

The next generation CONTROL®

version 10.3

**Flex Views**



# Flex Views

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# Flex Views

## Why Flex views?

With decades of usage by thousands of users in a broad spectrum of industries, it is fascinating to observe the creative ways in which CONTROL® data is used for business models, analyses, input templates, reports, and presentations.

Flex views are the latest advance in empowering anyone who knows Excel to access and manipulate CONTROL® data for any purpose they can imagine – with the same security, data integrity, and scope of applications that are the hallmark of CONTROL®.

In previous releases, we supplemented the capabilities of views with the addition of scratchpads and CONTROL® Reference Functions (CRF). While these additions have been used successfully by many customers, they have functional and scalability limitations that restrict their use. They also require a deeper knowledge of CONTROL® than a typical Excel user would have.

Flex views are designed to overcome these limitations and to feel natural to existing Excel users. Our goal is to marry the richness and power of the CONTROL® architecture to the familiarity, flexibility, and simplicity of Excel. This is a crucial element in the value equation that CONTROL® brings to our customers.

## What can you do with Flex views?

### A standard variance report

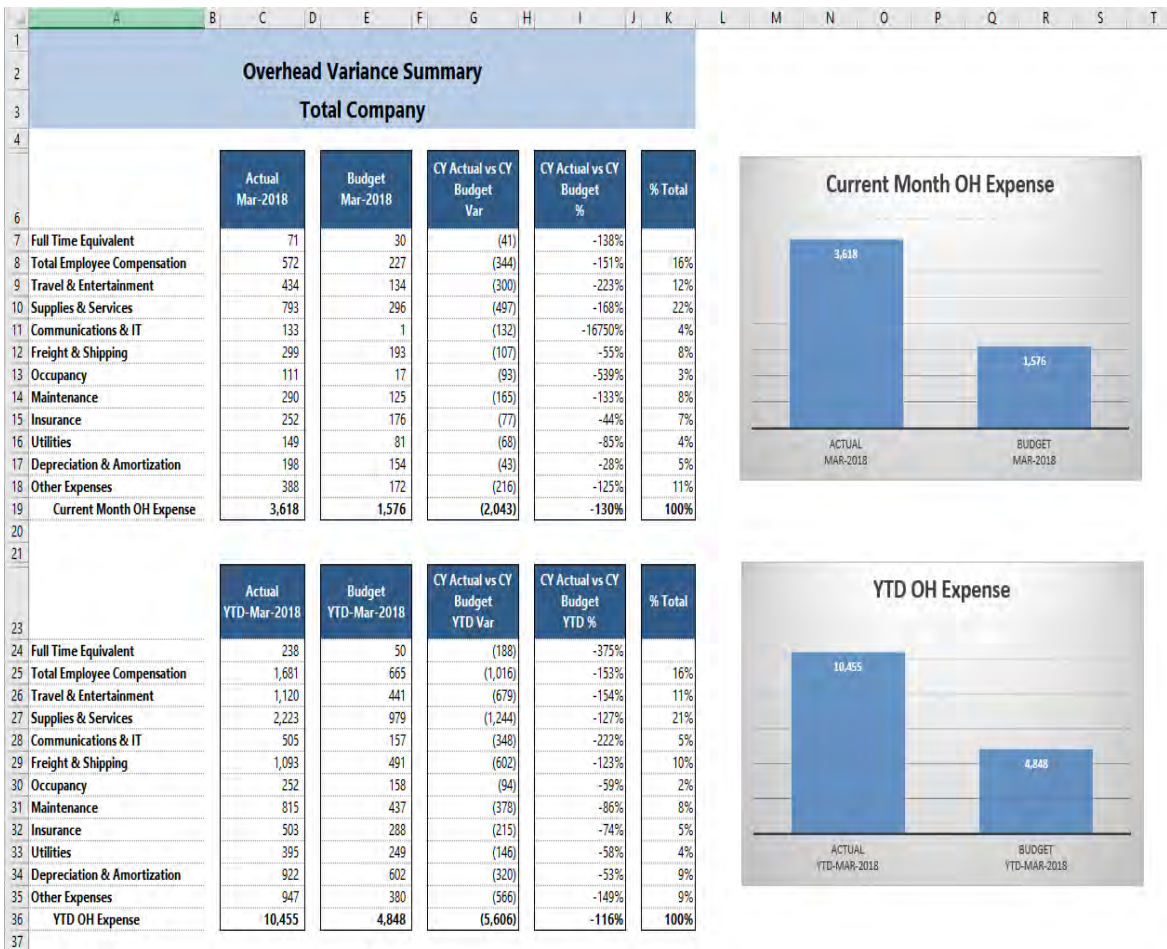
Flex views allow you to rearrange data from a CONTROL® view any way you want on the worksheet. For example, you can turn this view with variance information

	Actual Mar-2018	Budget Mar-2018	-CY Actual vs CY Budget Var	-CY Actual vs CY Budget %	Actual YTD-Mar-2018	Budget YTD-Mar-2018	-CY Actual vs CY Budget YTD Var	-CY Actual vs CY Budget YTD %	Budget YR-2018
Full Time Equivalent	71	30	(41)	-138%	238	50	(188)	-375%	500
+Total Employee Compensation	572	227	(344)	-151%	1,681	665	(1,016)	-153%	2,437
+Travel & Entertainment	434	134	(300)	-223%	1,120	441	(679)	-154%	1,529
+Supplies & Services	793	296	(497)	-168%	2,223	979	(1,244)	-127%	3,788
+Communications & IT	133	1	(132)	-16750%	505	157	(348)	-222%	903
+Freight & Shipping	299	193	(107)	-55%	1,093	491	(602)	-123%	1,922
+Occupancy	111	17	(93)	-539%	252	158	(94)	-59%	638
+Maintenance	290	125	(165)	-133%	815	437	(378)	-86%	1,345
+Insurance	252	176	(77)	-44%	503	288	(215)	-74%	1,158
+Utilities	149	81	(68)	-85%	395	249	(146)	-58%	1,248
+Depreciation & Amortization	198	154	(43)	-28%	922	602	(320)	-53%	1,988
+Other Expenses	388	172	(216)	-125%	947	380	(566)	-149%	1,482
-Total Overhead Expenses	3,618	1,576	(2,043)	-130%	10,455	4,848	(5,606)	-116%	18,439



# Flex Views

into a polished variance report just using simple Excel copy/paste and charting functions:



## A customized budget template

With a Flex view, you can insert rows and columns, add Excel formulas, and present data from other pages of the view. Perhaps you want to embed Excel formulas to calculate variable expenses based on total company revenue. As you adjust your values, you can see the impact on the total company expense and see how your ratios compare to the total company.



# Flex Views

## A customized budget template

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S			
1	Input NY Budget as % Total Company of Revenue																					
2	Total Company																					
3																						
4		PY Act	CY Fcst	NY Bud																		
5	Revenue	80,000,000	82,000,000	88,000,000																		
6	Total OH Expense	34,964,785	32,584,785	28,965,741																		
7	% Revenue	44%	40%	33%																		
8																						
9		CY Fcst			NY Budget																	
10	Department 101	Year	% Revenue	% Expense	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	% Revenue	% Expense			
11	Total Employee Compensation	2,319,026	3%	13%	231,126	267,395	363,186	111,972	355,389	147,517	196,121	256,384	321,851	187,350	179,573	319,637	2,937,500	3%	14%			
12	Travel & Entertainment	1,847,836	2%	10%	50,347	85,595	169,372	131,674	263,104	153,983	164,956	49,241	179,901	149,622	67,935	126,412	1,592,143	2%	8%			
13	Supplies & Services	4,218,416	5%	23%	543,518	235,181	386,607	395,633	433,500	331,326	249,370	538,574	485,430	404,701	362,412	367,658	4,733,910	5%	23%			
14	Communications & IT	1,033,921	1%	6%	65,603	132,084	165,060	41,105	51,767	142,496	125,481	(1,420)	19,400	95,967	146,163	185,069	1,168,776	1%	6%			
15	Freight & Shipping	1,422,990	2%	8%	120,155	139,010	188,809	58,210	184,755	76,689	101,957	133,286	167,320	97,397	93,354	166,169	1,527,111	2%	7%			
16	Occupancy	536,853	1%	3%	54,251	(10,963)	41,380	95,741	(5,500)	46,460	94,036	74,871	11,940	27,710	21,498	110,940	562,365	1%	3%			
17	Maintenance	1,468,420	2%	8%	151,877	117,045	200,825	124,644	257,096	197,578	111,840	165,198	173,560	94,570	30,650	131,759	1,756,642	2%	8%			
18	Insurance	994,222	1%	6%	150,366	9,487	203,213	18,416	195,224	(5,486)	179,662	22,921	108,561	56,680	88,992	98,102	1,126,139	1%	5%			
19	Utilities	1,178,758	1%	7%	191,046	115,990	152,731	88,775	154,183	66,979	82,343	90,218	43,586	126,854	76,301	34,691	1,223,699	1%	6%			
20	Depreciation & Amortization	1,510,132	2%	8%	143,634	137,594	200,716	168,022	149,270	167,270	221,925	132,644	111,920	87,195	199,760	139,114	1,859,064	2%	9%			
21	Other Expenses	1,456,738	2%	8%	187,899	146,973	127,557	223,711	255,629	126,888	217,076	153,973	237,780	209,961	254,815	143,574	2,285,836	3%	11%			
22	Total OH Expense	17,987,412	22%	100%	1,889,824	1,375,391	2,199,458	1,457,904	2,294,417	1,451,700	1,744,767	1,615,889	1,861,248	1,538,008	1,521,453	1,823,125	20,773,183	24%	100%			
23	% Revenue	22%			2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%	24%					
24																						

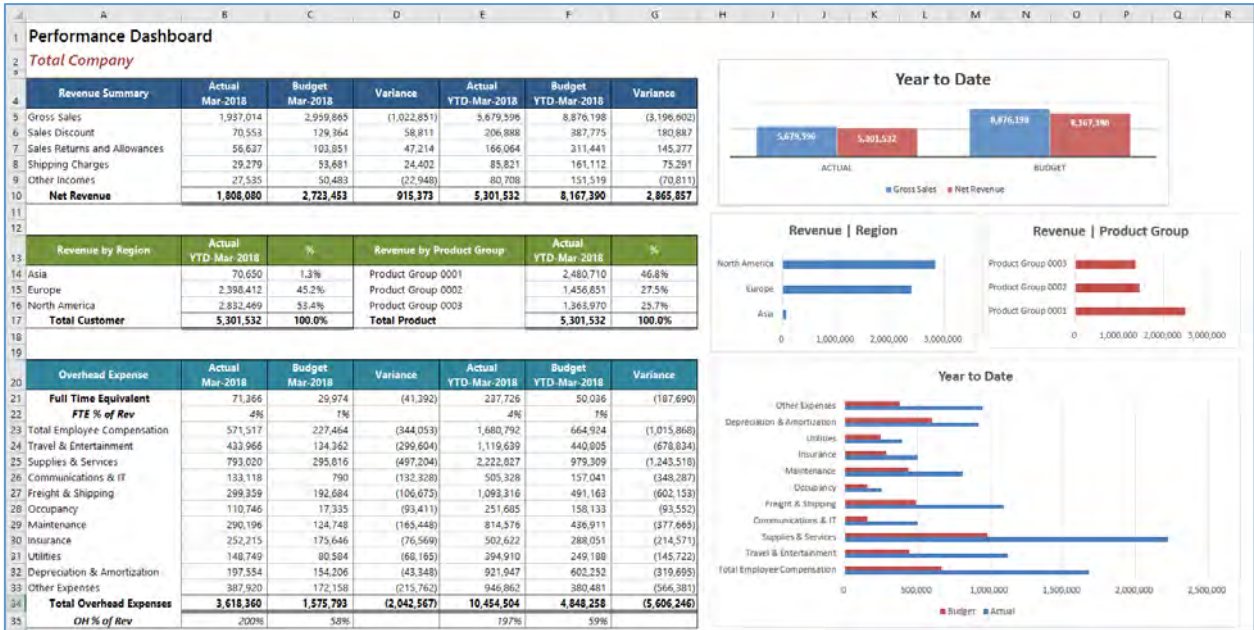
## A mashup

Have you ever wanted to analyze and compare data from different models or data sources in a single worksheet? For example, see key performance revenue information along with expense data.

With Flex views, you can add data from as many CONTROL® models or data sources as you like, and even page through their common dimensions:



# Flex Views



## The best of both worlds

While Flex views offer all the flexibility of Excel worksheet design, they retain these very powerful CONTROL® view capabilities:

- Cell comments and Hyperlinks
- Dimension filtering
- Page selection
- Expand to Multi-Page
- Refresh and Regenerate
- Save view and Save view as
- For updateable views: Solve, Lock for solve, and File data and comments
- Drill to data (in the underlying view), subaccount, scratchpad, source, comments, and hyperlinks
- Scaling of data
- Currency, translation map, and currency code



# Flex Views

Flex views do not support navigation operations that manipulate the content such as compress, expand, and rotation, because the designer determines their format, which is similar to an Excel worksheet. However, operations such as Hide can be accomplished using standard Excel techniques.

## How does it work?

The idea that powers Flex views is very simple. Each cell of the worksheet containing data is assigned a special string, called a Flex formula. The Flex formula includes a Flex function that retrieves either data or meta-data into the cell. Like Excel functions, the Flex function includes arguments, which identify a model, view, dimensional member(s), etc. in order to connect to the application.

The Flex formula does **not** replace the Excel formula or the value in the cell. Both a Flex formula and the Excel formula co-exist in the same data cell. This is a critical difference to a CRF, or other software products that interface using Excel's user defined functions.

For example, in an updatable view, you can define the data cells for travel expense with a Flex formula that references the travel account in CONTROL<sup>®</sup>, and in the same cells you can build an Excel formula that calculates travel expense based on other cells in the view, or from a different Excel worksheet. The Excel formula calculates the value, and the Flex formula defines where the resulting value is saved in the application.

In addition, when you copy, cut, and paste cells, insert or delete rows and columns, the Flex formulas are naturally reorganized without you having to do any extra work!

You can:

- Add Excel formulas to any part of the worksheet – even where there is CONTROL<sup>®</sup> content
- Add non- CONTROL<sup>®</sup> data
- Link to other Excel data
- Freely format the worksheet
- Use Excel grouping and outlining
- Add buttons, validations, charts, etc.
- Add CONTROL<sup>®</sup> data from the same view or any other view





# Flex Views

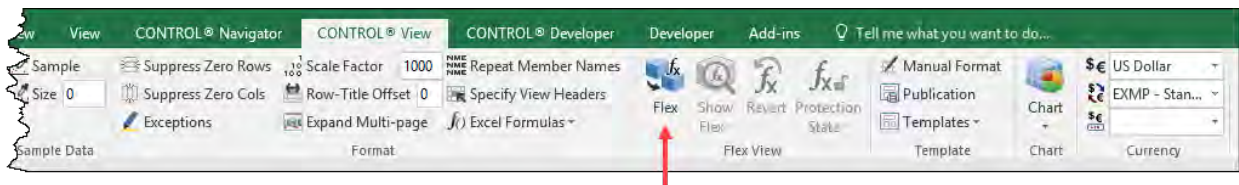
- Save the finished product (its still a view), or save as a different view
- Save the workbook for offline use

A Flex view works pretty much like any Excel worksheet.

## Flexing

You can turn any view, scratchpad, or CRF workbook sheet into a Flex view with the click of a single button, here's how to do it:

1. Open a view, scratchpad or CRF workbook sheet.
2. On the **CONTROL® View** tab (**CONTROL® Sheet** tab for CRF workbook sheets), in the **Flex View** group, click **Flex**.



The flex process will remove the view's **dimension-branch** buttons and install the appropriate Flex formulas in the cells where there is CONTROL® data. You are now ready to customize your Flex view:



# Flex Views

	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Full Time Equivalent	70	246	181	164	178	80	255	195	
Total Employee Compensation	805	583	752	610	681	907	728	640	
Travel & Entertainment	354	504	446	512	208	299	288	533	237
Supplies & Services	859	1,040	914	(453)	846	861	985	985	962
Communications & IT	282	324	287	219	268	277	333	264	317
Freight & Shipping	524	438	424	473	456	414	340	409	508
Occupancy	115	70	121	152	0	187	31	229	1
Maintenance	583	478	454	369	455	295	436	478	57
Insurance	391	265	237	216	282	219	370	132	
Utilities	223	171	223	352	244	210	251	231	25
Depreciation & Amortization	491	344	442	584	573	396	468	166	45
Other Expenses	383	524	256	435	427	310	418	389	423
Total Overhead Expenses	5,012	4,741	4,556	3,469	4,441	4,376	4,648	4,456	4,677

To see and edit the Flex formulas, click **Show Flex** on the ribbon:

	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Full Time Equivalent	=HeaderData(*, &2)								
Total Employee Compensation									
Travel & Entertainment									
Supplies & Services									
Communications & IT									
Freight & Shipping									
Occupancy									
Maintenance									
Insurance									
Utilities									
Depreciation & Amortization									
Other Expenses									
Total Overhead Expenses									



## Flex Views

**Show Flex** is similar to Excel's **Show Formulas** command. It displays the Flex formula in each cell instead of the resulting value. A Flex formula is a text string that looks like an Excel formula, with function names like **HeaderData**, **BranchData**, **Data**, etc. The arguments to these functions specify the details of where the data comes from or where to save the data in the CONTROL® application.

You can display Flex formulas in different formats. Most of the time you will use the default **Understandable** format. Here is a list of the available formats that you can choose:

<b>Show Flex</b>	<b>Used to</b>
Understandable	Show the Flex function and the <b>Reference Type</b> of each argument.
Absolute	Show the Flex function, with each argument converted to the source element. This format is extremely helpful, so you can clearly see the definition of the source data.
Persistent	Show the Flex function as its CRF equivalent. You can typically ignore this format.
Compact	Debug complex cases and is a technical format used by software developers. You will never use this format.

When you are satisfied with your new Flex view, simply use **Views > Save** or **Views > Save As** to save it in the database, either for yourself or for all users.

**Note:** If you have the appropriate data security privileges, and the view is updatable, then any data changes will also save when you save the view.

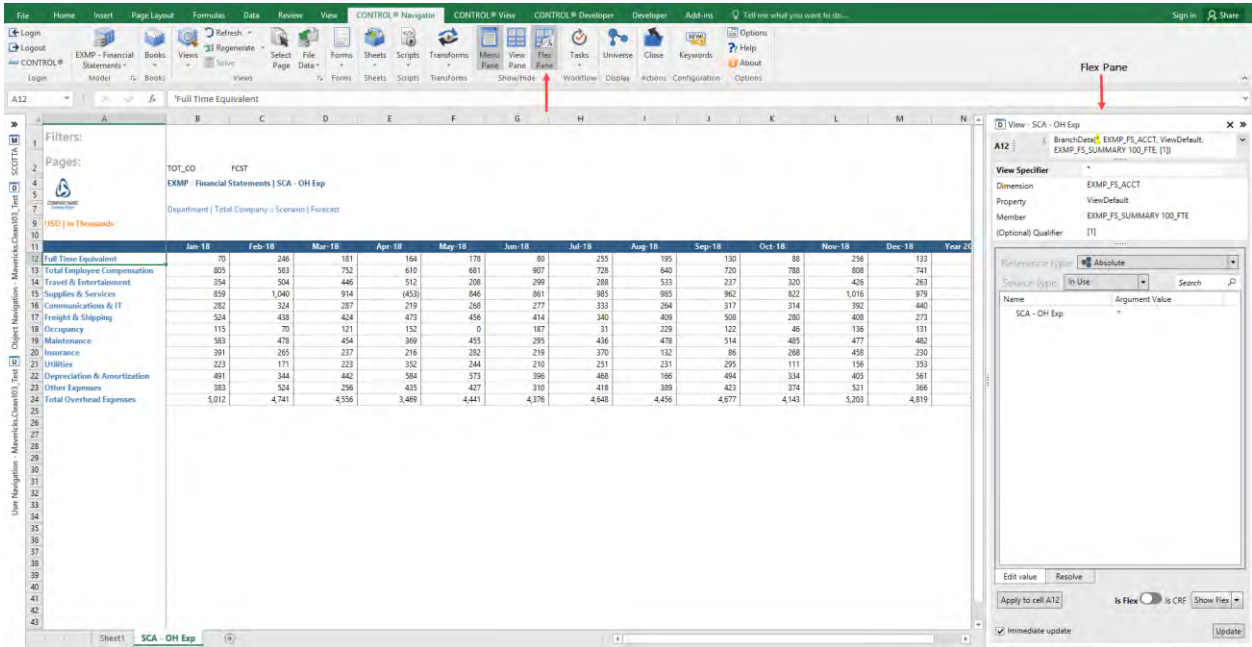
To turn your Flex view back to a standard view, click **Flex** and confirm that you want to discard any changes.

### Using the Flex Pane

The **Flex Pane** helps to create and manage Flex formulas in your Flex view. To display the **Flex Pane**, go to the **CONTROL® Navigator** tab and click **Flex Pane**.



# Flex Views



The **Flex Pane** will open on the right side of the Excel window and the pane will display the content of the active cell on the worksheet.

## The structure of the Flex Pane

The **Flex Pane** is similar to Excel's **Insert Function** dialog box:



## Flex Views

**Flex Function**

The screenshot shows the 'Flex Function' dialog box with the following components:

- Address of the active cell:** B12
- Flex formula:** Data SCENARIO p[0], EXMP\_DEPT p[0], EXMP\_FS\_ACCT r[0], TIMEPERIOD c[0]
- Arguments of the Flex function:**

Argument Name	Current Value
SCENARIO	SCENARIO p[0]
EXMP_DEPT	EXMP_DEPT p[0]
EXMP_FS_ACCT	EXMP_FS_ACCT r[0]
TIMEPERIOD	TIMEPERIOD c[0]
- Available argument options:**

Name	Argument Value
SCA - OH Exp	*
- Command to apply Flex formulas to the Worksheet:** Apply to cell B12

- The top of the pane shows the address of the active cell and the Flex formula box with the complete formula as a text string. You can edit the Flex formula directly in the box, or click to display a list of available Flex functions.
- The table immediately below the formula box has one row for each argument of the Flex function. The first column contains the argument name and the second its current value.
- The lower portion of the pane contains a list of available options for the selected argument. Single click an option to update the argument value in the table, or double click to update the argument value in both the table and the formula box.
- The **Apply to cell/range** button at the bottom inserts the updated Flex formula definition into the selected range of cells on the worksheet, and if immediate update is checked, refreshes the values in the worksheet.

**Note:** The selected range of cells on the worksheet may be broader than the active cell defined at the top of the **Flex Pane**.

# Flex Views

## Functions

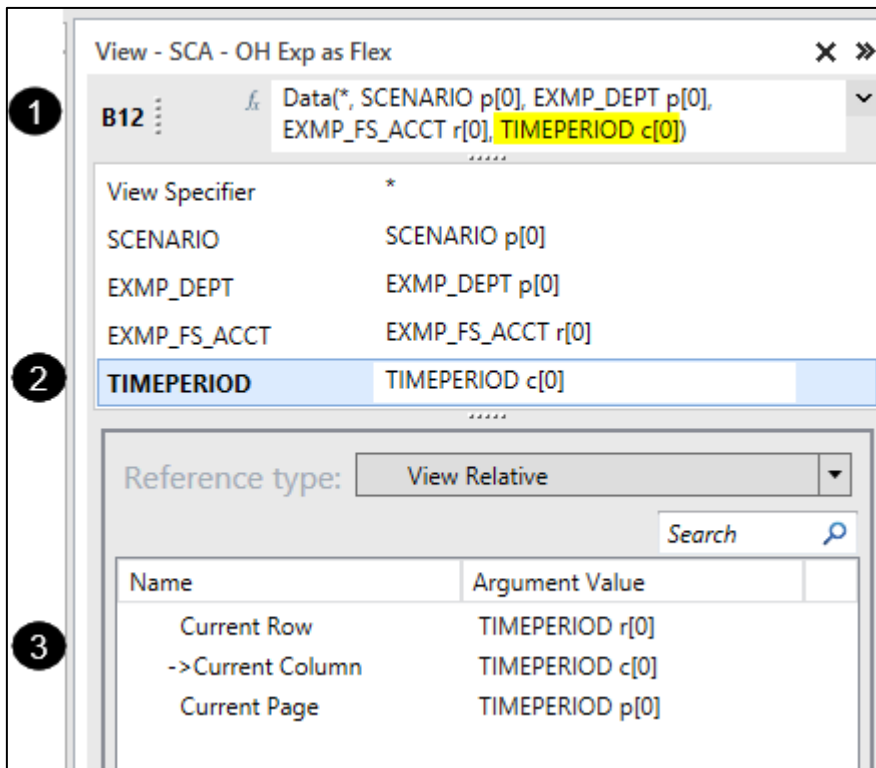
Any data or meta-data you have access to in CONTROL® is available in Flex views, via these 12 functions:

<b>View Specific Functions</b>	<b>Used to access</b>
BranchData	Member IDs and Names from the various dimension-branches
Data	Numeric or textual data in the view that you can update if the view is updateable and you have write access to the data
DataReadOnly	Numeric or textual data in the view, but the data is not updateable
HeaderData	Contents of the view's header, with any keywords or header strings resolved in the view context
Comments	Comments from the view's model that you can update
Hyperlinks	Hyperlinks from the view's model that you can update
NestedBranchData	Member IDs and names from a grouping of the view's dimension-branches, optionally subject to suppression of empty members
<b>Non-View Specific Functions</b>	<b>Used to retrieve</b>
MemberData	Meta-data (IDs, Names, reporting relationships) from a level or hierarchy
Lists	Meta-data from a level, hierarchy, custom dimension, or selection of objects in a convenient format for Excel cell validations
MetaData	Properties of objects
Keyword	Resolved value of a keyword for the current user
<b>Transient Functions</b>	<b>Used to</b>
ViewData	Assign a range of cells with the Flex formulas of the current page of a view, translated to the appropriate function

# Flex Views

## Flex function arguments

Each Flex function has one or more arguments that specify which data or meta-data element to retrieve from the database to populate the active worksheet cell. Here is an example of the arguments used for a **Data** function:



You have three options for updating the value of an argument:

1. In the formula box, you can manually update it (the selected argument is highlighted)
2. In the table, you can type in the column to the right of the argument name (autocomplete is available)
3. In the section below the table, you can select an option from the list or tree. This is the easiest way to see the allowed values.

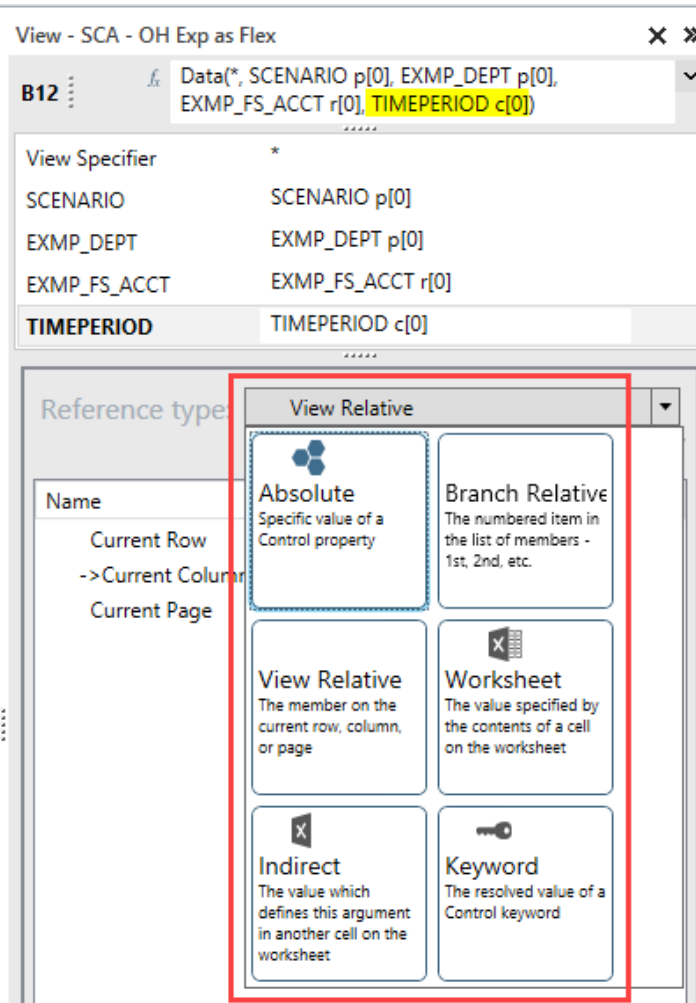
### Reference type

Excel uses **absolute** and **relative** cell references as arguments in a formula. Flex views support multiple reference types because CONTROL® deals with multi-dimensional data that is not visible in the worksheet.



## Flex Views

Flex formulas support six different reference types, although some arguments only support a subset of the reference types.



Here are some guidelines for each reference type:

Reference type	Used to
Absolute	Select a specific member, for example, 201801.
Branch Relative	Select the 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc. member of a <b>dimension-branch</b> , regardless of which members are included in the filter. This option provides some flexibility to meta-data changes (new accounts, departments, time periods etc.) or filter changes.



## Flex Views

Reference type	Used to
View Relative	Select data based on the closest member specified Flex function, e.g., BranchData, defined on the left in the row, above on the column, or on the page edge of the view. This is useful when you are displaying view data with row or column headers in a rectangular range, or if you want your view data to navigate or be expanded by pages. This option is only available for <b>Data</b> , <b>DataReadOnly</b> , <b>Comment</b> , and <b>Hyperlink</b> functions.
Worksheet	Put the absolute value of the argument in another cell on the worksheet. The reference may be Excel relative (A13), absolute (\$A\$13), or partially relative (e.g. \$A13 or A\$13). This reference type affords consistency with how many users build CRF worksheets.
Indirect	“Adopt” like arguments from a Flex formula in another cell. For example, if you want to specify the same Account member that appears in cell A13, which may have a <b>BranchData</b> , <b>Data</b> , or <b>Comment</b> function, you can simply use an <b>Indirect</b> reference to A13. <b>Indirect</b> references have the same Excel absolute/relative options as <b>Worksheet</b> references.
Keyword	Supply an argument value based on a CONTROL® keyword, evaluated for the current user and model scope of the Flex view. The resolved keyword replacement value may be any other type of reference (except Worksheet and Indirect).

We expect the KCI consulting team will develop a more refined set of guidelines for these **Reference Types** as customers begin developing Flex views.

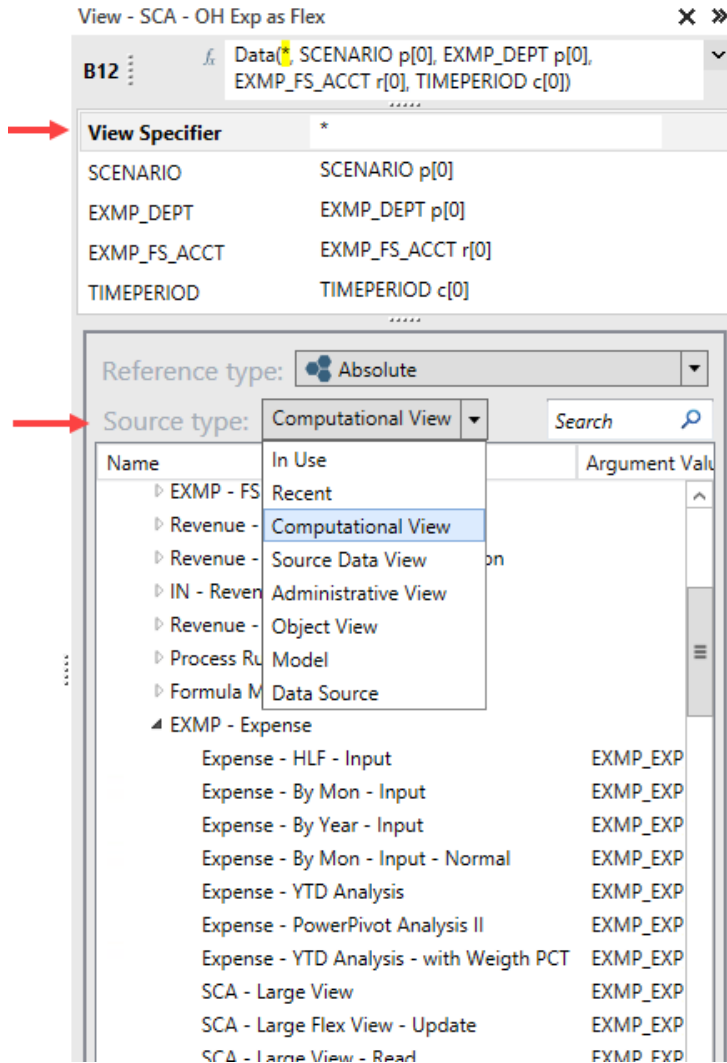
### *Source type*

Some arguments in Flex functions may have a large number of possible values, depending on the complexity of your CONTROL® application. To simplify the selection of the desired value, the range of values are broken into logical groups.

The **Source Type** serves to filter and limit the available values displayed in the list or tree below it.



# Flex Views



Since most of the Flex functions include the **View Specifier** argument, which defines the source of the data or meta-data, we will define the different source types for this argument. The **Source Type** for the **View Specifier** argument filters the available objects that you can choose from as the source data.

Source type	Used to
In Use	List all the active views.
Recent	List the most recently used views.
Computational View	List all the Computational views in your application.
Source Data View	List all the Source Data views in your application.
Administrative View	List all the Administrative views in your application.
Object View	List all the Object views in your application.
Model	List all the Models in your application.
Datasource	List all the Datasources in your application.



# Flex Views

**Note:** There are other Flex function arguments that include **Source Types** that reference other object types; for example, levels, hierarchies, etc.

## Dealing with ranges

You can use the **Flex Pane** to define or modify the Flex formula for either a single cell or a range of cells. To define a single cell, select that one cell on the worksheet. To define a range of cells, select the range of cells on the worksheet. The Flex formula, function, and arguments in the **Flex Pane** only reflect the active worksheet cell identified in the upper left corner of the **Flex Pane**. However, when you select a range of cells, a message indicating the number of cells that will be affected displays in the **Flex Pane**, and the title of the **Apply** button will change to **Apply to range...**

The screenshot shows a portion of an Excel worksheet on the left and the Flex Pane on the right. The worksheet displays a table with columns for months (Oct-18, Nov-18, Dec-18) and rows of numerical data. A red arrow points to the selected range of cells in the table. The Flex Pane, titled "View - SCA - OH Exp as Flex", shows the formula for cell K12: `Data("SCENARIO FCST, EXMP_DEPT p[0], EXMP_FS_ACCT r[0], TIMEPERIOD c[0])`. Below the formula, the View Specifier is set to "SCENARIO FCST". The Reference type is set to "Absolute". A table lists the arguments and their values:

Name	Argument Value
FCST: Forecast	SCENARIO FCST

A yellow warning box at the bottom of the Flex Pane states: "Selections not matched: 1 values will be duplicated when applied to current Excel range (26 cells)." A red arrow points to this warning. At the bottom of the Flex Pane, the "Apply" button is labeled "Apply to range (26 cells)", with another red arrow pointing to it. Other controls include "Edit value", "Resolve", "Is Flex" (toggle), "Is CRF", "Show Flex" (dropdown), "Immediate update" (checkbox), and "Update" (button).

## Flex Views

When you click **Apply**, all changes will propagate to the Flex formulas in the selected range.

For example, if you only change the reference type of one or more arguments, say from **View Relative** to **Absolute**, all the selected cells will have those arguments changed to the absolute member ID appropriate to that cell.

If you change a specific dimension argument, say Project, to an absolute member ID of **PROJECTTOTAL**, all the selected cells will then refer to the total of all projects when you click **Apply to range**.

Some arguments and reference types allow you to select multiple values in the **Flex Pane**.

Depending on the number of rows and columns selected, CONTROL® will try to make a sensible assignment of the selected items to the selected cells. In the example below, the **Flex Pane** has nine values selected, but the worksheet only has four cells selected, so CONTROL® applies the first four selected members in the **Flex Pane** to the four rows selected on the worksheet (CAN, ESP, FRA, and ITA).

Only 4 rows selected on the worksheet

9 values selected in the Flex Pane

Selections not matched: first 4 (from 9) values will be applied to current Excel range.

Name	Argument Value
CAN: Canada	EXMP_CNTRY CAN
ESP: Spain	EXMP_CNTRY ESP
FRA: France	EXMP_CNTRY FRA
ITA: Italy	EXMP_CNTRY ITA
JPN: Japan	EXMP_CNTRY JPN
THA: Thailand	EXMP_CNTRY THA
TWN: Taiwan, Province of C	EXMP_CNTRY TWN
USA: United States	EXMP_CNTRY USA
TOT_CO: Total Company	EXMP_CO TOT_CO

## Flex Views

If you select a single blank cell in the worksheet, and then pick a function that defines a range (e.g. **ViewData**), or pick multiple values for one or more arguments, if the area below and to the right of the selected cell is empty, **CONTROL®** will fill out the range with the specified data.

**Note:** When using the **Worksheet** or **Indirect** reference types, the cell reference will update across the selected range of cells on the worksheet similar to Excel's functionality when you copy and paste a cell reference. For example, in the screenshot below, the Flex function's **Time Period** argument for cell **B12** will be **B\$11** down all the rows in column B, but the value will be **C\$11** down all the rows in column C, etc.

	Jan-18	Feb-18	Mar-18	Apr-18
Full Time Equivalent	70	246	181	164
Total Employee Compensation	1,036	810	1,096	795
Travel & Entertainment	414	653	518	682
Supplies & Services	1,254	1,309	1,213	(587)
Communications & IT	347	367	312	318
Freight & Shipping	696	555	691	620
Occupancy	161	154	152	175
Maintenance	634	625	606	580
Insurance	493	327	305	338
Utilities	289	221	389	466
Depreciation & Amortization	787	496	702	728
Other Expenses	507	677	440	556
Total Overhead Expenses	6,618	6,184	6,424	4,672

BS11 CS11 DS11 ES11

### Authoring using the worksheet

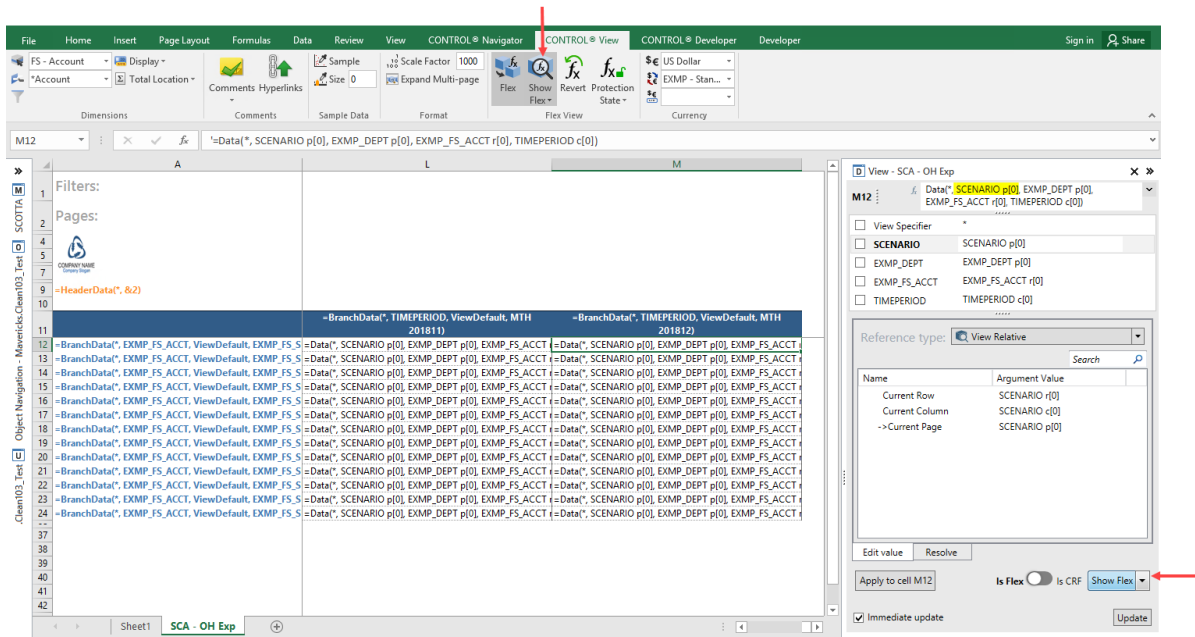
While the **Flex Pane** offers detailed options for defining Flex formulas, there are situations where it is easier or more convenient to simply edit the Flex formula on the worksheet.

To see the Flex formulas rather than the values, click **Show Flex** either on the **CONTROL® View** ribbon, or on the bottom right of the open **Flex Pane**.





# Flex Views



The columns of the view automatically expand to improve readability of the Flex formulas. An equal sign precedes each Flex formula in every cell. Cells with no Flex formula continue to display their value. Cells with Excel formulas also display their values because they would likely display **#VALUE!** errors if they referenced Flex values that momentarily display as Flex formulas.

You can copy, paste, edit, find, and replace the Flex formulas on the worksheet as you wish. You can flip back and forth between Flex formulas and values to verify that you are getting the results that you want. You can also copy and paste cells containing Flex formulas even when you are not showing the Flex formulas.

Even though you can edit the **Persistent** form of a Flex formula, it is the best practice to only edit the **Understandable** form of a Flex formula because it is more succinct, and is consistent with the syntax in the **Flex Pane**.

## Partial formulas

As you can see, while Flex formulas are very flexible and powerful, they can be lengthy and a bit intimidating.

If you want to focus on one or more specific arguments, you can select them by checking boxes that appear next to the arguments in the table of the **Flex Pane**. For example, check the box next to **EXMP\_FS\_ACCT** to display the accounts only:



# Flex Views

The screenshot shows a Flex View interface with a spreadsheet grid and a view configuration panel. The spreadsheet grid has columns A, B, and C. Row 12 is highlighted. The view configuration panel on the right shows a list of arguments with 'EXMP\_FS\_ACCT' selected. A red arrow points from the selected argument in the panel to the corresponding cell in the spreadsheet.

Any cell containing a formula that uses the selected arguments will show only the function name and the selected arguments.

You can edit or perform replacements when showing partial arguments, and the arguments not displaying will remain unchanged. This feature is particularly useful when dealing with views that include many dimension.

## Errors

Since Flex formulas are like Excel formulas, errors display in a similar fashion using the pound sign to prefix the error condition.

	A	B	C	D	E
2	Pages:	TOT_CO	FCST		
4		EXMP - Financial Statements   SCA - BranchRelative			
7	COMPANY NAME Company Signage	Department   Total Company :: Scenario   Forecast			
9	NOTTRANSLATION   in Thousands				
10					
11		Jan-18	Feb-18	Mar-18	Apr-18
12	Full Time Equivalent	#BadIndex: SCENARIO EXMP_FS_ACCT	246	181	
13	Total Employee Compensation	1,036	810	1,096	795
14	Travel & Entertainment	414	653	518	
15	Supplies & Services	1,254	1,309	1,213	
16	Communications & IT	347	367	312	
17	Freight & Shipping	696	555	691	

In most cases, Flex formula errors will not prevent the Flex view from opening, as cells without errors should populate correctly. However, with errors present, the content of the



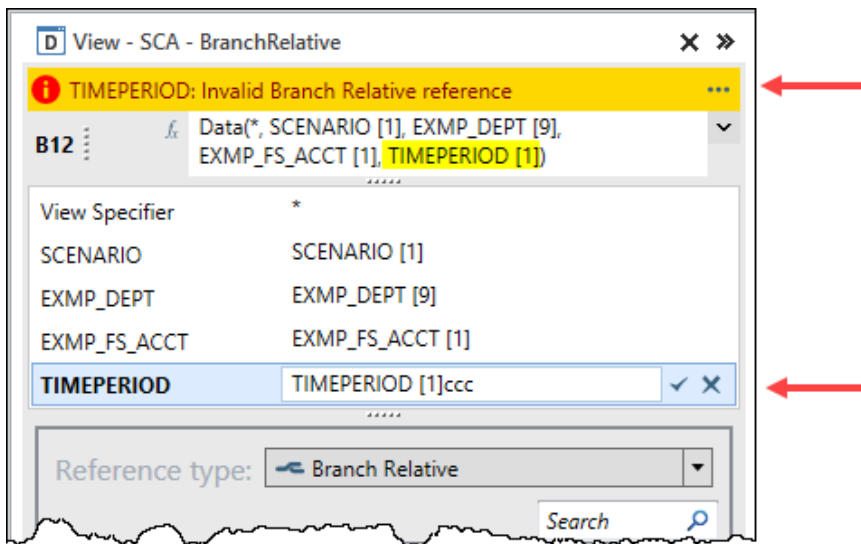
## Flex Views

view will be suspect because formulas or references based on the cells with errors are also likely to be incorrect.

When you edit Flex formulas in the worksheet, Excel cell comments will identify any cells that contain errors, after you refresh the worksheet:

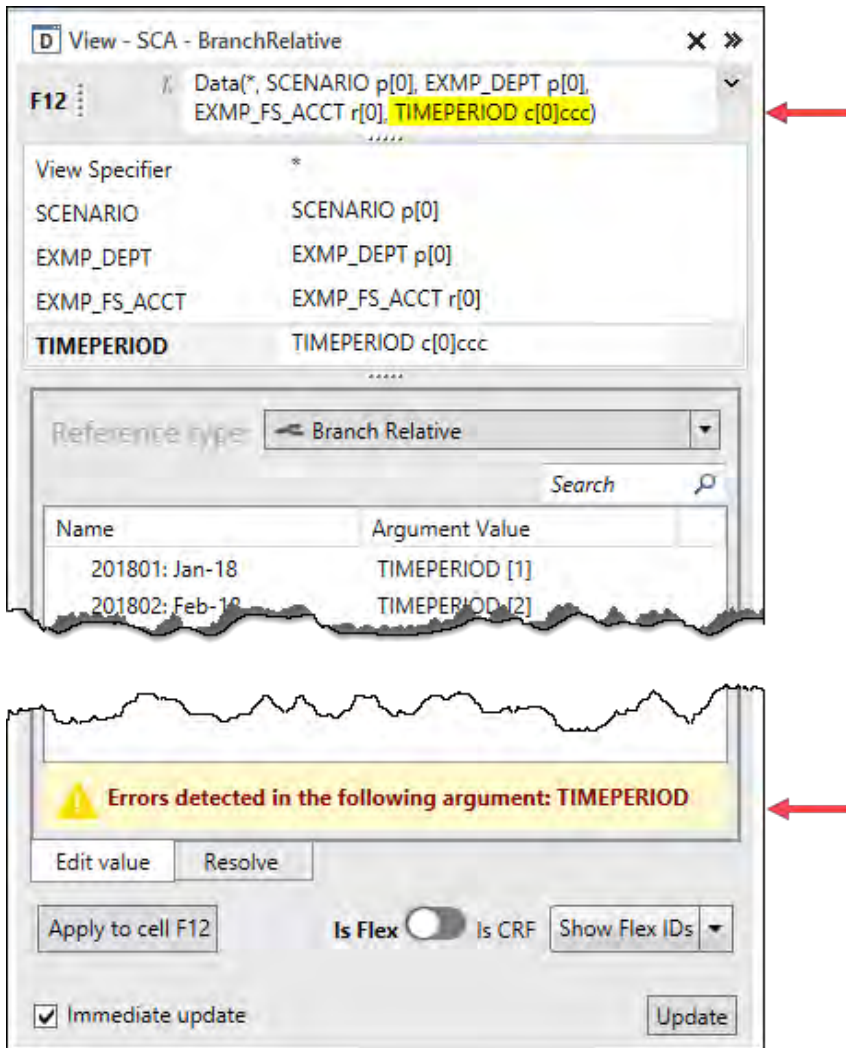
	A	B	C
2	Pages:	=HeaderData()	=HeaderData()
4		=HeaderData()	
5	COMPANY NAME	=HeaderData()	
7	Company Slogan	=HeaderData()	
9	=HeaderData()		
10			
11		=BranchData()	=BranchData()
12	=BranchData()	=Data(*, SCENARIO [1], EXMP_CO TOT_CO, EXMP_FS_SUMMARY 100_FTE)	=Data(EXMP_FS_SUMMARY 100_FTE)
13	=BranchData()	=Data(EXMP_FS_SUMMARY 600_PAY)	=Data(EXMP_FS_SUMMARY 600_PAY)
14	=BranchData()	=Data(EXMP_FS_SUMMARY 610_T_E)	=Data(EXMP_FS_SUMMARY 610_T_E)
15	=BranchData()	=Data(EXMP_FS_SUMMARY 620_SSV)	=Data(EXMP_FS_SUMMARY 620_SSV)
16	=BranchData()	=Data(EXMP_FS_SUMMARY 630_COM)	=Data(EXMP_FS_SUMMARY 630_COM)
17	=BranchData()	=Data(EXMP_FS_SUMMARY 640_FSH)	=Data(EXMP_FS_SUMMARY 640_FSH)
18	=BranchData()	=Data(EXMP_FS_SUMMARY 650_OCC)	=Data(EXMP_FS_SUMMARY 650_OCC)
19	=BranchData()	=Data(EXMP_FS_SUMMARY 660_MTN)	=Data(EXMP_FS_SUMMARY 660_MTN)
20	=BranchData()	=Data(EXMP_FS_SUMMARY 670_INS)	=Data(EXMP_FS_SUMMARY 670_INS)
21	=BranchData()	=Data(EXMP_FS_SUMMARY 680_UTL)	=Data(EXMP_FS_SUMMARY 680_UTL)

If you enter an invalid argument in the **Flex Pane**, the error displays above the Flex formula box.



If you enter an invalid Flex formula in the box, then the error displays at the bottom of the **Flex Pane**.

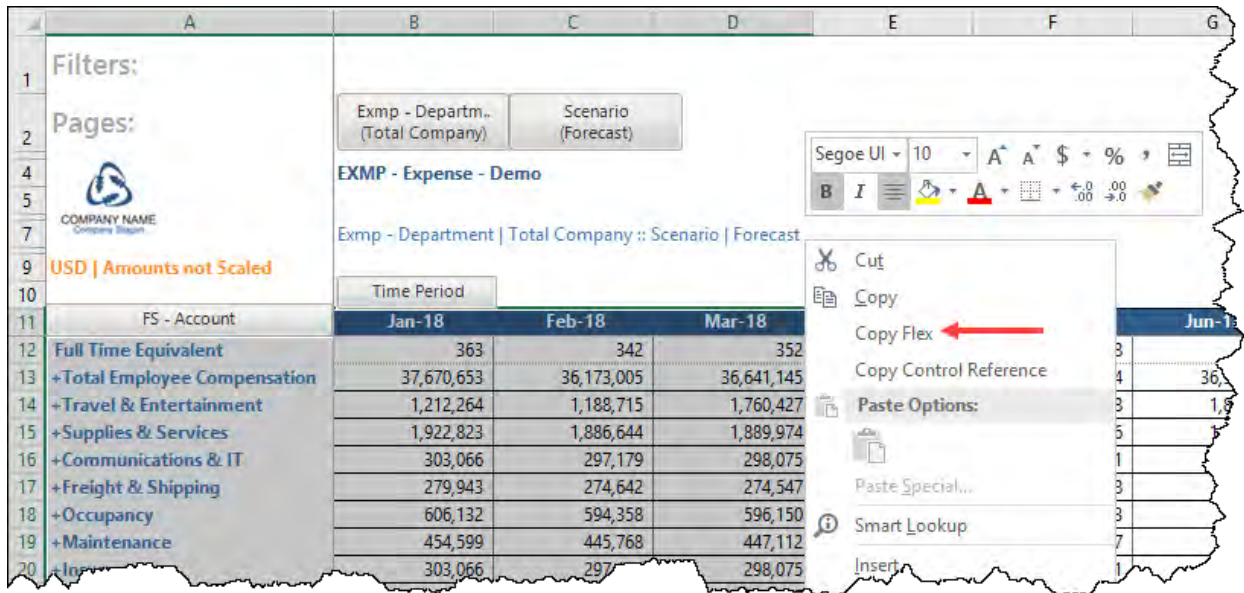
# Flex Views



## Creating a new Flex view

You can create a new Flex view from a blank worksheet. For example, you can copy information from an open view, using the **Copy Flex** command on the shortcut menu:

# Flex Views



The **Copy Flex** command converts the information from the standard view to Flex formulas.

Then paste the information on a blank worksheet:

The screenshot shows a blank Excel worksheet with the financial report data pasted into it. The data is organized by 'Time Period' with columns for 'Jan-18', 'Feb-18', and 'Mar-18'. The data is pasted into a range of cells starting from row 3, column A.

	Jan-18	Feb-18	Mar-18
<b>Full Time Equivalent</b>	363	342	352
<b>+Total Employee Compensation</b>	37,670,653	36,173,005	36,641,145
<b>+Travel &amp; Entertainment</b>	1,212,264	1,188,715	1,760,427
<b>+Supplies &amp; Services</b>	1,922,823	1,886,644	1,889,974
<b>+Communications &amp; IT</b>	303,066	297,179	298,075
<b>+Freight &amp; Shipping</b>	279,943	274,642	274,547
<b>+Occupancy</b>	606,132	594,358	596,150
<b>+Maintenance</b>	454,599	445,768	447,112
<b>+Insurance</b>	303,066	297,179	298,075
<b>+Utilities</b>	303,066	297,179	298,075
<b>+Depreciation &amp; Amortization</b>	1,363,797	1,337,305	1,341,337
<b>+Other Expenses</b>	3,465,342	3,268,967	3,278,824
<b>-Total Overhead Expenses</b>	47,884,750	46,060,939	47,123,741

## Flex Views

**Note:** If you use **Copy Flex** and your copied range includes branch data on the rows and columns, then the resulting Flex formulas will use the **View Relative** reference type.

	Jan-18
Full Time Equivalent	363
Total Employee Compensation	37,670,653
Travel & Entertainment	1,212,264
Supplies & Services	1,922,823
Communications & IT	303,066
Freight & Shipping	279,943
Occupancy	606,132
Maintenance	454,599
Insurance	303,066
Utilities	303,066
Depreciation & Amortization	1,363,797
Other Expenses	3,465,342
Total Overhead Expenses	47,884,750

**View - Test Flex**

Formula: Data(\*, SCENARIO p[0], EXMP\_DEPT p[0], EXMP\_FS\_ACCT r[0], TIMEPERIOD c[0])

View Specifier: \*

SCENARIO	SCENARIO p[0]
EXMP_DEPT	EXMP_DEPT p[0]
EXMP_FS_ACCT	EXMP_FS_ACCT r[0]
TIMEPERIOD	TIMEPERIOD c[0]

Reference type: View Relative

Name	Argument Value
Current Row	SCENARIO r[0]
Current Column	SCENARIO c[0]
->Current Page	SCENARIO p[0]

However, if your copied range does not include branch data, then the resulting Flex formulas will use the **Absolute** reference type.

	Jan-18
Full Time Equivalent	363
Total Employee Compensation	37,670,653
Travel & Entertainment	1,212,264
Supplies & Services	1,922,823
Communications & IT	303,066
Freight & Shipping	279,943
Occupancy	606,132
Maintenance	454,599
Insurance	303,066
Utilities	303,066
Depreciation & Amortization	1,363,797
Other Expenses	3,465,342
Total Overhead Expenses	47,884,750

**View - Test Flex**

Formula: Data(EXMP\_EXP;EXMP\_EXPENSE\_DEMO, SCENARIO SCENARIO FCST, EXMP\_DEPT EXMP\_CO TOT\_CO, EXMP\_FS\_ACCT EXMP\_FS\_SUMMARY 699\_OHX, TIMEPERIOD MTH 201801)

View Specifier: EXMP\_EXP;EXMP\_EXPENSE\_DEMO

SCENARIO	SCENARIO SCENARIO FCST
EXMP_DEPT	EXMP_DEPT EXMP_CO TOT_CO
EXMP_FS_ACCT	EXMP_FS_ACCT EXMP_FS_SUMMARY 699_OHX
TIMEPERIOD	TIMEPERIOD MTH 201801

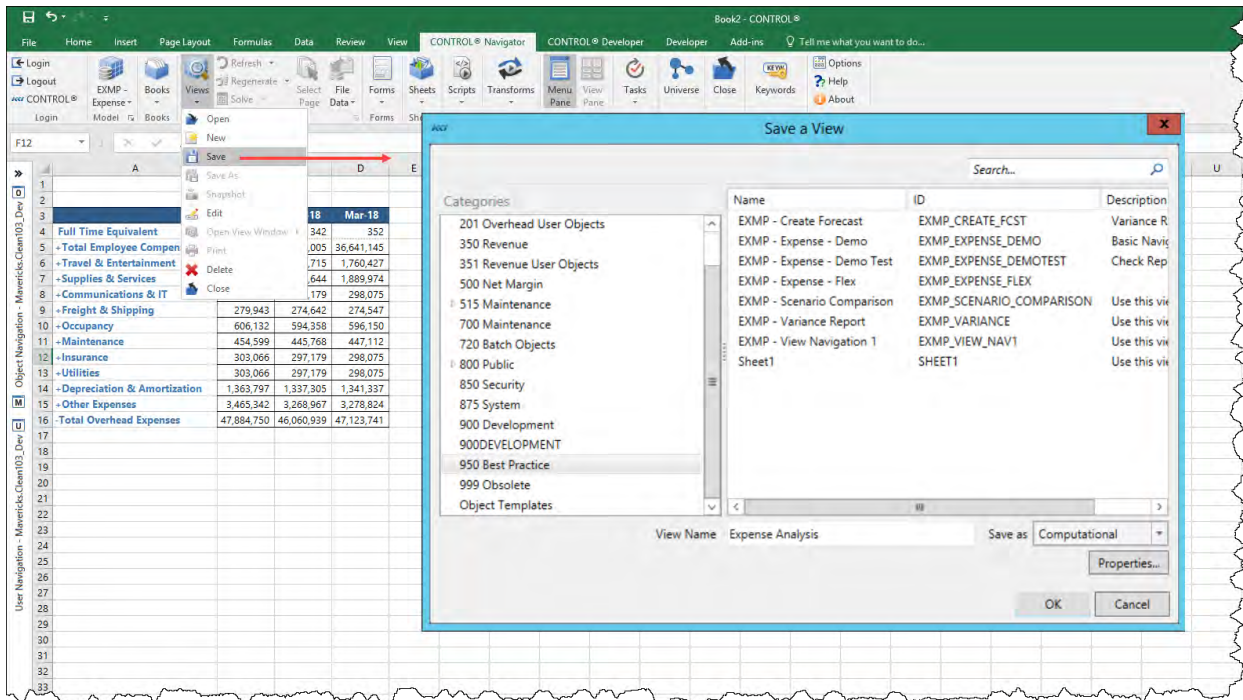
Reference type: Absolute

Name	Argument Value
BUD: Budget	SCENARIO BUD
recast	SCENARIO FCST

From the **CONTROL® Navigator** ribbon, you can select **Views > Save** to save the worksheet as a new Flex view.



# Flex Views



## Undoing Flex formula changes

If you make unwanted changes to your Flex formulas, you can go to the **CONTROL® View** ribbon and click **Revert** to undo all Flex formula changes since the last time you saved the view.



## Using model view specifiers

In the past, you always had to reference a view in order to display data in a worksheet, for example, views, workbook sheets, CRFs, and books. The reason being data in CONTROL® is dynamically computed and a view's context (filters and branches) determines the resulting values, for example, what data to retrieve from the database, which hierarchy to apply by scenario, and which level members to include.



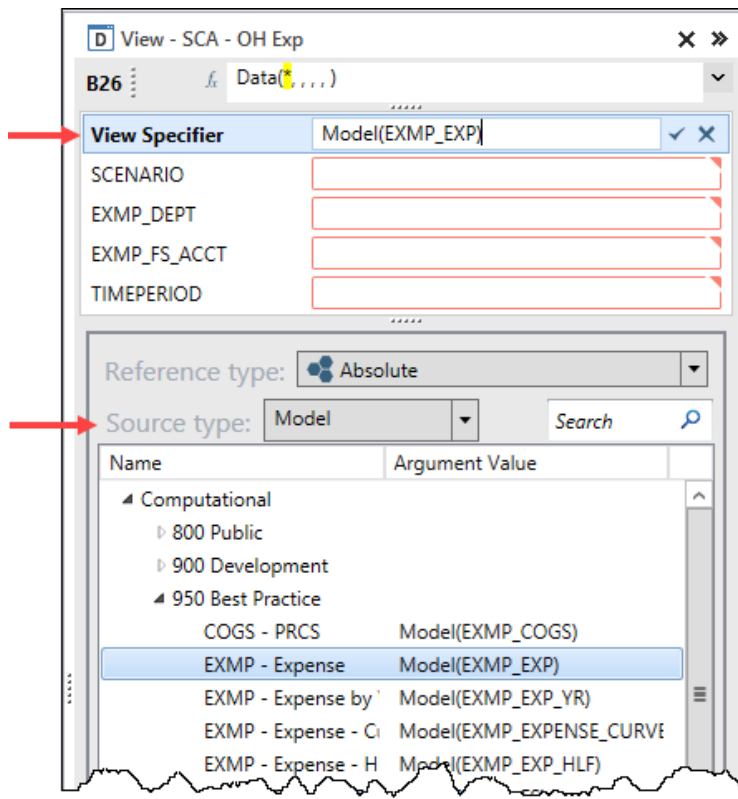


## Flex Views

However, we noticed when users worked with CRFs they did not always know which view to use, sometimes had to create a new view to include the information they wanted, or they could not create a view with the information they needed.

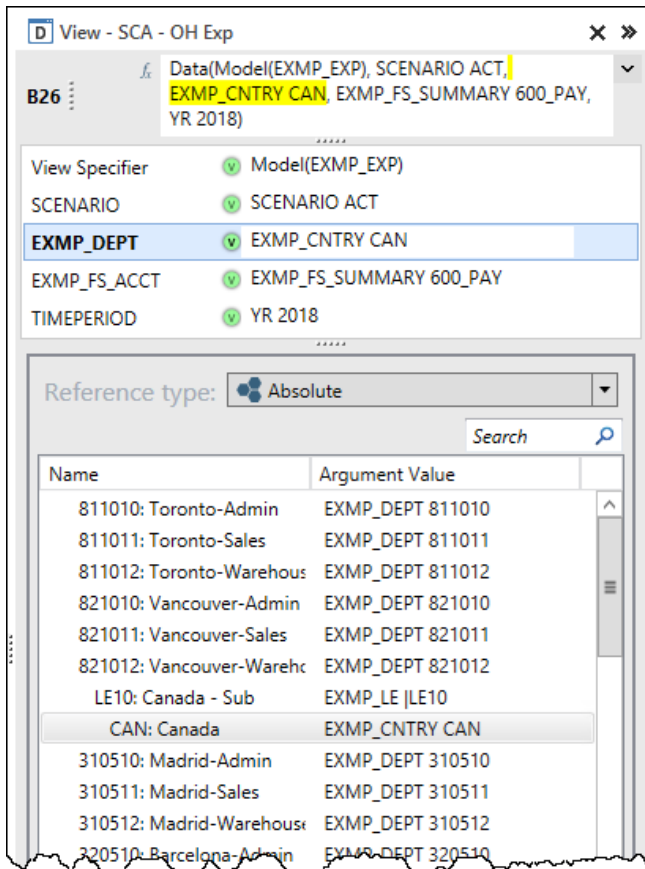
With Flex views, you no longer have to reference a view to retrieve data from the database. Flex formulas can directly reference a model without the filter or dimension-branch restrictions of a view.

If a Flex function includes a **View Specifier** argument, you can select **Model** as the **Source Type**.



Then, you can select members from any of the dimensions in the model to retrieve data.

## Flex Views



When you click **Apply**, the data appears on the worksheet in a “deferred” mode, so you will see **999** for any data cells.

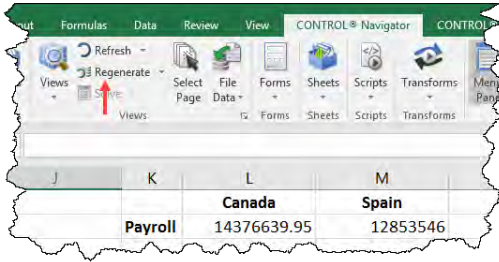
K	L	M
	<b>Canada</b>	<b>Spain</b>
<b>Payroll</b>	999	999

For large models, the initial carve could be a time consuming process. Deferring the carve avoids this potential delay.

Once your Flex view is complete, CONTROL® is able to analyze all of the data and meta-data you have requested from the model and optimize the data retrieval and any calculations. This process is known as **Carve Optimization** and is discussed below. To retrieve the data, go to the **CONTROL® Navigator** ribbon and click **Regenerate**.



## Flex Views



**Note:** Using a **Model** view specifier does not bypass any object or data access security restrictions.

### *Customizing the member lists*

**Model** view specifiers allow you to see all the data in a model rather than the limited and targeted data included in views.

The default branch for each dimension determines the display and order of members listed in the **Flex Pane**. In addition, both object and data access restrictions will limit the display of available members.

You can customize the list of members or the branch, for a user or all users, by using a special view with the ID of **FlexViewDesign**.

By default, this view has a dynamic definition and has an all model, all user scope.

You can make the following customizations:

- Add dimension-branches with specific filters or branches that will override the default behavior. Both filters and branches may contain keywords with replacement values scoped by model or user.
- Add view scopes with different filter and branch definitions for specific models, categories, users, or user groups.
- Define the **&FlexViewDesign** keyword whose replacement value is the ID of the view used to associate model and user scopes.

### **Options for Flex views**

To support environments where Flex views are created by an administrator or designer and then used by many end-users, there are three new scoped view properties. These properties allow granular control over the view's behavior and performance characteristics. Casual users do not need to be concerned with these properties as the default settings work well.

# Flex Views

## *Carve optimization*

The underlying views of a Flex view may have their filters defined for a large range of data, for example, **YR 2018, 2019, 2020**. However, the referenced data in the Flex view may only refer to year **2019**. The **Carve Optimization** property determines whether CONTROL® will limit the data retrieved in the underlying views when you open the Flex view. The table below defines the available options.

<b>Option</b>	<b>Used to</b>
No Optimization	Retrieve all data specified in the underlying views.  <b>Note:</b> This is the default.
Minimal Retrieval for Model Data Only	Retrieve all data in the underlying views, except for <b>Model</b> view specifiers that only retrieve the referenced data.  <b>Note:</b> This becomes the default if you add a Flex function that includes a <b>Model</b> view specifier.
Minimal Retrieval	Retrieve only the referenced data for the underlying views. This will yield the most efficient generation time for the views.  <b>Note:</b> Do not use this option for updatable views because it will affect updatability and solve functionality. In addition, views using this option will not share data with other Flex views or CRFs.

## *Synchronization*

When your Flex view references data from more than one view or model, you can synchronize the view options and common dimension filters and branches between the underlying primary and subsidiary views. The table below defines each option.

## Flex Views

Option	Used to
Minimal synchronization (Page and Comments)	Synchronize the primary view's page selection with common dimensions on the subsidiary view's page edge, as well as, cell comments/hyperlinks of common dimensions.  <b>Note:</b> This is the default.
Display synchronization (+Scaling and Currency)	Synchronize the primary view's scaling, currency, and member display (ID, Name, Both) view options with the subsidiary views, in addition to the <b>Minimal synchronization</b> options.
Basic Filters (+Filter Edge)	Synchronize the filters and branches of the dimensions on the primary view's filter edge with common dimensions in the subsidiary views, in addition to the <b>Display synchronization</b> options.
Advanced Filters (+Page Edge)	Synchronize the filters and branches of the dimensions on the primary view's filter and page edges with common dimensions in the subsidiary views, in addition to the <b>Display synchronization</b> options.
All Filters (+All Edges)	Synchronize the filters and branches of all dimensions in the primary view with common dimensions in the subsidiary views, in addition to the <b>Display synchronization</b> options.

This property is not relevant if:

- The Flex view only contains data from its primary view.
- Users do not expect to change any display or filter options.
- Users work with the Flex view offline.

**Note:** Display and filter synchronization can invalidate large sections of a Flex view if you use absolute references.

### *Protection state*

The **Protection State** property of a Flex view limits the changes that an end user can make to the view while it is open (similar in principle to Excel's protection options). The table below defines each option.



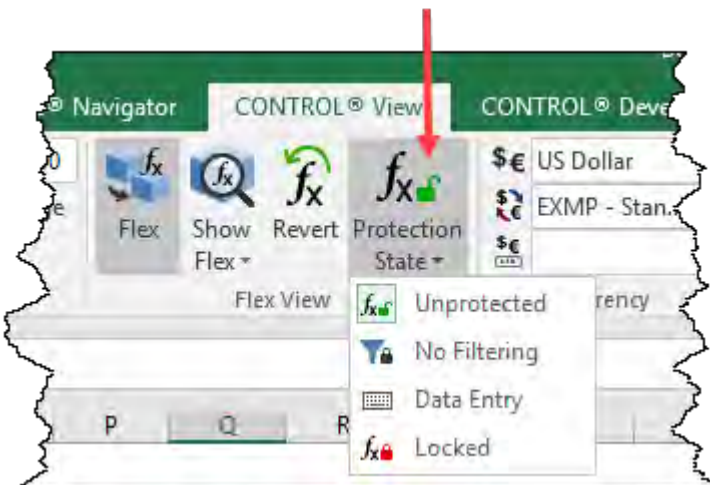
## Flex Views

Option	Used to
Unprotected	Grant full access to modify, edit, cut, copy and paste values, Excel formulas, and Flex formulas.
No Filtering	Restrict changing underlying view filters.
Data Entry	Grant access to enter data and comments, but restrict changes to Flex formulas.
Locked	Restrict all data and definition changes.

**Note:**

- The protection state options apply to the interaction with CONTROL® content. You can use Excel worksheet protection to govern cells with and without CONTROL® content.
- Pressing the delete key will delete the cell’s formula, value, and Flex formula, when the property is set to either **Unprotected** or **No Filtering**. Removing a cell’s Excel formula will also delete the cell’s Flex formula.
- The protection state adds restrictions to existing data and object access privileges, in addition to the **Read Only** property of the underlying view. That is, if you enable the view’s read only property, then you cannot change any data regardless of the Flex view’s protection state.

If you have the required security privileges, you can update the **Protection State** property from the **CONTROL® View** ribbon.



# Flex Views

## Offline usage

Like scratchpads, you can save Flex views as an Excel workbook and use them offline. This is useful when distributing reports for analysis or collecting budgets or forecasts from users who do not have a CONTROL® license.

When used offline, Flex views are subject to the following limitations:

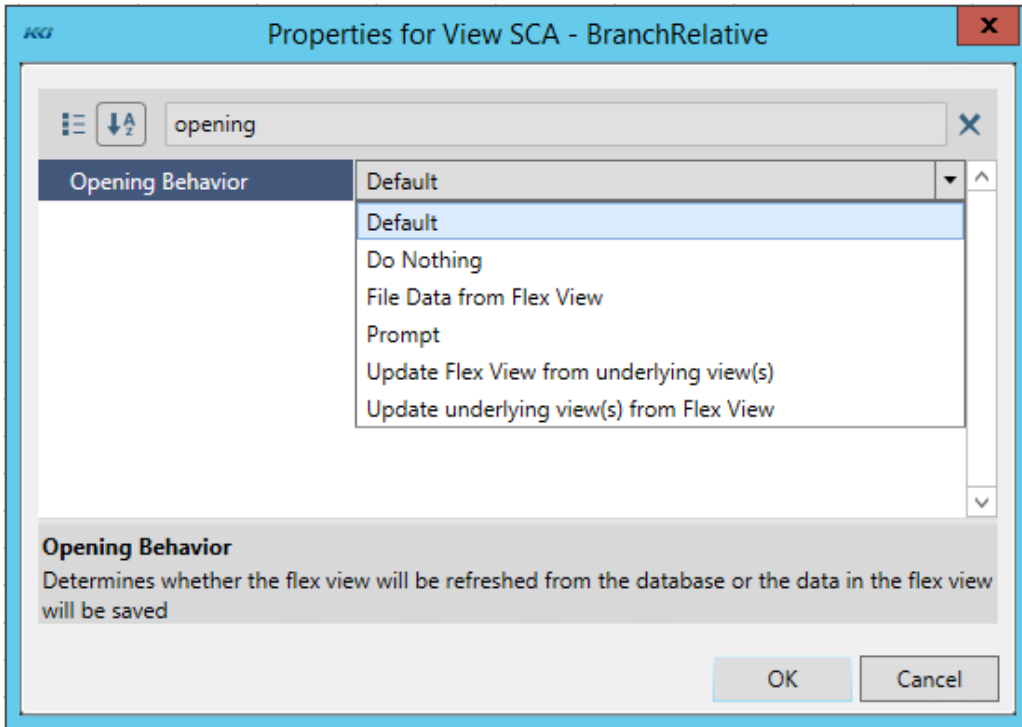
- You may not see or edit the Flex formulas.
- The **Flex Pane** is not available.
- Page selection is not available.
- Excel sorting is not allowed.

If you take a Flex view offline and then reopen it when you are logged into CONTROL®, the **Opening Behavior** property determines how data changes in the Flex view will be handled. The table below defines the available options.

Option	Used to
Default	Update the data based on the Read Only property of the underlying view. If the primary view is defined as read only, then update the Flex view with the data from the underlying view(s). If the primary view is not defined as read only, then update the underlying view(s) with the data in the Flex view.
Do Nothing	Open the Flex view and do not update the data in the underlying view.
File Data from Flex View	Open the Flex view and file the data from the Flex view into the application automatically.
Prompt	Prompt the user what they want to do with the data in the Flex view.
Update Flex View from underlying view(s)	Update the data in the Flex view with the data in the underlying view(s).
Update underlying view(s) from Flex View	Update the data in the underlying view(s) with the data in the Flex view (but don't file it).



# Flex Views



## Note:

- Unlike scratchpads, the opening behavior cannot be overridden by a keyword.
- Even if a view is read only, the comments are updatable.
- The protection state of the view is layered on top of these rules, so protecting the flex view from any change will stop all updates.

## CONTROL® reference functions (CRFs)

The introduction of Flex views comes with new functionality for CRFs and some subtle considerations about the choice between using CRFs and Flex formulas for new or existing applications.

### *New features and functionality*

The **Flex Pane** is equally useful in authoring CRFs, as it is Flex functions. There is a one to one equivalence between a Flex functions and a CRF, although the function names differ. The list of arguments for each function are the same, but the syntax and structure of the arguments differ slightly.

Here is the **Flex Pane** for a CRF versus a Flex function:



# Flex Views

**CRF**
**vs.**
**Flex Function**

Name	Argument Value
CAN: Canada	EXMP_CNTRY CAN
ESP: Spain	EXMP_CNTRY ESP
FRA: France	EXMP_CNTRY FRA
ITA: Italy	EXMP_CNTRY ITA
JPN: Japan	EXMP_CNTRY JPN
THA: Thailand	EXMP_CNTRY THA
TWN: Taiwan, Province of C	EXMP_CNTRY TWN
USA: United States	EXMP_CNTRY USA
TOT_CO: Total Company	EXMP_CO TOT_CO

Name	Argument Value
CAN: Canada	EXMP_CNTRY CAN
ESP: Spain	EXMP_CNTRY ESP
FRA: France	EXMP_CNTRY FRA
ITA: Italy	EXMP_CNTRY ITA
JPN: Japan	EXMP_CNTRY JPN
THA: Thailand	EXMP_CNTRY THA
TWN: Taiwan, Province of C	EXMP_CNTRY TWN
USA: United States	EXMP_CNTRY USA
TOT_CO: Total Company	EXMP_CO TOT_CO

Here are a few differences for CRFs:

- The “Is Flex/Is CRF” button at the bottom of the pane is set to “Is CRF”
- Textual arguments are enclosed in quotes, so they will be treated as strings by Excel
- View Relative and Indirect reference types are not supported
- Dimension specifiers for CRFs use the syntax





## Flex Views

levelID memberID [On dimensionID [branchID]]

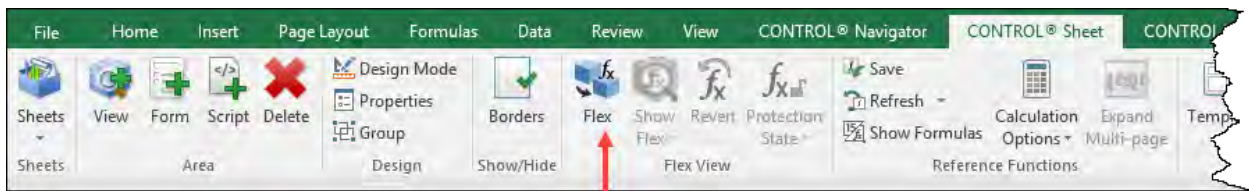
Whereas Flex functions use

[dimensionID[(branchID)]] levelID memberID

### *Converting CRF sheets to Flex views*

A sheet containing CRFs can be converted to a Flex view from the **CONTROL® Sheet** ribbon:

1. Open the workbook sheet that includes the CRFs.
2. On the **CONTROL® Sheet** ribbon, in the **Flex View** group, click **Flex**.



The flex process will open a new worksheet and create a new Flex view based on both the CONTROL® and Excel content. You can continue to customize the Flex view on the new worksheet, and when you are finished, you can save the view using the **View > Save** or **View > Save As** commands on the **CONTROL® Navigator** ribbon.

### *Converting individual CRFs to Flex formulas*

The **Flex Pane** allows you to convert some or all CRFs on a worksheet to Flex formulas.

You do this by following these steps:

1. Open the sheet or workbook containing the CRFs.
2. Open an existing Flex view.
3. Copy and paste the CRFs from the first worksheet to the worksheet containing the Flex view.
4. Select the range of cells on the Flex view that contain the CRFs you want to convert.
5. Open the **Flex Pane**.
6. Change the button from **Is CRF** to **Is Flex**. Any cell in the selected range containing a formula beginning with **=Control....** will convert to a Flex formula.

## Flex Views

7. When you are done with your changes, save the updated Flex view.

### *CRFs vs Flex formulas*

In the beginning of this document we described the motivation behind Flex views. We anticipate that Flex views will eventually replace CRFs. However, only time and customer usage will tell.

There are several considerations you will want to evaluate when choosing between these two functions:

- Flex formulas can coexist with Excel formulas in the same cell whereas CRFs are the Excel formula for the cell. This is extremely useful in reporting when you need to display a different name other than the retrieved member name. In addition, when budgeting or forecasting, you can enter an Excel calculation in a cell with a Flex formula in order to calculate data based on other user inputs.
- You can nest multiple CRFs as well as Excel functions in a single cell, which you cannot do with Flex formulas.
- CRFs are treated as Excel formulas and are executed in a sequence determined by Excel's order of execution based on Excel formula dependencies, while Flex formulas retrieve or post data for the entire worksheet pre or post the execution of Excel formulas. There may be cases where the two approaches yield differing results.
- CRFs will always share data among functions referencing the same view specifier whereas Flex views will not share data if the **Carve Optimization** property is set to **Minimal Retrieval**.
- CRFs do not support **Carve Optimization** and should not reference **Model** view specifiers.
- We expect the performance profile of very large Flex views will be significantly faster than the equivalent sheet with CRFs.

## Conclusion

The goal of creating this new feature is to entice both expert and casual users to create interesting and innovative applications using the amazing flexibility of Excel in concert with the robust multi-dimensional data management capabilities of CONTROL®.

The challenge for you is to find and create those applications and take your contributions to a new level for your company.

