ABB MEASUREMENT & ANALYTICS | APPLICATION MIGRATION MANUAL

Spirit^{IT} eXLerate

Measurement supervisory software

From 2003 to 2016

Measurement made easy

Spirit^{IT} eXLerate interfaces

Introduction

This manual is intended for Spirit^{IT} eXLerate developers who wish to upgrade their Spirit^{IT} eXLerate 2003 applications to Spirit^{IT} eXLerate 2016.

Within this document, the term “Excel 2010+” is used to indicate “Excel 2010 or higher”.

For more information

All publications of Spirit ^{IT} eXLerate are available for free download from:

	Search for:
Spirit ^{IT} eXLerate application reference manual	IM/eXL-EN
Spirit ^{IT} eXLerate advanced topics reference manual	CM/eXL-EN
Spirit ^{IT} eXLerate function reference manual	CM/eXL/RF-EN
Spirit ^{IT} release notes	RN/eXL-EN

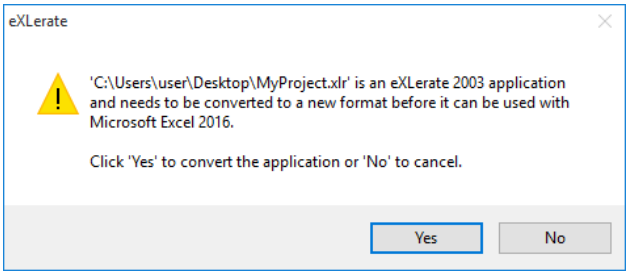
Contents

1 Migrating to Excel 2010+

Spirit^IT eXLerate 2016 can be used in combination with Excel 2010, 2013, 2016 and Excel 2019 (provisional support). Excel 2003 had the file-format for eXLerate-files ".xlr". For Excel 2010+, a new file-format is used which uses the extension ".xlrx". Upgrading an existing ".xlr" application to an ".xlrx" application can be easily done using the eXLerate Control Center.

Automatic conversion

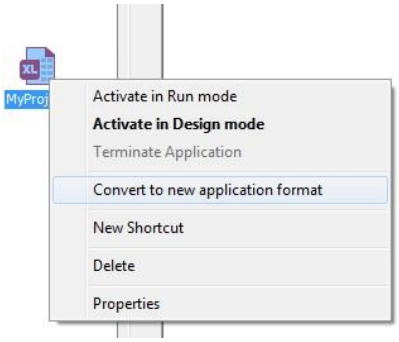
In Spirit^IT eXLerate 2016, if you try to open an ".xlr" file, eXLerate will offer the possibility to convert the application to the new ".xlrx" file-format.



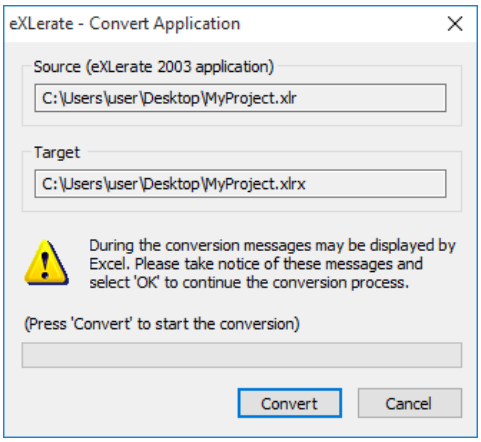
After you click 'Yes' the Conversion Wizard is started.

Conversion wizard

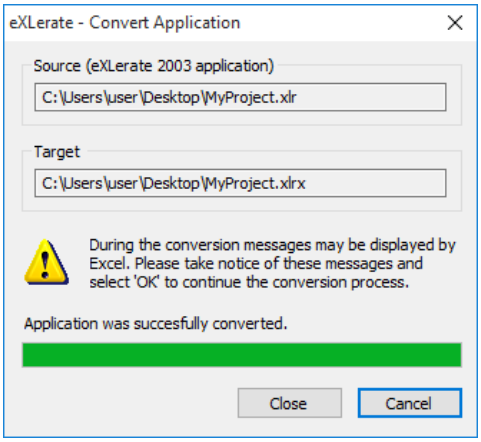
The Conversion wizard is automatically started when necessary, but can also be started manually:



The wizard shows the source-file and the destination-file. To start the operation, click the 'Convert' button.



During the conversion Excel will be started several times. In some cases, Excel will display warnings that it needs to make a change to the workbook in order to convert to the new file-format. For instance, the name "ZZ100" is valid in Excel 2003, but conflicts with a valid range in Excel 2016. In this case make a note of the warning and change the name in your application afterwards to something that doesn't conflict with Excel 2010+.



Upon success, the Shortcut in the Control Center is automatically updated to refer to the new ".xlrx" file.

2 Math Functions

xlMath is the flow-math library that has been traditionally used in combination with eXLerate. In 2009, Spirit IT Flow-Xpert was created, the successor to xlMath. In Spirit IT eXLerate 2016, both Spirit IT Flow-Xpert and xlMath functions are available. However, in time xlMath will be phased out and become obsolete in Spirit IT eXLerate. It is therefore advised to develop new applications using the Spirit IT Flow-Xpert (**fx**-prefix) worksheet functions rather than the xlMath (**xl**-prefix) worksheet functions.

Math functions

The following table shows the math-functions from xlMath and their Spirit IT Flow-Xpert counterparts. Note that this table only shows the functions contained in xlMath. Spirit IT Flow-Xpert itself contains more functions but these surpass the scope of this document.

Function	Alternative
xlMassFlow_ISO5167_Orifice	fxISO5167_Orifice
xlMassFlow_ISO5167_ClassVent	fxISO5167_Venturi
xlMassFlow_ISO5167_VentNozzle	fxISO5167_VenturiNozzle
xlMassFlow_ISO5167_Nozzle	fxISO5167_ISA1932
xlMassFlow_ISO5167_LongRadiusNozzle	fxISO5167_LongRadius
xlMassFlow_AGA3	fxAGA3_C
xlProp_AGA5	fxAGA5_C
xlComponents_AGA8	See section xlComponents_AGA8
xlMolarMass_AGA8	fxAGA8_C; fxAGA8_M
xlProp_AGA8	fxAGA8_C; fxAGA8_M
xlPseudoComp_AGA8	No alternative available.
xlProp_AGA10	fxAGA10ex_M
xlLegend_AGA10	See section xlLegend_AGA10
xlApi2540_Density	fxAPI_Dens15C_1980
xlGpaTp25_Density	fxAPI_Dens15C_NGL_LPG
xlDensitySolartron7835	fxSolartron_Gas_M
xlLiquidDensity	fxAPI_MPMS_11_3_3_2; fxEthylene_IUPAC_C; fxEthylene_IUPAC_M
xlProp_NX19	fxNX19_M
xlProp_ISO6976_1995	fxISO6976_1995_M
xlProp_ISO6976_1983	fxISO6976_1983_M
xlProp_SGERG88	fxSGERG_C; fxSGERG_M
xlVOS_GasUnie	fxAGA10_M
xlThermoProp	No alternative available.
xlThermoPropNames	No alternative available.
xlGravity	No alternative available.
xlAPIDens_Table5	fxAPI_Table5_1980
xlAPIDens_Table6	fxAPI_Table6_1980
xlAPIDens_Table53	fxAPI_Table53_1980
xlAPIDens_Table54	fxAPI_Table54_1980
xlAPIDens_Table24	fxAPI_Table24_1980
xlAPIDens_Table23	fxAPI_Table23_1980
xlR	This function returned the universal gas constant which is 8.31451 J/mol K.
xlFitValue	(eXLerate) exFitValue
xlFitUser	(eXLerate) exFitUser
xlFitLin	(eXLerate) exFitLin

xlComponents_AGA8

The worksheet function “xlComponents_AGA8” is a so-called meta function and returns name information about an AGA8 composition. There is no alternative for this function in Spirit IT Flow-Xpert. Instead Spirit IT Flow-Xpert contains extensive documentation on components. The table below lists the content contained in the “xlComponents_AGA8” function, which can be used for migration purposes.

#	Component	Formula	
1	Methane	C1	CH4
2	Nitrogen	N2	N2
3	Carbon Dioxide	CO2	CO2
4	Ethane	C2	C2H6
5	Propane	C3	C3H8
6	Water	H2O	H2O
7	Hydrogen Sulphide	H2S	H2S
8	Hydrogen	H2	H2
9	Carbon Monoxide	CO	C
10	Oxygen	O2	O2
11	i-Butane	iC4	i-C4H10
12	n-Butane	nC4	n-C4H10
13	i-Pentane	iC5	i-C5H12
14	n-Pentane	nC5	n-C5H10
15	n-Hexane	nC6	n-C6H14
16	n-Heptane	nC7	n-C7H16
17	n-Octane	nC8	n-C8H18
18	n-Nonane	nC9	n-C9H20
19	n-Decane	nC10	n-C10H22
20	Helium	He	He
21	Argon	Ar	Ar
22	NeoPentane	C5	C5H12

xlLegend_AGA10

The worksheet function “xlLegend_AGA10” is a so-called meta function and returns name information about an AGA10 composition. There is no alternative for this function in Spirit IT Flow-Xpert. Instead Spirit IT Flow-Xpert contains extensive documentation on components. The table below lists the content contained in the “xlLegend_AGA10” function, which can be used for migration purposes.

	Component	Formula	Units
1	Molecular weight	Mw	[kg/kmol]
2	Molar density at base conditions	Rhob	[mol/m3]
3	Molar density at flowing conditions	Rhof	[mol/m3]
4	Mass density at base conditions	Rhob	[kg/m3]
5	Mass density at flowing conditions	Rhof	[kg/m3]
6	Ideal gas relative density	iRD	[-]
7	Real gas relative density	rRD	[-]
8	Velocity of sound	w	[m/s]
9	Velocity of sound	w	[ft/s]
10	Compressibility at base conditions	Zb	[-]
11	Compressibility at flowing conditions	Zf	[-]
12	Supercompressibility	Fpv	[-]
13	Ideal gas specific enthalpy	H0	[kJ/kg]
14	Real gas specific enthalpy	H	[kJ/kg]
15	Real gas specific entropy	S	[kJ/kg/K]
16	Ideal gas isobaric heat capacity	Cp0	[kJ/kg/K]
17	Real gas isobaric heat capacity	Cp	[kJ/kg/K]
18	Real gas isochoric heat capacity	Cv	[kJ/kg/K]
19	Ideal gas isobaric heat capacity	Cp0	[kJ/kmol/K]
20	Real gas isobaric heat capacity	Cp	[kJ/kmol/K]
21	Real gas isochoric heat capacity	Cv	[kJ/kmol/K]
22	Ratio of specific heats	Gamma	[-]
23	Isentropic exponent	Kappa	[-]
24	Critical flow factor	C*	[-]
25	Ideal gas specific enthalpy	H0	[kJ/kmol]
26	Real gas specific enthalpy	H	[kJ/kmol]
27	Isentropic perfect gas critical flow factor	C*i	[-]
28	Isentropic real gas critical flow factor	CRi	[-]
29	Calculation time	t	[mS]

Trend functions

xlMath contains a set of basic trending functions. These functions were intended for use in standalone Excel applications where there is no eXLerate available. These functions will become obsolete when xlMath is phased out. As an alternative, the eXLerate Trending functionality should be used which also has much more features. The following functions will therefore become obsolete in time.

Function	Alternative
xlTrendValue	eXLerate Trending
xlTrendExtremes	eXLerate Trending
xlTrendTime	eXLerate Trending
xlTrendAverage	eXLerate Trending

Miscellaneous functions

Traditionally, xlMath also contains various general purpose functions. The list below shows the alternatives for these functions in Spirit^IT eXLerate.

Function	Alternative
xlTime	(eXLerate) exNow
xlBitTest	(eXLerate) exBitTest
xlBits2Num	(eXLerate) exBits2Num
xlNum2Num	(eXLerate) exNum2Num
xlNumBytes	Obsolete
xlCRC16	(eXLerate) exCRC32
xlEGU	(Flow-Xpert) fxConvertUnit

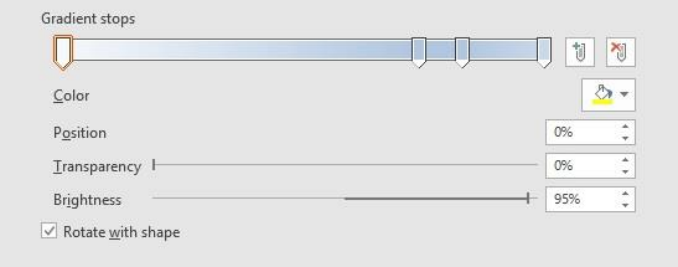
3 Animations

In Excel 2010+, shapes have undergone a big metamorphosis. Not only do the shapes look nicer, they also contain a lot more configurable properties. In Spirit[IT] eXLerate 2016, the set of functions to animate shapes remains the same and is fully backwards compatible.

This chapter is intended for trouble shooting if you experience problems with animations, specifically with gradients. If you don't see any problems with animations, you can skip this chapter.

Gradient stops

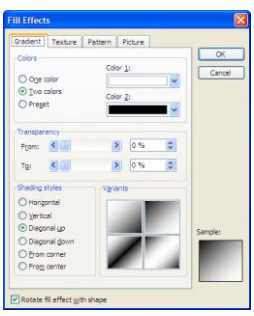
When an application is converted from an ".xlr" file to a ".xlrx" file, the shapes in the application are also automatically converted. Since Excel 2010+ has more gradient capabilities, gradient settings are represented in a different way. Gradients in Excel 2010+ are represented as a set of gradient stops which can be added, removed, moved and changed color.

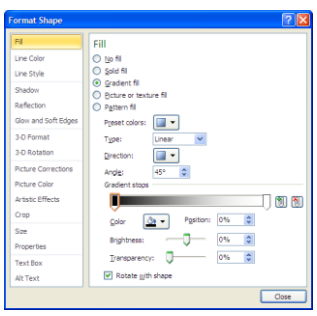


The exShape functions in eXLerate 2016 can change (animate) the first color of a gradient, which is the same as in eXLerate 2003.

When converting from an ".xlr" file to a ".xlrx" file, it may happen that Excel decides to place a different color as the first gradient stop. The following example illustrates this behavior. It shows a shape with a two color gradient which was created in Excel 2003 and converted to Excel 2016.

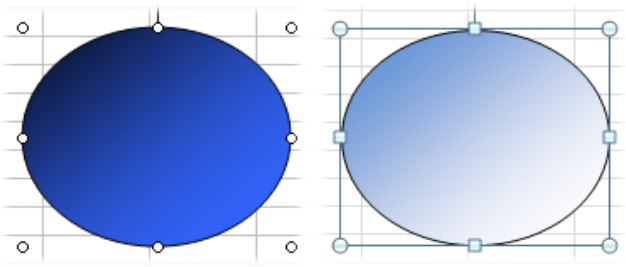
Excel 2003 (original) Excel 2016 (converted from Excel 2003)





The Shape looks the same in Excel 2016, but the primary color has been switched. Because eXLerate always animates the first color, something different happens when animating the (primary) color using an exShapeColor(..) function. For instance, when animating the fill color to blue, the following happens:

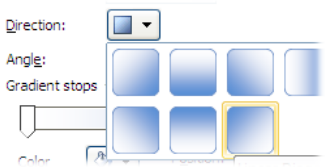
Excel 2003 Excel 2016



This happens only when you have chosen certain Variants of certain Shading styles in Excel 2003.

To resolve this issue, two steps are required:

Select the opposite gradient direction:

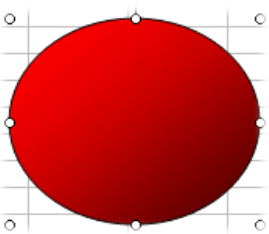


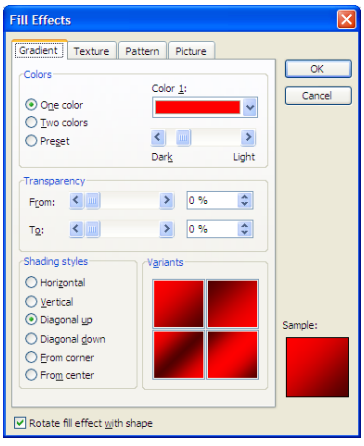
Swap the colors on the gradient stops:

One color gradients in Excel 2003

Excel 2003 supports one color gradients. Using this feature, you could create a gradient using only one color by setting the darkness of the second gradient color.

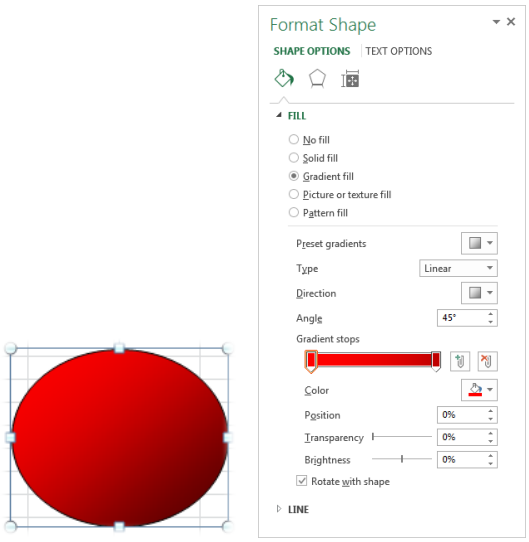
One color gradient in Excel 2003





Excel 2016 does not support these one color gradients, but instead uses two gradient stops to achieve the same effect.

Gradient fill in Excel 2016 (converted from one color gradient in Excel 2003)



When converting from a ".xlr" file to a ".xlrx" file, these one color gradients are automatically converted to a gradient fill with 2 gradient stops. The color of the second gradient stop will be set to a fixed color (the color it had at the moment of the conversion). Since Spirit[IT] eXLerate animates the first color only, the gradient that appears when animating the first color (e.g. from red to blue) may be incorrect. This is because the color of the second gradient stop will not change in Excel 2016 as it did in Excel 2003.

To resolve this issue, set the second gradient stop to a neutral color, for instance: white, black or gray. This will ensure that when animating the first color, the gradient appears correctly.

4 Trending

In 2006, a new and improved trending module was added to Spirit[IT] eXLerate. This module consisted of a set of controls which can be easily added to sheets and forms. This module superseded the old trending module which was based on Excel Charts and had various limitations. As of Spirit[IT] eXLerate 2016, the old (legacy) trending module has become obsolete.

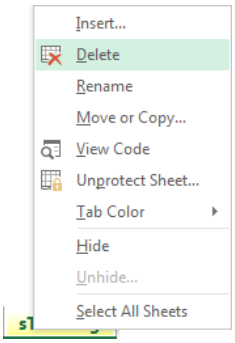
Migrating from legacy to the new trending module

Applications that are already built upon the new trending module (i.e. uses exTrendChart controls) do not require any migration. Applications that are built using the legacy trending module (based on Excel Charts) need to be migrated to the new trending module.

To migrate, follow these steps:

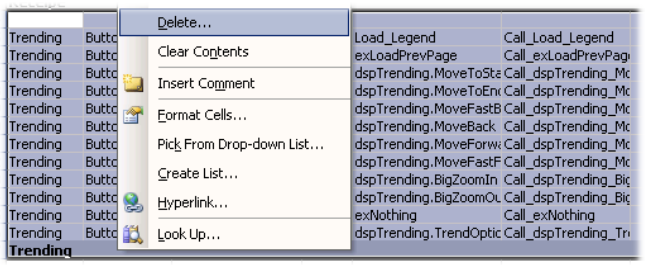
- Remove legacy trending worksheet
- Remove legacy trending functions from button-table
- Remove legacy trending 'AutoUpdate' VBA function
- Remove legacy trending worksheet & VBA functions
- Insert new trending worksheet/control

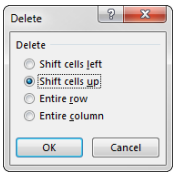
Remove legacy trending worksheet(s)
Right-click the worksheet and select 'Delete'.



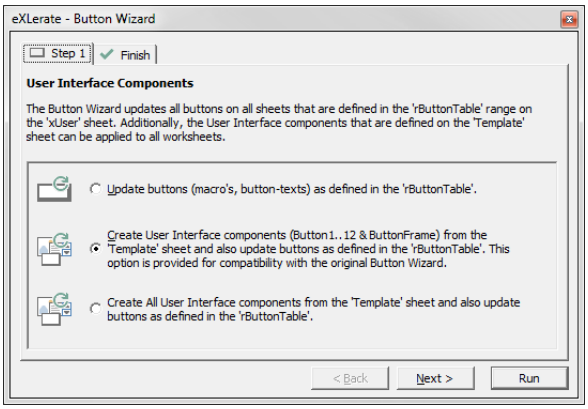
Repeat this step for every legacy trending worksheet in your application.

Remove legacy trending functions from button-table
Select the cells in the button-table containing the legacy trending functions. Delete these cells.





Run the Button-wizard (this removes the legacy trending related functions from modEvents).



Remove legacy trending 'AutoUpdate' VBA function(s)
Remove the legacy trending 'AutoUpdate' function from the 'OnEvent' handler in 'modEvents'.

```
'----------------------------
'5 sec timer
'----------------------------
Case 2:
  dspTrending.AutoUpdate
  dspDisplay.AutoUpdate

'----------------------------
```

```
'----------------------------
'5 sec timer
'----------------------------
Case 2:
  dspDisplay.AutoUpdate

'----------------------------
'1 minute timer
```

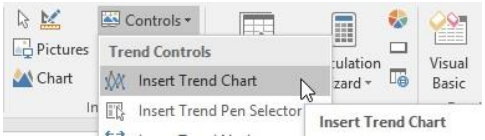
Remove legacy trending worksheet & VBA function(s)
Search the worksheets and the VBA code for any of the legacy trending functions, and remove them. An overview of the legacy worksheet- and VBA functions is listed further on in this chapter.

Insert new trending worksheet/control
Adding the new trending module to your application can be done in two ways:

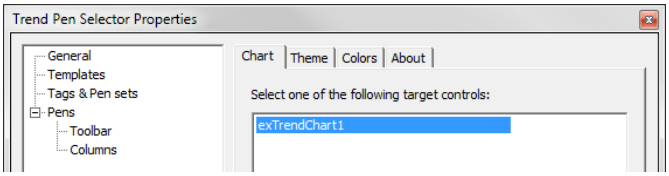
- Copy an existing trending worksheet into your application
- Add trending controls to your own worksheet

The 'MyTemplate' application contains a ready to use trending worksheet. To add it to your application, just open the 'MyTemplate' application and copy the worksheet to your application.

To add trending support to your own worksheet, you need at least one exTrendChart control and one exTrendPenSelector control. These controls can be added using the 'Controls' option in the eXLerate ribbon.



After both controls have been inserted, the exTrendPenSelector needs to be linked to the corresponding exTrendChart. This can be done by clicking on the 'Properties' button on the right-top of the exTrendPenSelector control. From the 'General->Chart' option, select the corresponding exTrendChart control.



The basic configuration is now complete. You may now continue to customize the controls to your specific needs.

Trend client option

The legacy trending module required that a 'Client' flag was set in a shortcut of the Control Center. The new trending module does not require this flag and the option has therefore been removed from the Control Center.

Old:

New:

Worksheet functions

The following worksheet functions were used by the legacy trending module and have been removed.

Function	Alternative
exTrendUpdate	Internal function that was used by the legacy trending module. No alternative needed because the updating of trend data is .
exTrendData exTrendDataEx	Retrieves trend-data onto a worksheet. Two alternatives in VBA are available for these functions: exTrendReadTag and exTrendReadFile. The output of these functions is an array which can be easily copied onto a worksheet using "Range(..) = vArray".
exTrendPenInfo	Retrieves pen-info of a specific trend. Trend pen information is stored in the exTrendChart Control for the new trending. Using VBA, all properties of the pens are accessible.
exZoomFactor	Zooms in or out for a specific trend. Zooming support is integrated in the UI of the exTrendChart Control and is also accessible from VBA.

VBA functions

The following VBA functions were used by the legacy trending module and have been removed.

Function	Description
exAutoMoveToEnd	Move the specified trend to the end of the data.
exBigZoomIn	Zoom the specified trend in with a bigger step.
exBigZoomOut	Zoom the specified trend out with a bigger step.
exHistZoomFactor	Return the current zoom factor of the specified trend.
exMoveBack	Scroll backwards through the specified trend data, i.e. move the trend to the left.
exMoveFastBack	Fast scroll backwards through the specified trend data.
exMoveFastForward	Scroll forward through the specified trend data, i.e. move the trend to the right.
exMoveForward	Scroll forward through the specified trend data, i.e. move the trend to the right.
exMoveToBegin	Move the specified trend towards the beginning of the available data.
exMoveToEnd	Move the specified trend once towards the end of the available data.
exTrendOptions	Display the dialog with trend options of the specified trend.
exZoomIn	Zoom the specified trend in, i.e. decrease the total time in the specified chart.
exZoomOut	Zoom the specified trend out, i.e. increase the total time in the specified chart.

The function of all these VBA functions has been superseded by the VBA object model of the new trending module. All Trend Controls can be accessed through VBA where their properties are accessible. Through VBA it is also possible to programmatically add/remove pens to and from trend-charts.

5 Databases

Database support is an important feature of Spirit[IT] eXLerate. In Spirit[IT] eXLerate 2016 this feature will be further extended to make it easier to manage databases and view/edit database content with the use of off the shelve controls. With some exceptions database support remains largely unchanged and backwards compatible.

exMySQL worksheet functions

In 2006, a new set of generic database functions with the prefix “exSQL” was introduced in Spirit[IT] eXLerate. These more powerful functions made it possible to communicate with the newly introduced embedded database and external databases. These functions superseded the old-style “exMySQL” worksheet functions. In Spirit[IT] eXLerate 2016, the old-style “exMySQL” functions have become obsolete. The table below shows the obsolete functions and their alternatives:

Function	Alternative
exMySQLConnect	exSQLConfigureDatabase
exMySQLCreateQuery	exSQLCreateQuery
exMySQLExecQuery	exSQLExecQuery
exMySQLExecRangeQuery	exSQLExecQuery
exMySQLExecRecordQuery	exSQLExecQuery
exMySQLLastError	exSQLLastError
exMySQLInfo	exSQLDiagnosticalValue
exMySQLPing	exSQLDiagnosticalValue
exMySQLStatus	exSQLDiagnosticalValue
exSQLExecRangeQuery	exSQLExecQuery
exSQLExecRecordQuery	exSQLExecQuery

exSQLExecRangeQuery & exSQLExecRecordQuery

Because of a limit in Excel 2003, arguments passed to worksheet functions were limited to a length of max 255 characters. Because of this, the “exSQLExecRangeQuery“ and “exSQLExecRecordQuery” functions were introduced. These functions made it possible to circumvent this limit and construct SQL queries with a larger length. The use of these functions was however complicated and prone to errors. In Excel 2010 and later versions, this limit was removed from Excel and it is now possible to use worksheet function arguments with a max limit of 65536 characters. For this reason, the “exSQLExecRangeQuery“ and “exSQLExecRecordQuery” functions have become obsolete. To migrate from these functions, construct your whole query in a string and use “exSQLExecQuery” instead.

Function	Alterative
exSQLExecRangeQuery	exSQLExecQuery
exSQLExecRecordQuery	exSQLExecQuery

6 Revisions

Revision A

Date November 2011

- Initial release of eXLerate 2010 Migration Manual.

Revision B

Date December 2016

- Update to eXLerate 2016
- Update to ABB lay-out
- New document code: IN/eXL2016-EN

Revision C

Date July 2018

- New document code: IN/eXL-EN
- Reintroduce revisions chapter
- Provisional support of Excel 2019 added

ABB b.v.
Measurement & Analytics
Prof. Dr. Dorgelolaan 20
5613 AM Eindhoven
The Netherlands
Phone: +31 40 236 9445
Mail: nl-spiritit-sales@abb.com

ABB Malaysia Sdn Bhd.
Measurement & Analytics
Lot 608, Jalan SS 13/1K
47500 Subang Jaya
Selangor Darul Ehsan, Malaysia
Phone: +60 3 5628 4888

abb.com/midstream

ABB Inc.
Measurement & Analytics
7051 Industrial Boulevard
Bartlesville OK 74006
United States of America
Phone: +1 800 442 3097

ABB Limited
Measurement & Analytics
Oldends Lane, Stonehouse
Gloucestershire, GL10 3TA
United Kingdom
Phone: +44 7730 019 180

IN/eXL-EN Rev. C 06.2018