



EMERSON EXCHANGE 2025

ACCELERATING INNOVATION



ACCELERATING
INNOVATION

**6-1100 Is my new HMI aLive and
Well!**

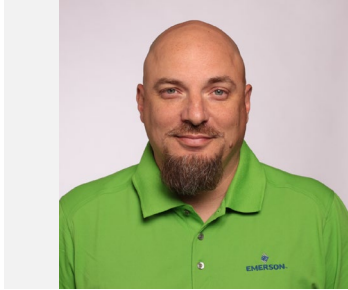
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Important Reminders

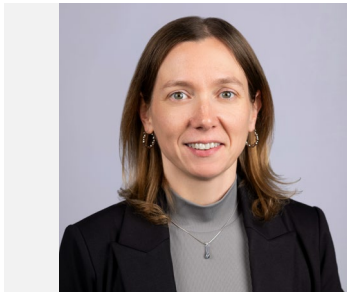
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Topics

- Graphics Basics
 - Layouts/Resolution
 - Importing
 - Debugging
- Animating and Scripting
- Advanced Functionality

Resolution independence!

- All graphical objects are SVG objects, there is no dependency on video resolution
- Displays will be accurately represented in any screen resolution, fitting properly the available area
- Consider Aspect Ratio, rather than resolution



 **Tip:** If you want the Toolbar and Navigation bars to appear bigger on a given monitor, define the screen size to be smaller than the physical size of the monitor
For larger Navigation Bar buttons, change the standard S_LayoutFont from its default value (9.5) to your desired value, for example 14

Advanced layout configuration

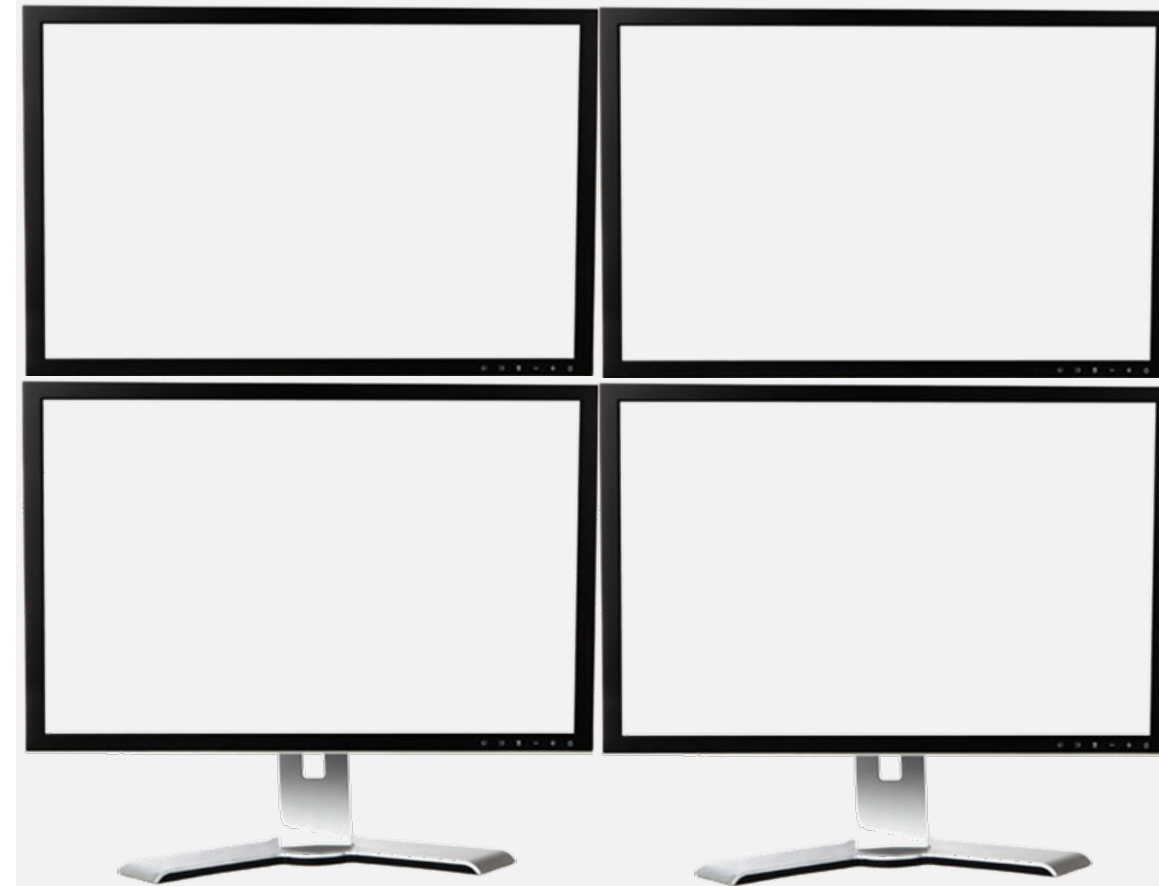
- Layout level actions
 - Pinning (Enable Disable Pinning of Types of Contextual Displays)
 - OnOpen, OnClose
 - OnKeyPress: Supported keys "B", "D", "E", "G", "O", "Q", "U", "W", "F1", "F2", "F3", "F4", "F6", "F7", "F8", "F9", "F10", "F11"
Pressing ["Ctrl" + the supported keys] allows for a total of 36 key combinations

- Example:

```
Layout1
{
  Layout1.OnKeyPress(key: string, ctrlKey: boolean): void
  {
    if (ctrlKey == true && key == "F1"){
      DL.OpenDisplayAsync("AustinOverview");
    }
  }
}
```

- Timers: Equivalent to DeltaV Operate Scheduler

- Layout Variables: Available to all displays



Graphics Importing

- File(s)
 - Folder import option will only import files in that selected folder and not any subfolders
 - Graphic Studio supports importing files within Zip file(s) even if items are in subfolders when unzipped.
 - So DON'T UNZIP!
 - While importing you will be presented with New Item, Newer, Same, Older, Different (this is typically multi-language differences)

Graphics Studio

Import

Import from Folder File

C:\Users\MSTONER\Desktop\Graphics

Select Items to Import

1 OF 5 ITEMS SELECTED FOR IMPORT

<input type="checkbox"/>	NAME	TYPE	COMPARISON	IMPORT ACTION	CREATE IN
<input type="checkbox"/>	DisplayTagSettings	Contextual Display	Different	Skip	Graphics.ContextualDisplays.Emerson.Support
<input type="checkbox"/>	MEC_AI_SOFT_FP_v01	Contextual Display	Same	Skip	Graphics.ContextualDisplays.MEC.Faceplate
<input type="checkbox"/>	MEC_EDC_FP_v01	Contextual Display	Older	Skip	Graphics.ContextualDisplays.MEC.Faceplate
<input type="checkbox"/>	MEC_ERAMP_FP_v01	Contextual Display	Newer	Skip	Graphics.ContextualDisplays.MEC.Faceplate
<input checked="" type="checkbox"/>	MEC_ERAMP_FP_v02	Contextual Display	New Item	Create	Graphics.ContextualDisplays.MEC.Faceplate

Import Settings

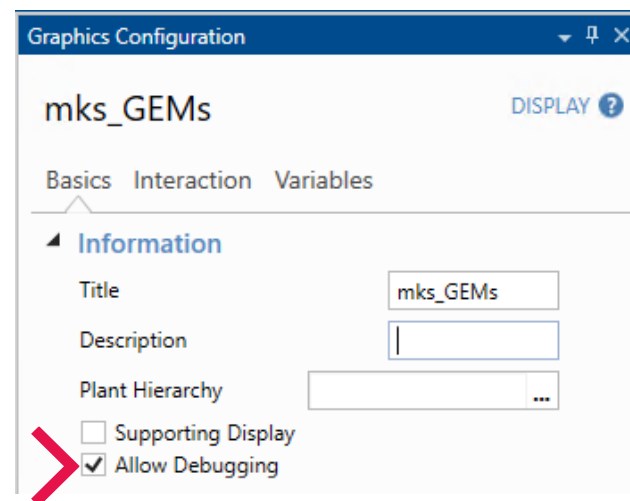
Auto-select new items

Only active content languages

- Languages
 - Languages can't be deleted and only up to 8 can be enabled for runtime (with Premium License and only 2 without it).
 - They will import even if language is not selected during import because multi language strings reside in each object
 - To ensure “unwanted” languages don't appear check this box when importing

Graphics Basic Information

- DeltaV Live displays have a Title and Description that can be used instead of display name, if they are blank Live defaults to using the display name. Be sure that you at least configure the Title as this is used to display the name of displays to open. If you copy and forget, you will have two entries of the same name.



- The **Allow Debugging** option needs to be checked if you want to debug the display in any manner and the default is unchecked. This option should be turned off after Debugging is completed and **NOT** left on.

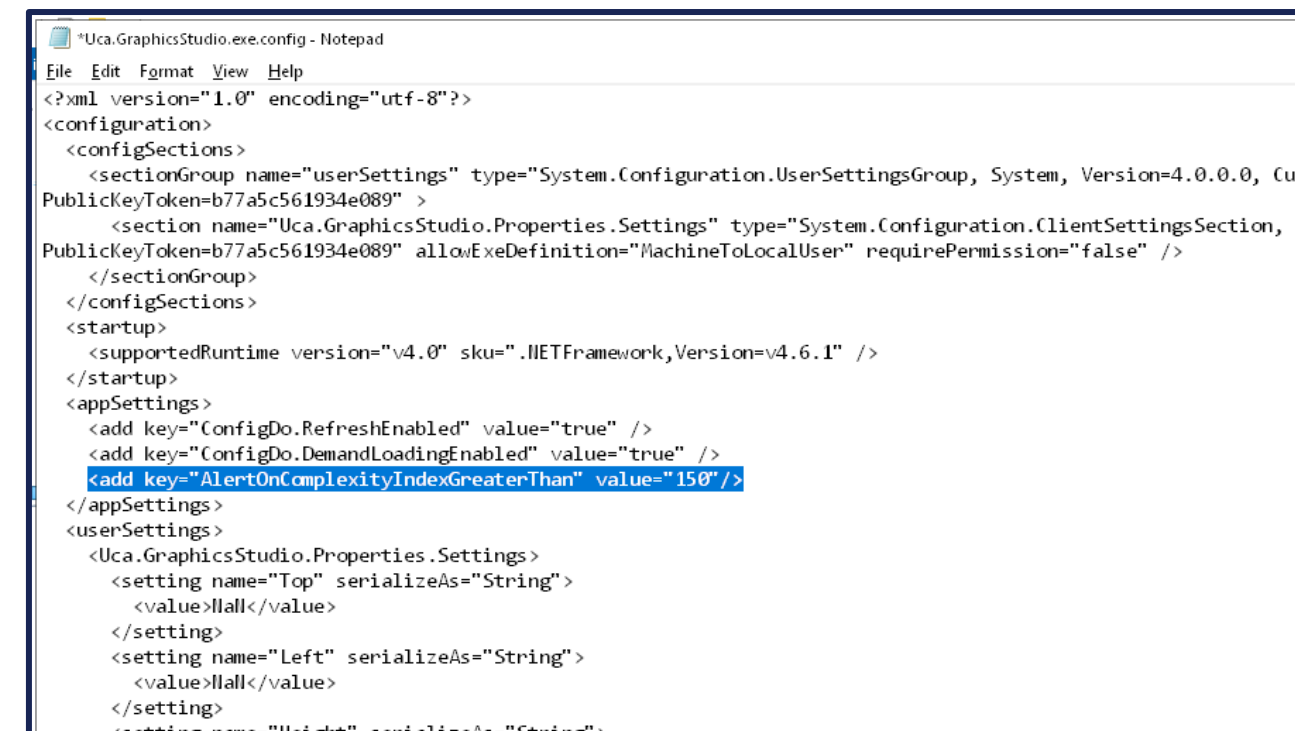
Complexity Score

Setting up a Complexity Index Threshold Alert

An alert may be configured on Graphics Studio whenever the Complexity Index of a display reaches a certain threshold. This will help the graphics developer not to exceed the target complexity.

To configure the alert:

- a. Open the file C:\ProgramFiles (x86)\Emerson\Delta\Uca.GraphicsStudio.exe.config in Notepad.
- b. Add the key "AlertOnComplexityIndexGreaterThan" under appSettings and assign it with the desired Complexity Index threshold value.

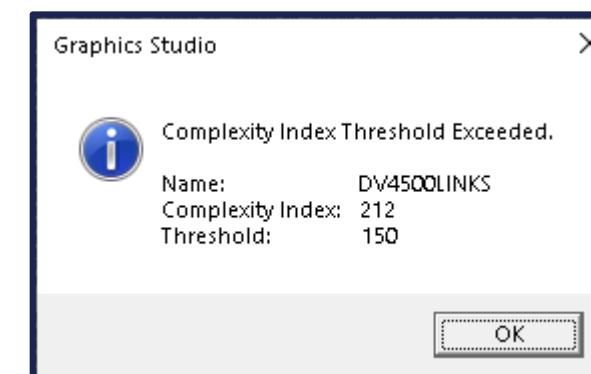


```

*Uca.GraphicsStudio.exe.config - Notepad
File Edit Format View Help
<?xml version="1.0" encoding="utf-8"?>
<configuration>
  <configSections>
    <sectionGroup name="userSettings" type="System.Configuration.UserSettingsGroup, System, Version=4.0.0.0, Cul
    PublicKeyToken=b77a5c561934e089" >
      <section name="Uca.GraphicsStudio.Properties.Settings" type="System.Configuration.ClientSettingsSection, S
      PublicKeyToken=b77a5c561934e089" allowExeDefinition="MachineToLocalUser" requirePermission="false" />
    </sectionGroup>
  </configSections>
  <startup>
    <supportedRuntime version="v4.0" sku=".NETFramework,Version=v4.6.1" />
  </startup>
  <appSettings>
    <add key="ConfigDo.RefreshEnabled" value="true" />
    <add key="ConfigDo.DemandLoadingEnabled" value="true" />
    <add key="AlertOnComplexityIndexGreaterThan" value="150" />
  </appSettings>
  <userSettings>
    <Uca.GraphicsStudio.Properties.Settings>
      <setting name="Top" serializeAs="String">
        <value>|||</value>
      </setting>
      <setting name="Left" serializeAs="String">
        <value>|||</value>
      </setting>
      <setting name="Height" serializeAs="String">

```

An alert will be displayed when saving the display in Graphics Studio if the threshold is exceeded.



Debugging

- If the Debug Option on a display is enabled, user can hit F12 to get the Chromium debug interface

Hover over items will show details of entity

Hitting F5 will cause refresh which triggers OnOpen scripts to rerun and allowing debugging of this event

Debugging Commands

Values shown during debug and on breakpoint

Hitting Esc key will open this console interface

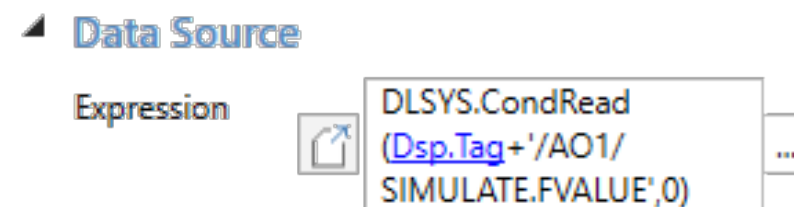
Animations

- DLSYS[...] and DLSYS.Read(...). Value are **NOT** the same!
- DLSYS[...] takes into account the status so if it's bad then value returned is **undefined**
- DLSYS.Read(...).Value will return the **actual value** that can be read

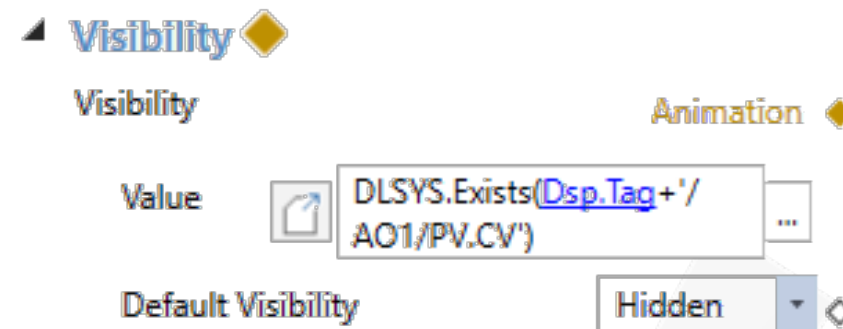
- Visibility Animation it affects it, others?

“Smart” Displays

- When items may or may not exist, CondRead Function should be used.
 - Remember that the return value needs to be of proper data type



- Use .Exist for the Visibility to only show item(s) if is Valid (Note: Default Value)
 - Default value should be Not Visible so it only appears when read properly to ensure items don't appear and then disappear
 - The Selection Pane in Graphics Studio helps finding hidden objects



Advanced Scaling

- Sometimes things don't have scaling that needs to be scripted
 - Example is the Number of PVs for DC or EDC block for Trend

PV Scale



```
new Types.Scaling({Eu0: -1, Eu100: Dsp.MaxPv,  
DecimalPoint: 0, Units: " "})
```

...

Calculated
Display Variable
based on number
of Visible items
in Named Set
prev slide

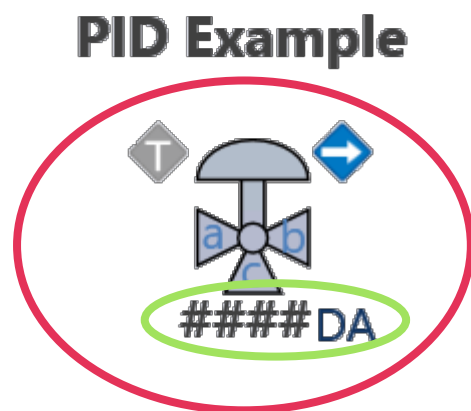
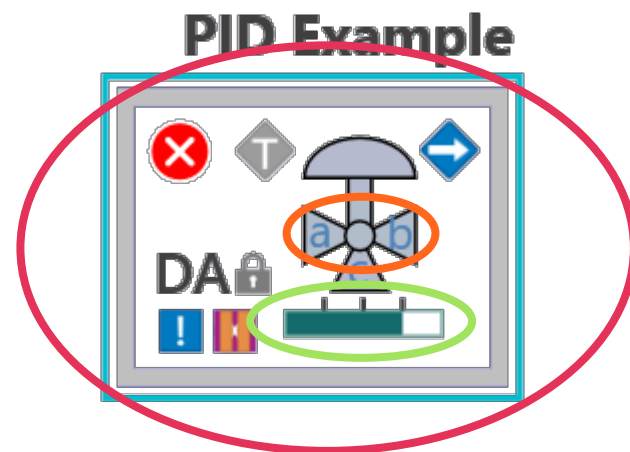
Converting Units

- Sometimes you will have objects that don't have the units needed (Point in below example)
 - The item only had Px unit so setting this value to a variable and then referencing the .Pt of the variable gave us the value in Pt needed.

```
let mouseX = new Types.Measurement({Px: e.offsetX})  
let chartX = (mouseX.Pt - Gem.grpScaleY.Width.Pt)
```

Present Online

- Many uses for Present Online option which is only available on Groups/GEMs
 - Reduce objects and animations that aren't required during Runtime.
 - Help visualize Runtime performance in Graphic Studio since animations/positioning sometimes don't work.
 - Design better overall GEMs to reduce risk by not requiring to change to a different GEM.



Basic Configuration

Module Name: CSD

Friendly Name: PID Example

Function Block Output: AO

Function Block Number: 1

Show Tag: True

Scale: Default Scale

Port Selection (In Close Pos): a (In) - b (Open)

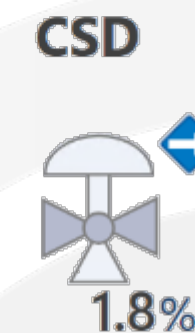
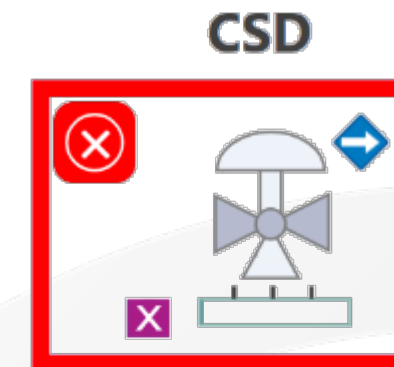
Geometry Configuration

Extended Configuration

Fail Position Indicator: None

Output: Bargraph

Minimal Indications: False



Present Online Examples

PID Example



Extended Configuration

Bargraph

- DeviationBar
- ComboBar
- DeviationBar
- None

PID Example



Extended Configuration

Bargraph

- DeviationBar
- ComboBar
- DeviationBar
- None

PID Example

DATADA

Extended Configuration

Bargraph

- DeviationBar
- ComboBar
- DeviationBar
- None

Configuration

Bargraph

Basics

Information

Title

Description

Tooltip

Value

Number of options

Default Selection

Add column

NAME	ComboBarVisibility	DeviationbarVisibility
ComboBar	True	False
DeviationBar	False	True
None	False	False

Use capture mode

SG_Combobar1 LINKED GEM ?

Basics Variables

Information

Basic Configuration

Geometry

Visibility

Visibility: False Gem.Bargraph.CombobarVisibility

Blink: False

Blink Style: Standard blink rate

Present Online: False ...rgraph.CombobarVisibility

SG_DeviationBar1 LINKED GEM ?

Basics Variables

Information

Basic Configuration

Geometry

Visibility

Visibility: True Gem.Bargraph.DeviationbarVisibility

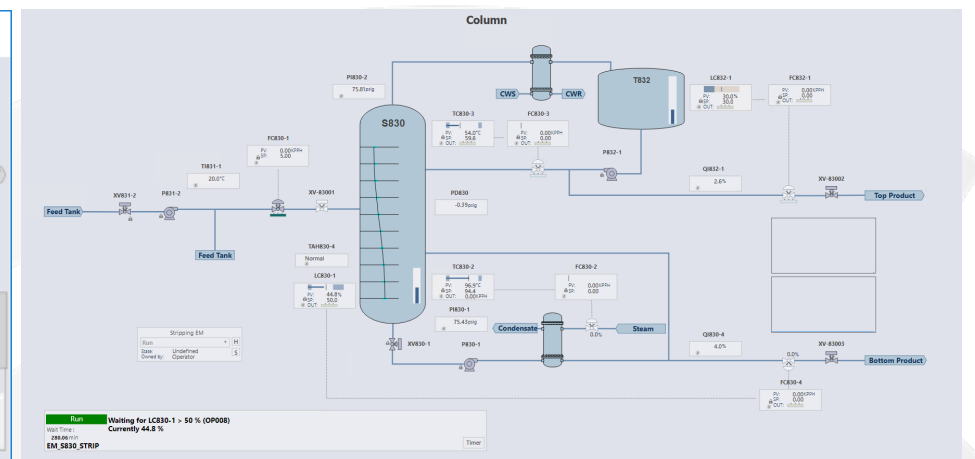
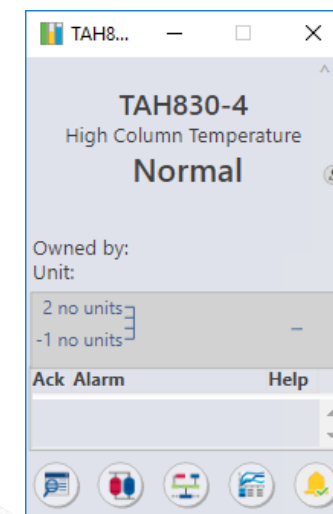
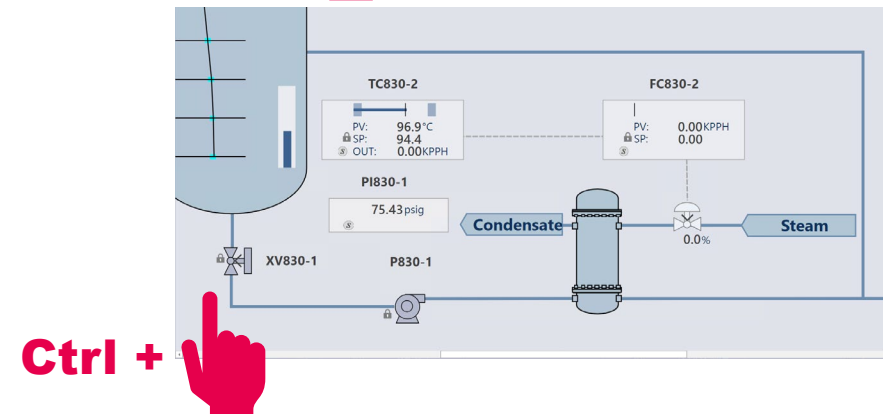
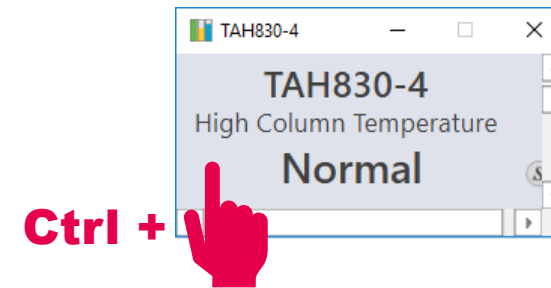
Blink: False

Blink Style: Standard blink rate

Present Online: True ...rgraph.DeviationbarVisibility

Display Hints

- Contextual Displays can be resized and is remembered
- Main Displays can be Zoomed In/Out by holding CTRL and with Click/Drag (Roping) or using Mouse Wheel. This setting is also remembered.
- To get item back to original size for Contextual or Main Displays, hold CTRL and Double Click anywhere on the object



Clear Value of Text Entry Element

- When attempting to reset the displayed value of a Text Entry Element, using `Dsp.TextEntry1.Value = ""` gives Verify Error

```
◆ GroupClearForm.ButtonClearAct1.Action.Script(X: number, Y: number): void ◆  
{  
  Dsp.TextEntry1.Value = ""  
}
```

Verification Results
GroupClearForm.ButtonClearAct1.Action.Script(X: numb: Can't resolve 'Dsp.TextEntry1.Value' reference.

- Instead, use `(Dsp.TextEntry1 as any).Value = ""`

Reading Named Set

- Find the Visible values of a Named Set
 - Example find the Max Value to use for Trend on DC/EDC
 - Named Set Options (None=0,Selectable=1,Visible=2)

```
let paramValueObject = (await DLSYS.ReadAsync(Dsp.Tag+'/'+Dsp.Context1+'/PV_D')); //read parameter
let parameter = paramValueObject.Value; //get Value
let nsOptions = Object.values(parameter.Options); // get the options of the namedset
nsOptions = nsOptions.filter(option => option.Flags.Number & 2); // get the visible options only (i.e. flag bit 2)
Dsp.MaxPv = nsOptions[(nsOptions.length - 2)].Number + 1;
```

Array(7)

```
0, Text: "STOPPED", Flags: NamedSetOptionFl
1, Text: "RUNNING", Flags: NamedSetOptionFl
2, Text: "State 2", Flags: NamedSetOptionFl
3, Text: "State 3", Flags: NamedSetOptionFl
4, Text: "State 4", Flags: NamedSetOptionFl
5, Text: "State 5", Flags: NamedSetOptionFl
255, Text: "Undefined", Flags: NamedSetOpti
```

Array(3)

```
0, Text: "STOPPED", Flags: NamedSetOptionFl
1, Text: "RUNNING", Flags: NamedSetOptionFl
255, Text: "Undefined", Flags: NamedSetOpti
```

Convert my VBA!

- Pre-defined Live Standards, equivalent to the Operate variables in *frsVariables.apps_glb* that can be found in *Library.Standards.Emerson.Applications*

Standard Name	Value
S_AMSDeviceMgr_path	C:\AMS\bin\AMSDevStatus.exe
S_Cond_Summ_path	%DeltaVPath%\HACViewer.exe;NoSignatureCheck
S_ControlStudio_path	%DeltaVPath%\dvcs.exe
S_InSight_path	%DeltaVPath%\Insight.exe
S_InternetExplorer	%ProgramFiles%\Internet Explorer\iexplore.exe
S_MPCOper_path	%DeltaVPath%\MPCOper.exe
S_MPCOperPro_path	%DeltaVPath%\MPCOperPro.exe
S_Predict_path	%DeltaVPath%\predict.exe
S_SAT_path	%DeltaVPath%\SAT.exe
S_WindowsHelp_path	%SystemRoot%\hh.exe;NoSignatureCheck

Interacting with Custom Applications

- Create a Standard
 - Value will hold the path to the Application
 - Path may vary depending on system, version of applications, etc
- Add Action to Button
 - Use 'Open Application'
 - Set 'DeltaV Application' to False
 - Point 'Application Path' to the new Standard
 - **Note:** Notice double slashes for arguments
- **Note:** If the Application doesn't have a digital signature, add ";NoSignatureCheck" at the end of the path

S_EXCEL PRIVATESTRING STANDARD ?

Basics

Information

Title: EXCEL Application

Description: Used to launch MS Excel

Value: C:\Program Files (x86)\Microsoft Office\Office16\excel.exe

Button

Action: Open Application

DeltaV Application: False

Application Path: C:\Prog... Library.S_EXCEL

Command Arguments: "D:\\deltav\\dvddata\\historyresults.csv"

Active: True

Title: EXCEL Application

Description: Used to launch MS Excel

Value: C:\Program Files (x86)\MicrosoftOffice\Office16\excel.exe;NoSignatureCheck

Touch Screens

- Mouse/Touch While Down Write Value and Write Different Value when released (i.e. Jog Button)

Put the below on the Picture OnOpen script and Update **ObjectName**, **MOD/PATH**, **ValueWhenPressed** and **ValueWhenReleased** to what is required

```
var btnObj = document.getElementById((Dsp.ObjectName as any).ClientPath) as any;
btnObj.addEventListener("mousedown", async function(e: any){
    let wResult = await DLSYS.WriteAsync("MOD/PATH", ValueWhenPressed)
});
btnObj.addEventListener("touchstart", async function(e: any){
    let wResult = await DLSYS.WriteAsync("MOD/PATH", ValueWhenPressed)
});
btnObj.addEventListener("mouseup", async function(e: any){
    let wResult = await DLSYS.WriteAsync("MOD/PATH", ValueWhenReleased)
});
btnObj.addEventListener("touchend", async function(e: any){
    let wResult = await DLSYS.WriteAsync("MOD/PATH", ValueWhenReleased)
});
```

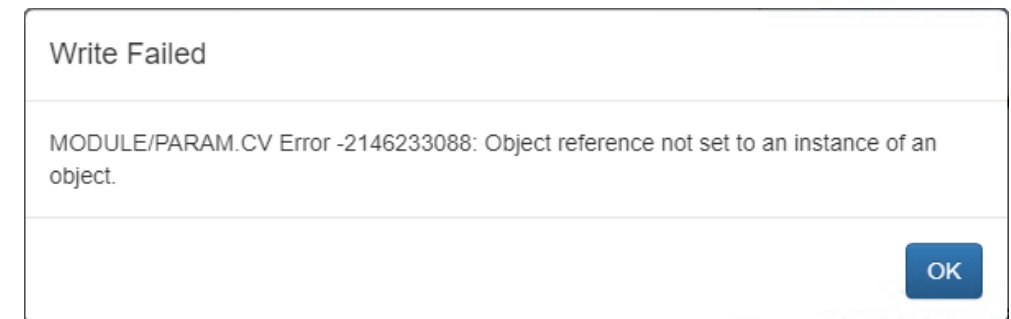
Showing Write Errors

- There are two methods of displaying error messages (this is assuming the previous script for Jog Button)
 - Message Box (**Modal**, nothing else can be done from where it is opened from)

```

if (!wResult.Success) {
    let errMsg = "";
    if (wResult == undefined || (!wResult.ErrorMessage)) {
        //write failed for unknown reasons
        errMsg = MOD/PATH + '\r\n' + GL.Library.S_WriteFailure;
    }
    else if (!wResult.Success){
        //write failed
        errMsg = MOD/PATH + '\r\n' + GL.Library.S_Error + '' + wResult.ErrorId + ': ' + wResult.ErrorMessage
    }
    DL.MessageBoxAsync(errMsg, GL.Library.S_WriteFailed, Constants.MessageBoxButtonType.MB_OK, 30);
}

```

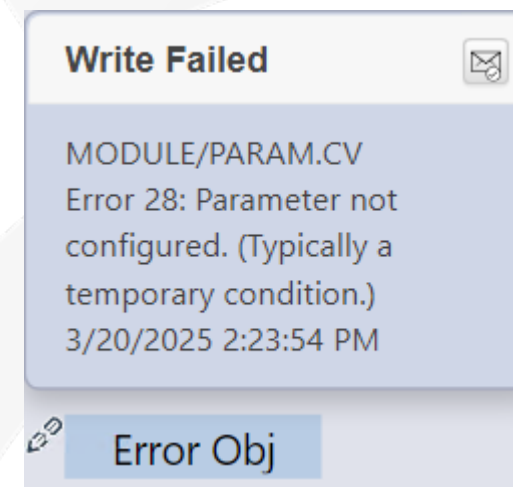


- Error on Object (**NOT Modal**, broken Pencil)

```

Dsp.ObjectName.ClearError();
if (!wResult.Success) {
    let errMsg = "";
    if (wResult == undefined || (!wResult.ErrorMessage)) {
        //write failed for unknown reasons with generic message
        errMsg = MOD/PATH + '\r\n' + GL.Library.S_WriteFailure;
    }
    else {
        //write failed
        errMsg = MOD/PATH + '\r\n' + GL.Library.S_Error + '' + result.ErrorId + ': ' + wResult.ErrorMessage;
    }
}
Dsp.ObjectName.AddErrorMessage(errMsg, GL.Library.S_WriteFailed, true);

```



Advanced Contextual Displays

- Sometimes you might find that you need to pass more information than the standard Tag plus 4 items.
- Pack the items in a string, Pass, Unpack on OnOpen script of the Contextual Display
- Example we wanted to have a popup that would show the associated split range input value, output values, descsc and colors (7 values to pass plus Tag)

```
//Setup Contexts so it can be Unpacked on contextual display
```

```
const Out1context = {
  OutValue: Out1Var,
  OutDesc: Gem.Out1Desc,
  OutColor: JSON.stringify(Gem.Out1Color)
}
const Out2context = {
  OutValue: Out2Var,
  OutDesc: Gem.Out2Desc,
  OutColor: JSON.stringify(Gem.Out2Color)
}
```

```
const Contxt2 = JSON.stringify(Out1context);
const Contxt3 = JSON.stringify(Out2context);
```

```
DL.OpenContextDisplayAsTooltipAsync(Gem.GraphBackground, DL.DN("MKS_SplitRange_Values_v01"), Gem.Tag, String(charTX), Contxt2, Contxt3);
```

Packing

UnPacking

```
const Out1context = JSON.parse(Dsp.Context2);
const Out2context = JSON.parse(Dsp.Context3);
const Out1ColorObj = JSON.parse(Out1context.OutColor);
const Out2ColorObj = JSON.parse(Out2context.OutColor);
const Out1Brush = new Types.SolidBrush(Out1ColorObj);
const Out2Brush = new Types.SolidBrush(Out2ColorObj);
Dsp.Out1Value = Out1context.OutValue;
Dsp.Out1Desc = Out1context.OutDesc;
Dsp.Out1Color = Out1Brush;
Dsp.Out2Value = Out2context.OutValue;
Dsp.Out2Desc = Out2context.OutDesc;
Dsp.Out2Color = Out2Brush;
```

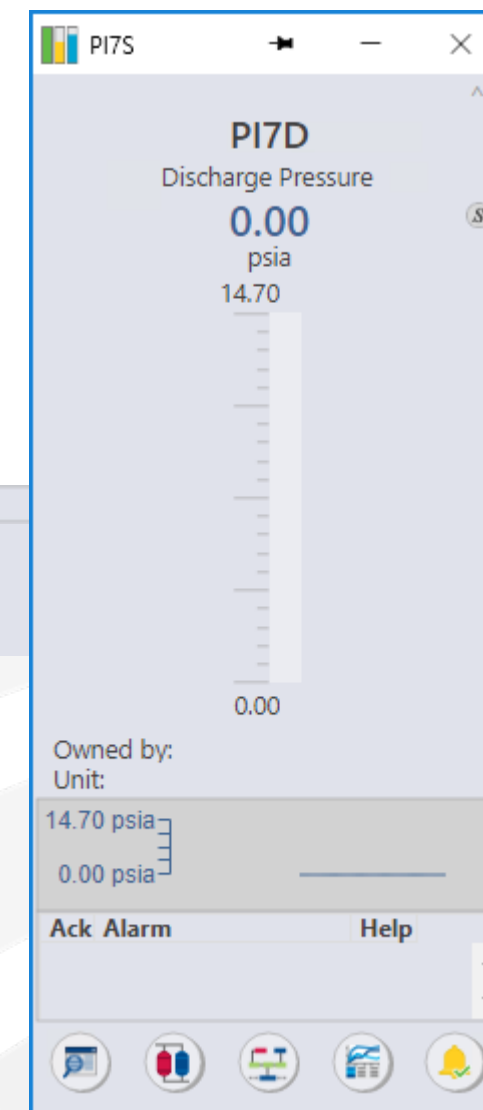
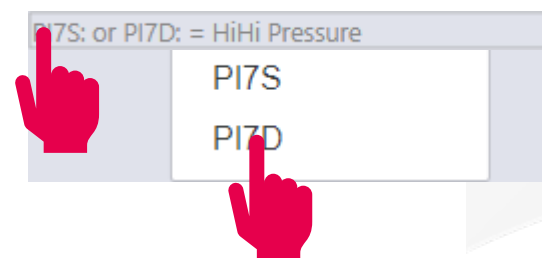
Custom Interlock Desc

- Interlock Description with Tag(s) and Opening FP on Click

```

◆ grpCnd.grpDesc.dtlDesc.Click1.Script(X: number, Y: number): void ◆
{
  let desc = Gem.Type.expDesc as string
  let ModSeparator = GL.MEC.S_MEC_TagDesc_ID.trim();
  //find strings with any number, lower/uppercase or '-', '_' and '$' that end with Standard value i.e. 'MOD-TAG_01$:'
  let regex = new RegExp('[0-9a-zA-Z\-\_\$]+' + ModSeparator, 'g');
  let result = desc.match(regex);
  let modtag = result.map(x => x.slice(0, (x.length - String(ModSeparator).length)));
  modtag = modtag.map(x => x.toUpperCase());
  if (modtag.length == 1)
  {
    DL.OpenFaceplateAsync(modtag[0])
  }
  else
  {
    let region = await DL.GetDisplayElementRegion(Grp.dtlDesc);
    let pos = new Types.Placement({
      Option: Constants.PlacementOption.NearRegion,
      Region: region,
      UseCachedPosition: true
    });
    let key = await DL.ShowContextMenuAsync(...modtag);
    if (!key) return;
    DL.OpenFaceplateAsync(key)
  }
}

```

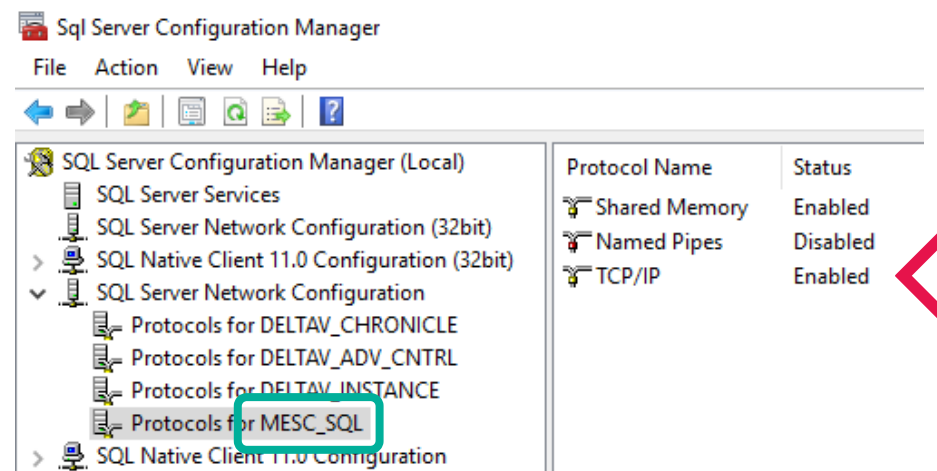


- Enable the click event

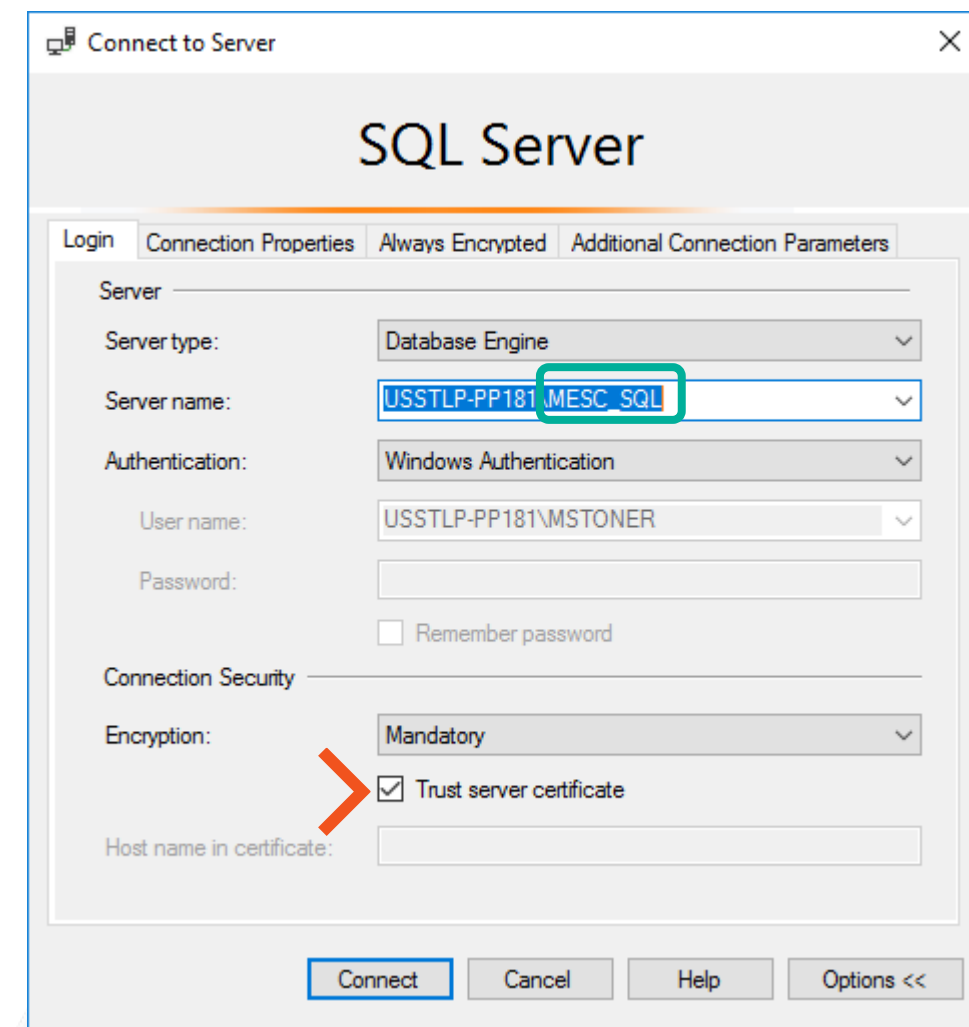


SQL setup

- Install a new instance of SQL Express
- Below shows the default DeltaV SQL instances plus custom instance **MESC_SQL**
 - Ensure that the TCP/IP is **Enabled** for new instance

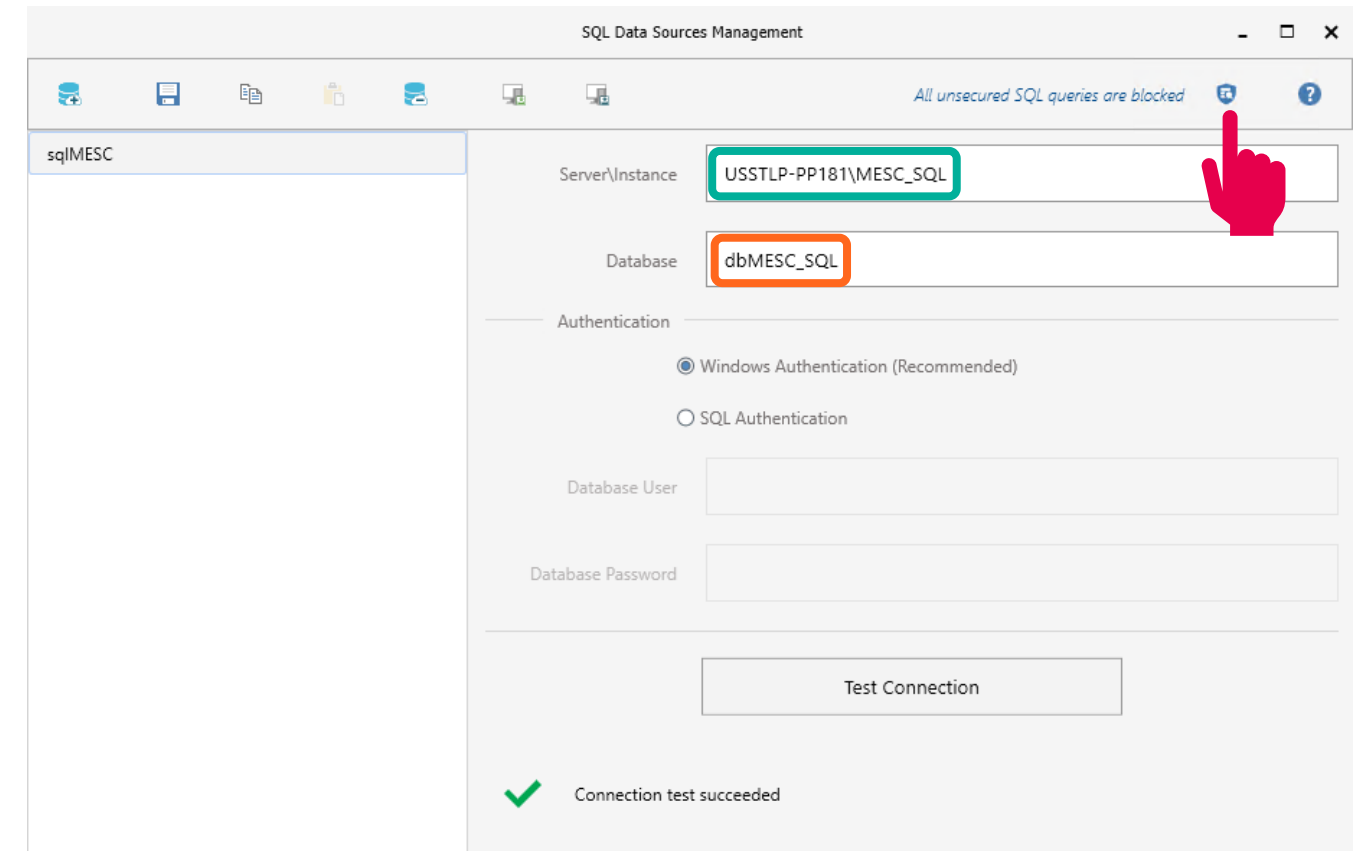
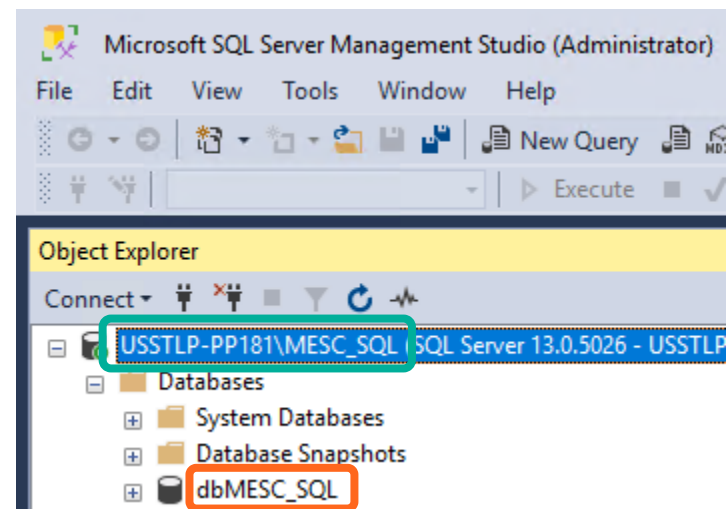


- Using SQL Serve Management Studio (SSMS) to connect and configure the SQL database
 - When connecting make sure to check **Trust server certificate**
 - Give Security\Logins\User Mapping to have db_datareader role on “Server\DeltaV” Group



SQL in Live

- Setup SQL Data Source in Live Administration
 - Match up config to what was done with SSMS and Test Connection



- Queries should use **Private Strings** unless dynamic text is needed in the query and then you have to use normal strings and **Allow Unsecured SQL Queries** selection.

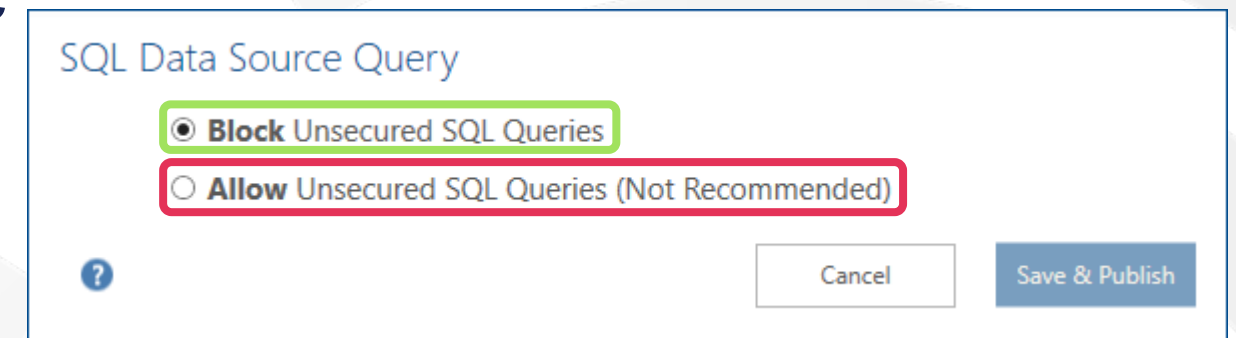


Table Object in Live

- V15 introduced the Table Object
 - Perfect for Loading SQL results!

Table1 TABLE ?

Basics Columns Text Interaction

Add Column

Field
fldTag
fldType
fldInService
fldSource
fldDest

Primary Key

Primary Key Field

```
const table = Dsp.Table1;
const data:any = [];
table.Data = data;
let strSQL = 'SELECT [tblEquipment].[fldTag], [tblEquipCodes].[fldType], [tblEquipment].[fldInService], [tblEquipment].[fldSource], [tblEquipment].[fldDestination]'
strSQL = strSQL + ' FROM [dbMESC_SQL].[dbo].[tblEquipCodes], [dbMESC_SQL].[dbo].[tblEquipment]'
strSQL = strSQL + ' WHERE [dbMESC_SQL].[dbo].[tblEquipCodes].[fldTypeCode] = [dbMESC_SQL].[dbo].[tblEquipment].[fldTypeCode]'
let SQLResults:any = [];
try
{
  SQLResults = await SQL.PEPRC.QueryAsync(strSQL);
  /* SQLResults array, 0 = fldTag, 1 = fldType, 2 = fldInService, 3 = fldSource, 4 = fldDest */
}
catch(e)
{
  SQLResults = [];
}

if (SQLResults.length > 0)
{
  for (let i=0; i < SQLResults.length; i++)
  {
    data.push ({ fldTag: SQLResults[i][0], fldType: (SQLResults[i][1]).trim(), fldInService: SQLResults[i][2], fldSource: SQLResults[i][3], fldDest: SQLResults[i][4] })
  }
  table.Data = data;
}
}
```

Summary

- In this session we discussed many different topics and gave examples that will help DeltaV Live users use and/or configure the system.
- Questions?

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Find More Information

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- <https://www.emerson.com/en-us/automation/control-and-safety-systems/distributed-control-systems-dcs/deltav-distributed-control-system/deltav-live>
- <https://www.typescriptlang.org/>
- <https://www.tutorialspoint.com/typescript/index.htm>
- <https://www.tutorialspoint.com/javascript/index.htm>
- <https://emersonexchange365.com/>
- <https://stackoverflow.com/questions>

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Thank You