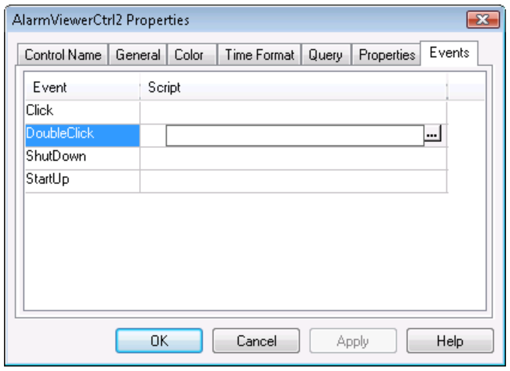
You can re-use ActiveX event scripts if they are created by the same ActiveX control parent and event.

For example, if you have multiple AlarmViewer ActiveX controls in an application, they can share event scripts for the DoubleClick event.

To re-use an ActiveX event script

1. Double-click the ActiveX control. The properties dialog box appears.
2. Click the **Events** tab.

3. Click the event to associate. Brackets and ellipses appear in the **Script** column.



4. In the **Script** column of the corresponding row, click the ellipsis button. The **Choose ActiveX Script** dialog box appears.
5. Click an ActiveX script and click **OK**.
6. Click **OK** again.

Creating Self-Referencing ActiveX Event Scripts

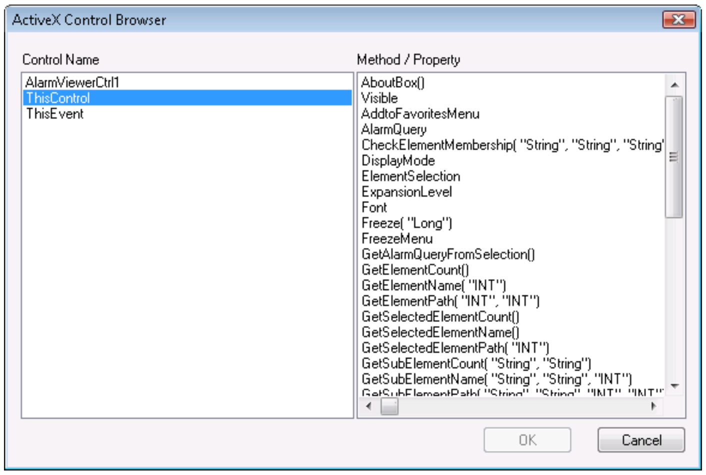
If you use ActiveX event scripts, you can configure them to reference themselves instead of an absolute ActiveX control name. This is useful when you create ActiveX event scripts that will be re-used. ActiveX event scripts can either:

- Reference the specific ActiveX control that produced the event (ThisControl).
- Reference the specific event that called the script (ThisEvent).

Referencing the specific event enables the ActiveX control to pass other parameters to the ActiveX control script.

To create self-referencing ActiveX event scripts

1. Create an ActiveX event script for a specific ActiveX event. See *Creating ActiveX Event Scripts* on page 138.
2. In the **ActiveX Event Script** dialog box, click **Insert**, and then click **ActiveX**. The **ActiveX Control Browser** dialog box appears.



3. In the left pane, do one of the following:
   - Click **ThisControl** to see properties and methods that you can use in connection with this control (and any other control that you re-use this script in).

- Click **ThisEvent** to see properties and methods of the ActiveX control that you can use in connection with the self-referencing event.

4. In the right pane, click one of the properties or methods and click **OK**. The selected property or method is pasted to the script window.
5. Configure the script.
6. Click **OK**.

For example, this statement writes the value of the ClicknRow event parameter to the ClickedRow tag:

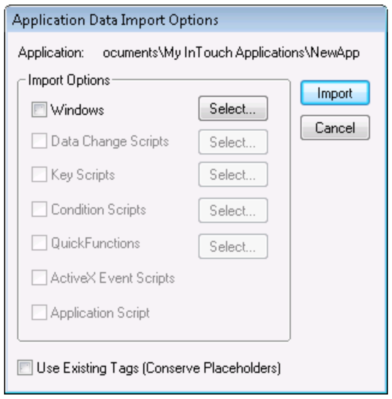
```
ClickedRow = ThisEvent.ClicknRow;
```

Importing ActiveX Event Scripts

You can import ActiveX event scripts from other InTouch HMI applications so as to re-use them in the application currently under development.

To import ActiveX event scripts from other applications

1. On the **File** menu, click **Import**. The **Import from directory** dialog box appears.
2. Browse to the InTouch HMI application that contains the ActiveX event scripts to import.
3. Click **OK**. The **Application Data Import Options** dialog box appears.



4. Select the **ActiveX Event Scripts** check box and click **Import**. All ActiveX event scripts are imported into the current InTouch HMI application.

CHAPTER 9

Troubleshooting QuickScripts

You can troubleshoot QuickScripts by using the Log Viewer to display run time values of tagnames.

Logging Messages to the Log Viewer

Use the ArchestrA Log Viewer to help you debug QuickScripts. The Log Viewer is located in the ArchestrA System Management Console (SMC) and is installed when you install the InTouch HMI.

One way to debug QuickScripts is to:

1. Set check points in the QuickScript to log values to the Log Viewer.
2. Open Log Viewer to view the values.

Another way is create a Key Script that logs tag values to the Log Viewer.

To set check points in a QuickScript

1. Open the QuickScript that you suspect is causing errors.
2. Locate the line where you want to set a check point.
3. Insert one of the following snippets of code after that line:
   - LogMessage(messagetag);
     In this script, messagetag is the name of a message tagname whose value you want to log.
   - LogMessage(StringFromIntg(inttag,10));
     In this script, inttag is the name of an integer tagname whose value you want to log.
   - LogMessage(Text(realtag,"#.#######"));
     In this script, realtag is the name of a real tagname whose value you want to log.
   - LogMessage(DText(disctag,"TRUE","FALSE"));
     In this script, disctag is the name of a discrete tagname whose value you want to log.
   - Log more information to the LogViewer at a checkpoint, such as an identifier and/or tagname. For example,
     ```
     LogMessage("DEBUG tag:"+ind.name+" value:"+Text(ind,"#.####"));
     ```
     In this script, `ind` could be an analog indirect tag.

LogMessage() Function

Writes a user-defined message to the ArchestrA Log Viewer.

Category

misc

Syntax

```
LogMessage("Message_Tag");
```

Parameter

Message_Tag
String to log to the Log Viewer. Actual string or message tagname.

Remarks

This is a very powerful function for troubleshooting InTouch scripting. By strategically placing LogMessage() functions in your scripts, you can determine the order of QuickScript execution, the performance of scripts, and identify the value of tags both before they are changed and after they have been affected by the QuickScript. Each message posted to the Log Viewer is stamped with the exact date and time.

Important: The percent (%) character formats diagnostic messages that appear in the SMC Log Viewer while debugging scripts. WindowViewer can stop responding if the % character appears in a log string or a function parameter. To eliminate errors caused by %, use two %% characters.

Example(s)

```
LogMessage("Report Script is Running");
```

The above statement would print the following to the Log Viewer:

94/01/14 15:21:14 WWSCRIPT Message:Report Script is Running.

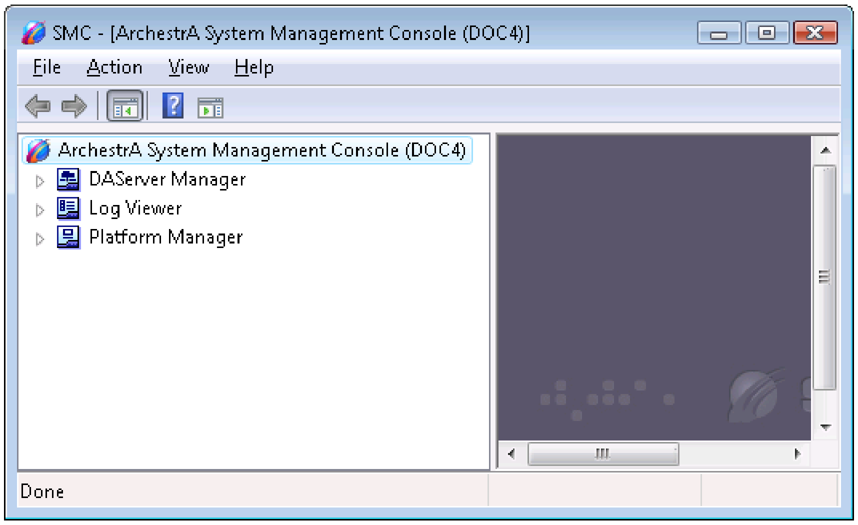
```
LogMessage("The Value of MyTag is " + Text(MyTag, "#"));
MyTag = MyTag + 10;
LogMessage("The Value of MyTag is " + Text(MyTag, "#"));
```

Viewing Log Viewer Messages

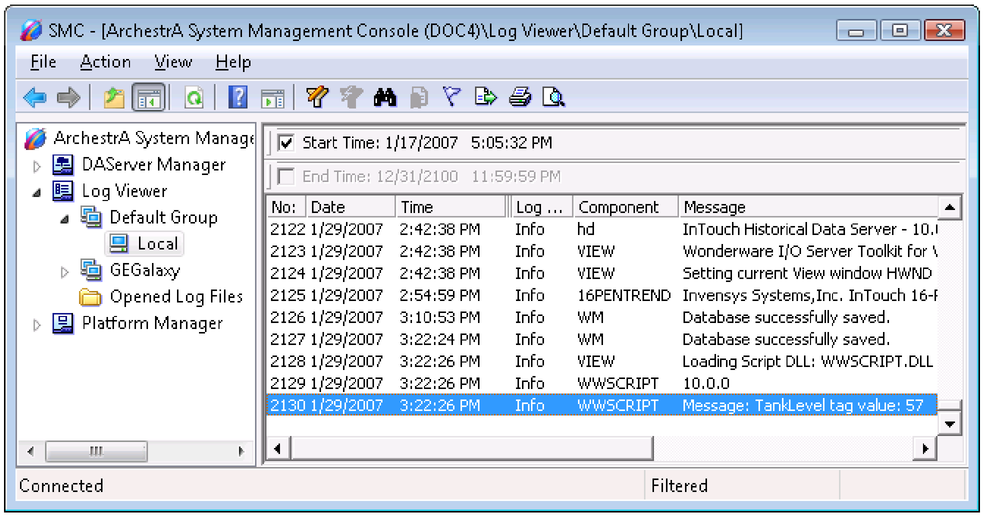
The Log Viewer is located in the ArchestrA System Management Console (SMC) and is installed when you install the InTouch HMI.

To view the logged values in Log Viewer

1. Click **Start**, point to **Programs**, point to **AVEVA**, and then click System Platform Management Console. The ArchestrA System Management Console appears.


SMC - [ArchestrA System Management Console (DOC4)]
File
Action
View
Help
ArchestrA System Management Console (DOC4)
DAServer Manager
Log Viewer
Platform Manager
Done

2. In the left pane expand **Log Viewer**, expand **Default Group**, and then click **Local**. The Log Viewer messages appear in the details pane.



Start Time: 1/17/2007 5:05:32 PM
End Time: 12/31/2100 11:59:59 PM

```
No:  Date       Time        Log ...  Component   Message
2122 1/29/2007  2:42:38 PM  Info     hd          InTouch Historical Data Server - 10.
2123 1/29/2007  2:42:38 PM  Info     VIEW        Wonderware I/O Server Toolkit for \
2124 1/29/2007  2:42:38 PM  Info     VIEW        Setting current View window HWND
2125 1/29/2007  2:54:59 PM  Info     16PENTREND  Invensys Systems,Inc. InTouch 16-F
2126 1/29/2007  3:10:53 PM  Info     WM          Database successfully saved.
2127 1/29/2007  3:22:24 PM  Info     WM          Database successfully saved.
2128 1/29/2007  3:22:26 PM  Info     VIEW        Loading Script DLL: WWSCRIPT.DLL
2129 1/29/2007  3:22:26 PM  Info     WWSCRIPT    10.0.0
2130 1/29/2007  3:22:26 PM  Info     WWSCRIPT    Message: TankLevel tag value: 57
```

3. Locate the logged values from the LogMessage() function.

Note: If you are debugging the script on a remote InTouch HMI node, you must add the Node name to the Node Group in Log Viewer and view the Log Viewer messages of that node.

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