ClearSCADA 2014 Appreciation

A Brief Training on ClearSCADA

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Introduction

Contents of Courseware

1. Configuration
2. Mimics
3. Embedded Mimics & Symbols
4. More of Commands
5. Trends — Day 1
6. Templates & Instances
7. Structured Text
8. Security
9. Document Stores
10. WebX — Day 1.5

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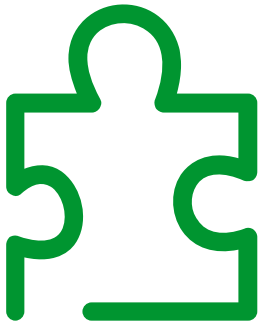
Introduction

Pay attention to the Icons

> Each have its own directives for you to follow.



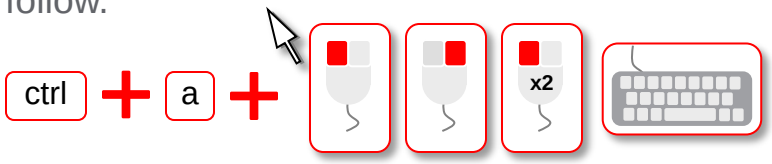
Action

Whenever you see these wordings, means something you have to perform by yourself.

Step by Step

Whenever you see these wordings, the course is guiding you through a step by step sequence. This allows you to follow easily a sequence of actions in order to achieve a certain objective.

Normally found together with Step by Step slides, these arrows with numbers within shows the sequence in which you should follow.



Icons like theses show which mouse buttons or key sequence or key entry you should execute.

Introduction

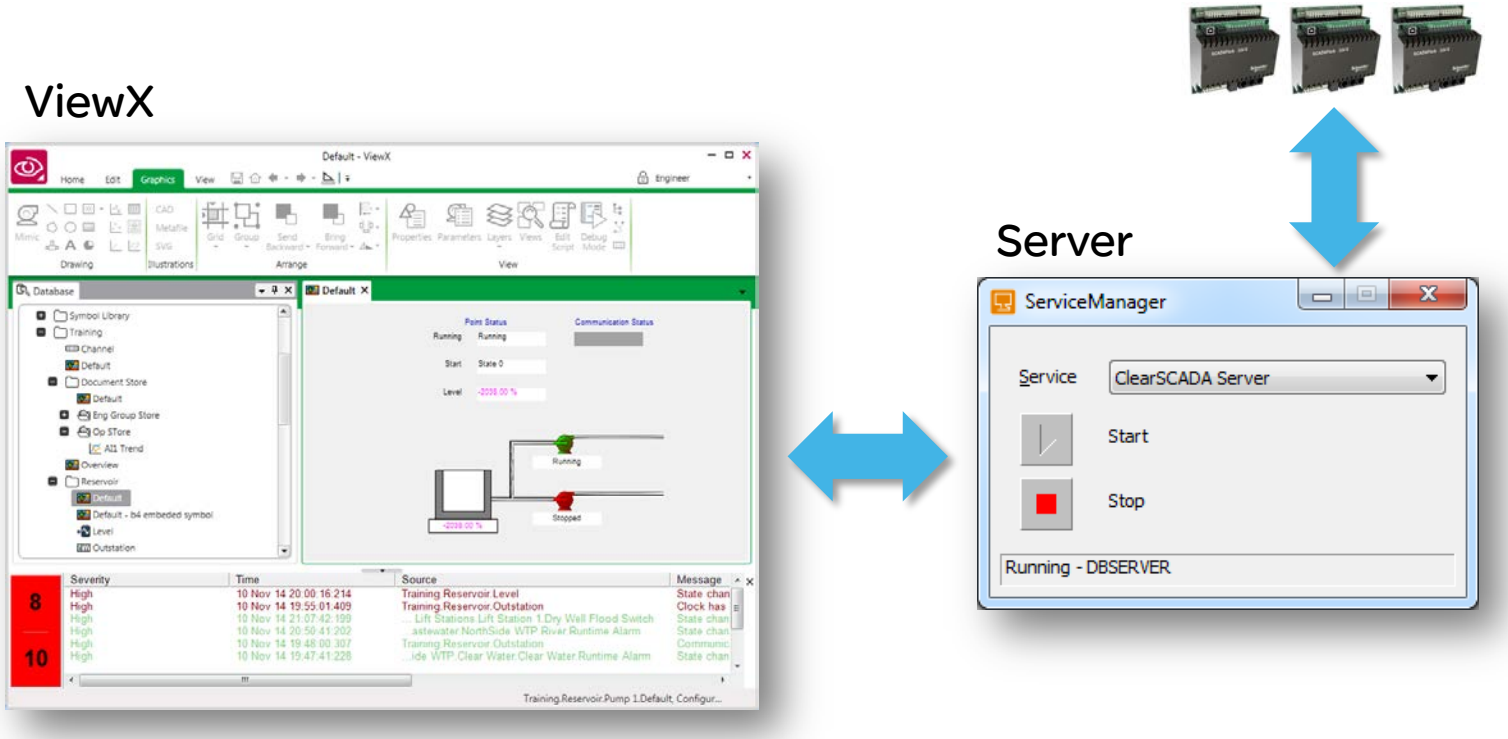
> Software Base
  > This document is based on runs in Windows 7 64 bits.
  > Is based on ClearSCADA 2014 R1.
> Document Base
  > ClearSCADA Level 1 Training Manual release 4.01.

How ClearSCADA Works

Understanding before Proceeding

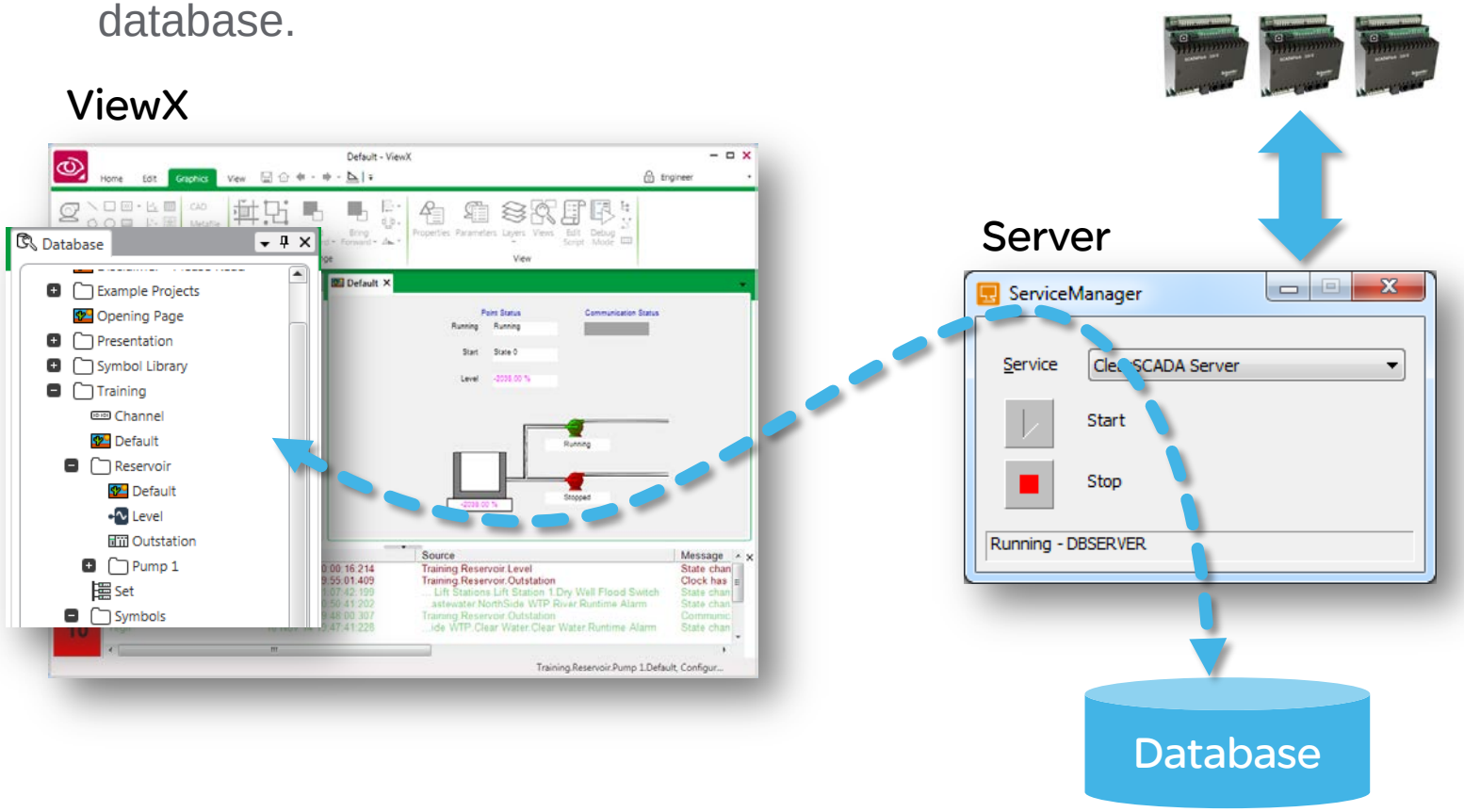
ClearSCADA Architecture

- The 2 major components of **ClearSCADA** is the **Server** and the **ViewX Client**.



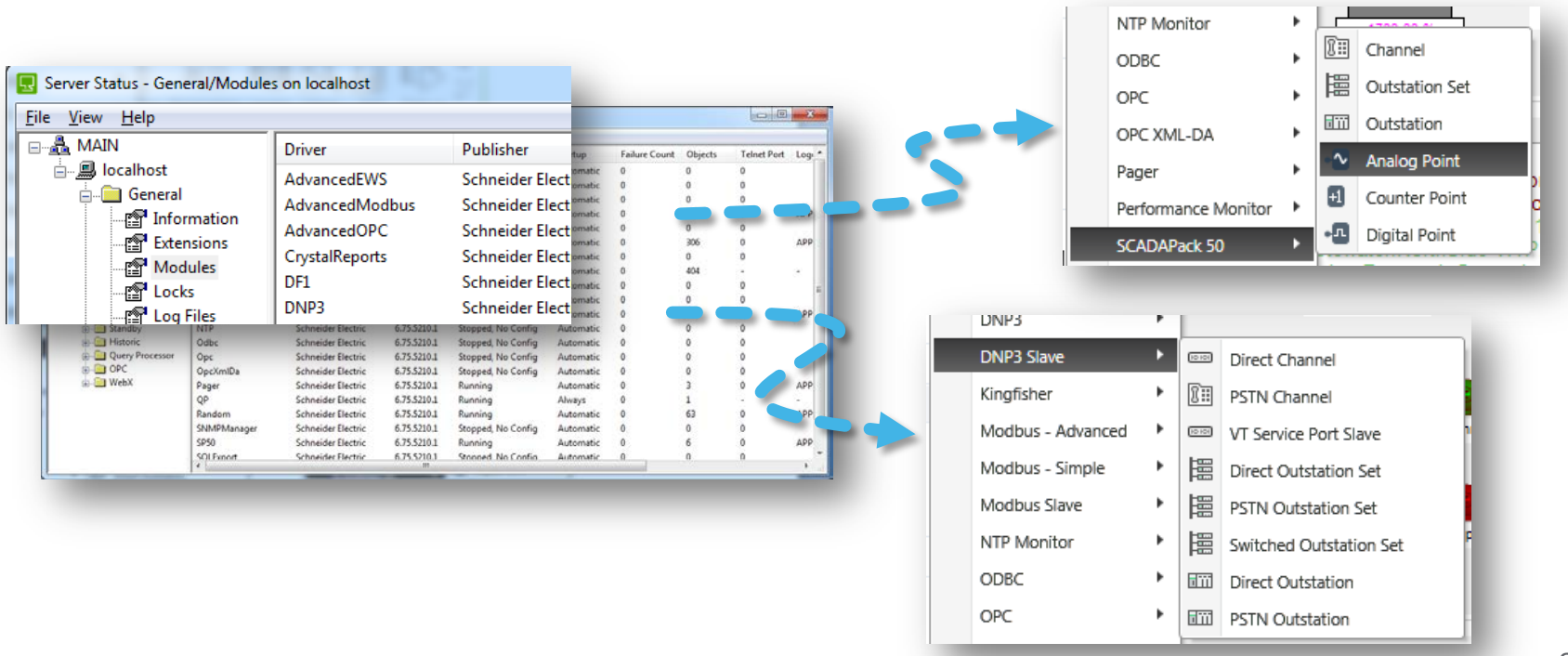
ClearSCADA Architecture

- Everything in **ClearSCADA**, such as settings, graphical mimics and much much more are all stored in an underlying database. **ViewX** is not only the viewer, but also an engineering tool to operate on the underlying database.



ClearSCADA Architecture

- **ClearSCADA** comes with installed “drivers” that can communicate with RTU, database and communicating equipments. All these are fixed when the software is installed.
- Anytime if there are drivers to support new devices, they can be installed at a later date. A driver contains not only the protocol, but also product specifics such as supported point types.



Let’s get on With it

Actual Training

Configuration

Section 1

Configure a Project

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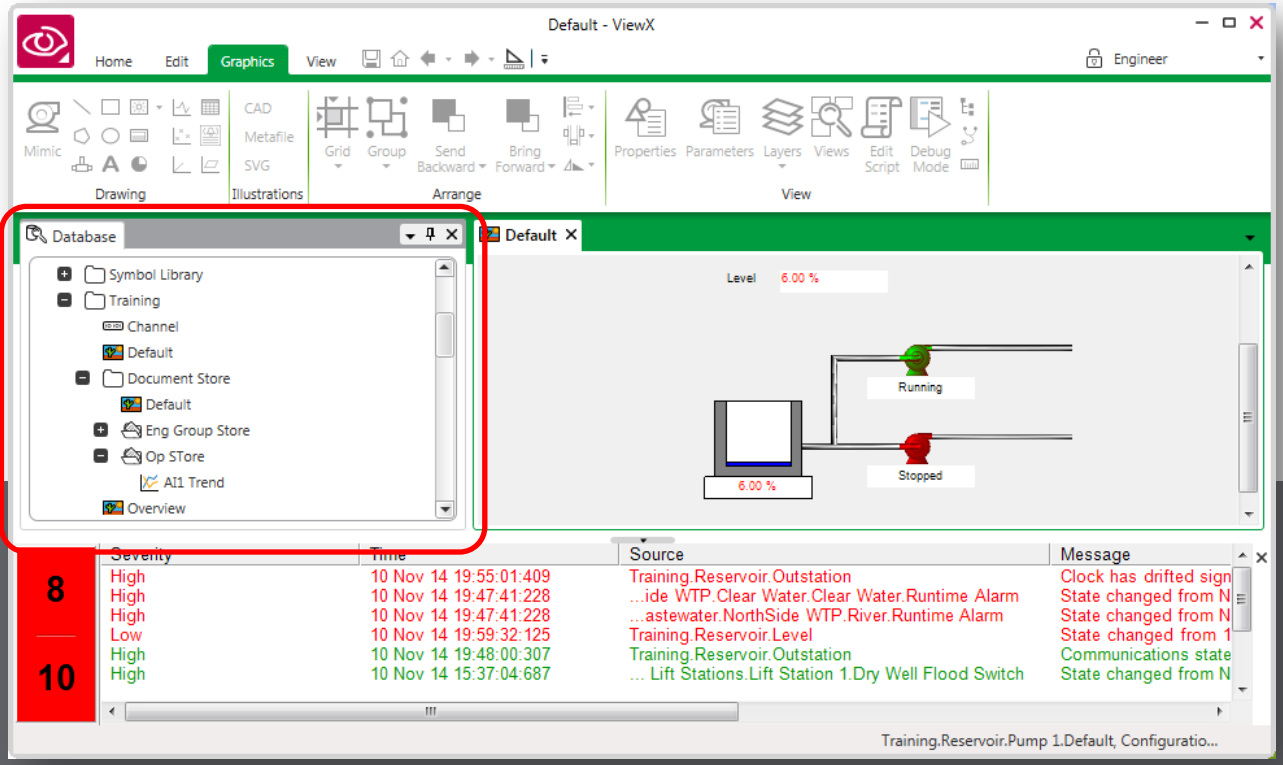
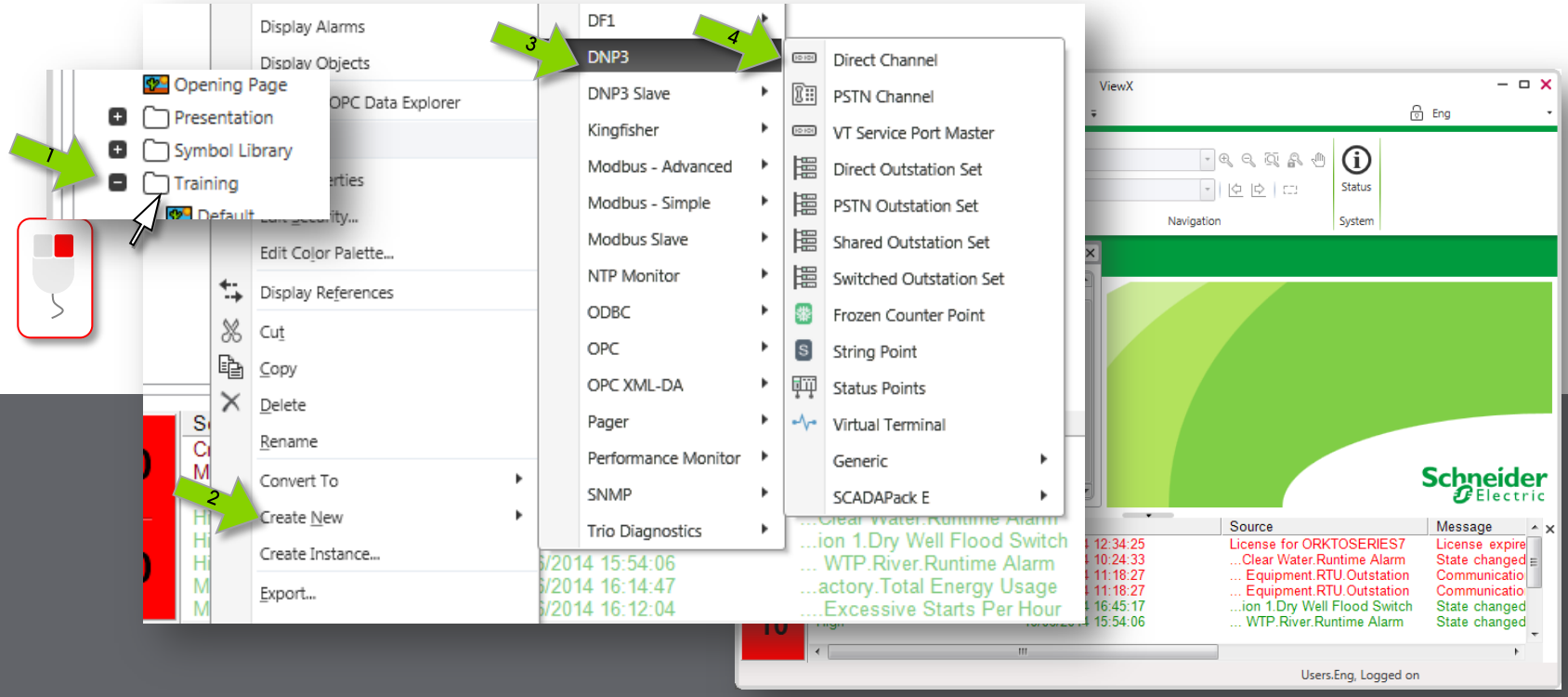
Objective

- In ClearSCADA, all components such as mimics, symbols that you create, templates that you designed, settings for points and RTU are all organized into folders.



Objective

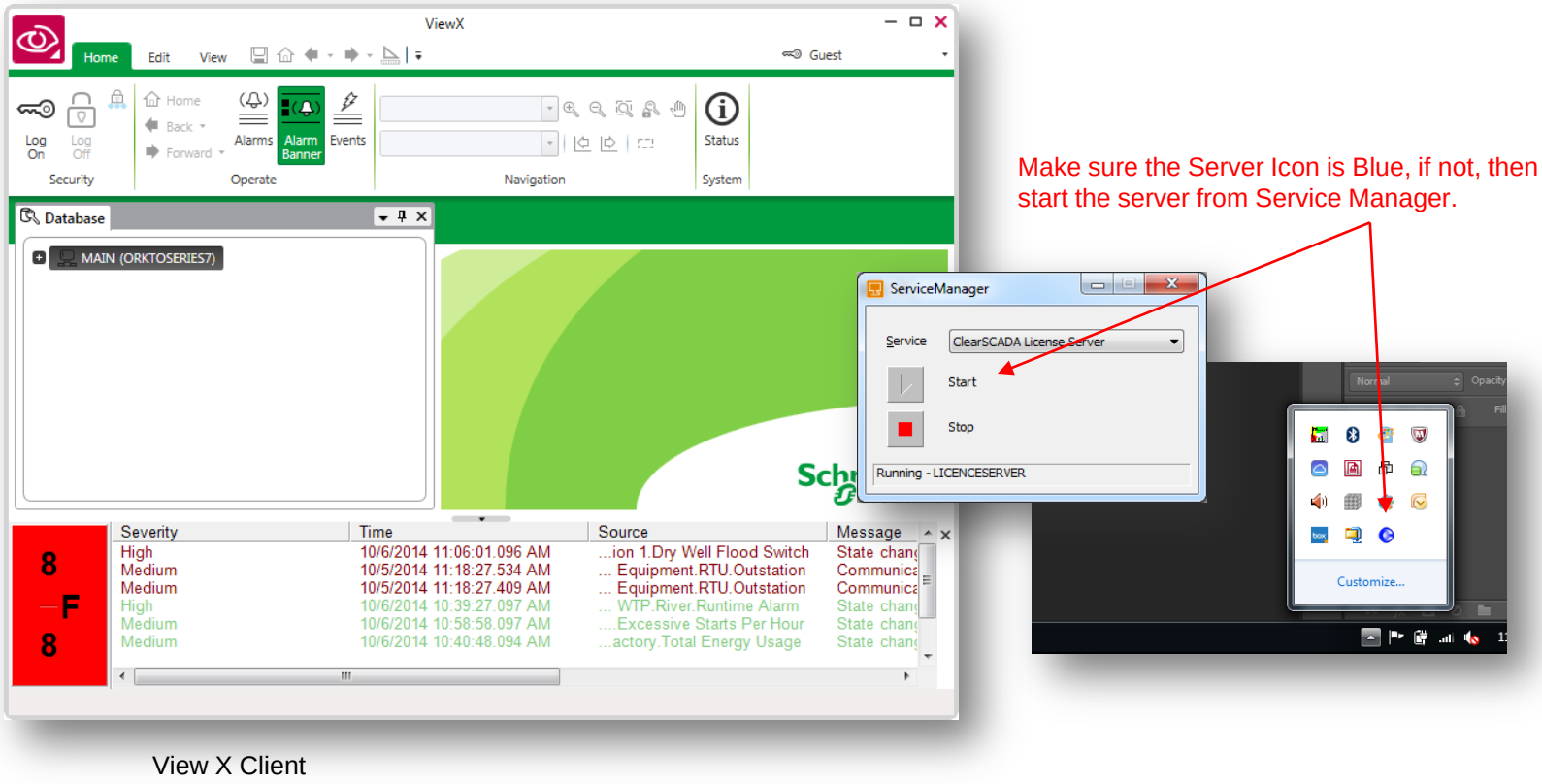
- There are not fix rules, how your project is to be organized, it is entirely up to you.
- The aim of this first section is to get you familiarized with the best practice way in which a project should be created and organized in **ClearSCADA.**



Launch View X

- Make sure the **Server** is running;
- Launch **View X**;

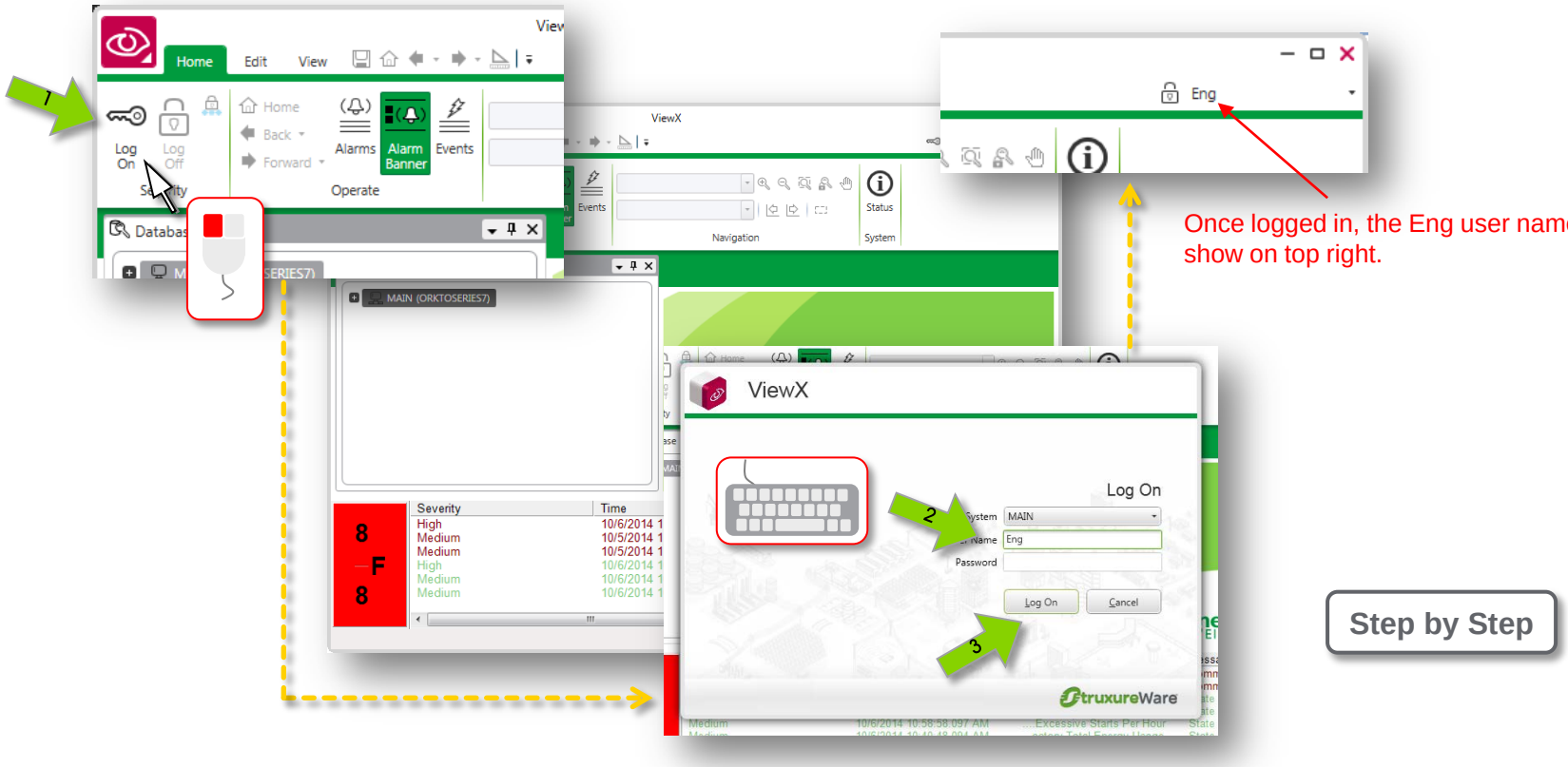
Step by Step



View X Client

Logon

- Log on as **Eng**. Password is blank.

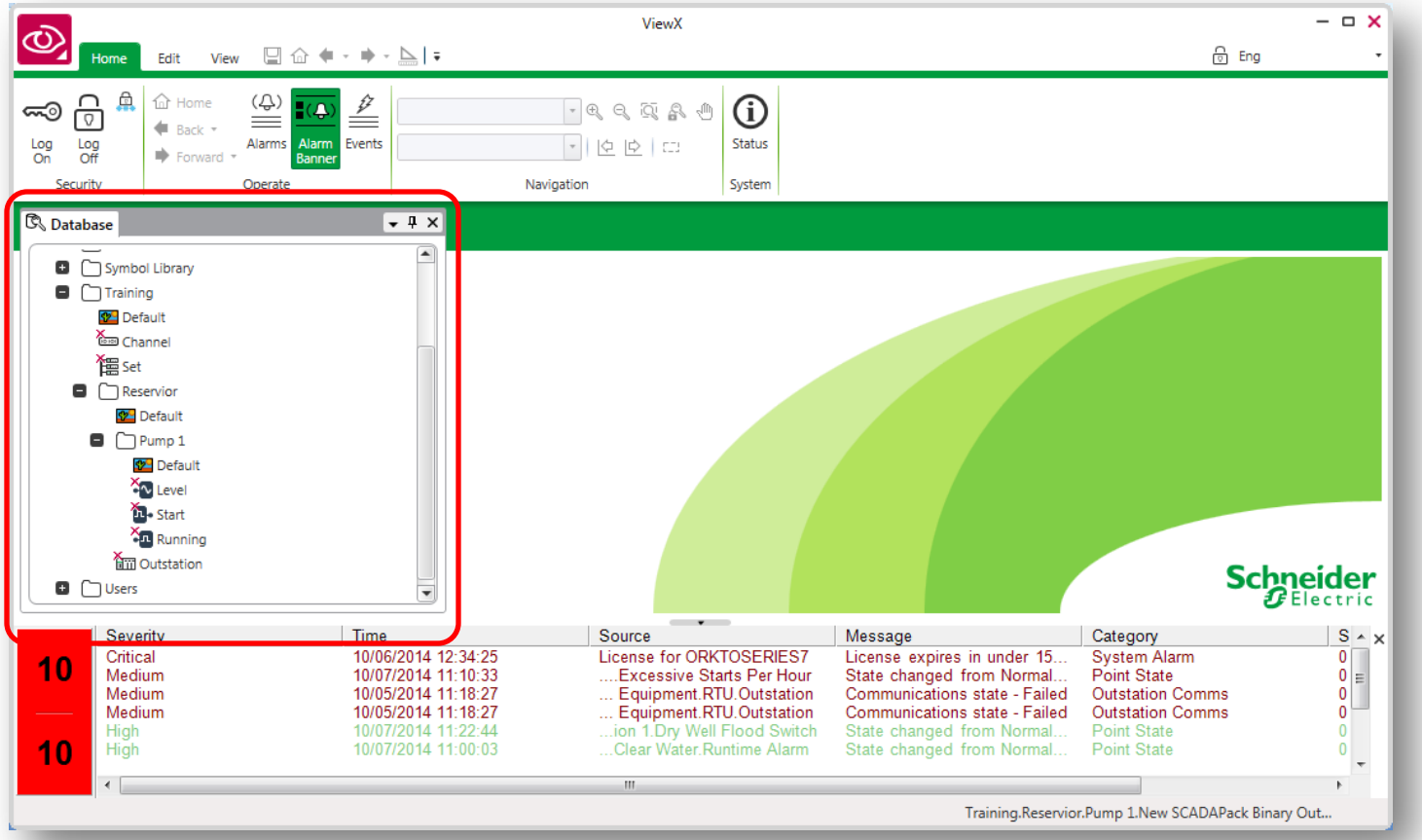


Step by Step

Create Group

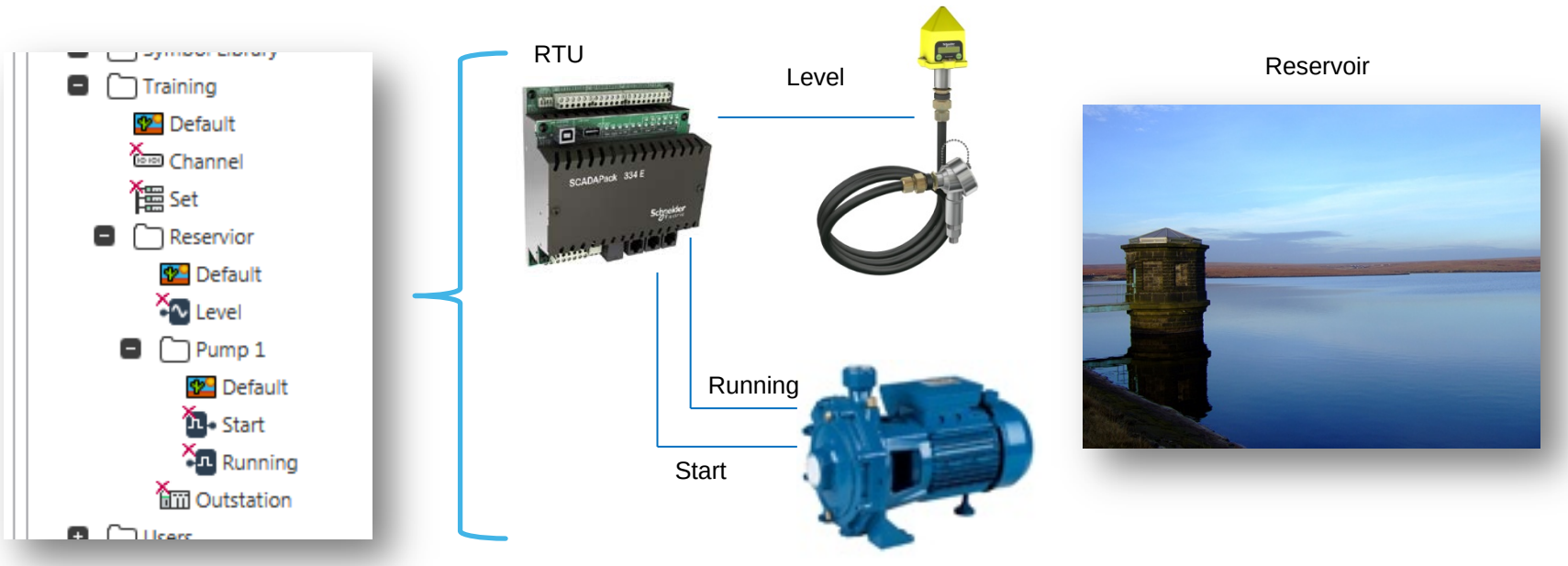
- **ClearSCADA** use a logical tree structure to manage and contain all components of a project.

Each database object represents a ClearSCADA display, a program, a device in the real world such as an outstation, or an internal feature such as a group or user account.



Create Group

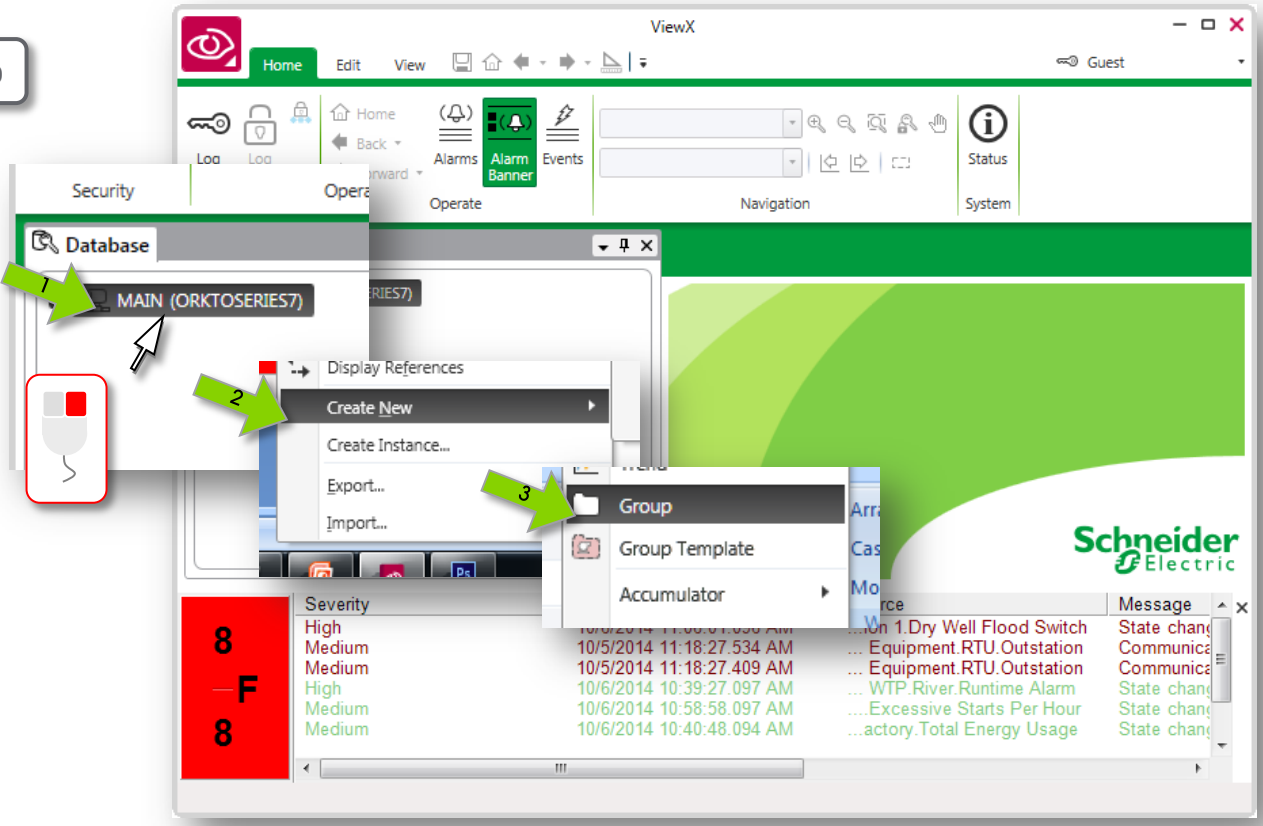
- The way in which the tree structure is created is entirely up to the programmer. It can either be well organized or an epic disaster depending on programmer's discipline.
- We will next create a structure to hold the components of the actual site illustrated below.



Create Group

- Next, we need to create a folder to keep our configuration.
- Right click on the root folder and do as per follows.

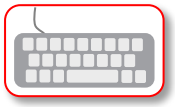
Step by Step

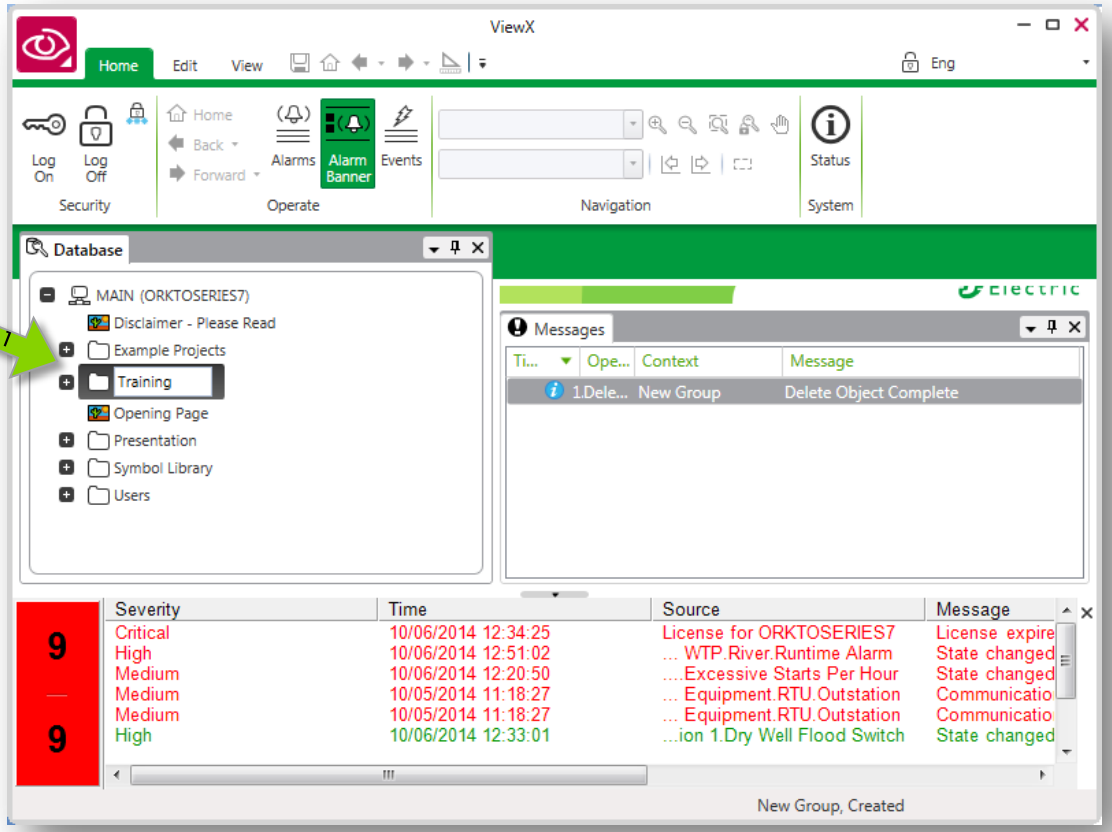


Create Group

- Name the new folder **Training**.

Step by Step

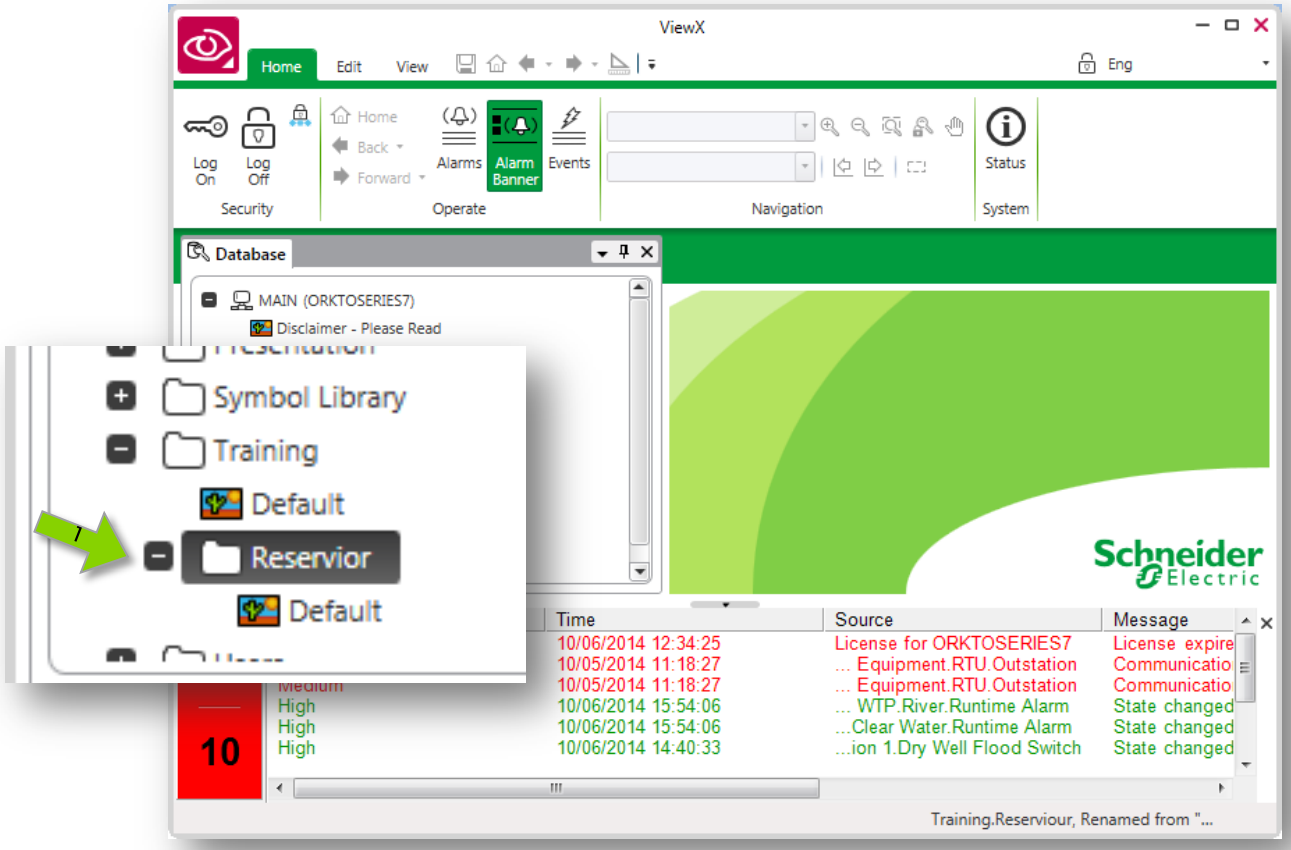




Create Reservoir Group

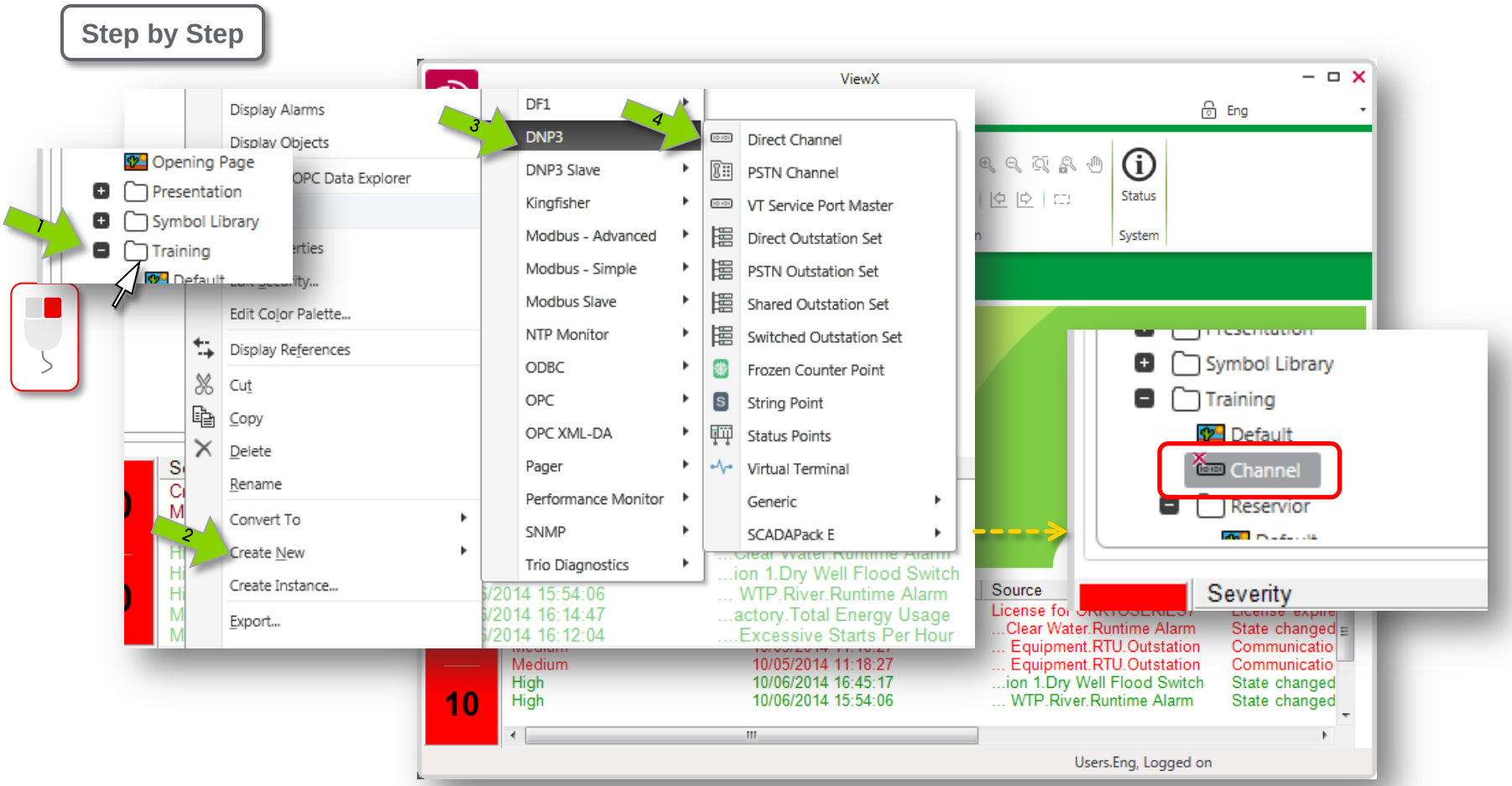
Action

- Right click on the **Training** group and then create another folder under and name it **Reservoir**.



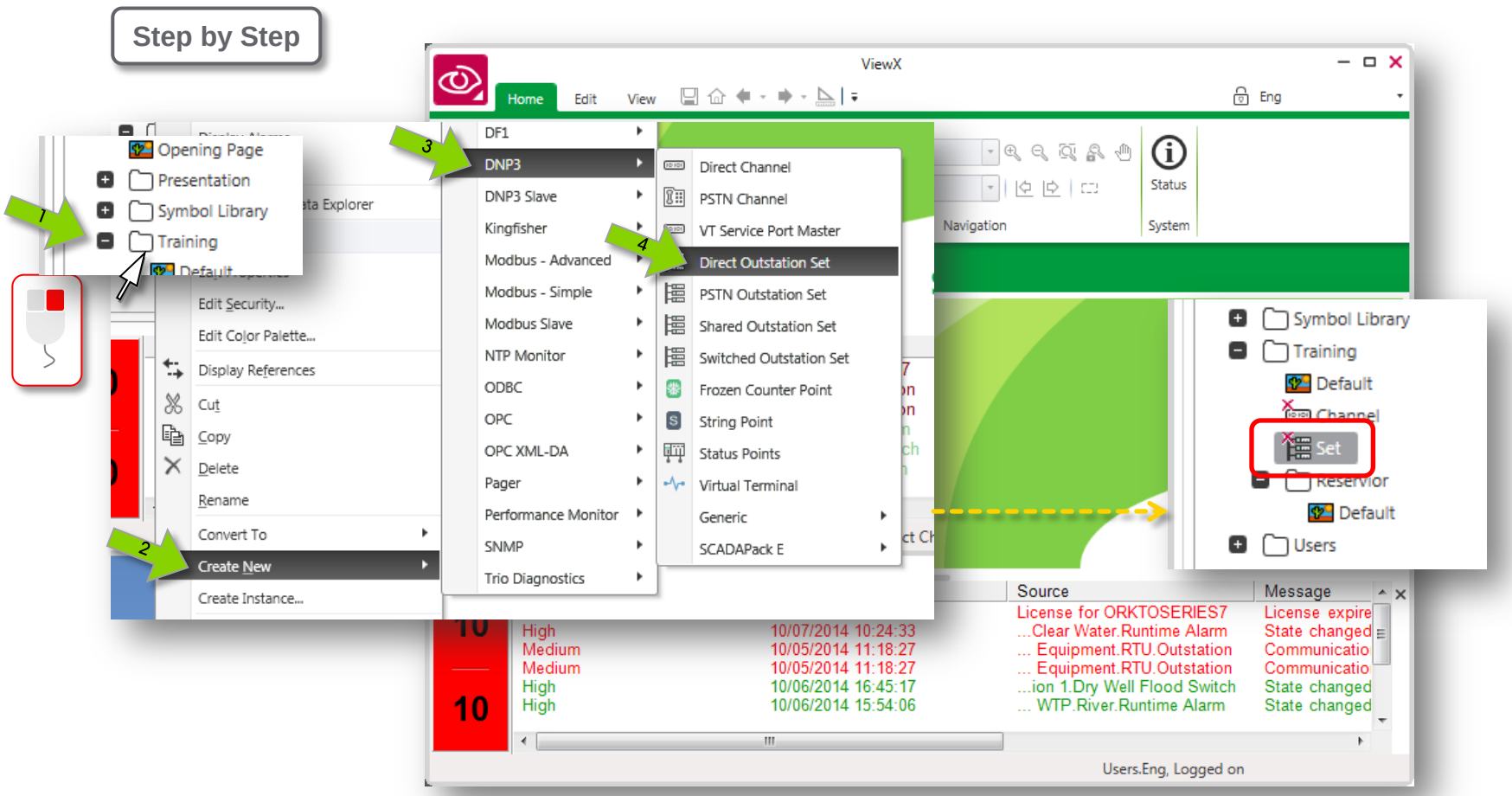
Create Channel

- We next need to create **Direct Channel**. Name this **Channel**.



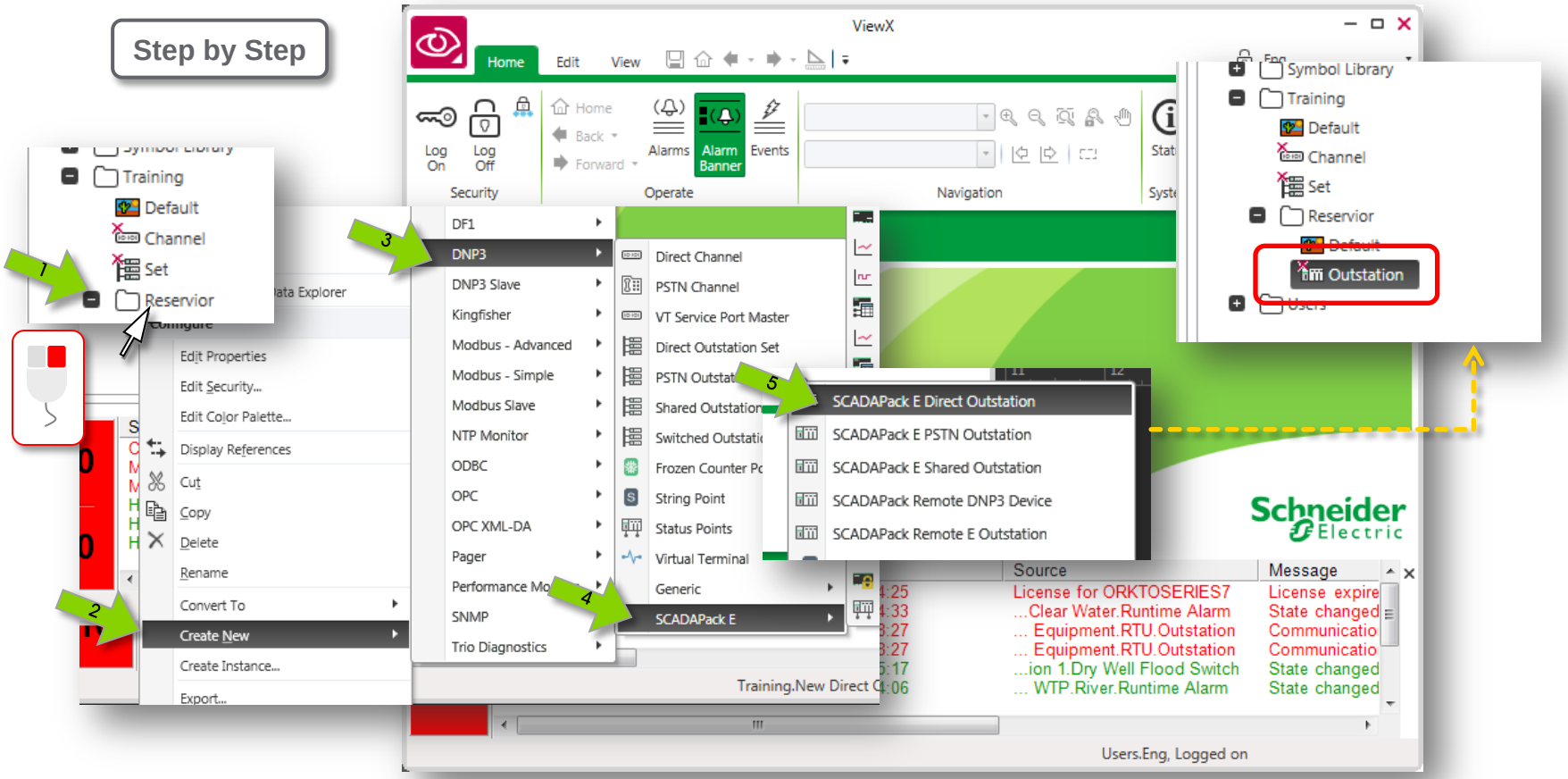
Create Set

- We next need to create **Direct Outstation Set**. Name this **Set**.



Create Outstation

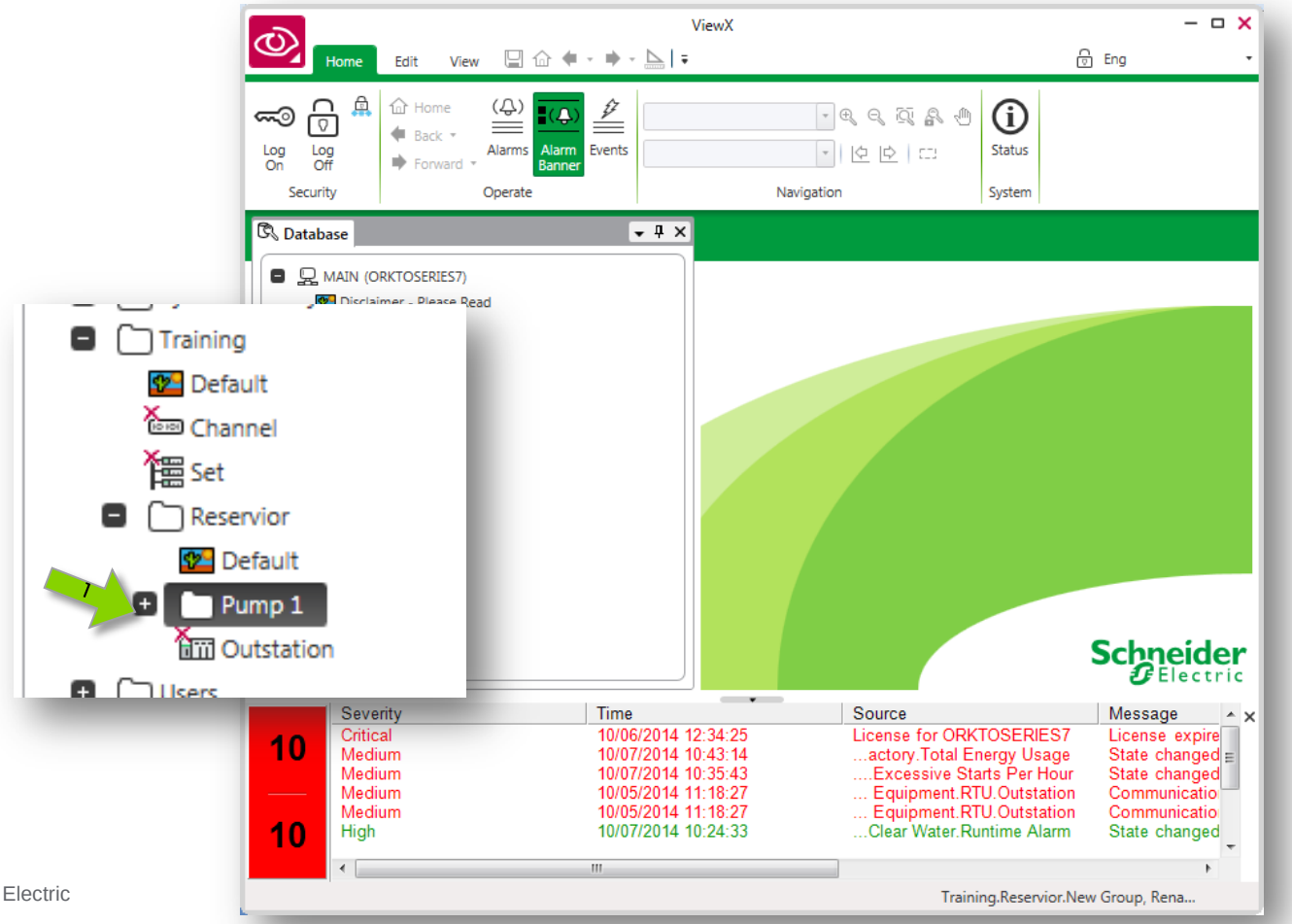
- We next need to create **SCADAPack E Direct Outstation** under **Reservoir**. Name this **Outstation**. This is the RTU in the **Reservoir**.



Create Pump 1 Group

Action

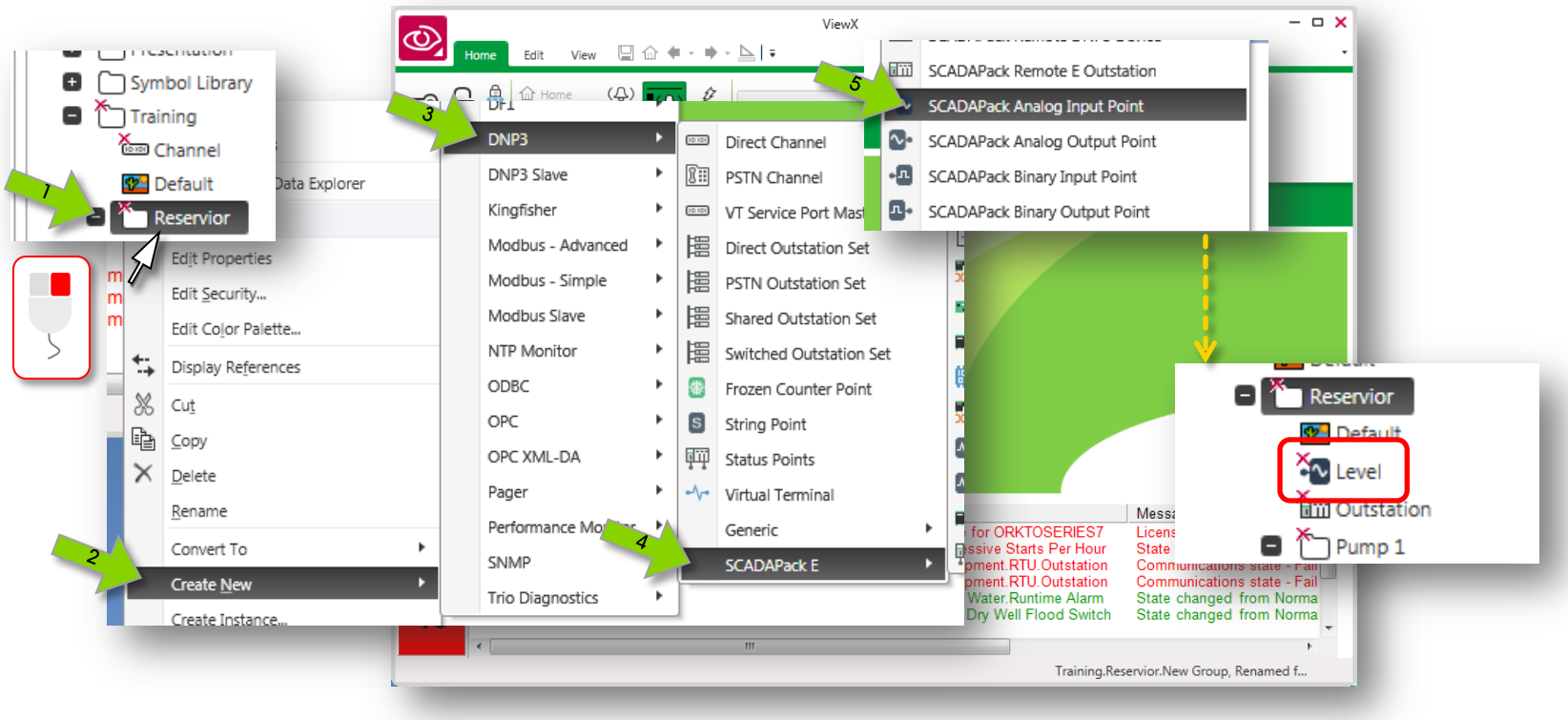
- Create another **Group** and name it **Pump 1**. This folder will contain all the points related to the **Pump 1** within the **Reservoir**.



Create Pump 1 Group

- There will be a AI point for level, create a **SCADAPack Analog Input Point** under **Reservoir** and name it **Level**.

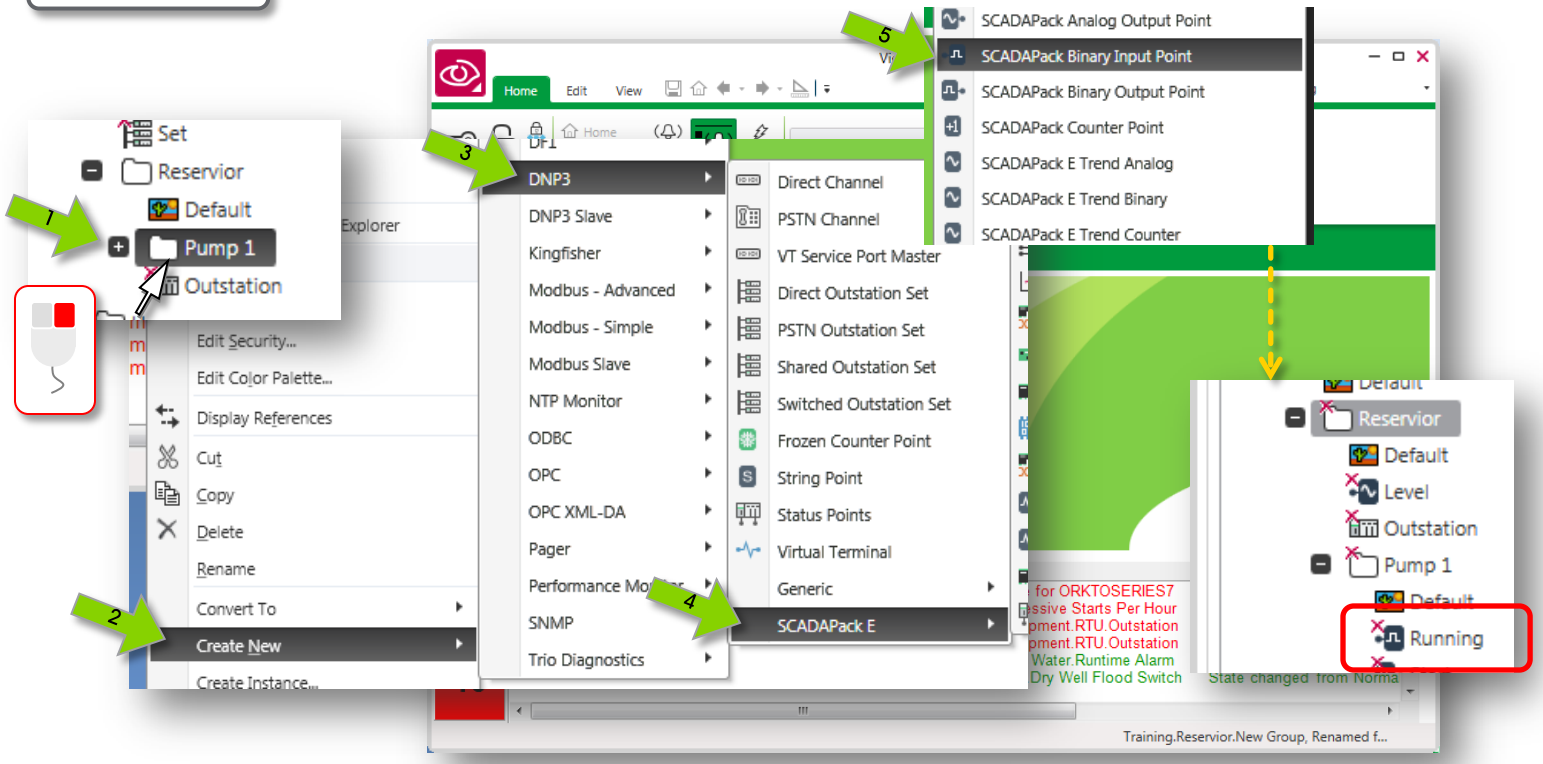
Step by Step



Create Pump 1 Group

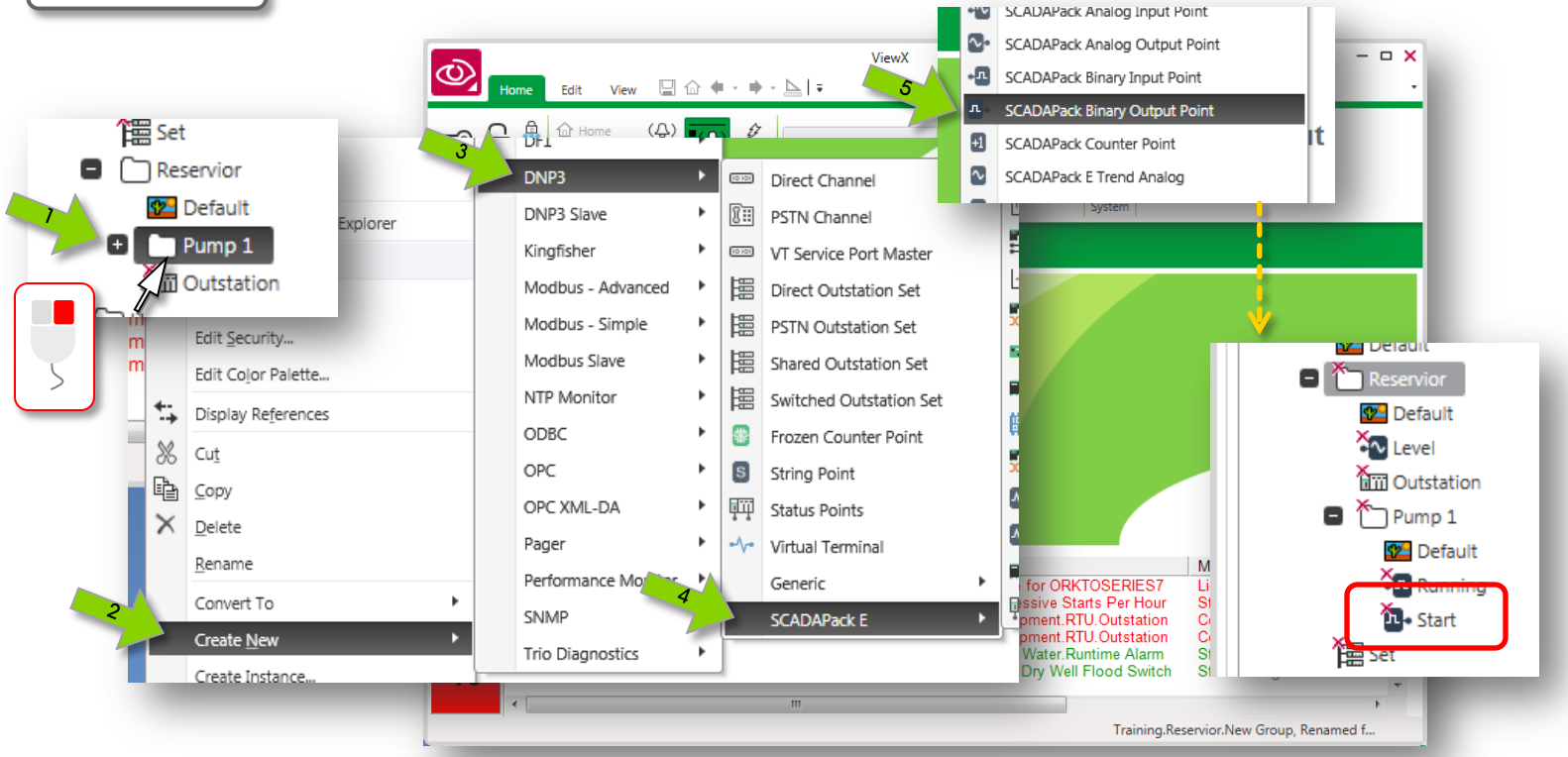
- There will be a AI point for level, create a **SCADAPack Binary Input Point** under **Pump 1** and name it **Running**.

Step by Step



Create Pump 1 Group

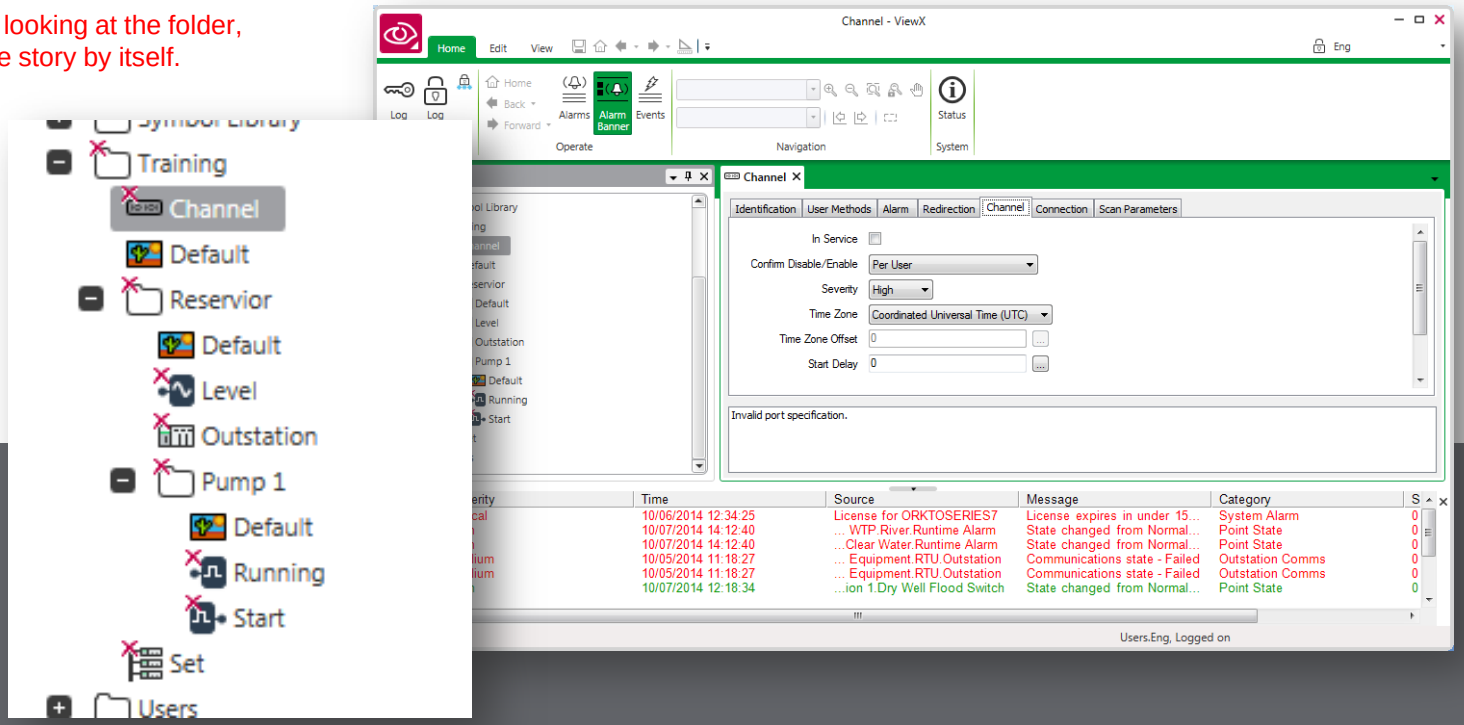
- There will be a AI point for level, create a **SCADAPack Binary Output Point** under **Pump 1** and name it **Start**.



Where are we at?

- Now we have completed setting up the shell structure and essential components of our site.
- We next need to set up the intricate details in which communication to RTUs can actually occur.

Just looking at the folder, is the story by itself.



The Theory of Outstation

- In CS, in order to establish a link to the external device, there are 3 items which needed to be set. They are:
  - Outstation Set;
  - Channel;
  - Outstation;

Outstation Set

Master

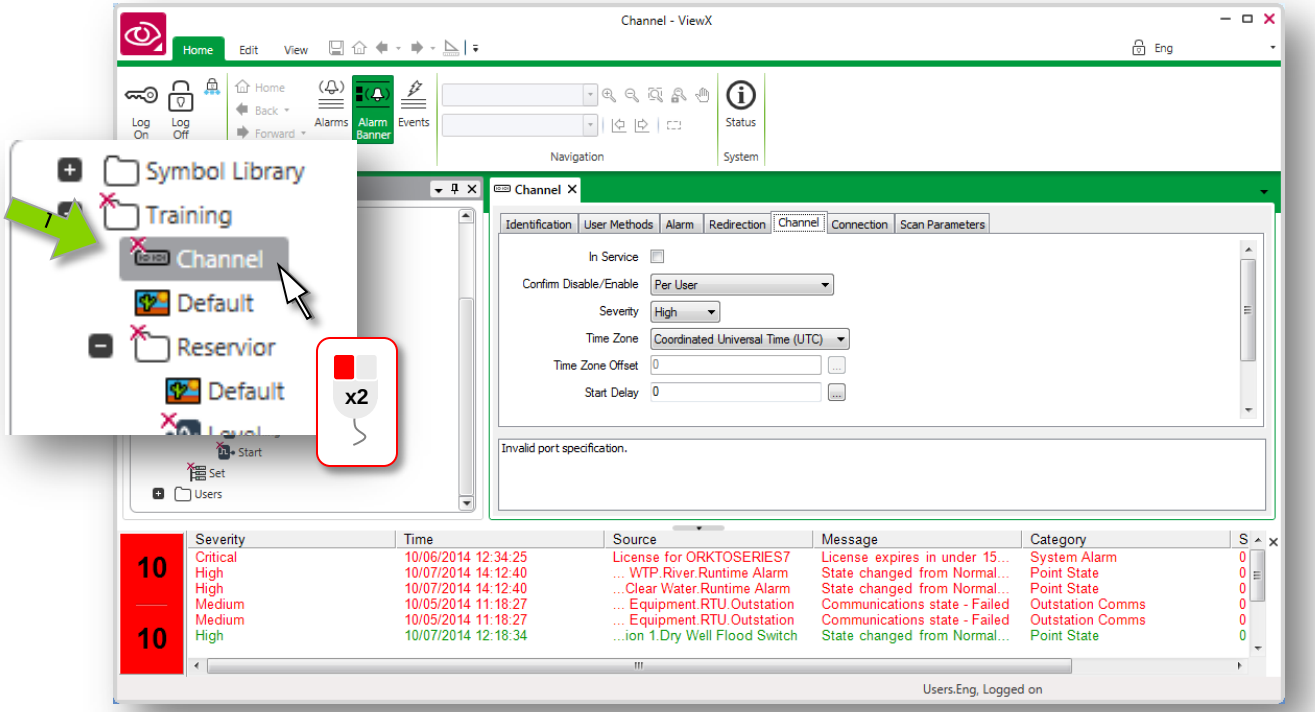
Channel

Outstation

Configure the Channel

- The channel object specifies the type of communications that are used to connect to the device, along with some timing parameters. A single channel can be used to communicate with multiple RTUs, depending on the type of communications used.

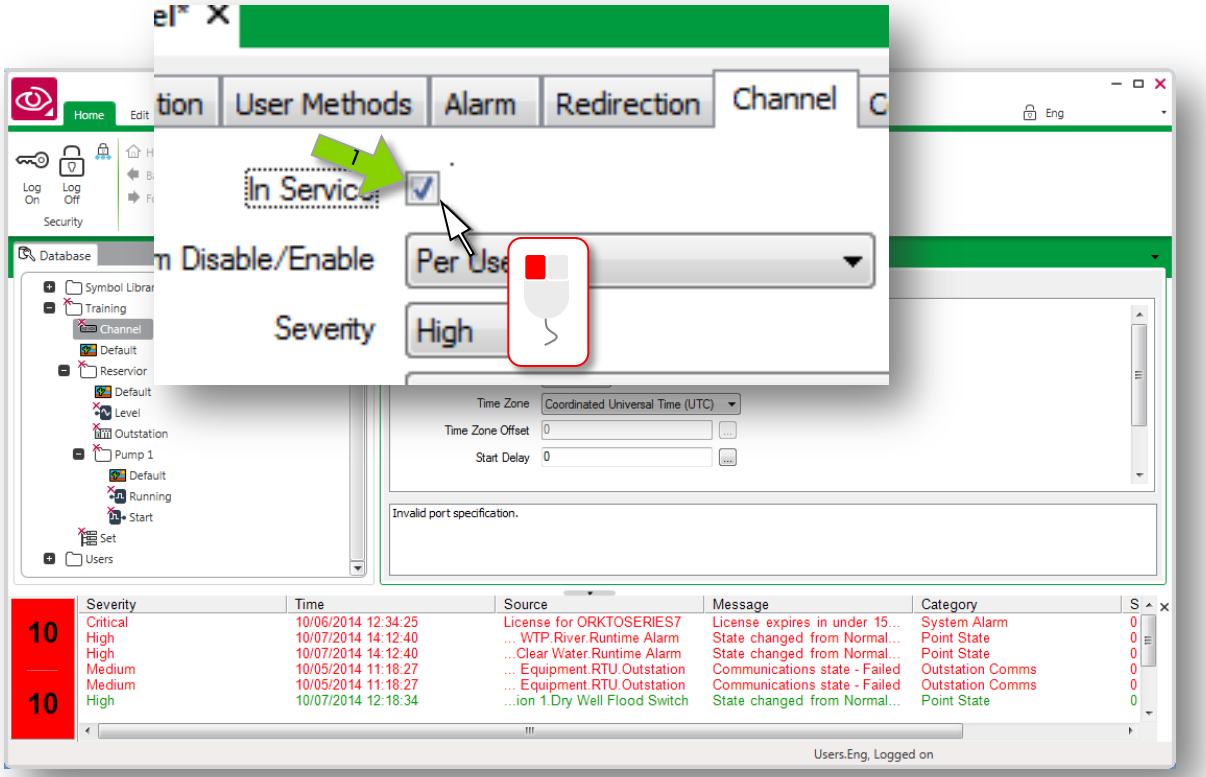
Step by Step



Configure the Channel

- Now, to enable this RTU, click as per below. This will put CS to communicate with the RTU.

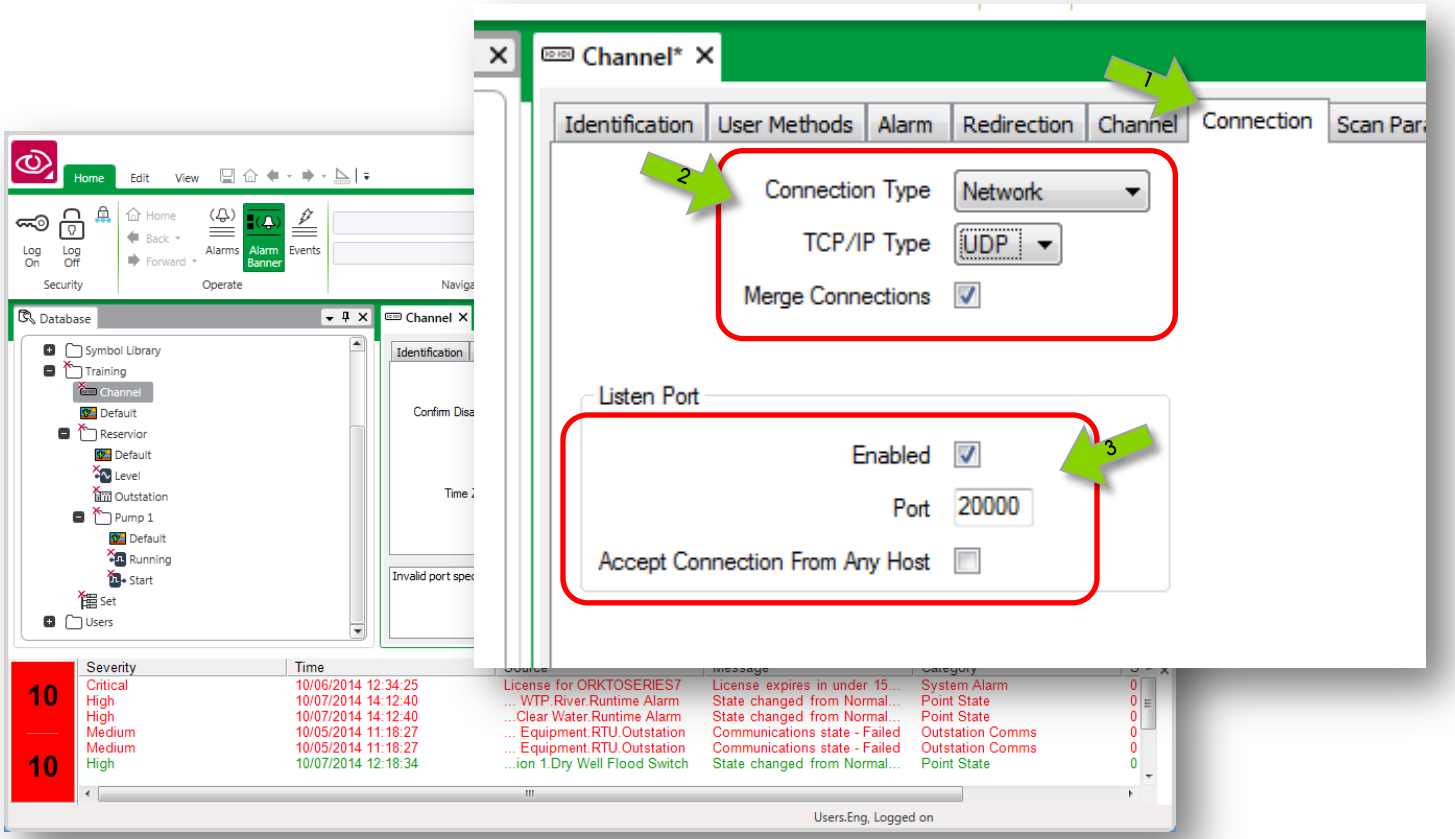
Step by Step



Configure the Channel

Step by Step

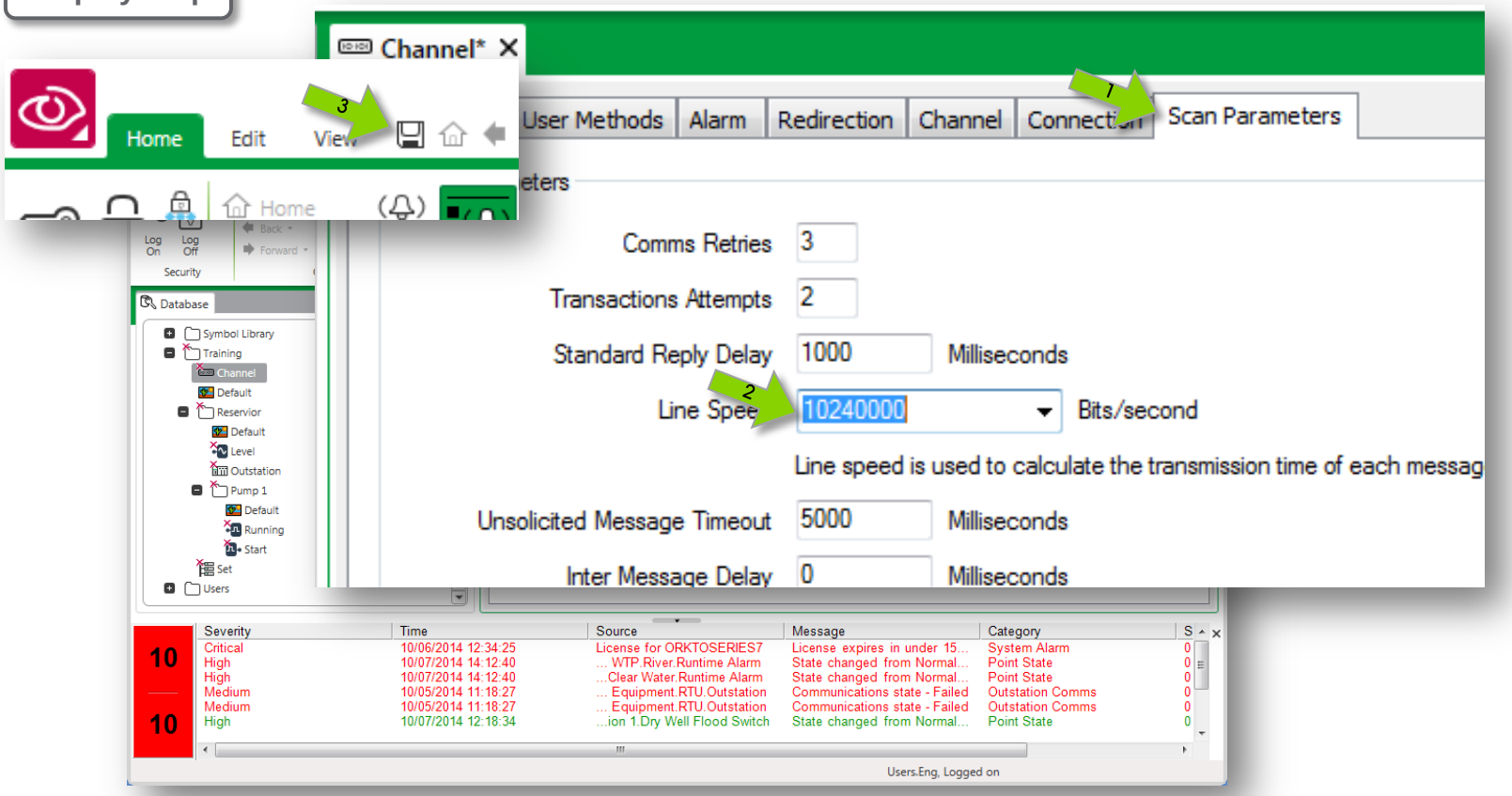
- Now set the **Connection** section as follows:



Configure the Channel

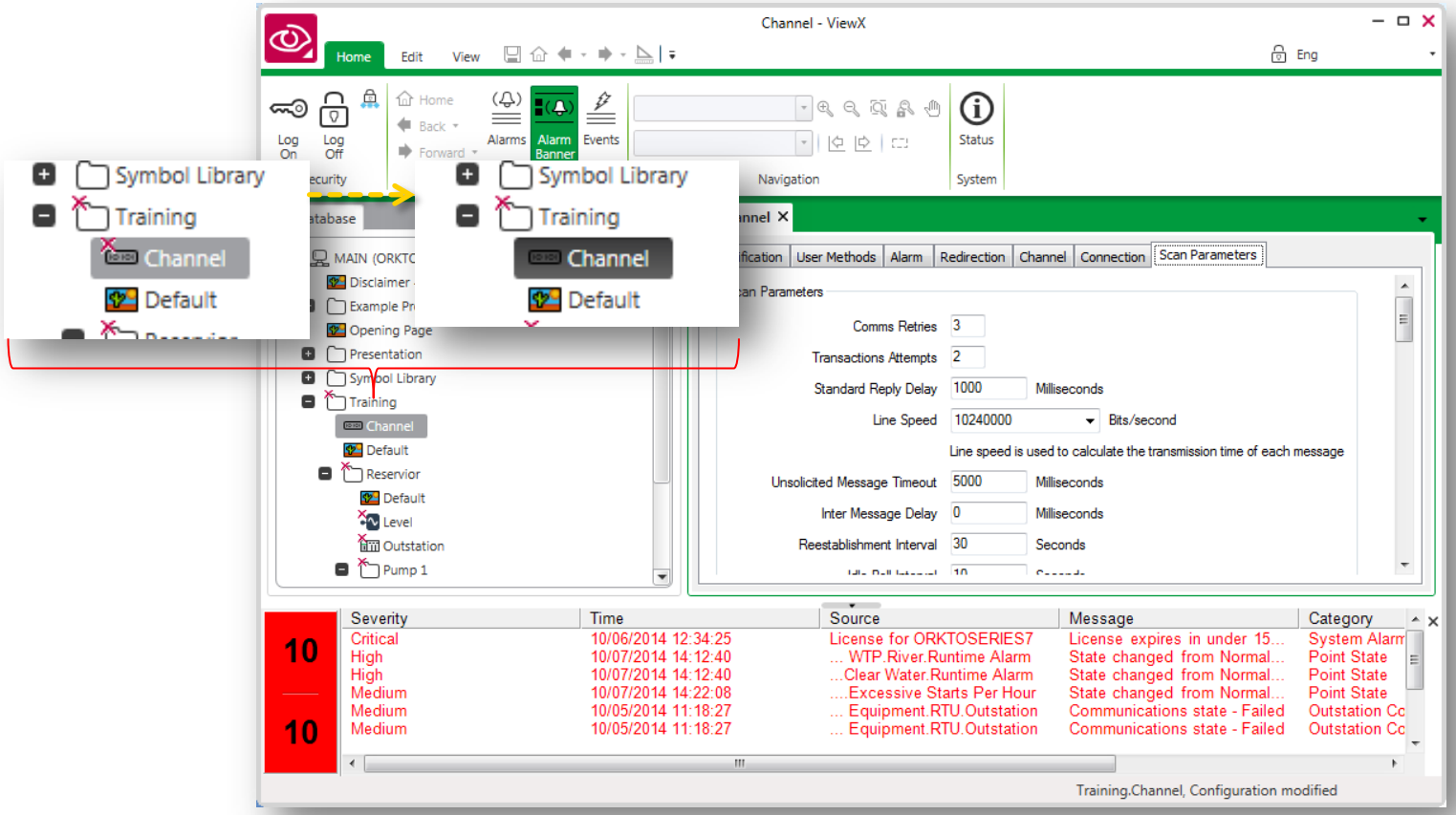
- Now set the **Scan Parameters** section as follows and then **Save**:

Step by Step



Configure the Channel

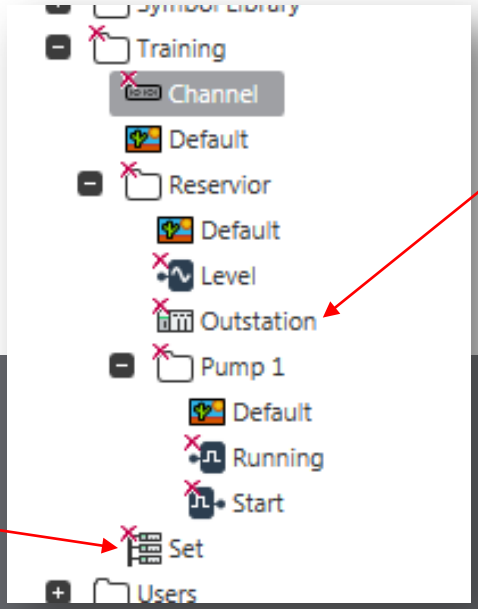
- Notice that the X mark is now gone from the **Database Pane**. This means the configuration is now correct.



Outstation Set

Master

- The **Outstation Set** actually refers to a **Master Station**.
- In this case, it is the **ClearSCADA** server herself.
- In DNP, we need to specify a DNP master address, RTUs can be set to response to only certain masters, and to send unsolicited messages to masters by way of this address.



- Response only to polls from 100.
- Send unsolicited to 100.

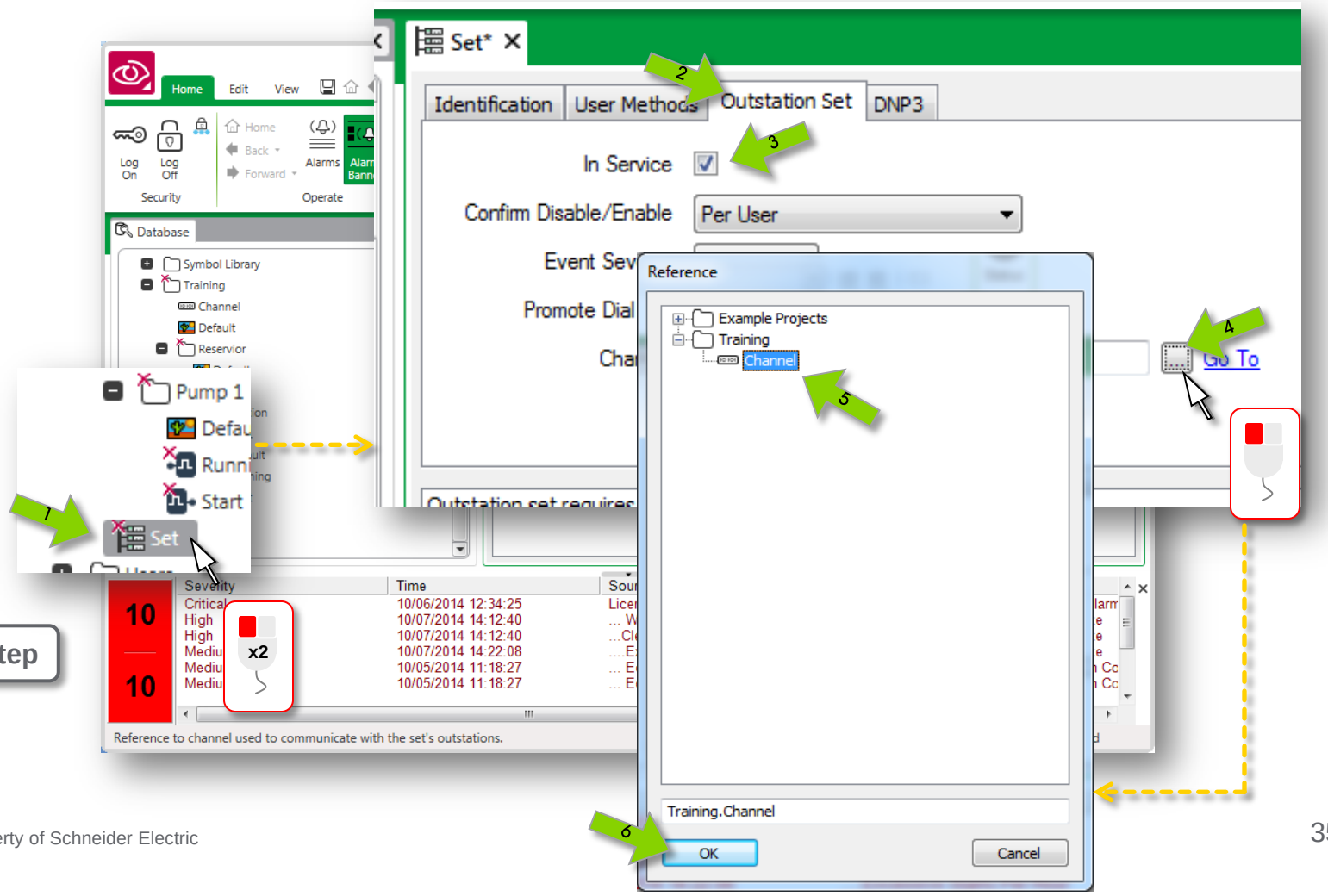
Master

Master DNP Addy: 100

Configure the Outstation Set

Master

- Next is to configure the **Outstation Set**. Do as per follows:



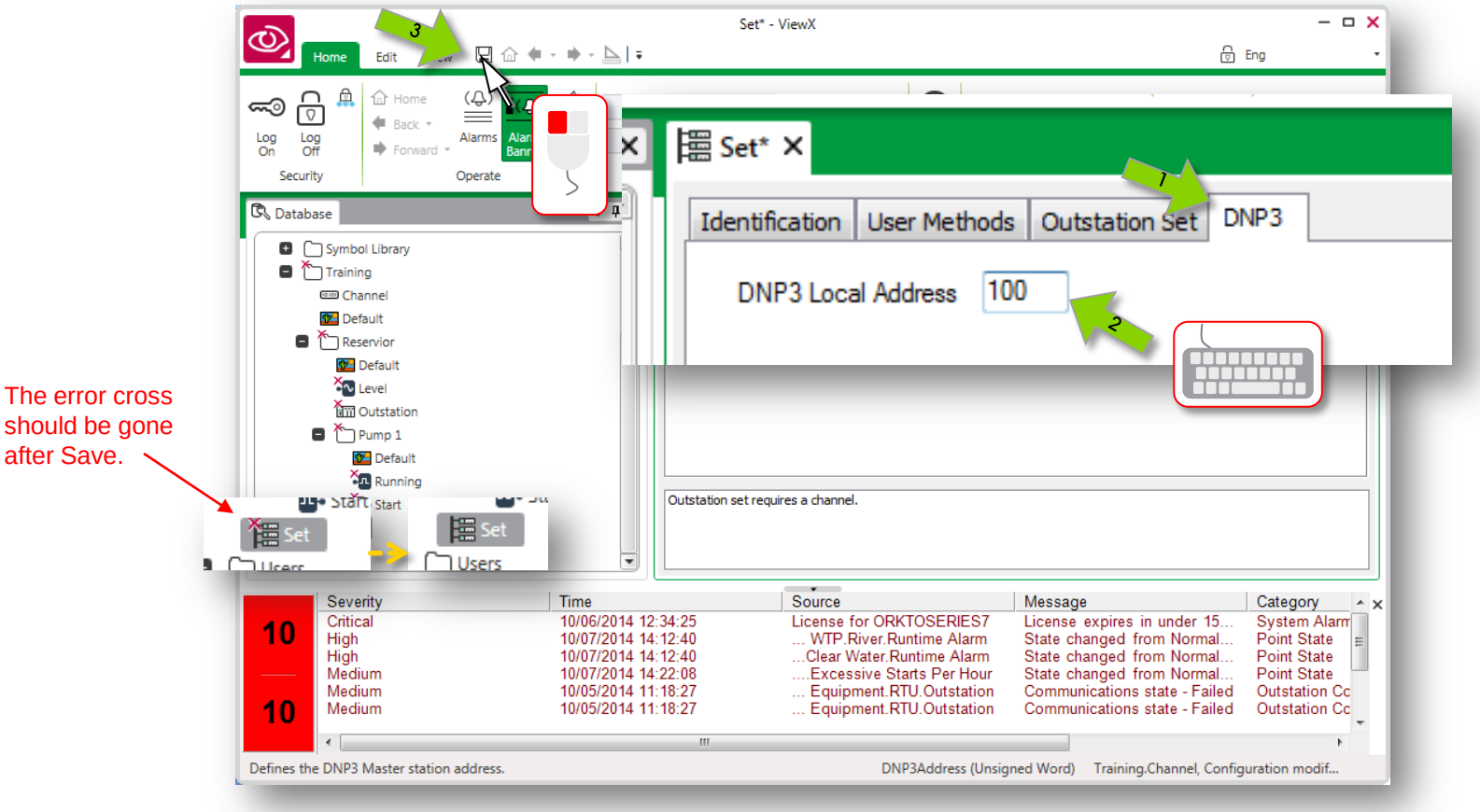
Step by Step

Configure the Outstation Set

Master

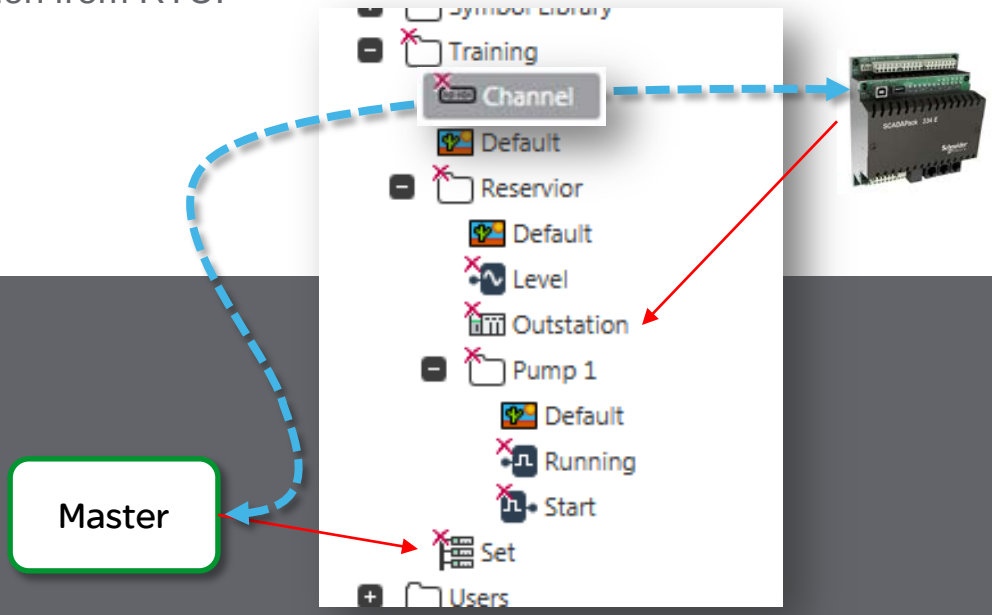
- **Outstation Set** needs to have a master DNP address. Use **100**. Then Save the settings.

Step by Step



Outstation

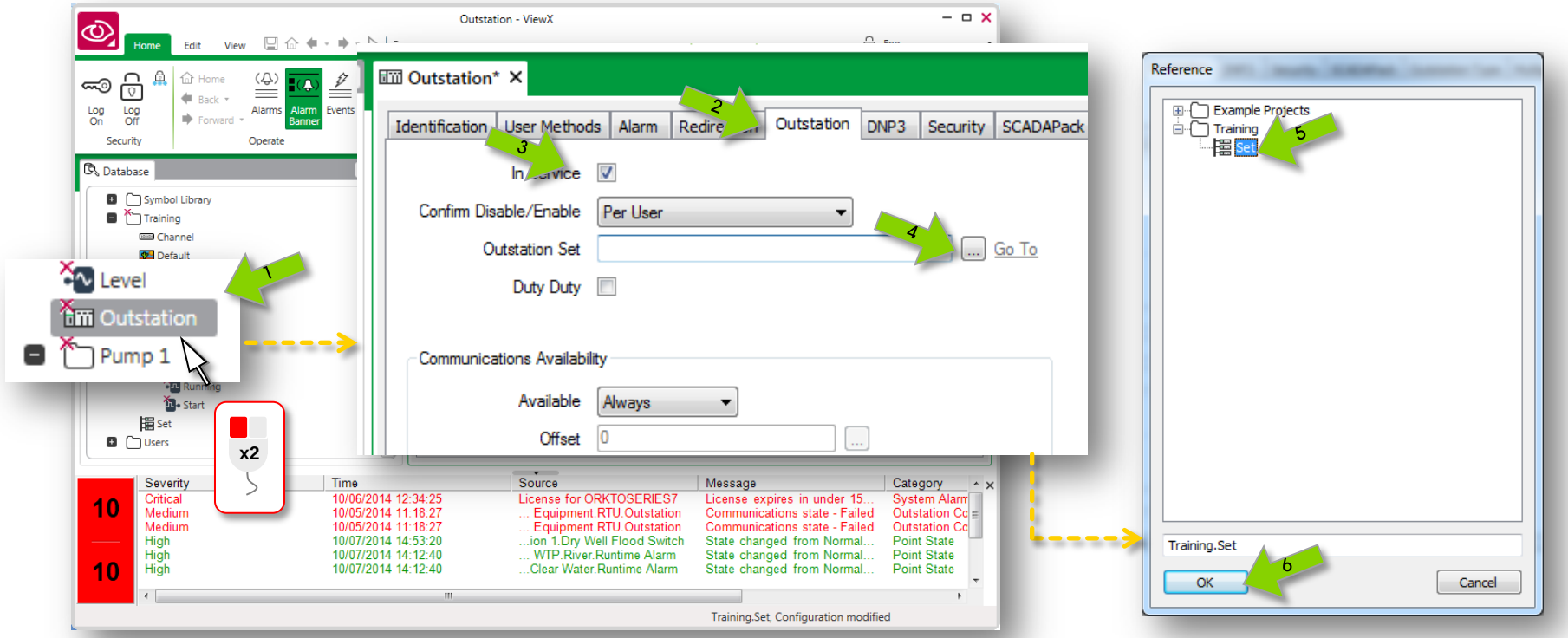
- We need to define which RTU CS will connect to.
- Therefore CS needs to:
  - CS need to know which channel to use in order to get to the RTU.
  - Which master (**Outstation Set**) polls this RTU.
  - RTU Details:
    - IP address.
    - The salve DNP address.
    - In what manner to get information from RTU.



Configure the Outstation RTU

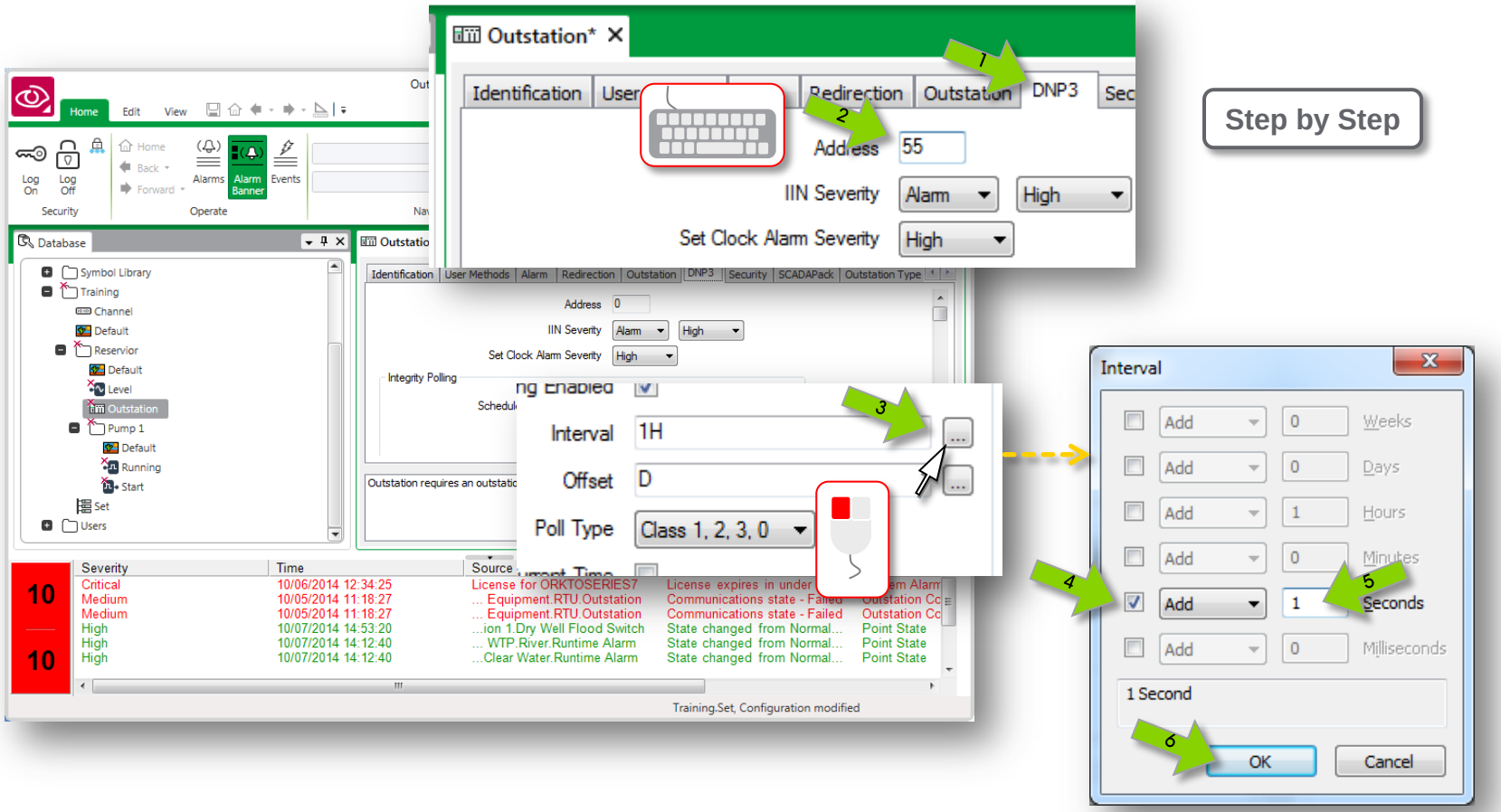
- Next the actual RTU needed to be link. First, we must configure the **Set** to poll this **RTU** by doing the following:

Step by Step



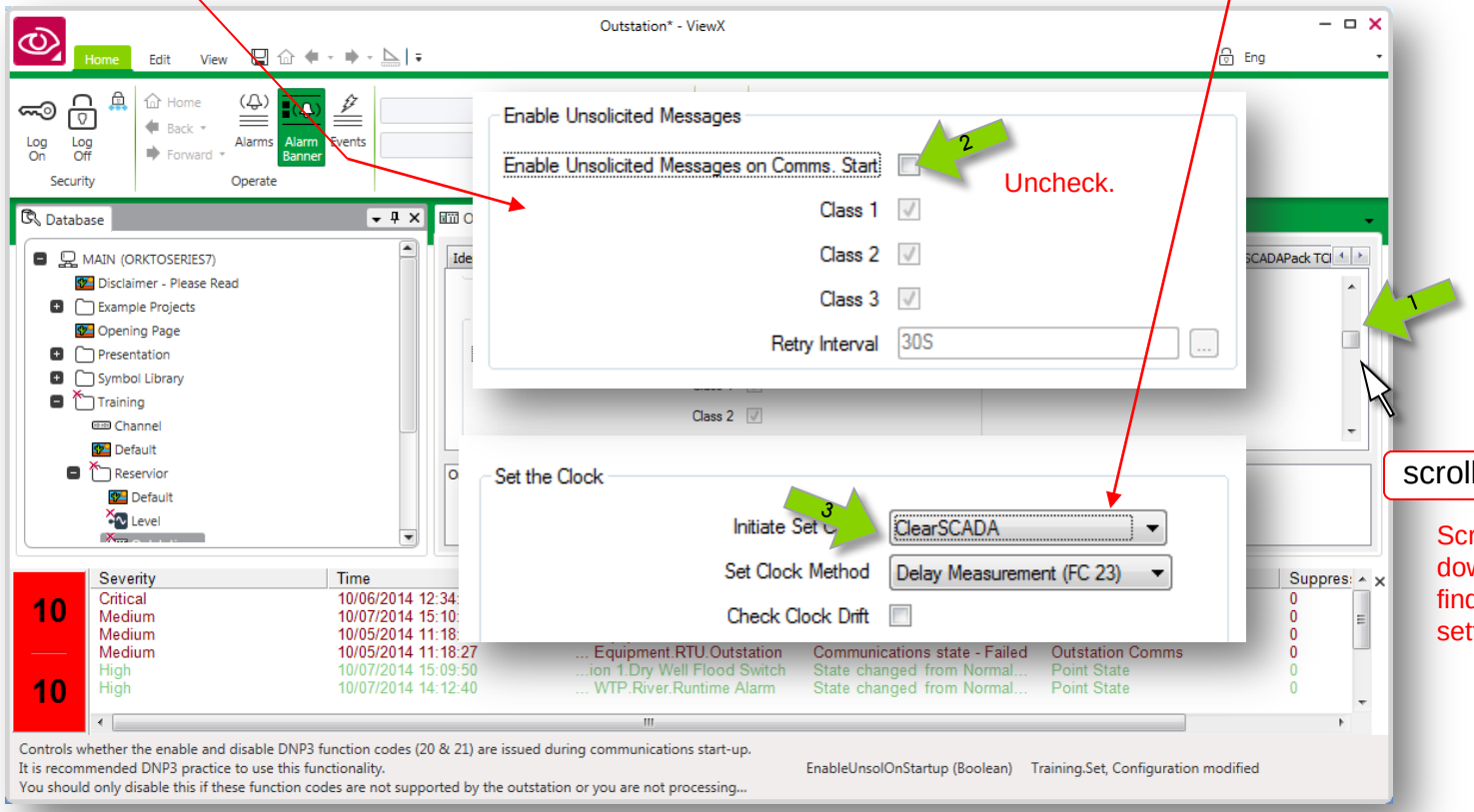
Configure the Outstation RTU

- The RTU is configured with a salve address. Instructor will inform the actual value.



Configure the Outstation RTU

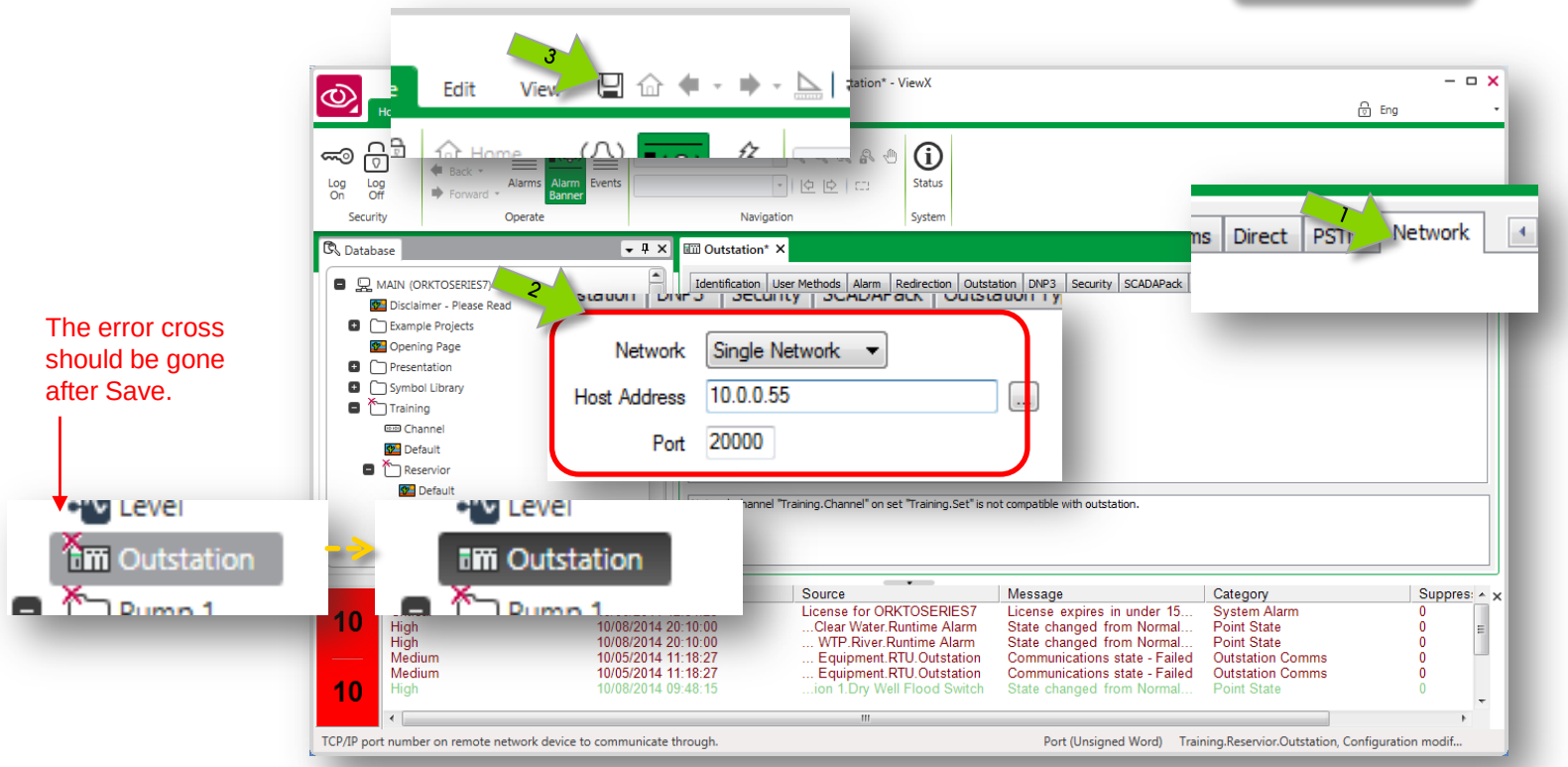
- This exercise will not use Unsolicited Messaging. As such, disable as per follows. To have CS set the clock in RTU, select as per follows.



Configure the Outstation RTU

- We next need to configure CS to know how to connect to the RTU, what is the IP and what is the DNP port. The IP address may be different in your lesson.

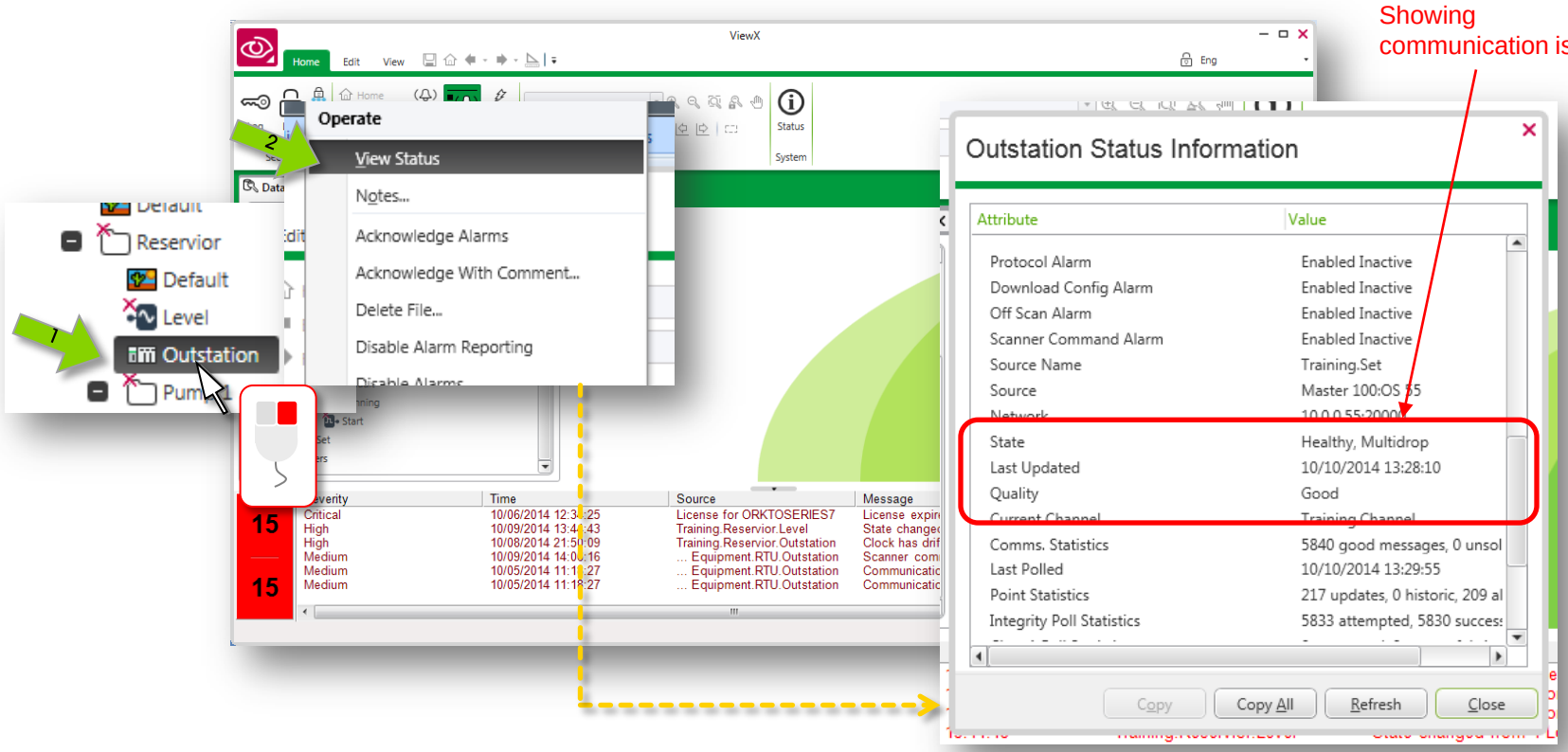
Step by Step



Checking the Communication

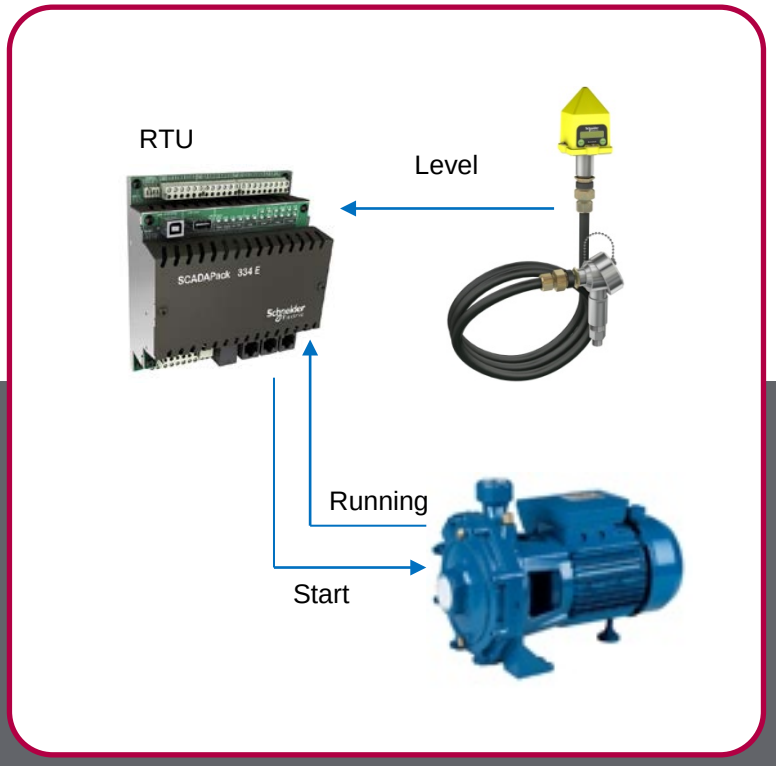
- Now at this stage, CS will attempt to connect to the RTU. We can check connectivity success or failure by doping the following:

Step by Step



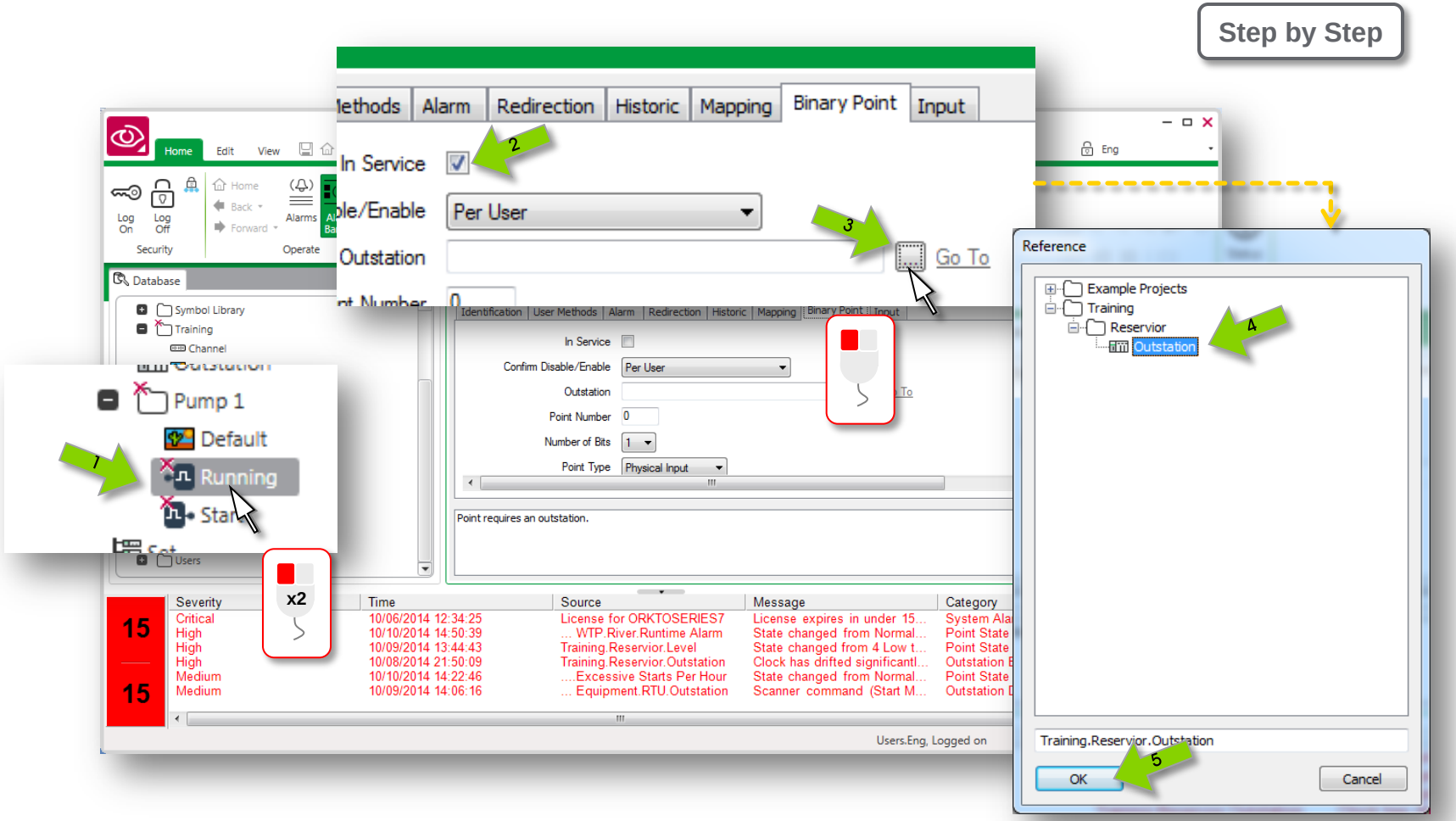
Outstation Points

- Next we need to configure the 3 points connected to the RTU.
- When we configure points in CS, we can set many properties associated with each point such as just to name a few:
  - Which physical IO point this is;
  - Description of state;
  - Trending;
  - Alarms;



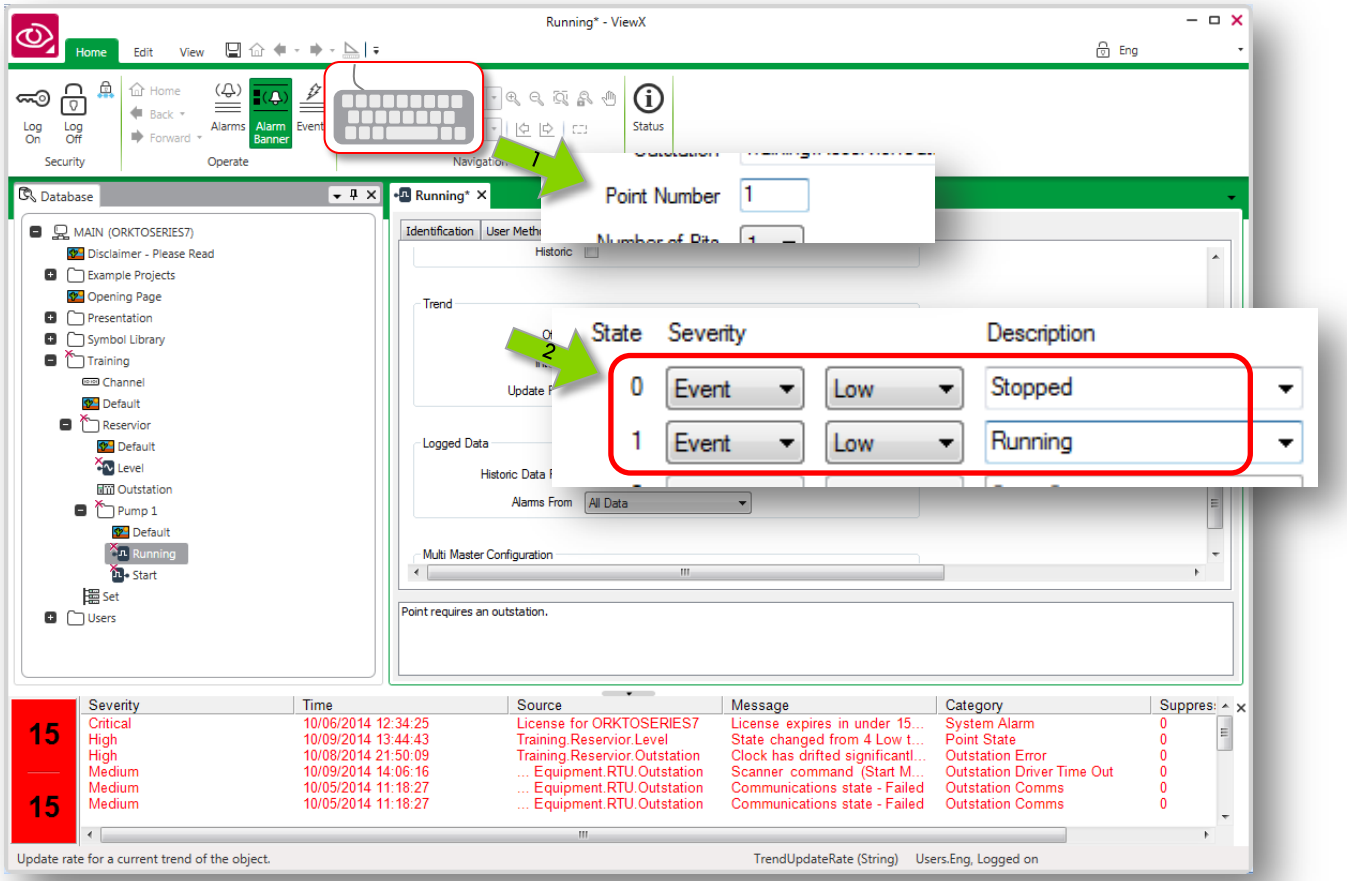
Config Digital In

- Configure settings for the **Running** binary/digital input point. Put the point **In Service** and link it to the **Outstation** RTU.



Config Digital In

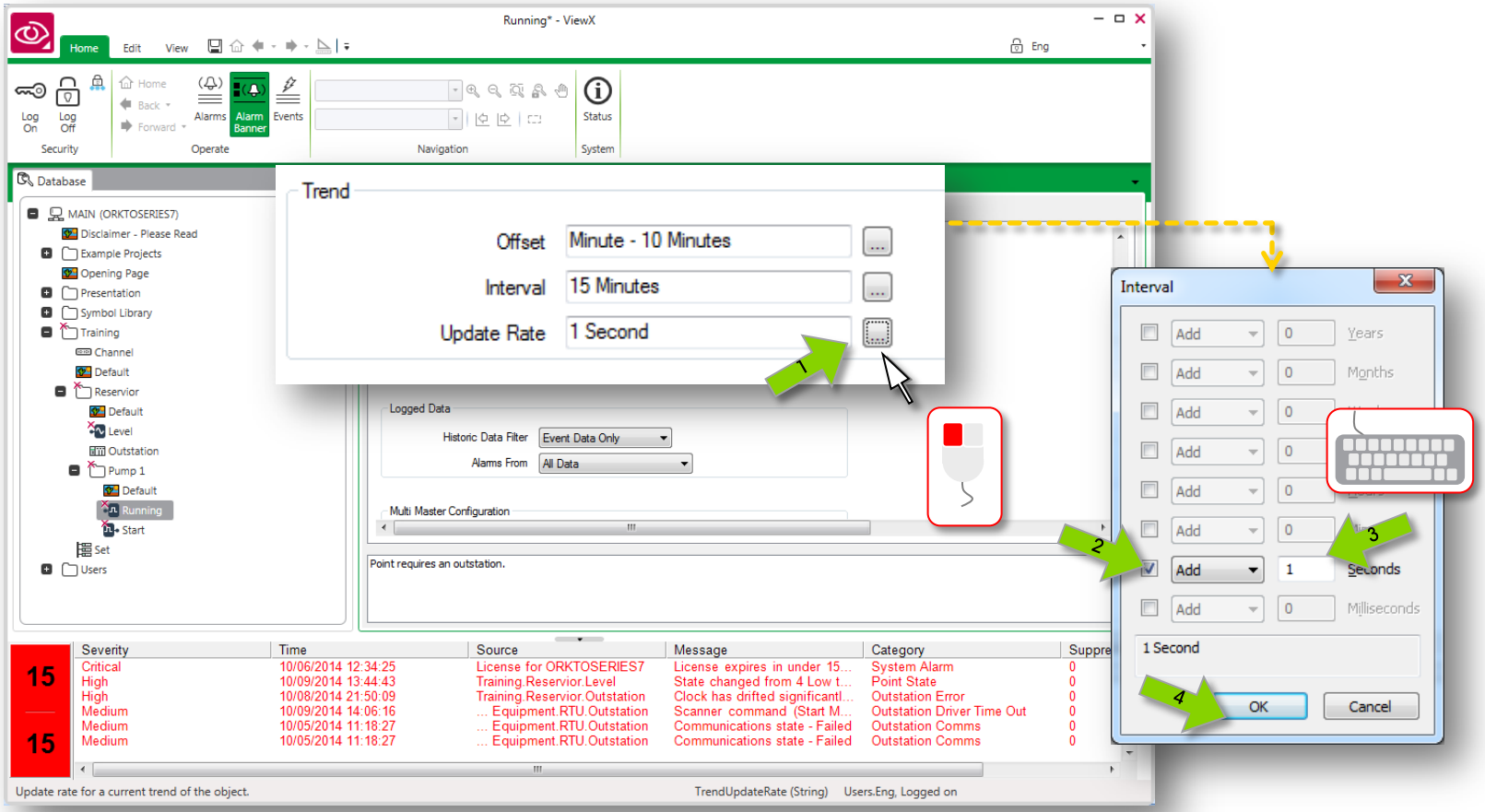
- Scroll down to set the **Point Number** and **States** settings.



Config Digital In

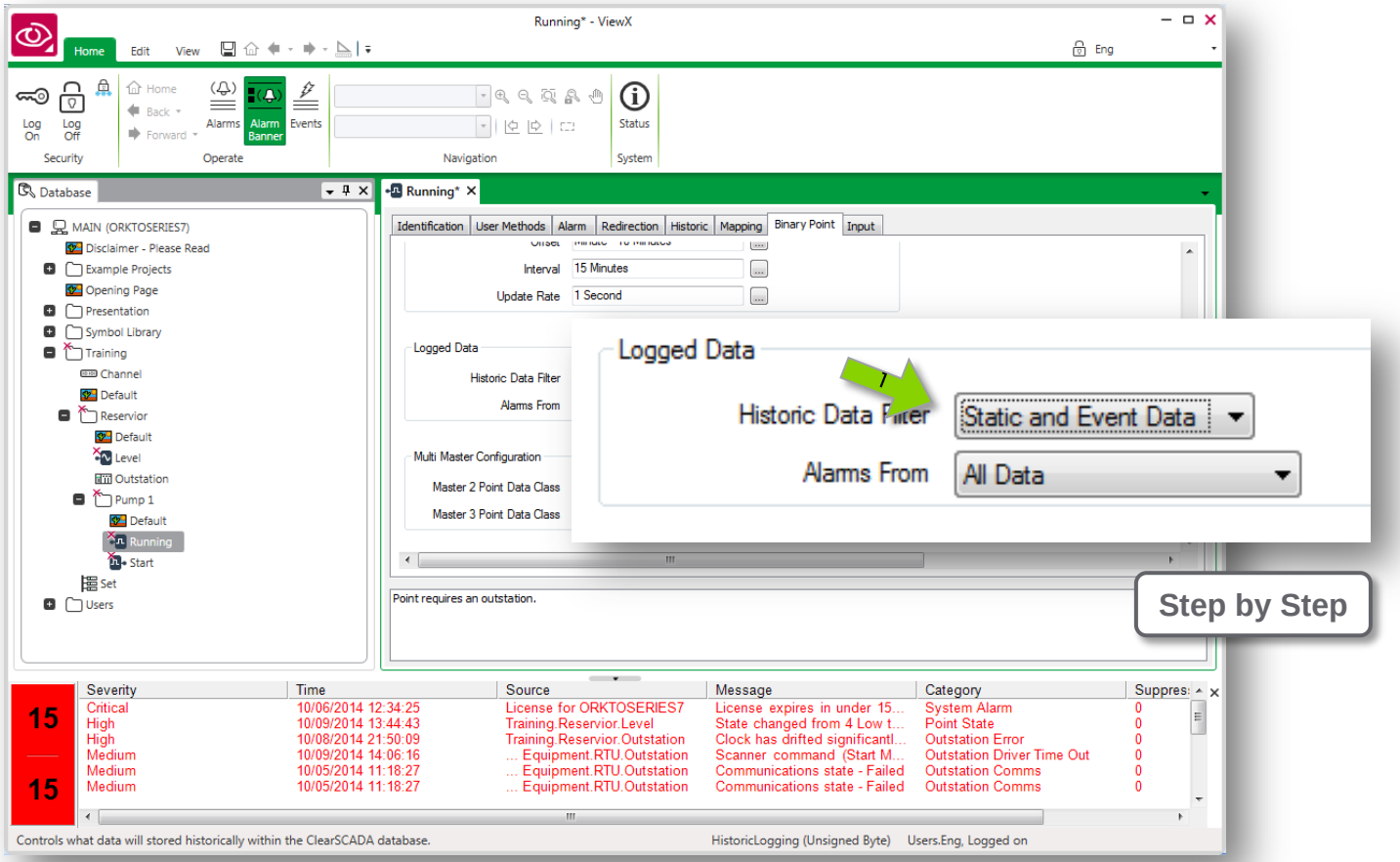
- Set the **Trend Update Rate** to **1** second.

Step by Step



Config Digital In

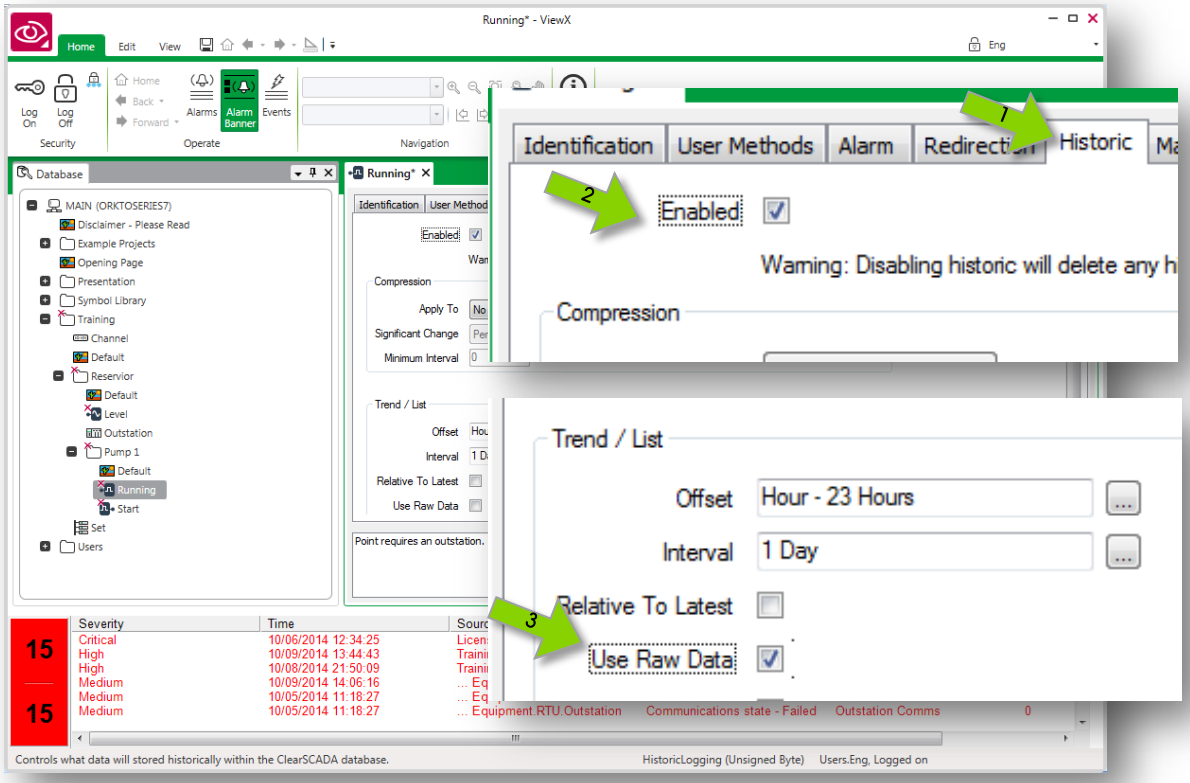
- Scroll further down to **Logged Data** and set it to log **Static and Event Data**.



Config Digital In

- Enable the historizing of this point and set to historize the raw data.

Step by Step

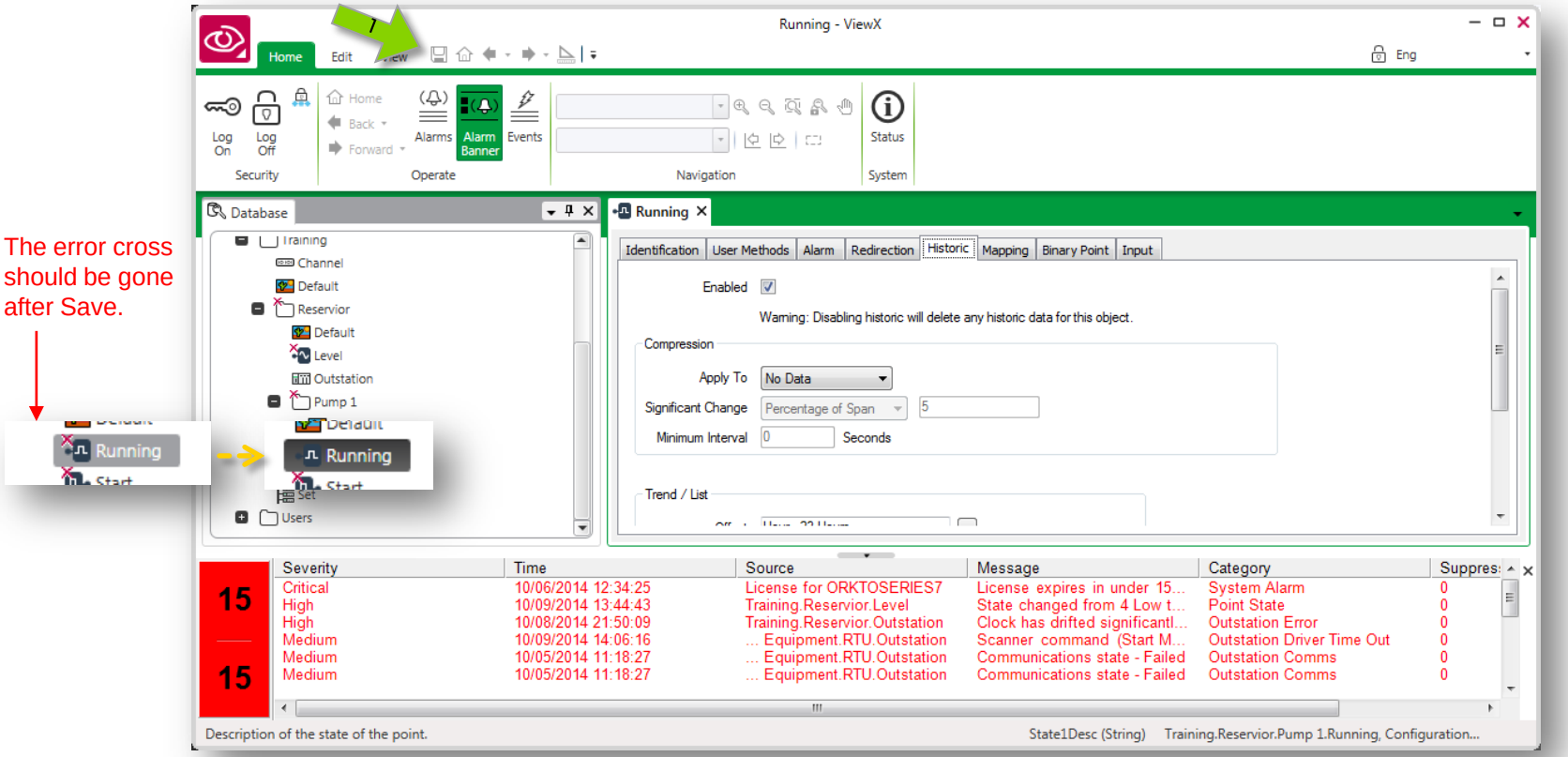


Config Digital In

- Save the configuration.

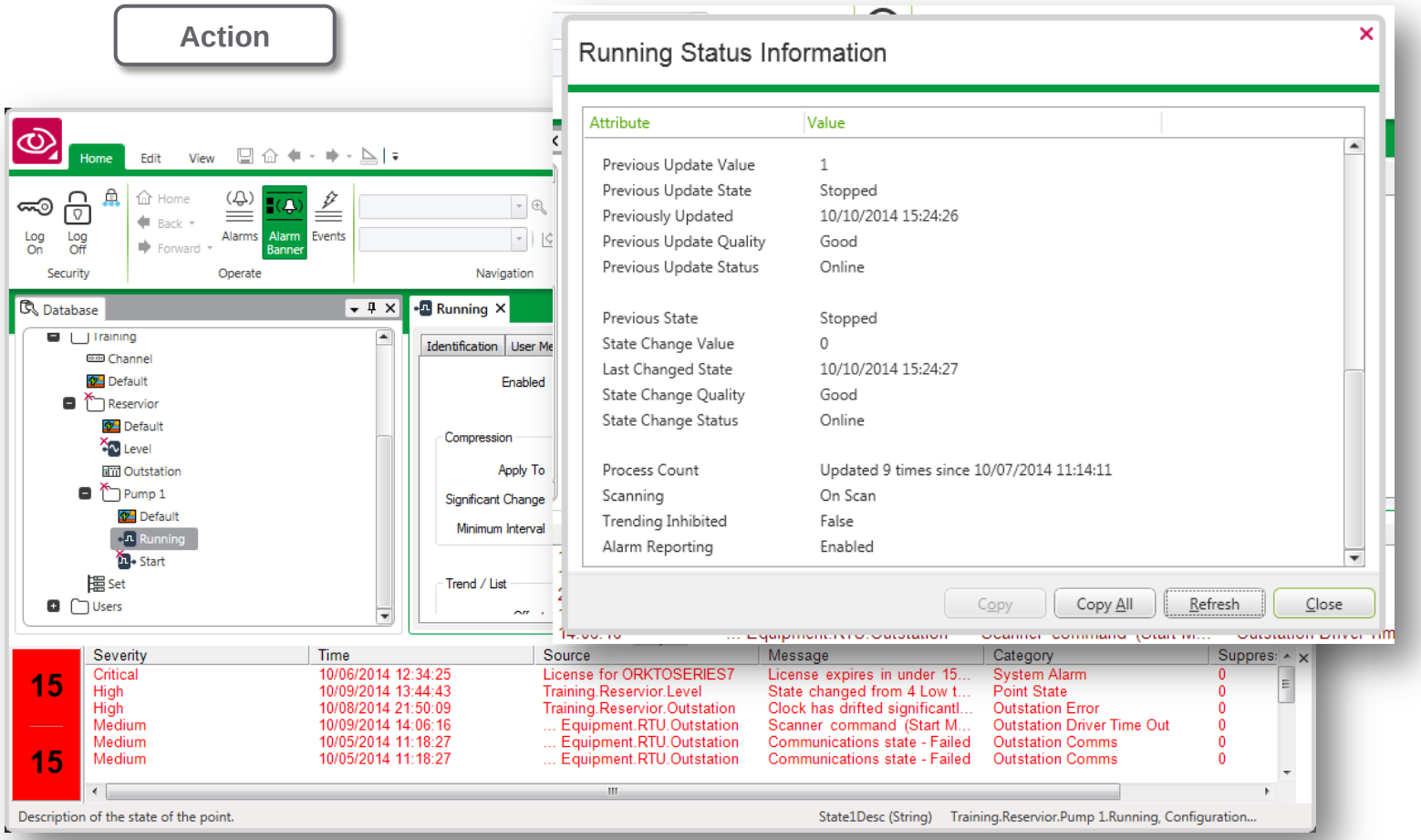
Step by Step

The error cross should be gone after Save.



Config Digital In

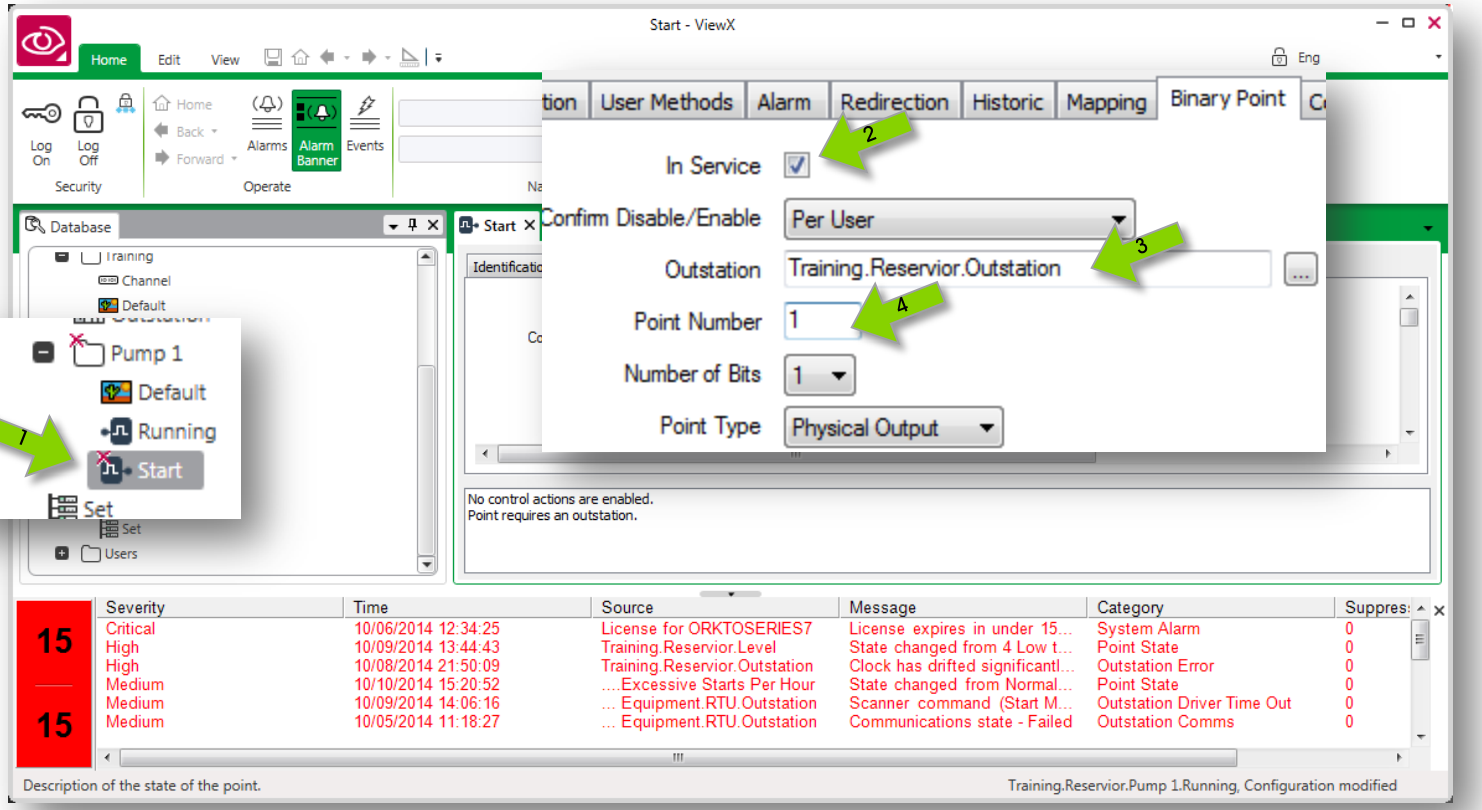
- View the status of the point.



Config Digital Out

- Put the output point **Start** into service and link it to the **Outstation RTU**. Set this to DO point number **1**.

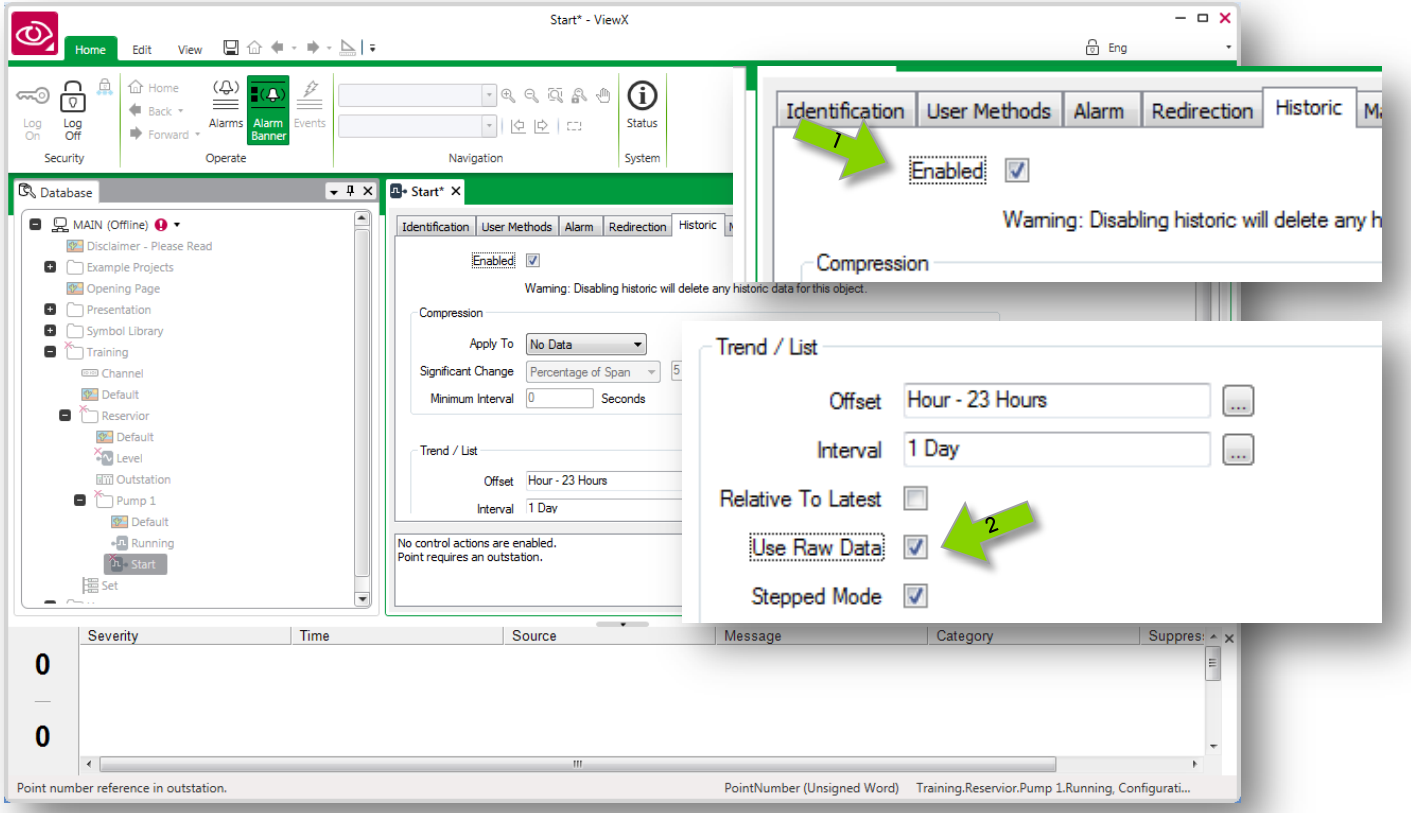
Action



Config Digital Out

- Enable the historizing of this point and set to historize the raw data.

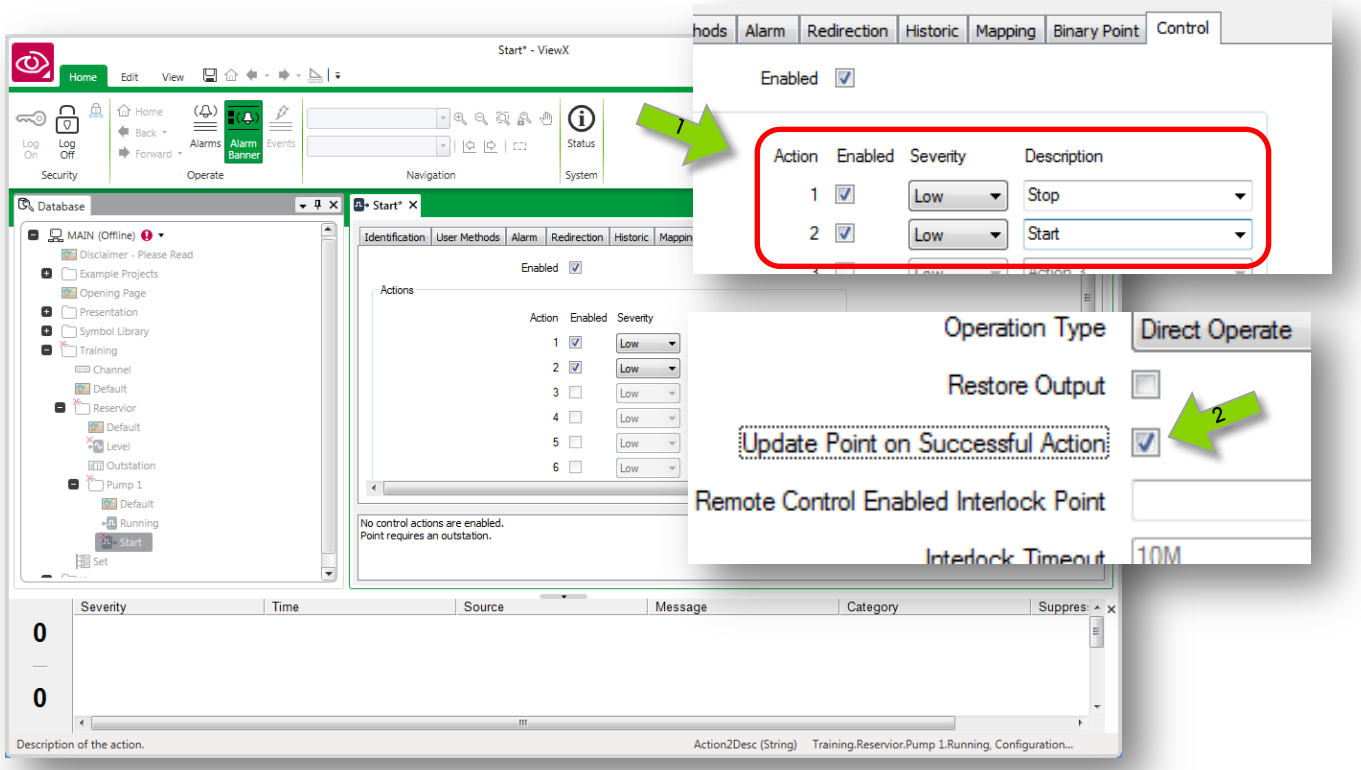
Action



Config Digital Out

- Enable the control actions and their description.

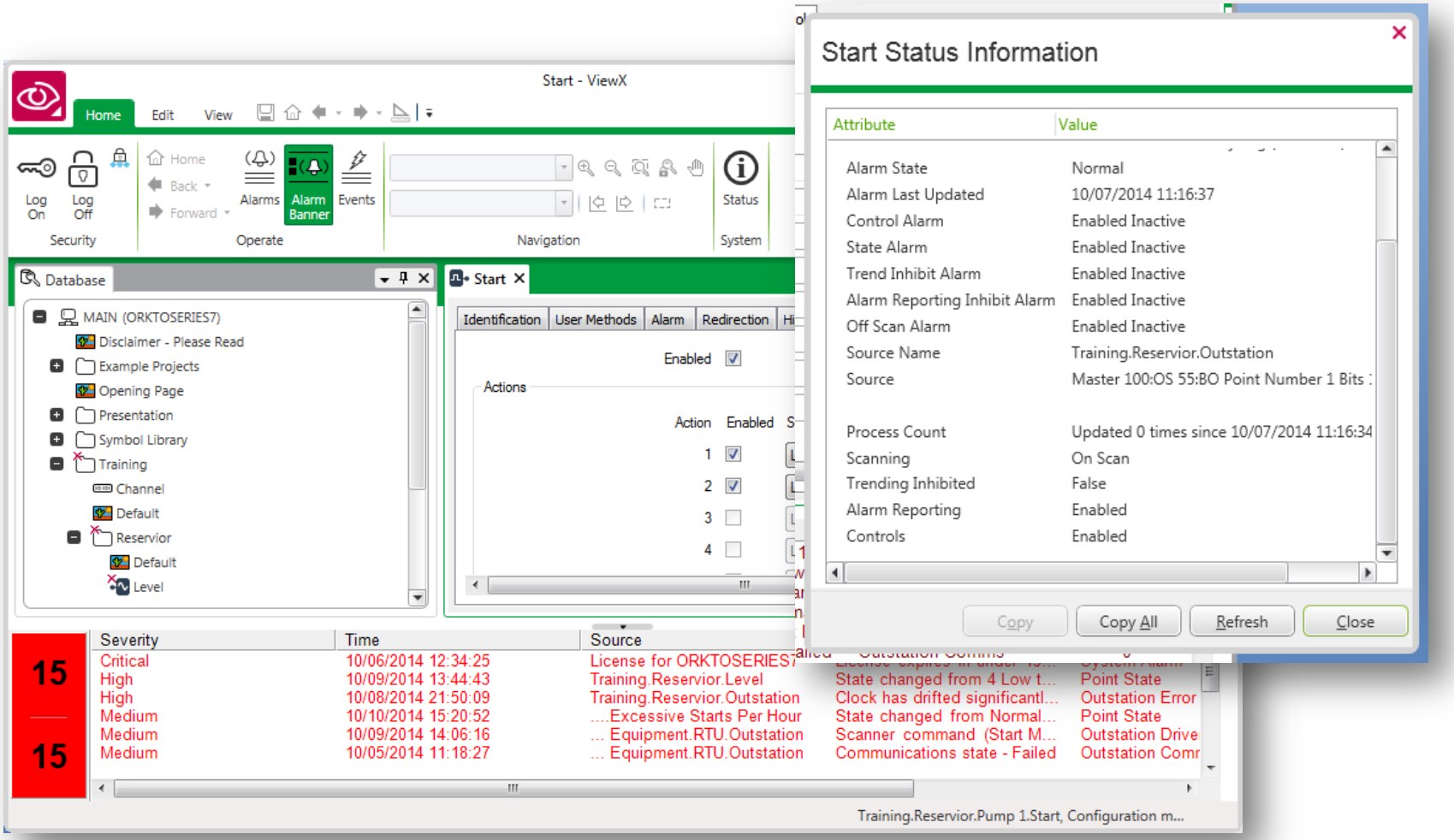
Step by Step



Config Digital Out

- Save the configuration and view the point's status.

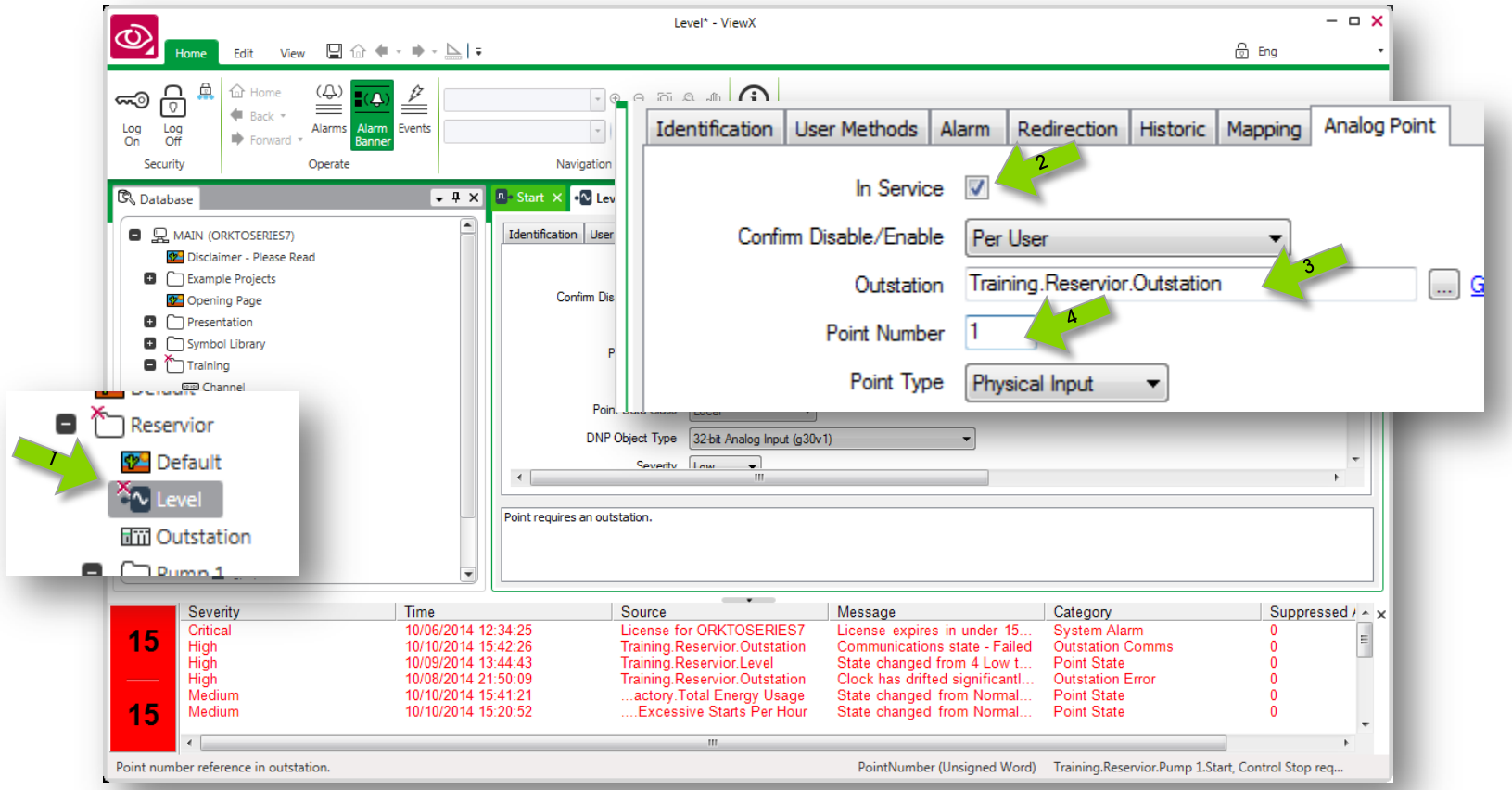
Action



Config Analog In

- Put the output point **Level** into service and link it to the **Outstation RTU**. Set this to AI point number **1**.

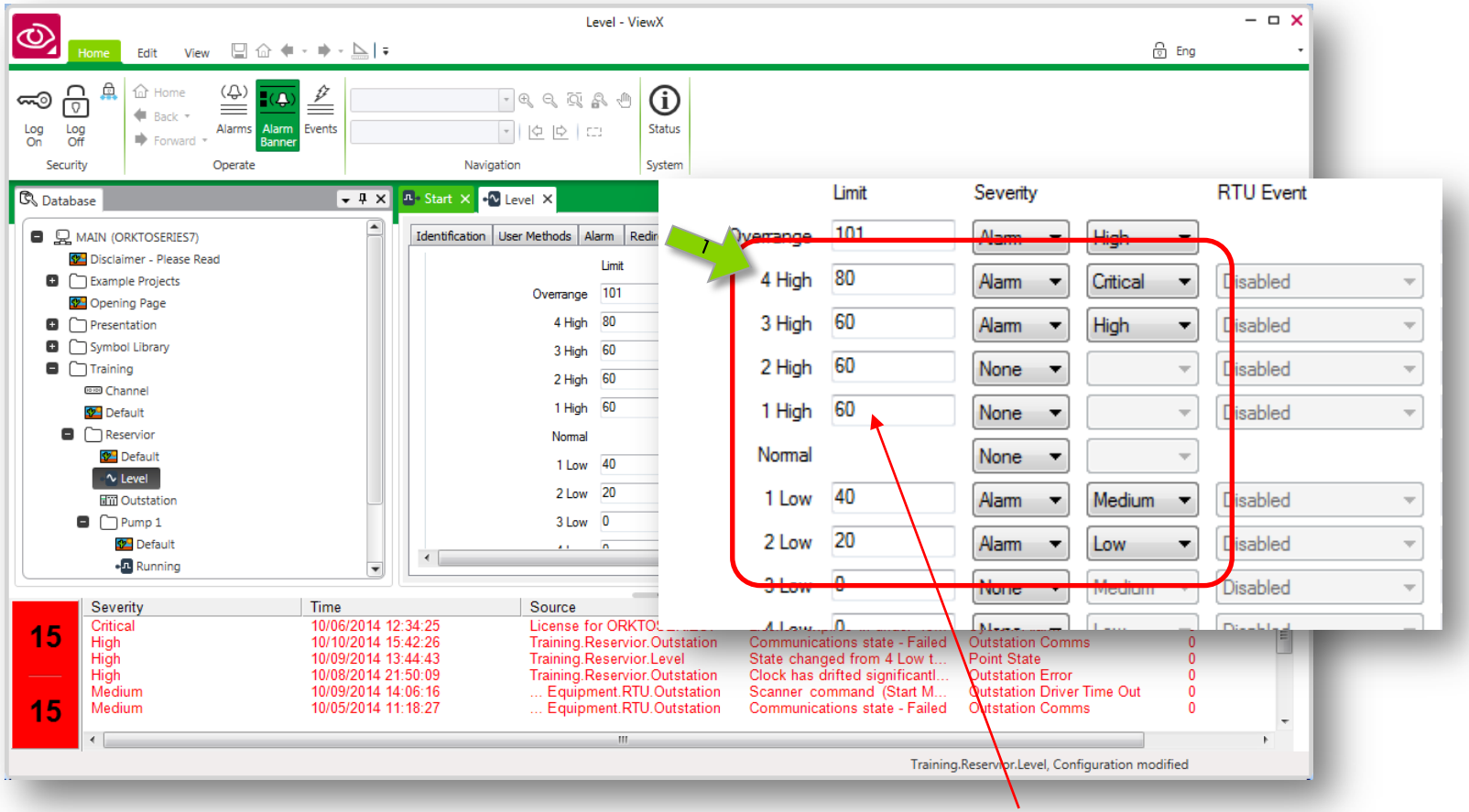
Action



Config Analog In

- Scroll down and set the **Alarm Limits** as follows. This will make CS raise an alarm whenever the threshold is breached.

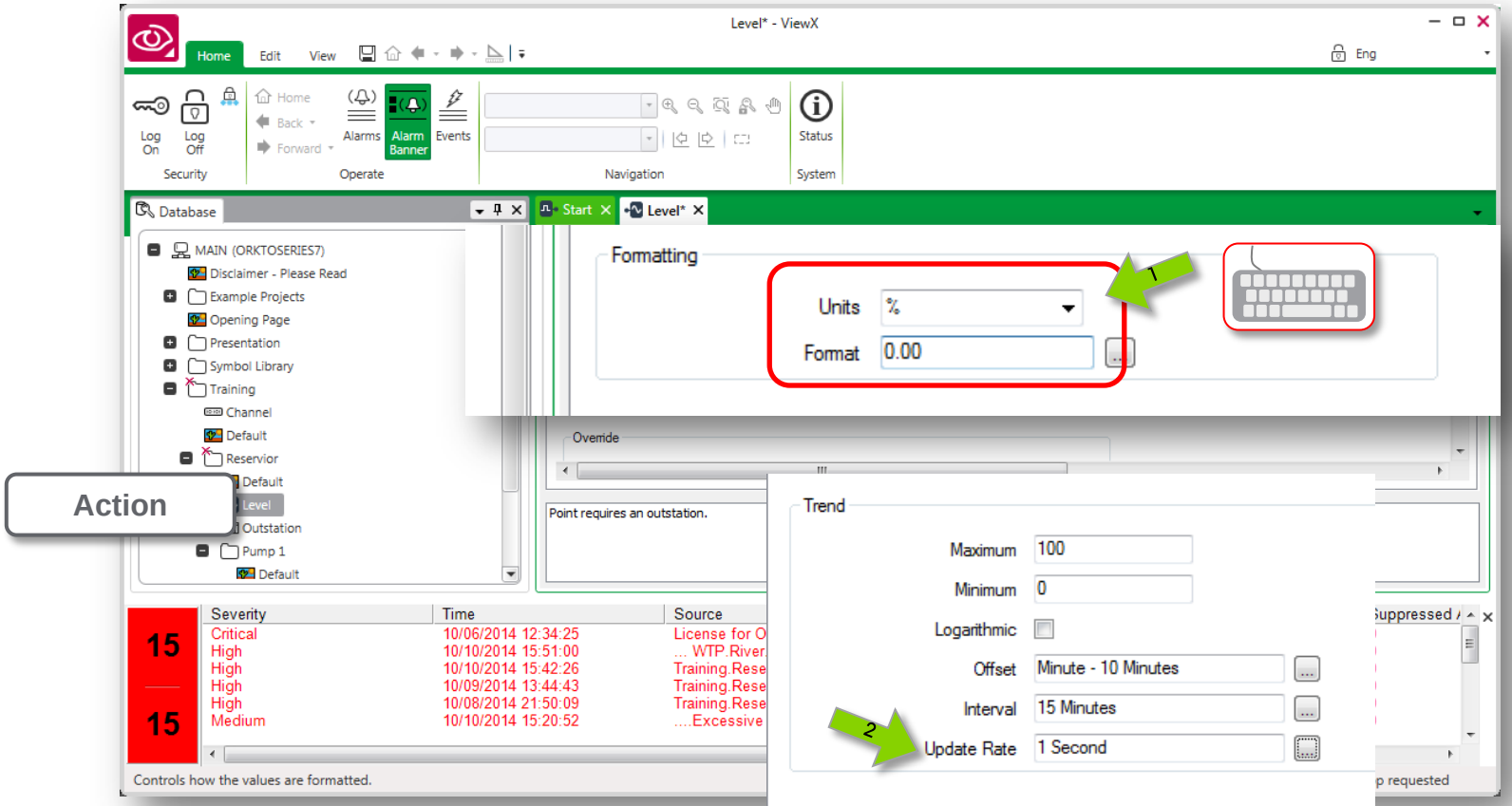
Action



You must set 2 High and 1 High values even thought they are not used.
Oh yeah, get use to it, this is the way CS is.

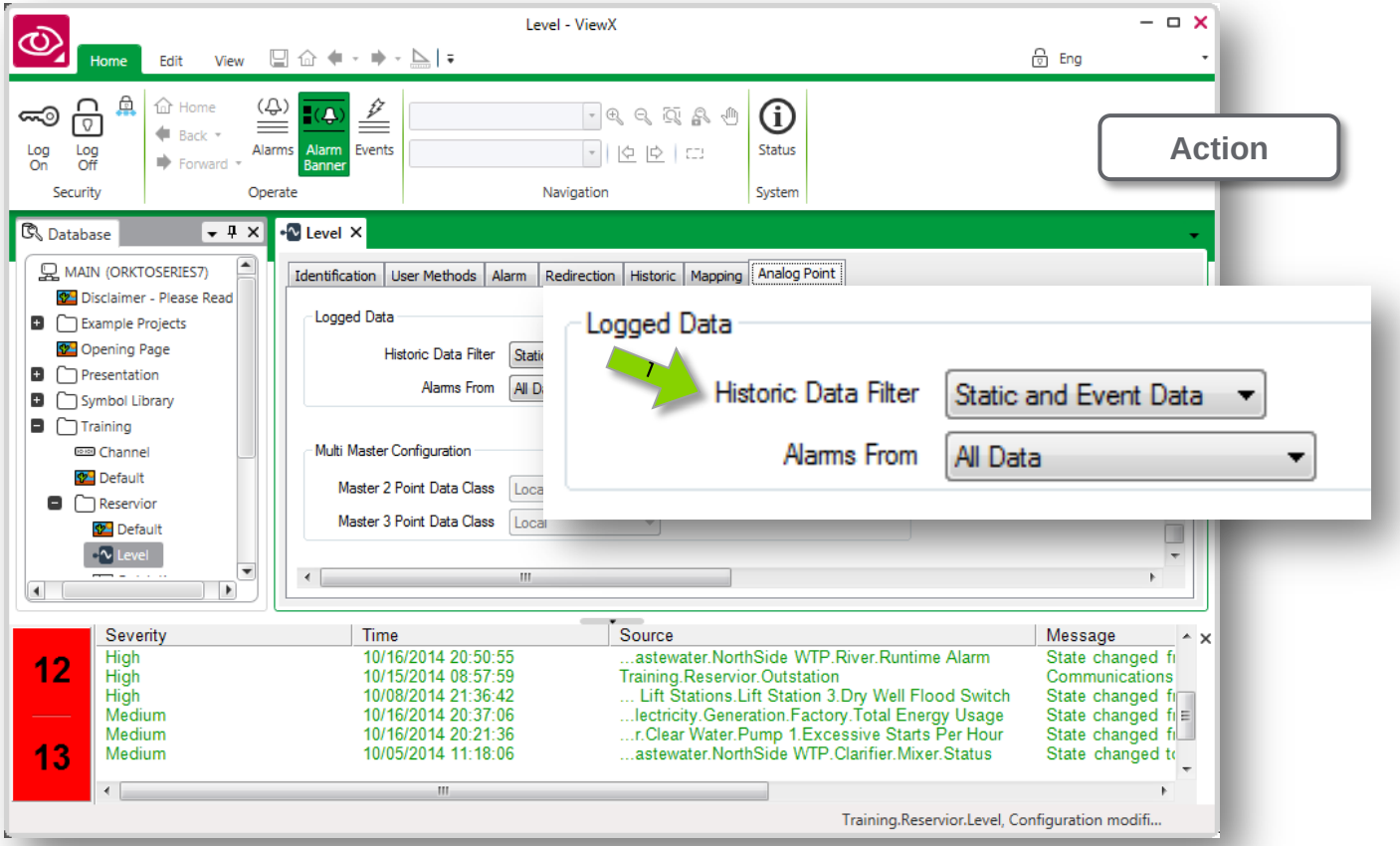
Config Analog In

- Next, scroll further down and set the units for display and the format.
- Set the **Trend Update Rate** to 1 second.



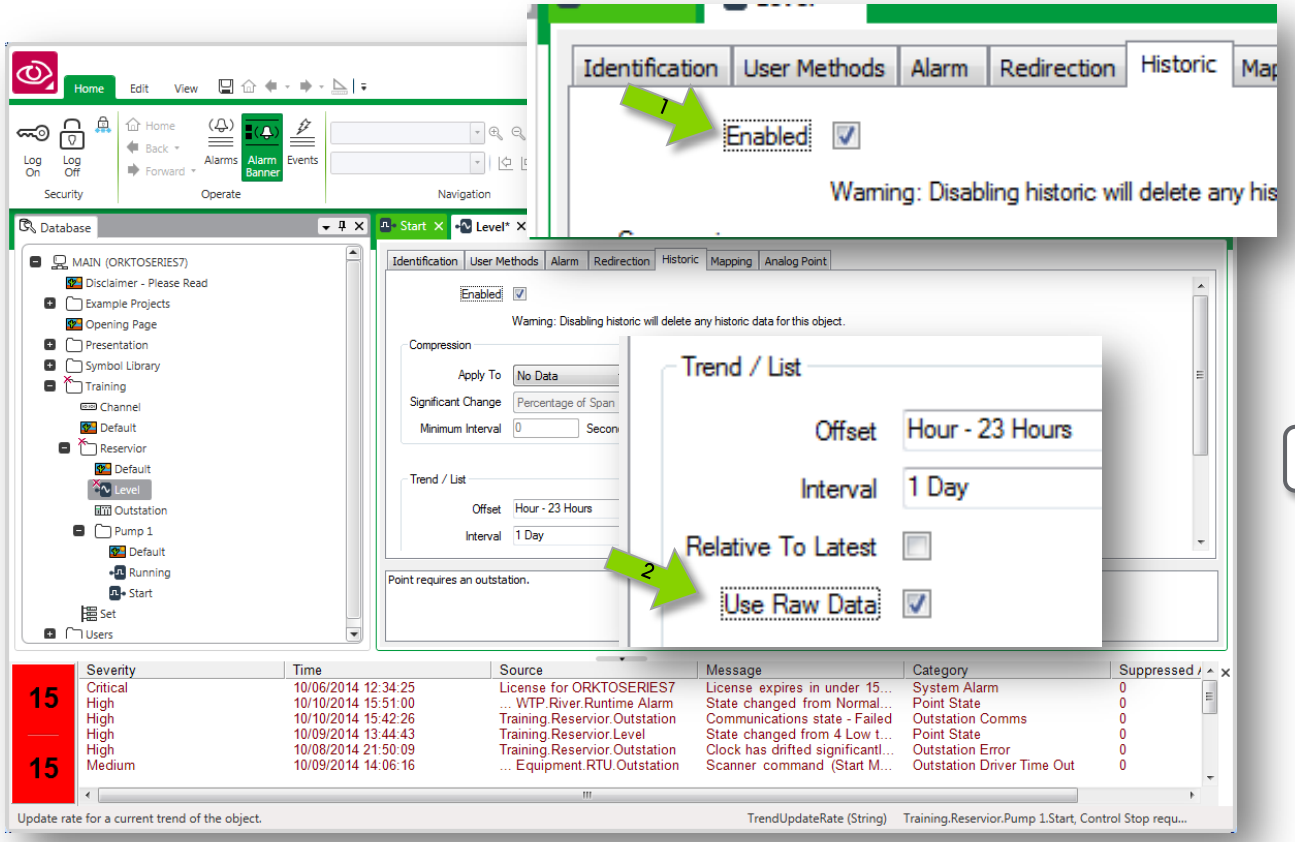
Config Analog In

- Scrolling further down, set to log **Static and Event Data**.



Config Analog In

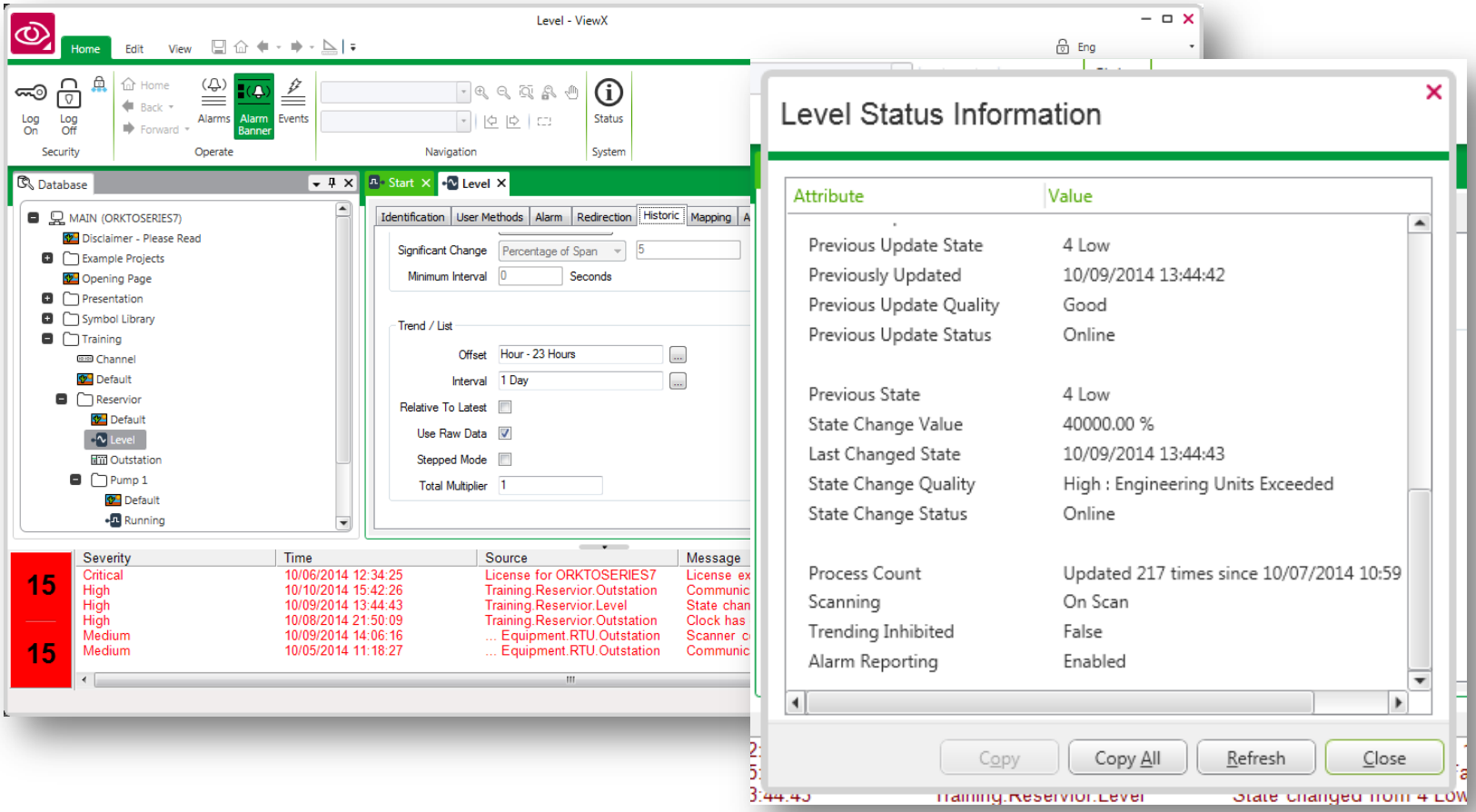
- Enable the historizing of this point and set to historize the raw data.



Config Analog In

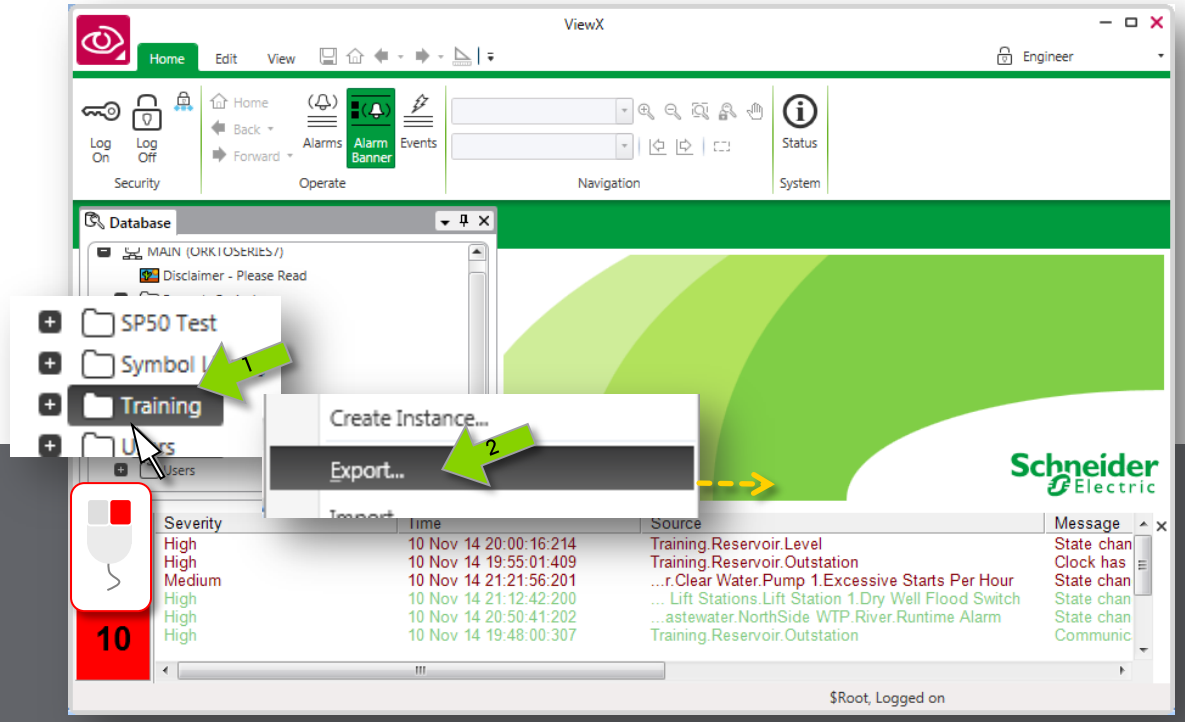
- Save the configuration and view the point's status.

Action



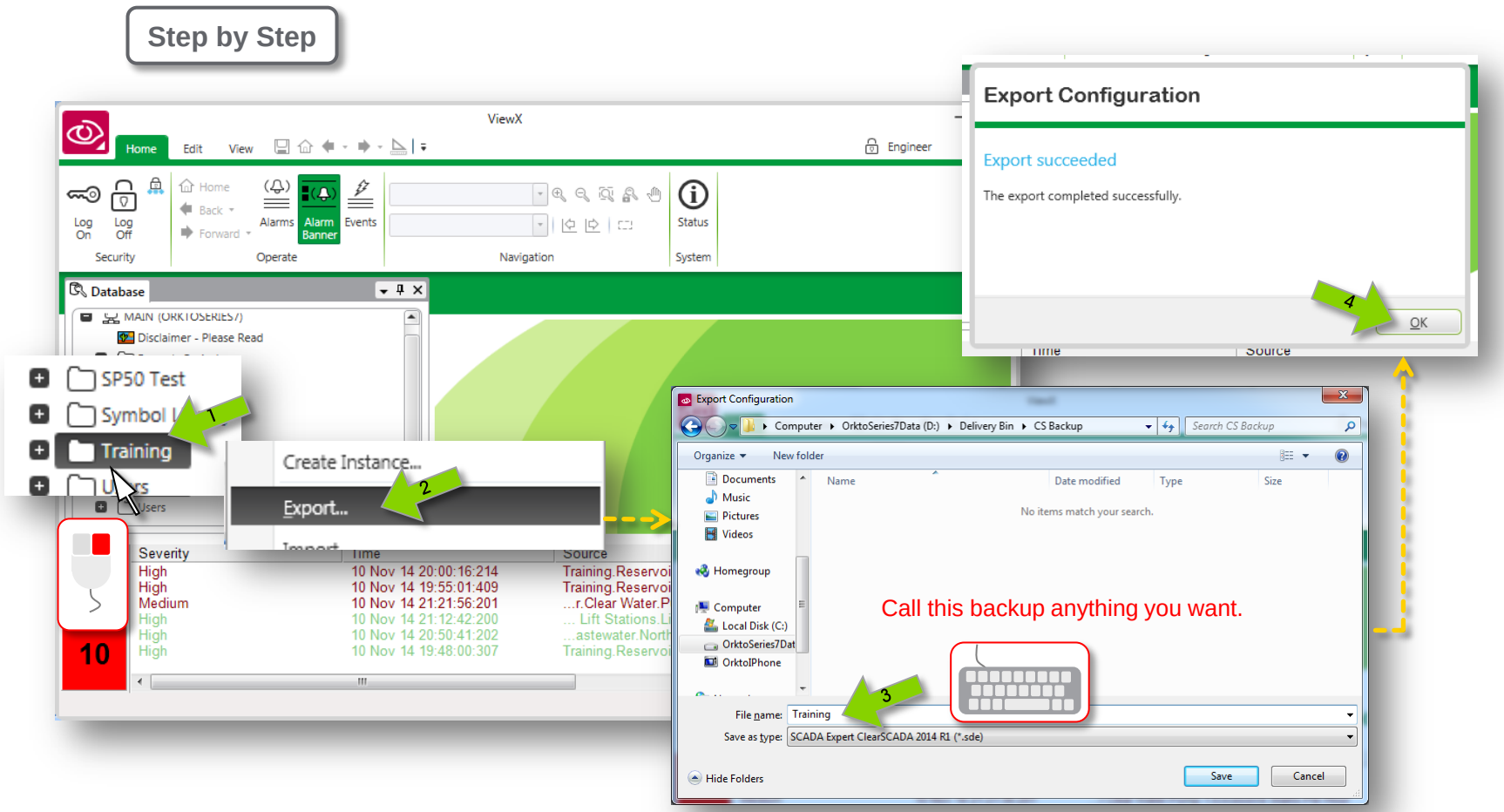
Export & Import Project

- In **ClearSCADA**, the way to back up a project is called Export. Import is the restore process.
- Individual components (folders) of a project can be selected for the process.



Backup a Project - Export

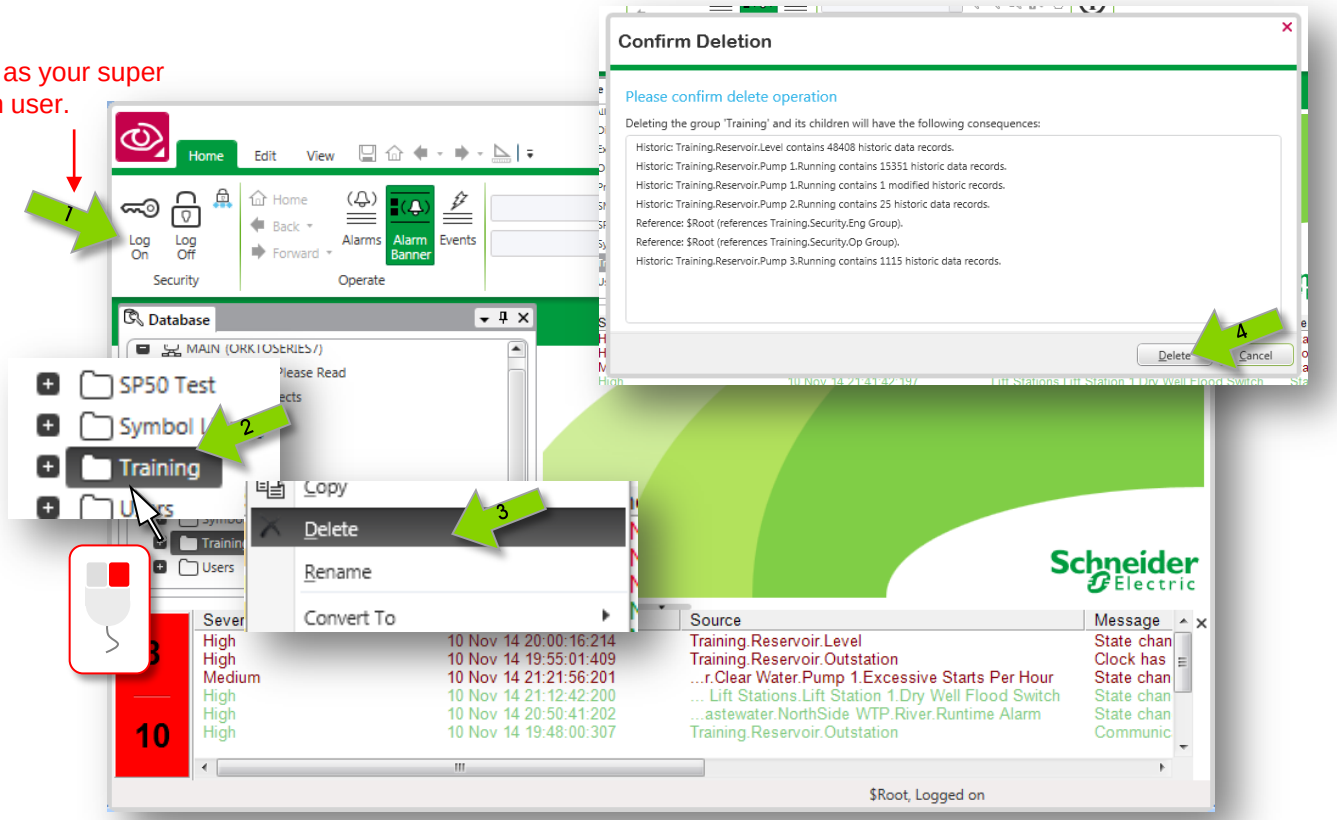
- To backup a project, do as per shown. Save it some where you know.



Backup a Project - Export

- Login as the super admin user.
- The delete the **Training** project.

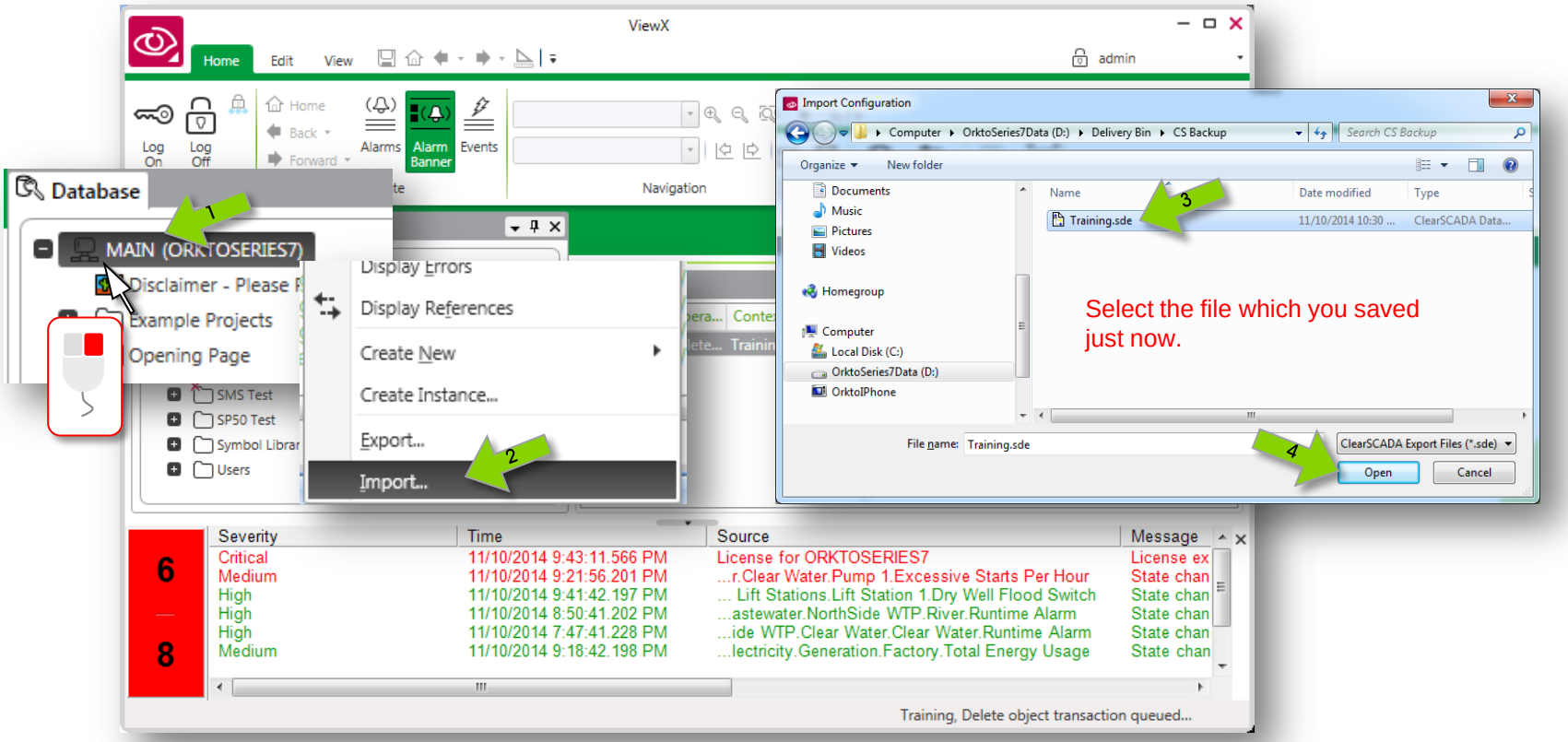
Step by Step



Backup a Project - Export

- Do the following to restore the project.

Step by Step



Mimics

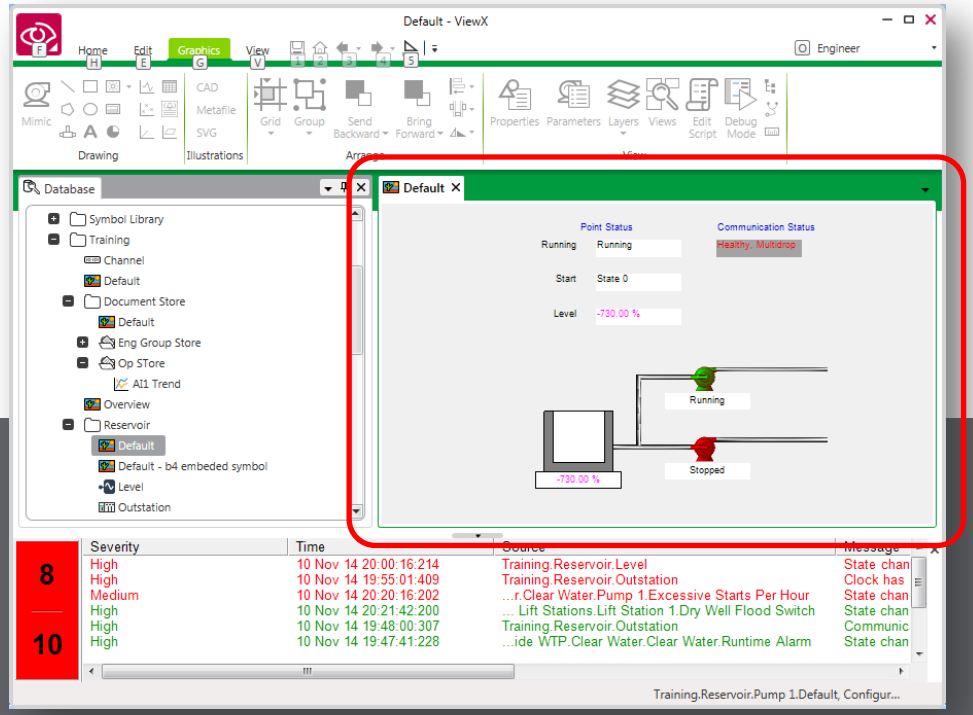
Section 2

The User Interface, Control and Monitoring

Confidential Property of Schneider Electric

Showing Point's Value and Status

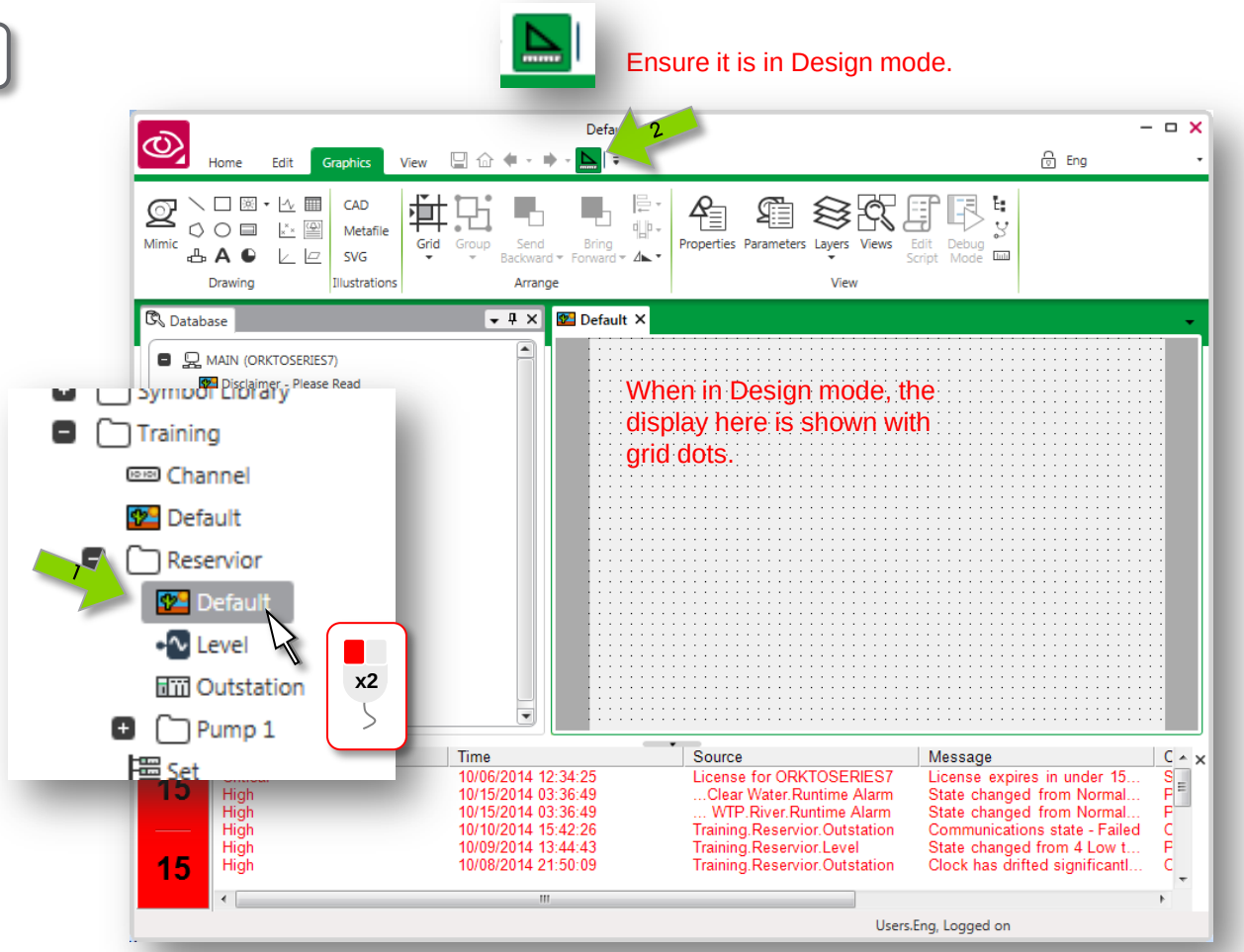
- A mimic is a page in which you can configure to show values from the RTU in graphical representation. It is also where you cans end commands.
- How a mimic is to be engineered is what this huge section will be about.



Open Mimic

- Click on **Training->Reservoir->Default** from the Database pane.

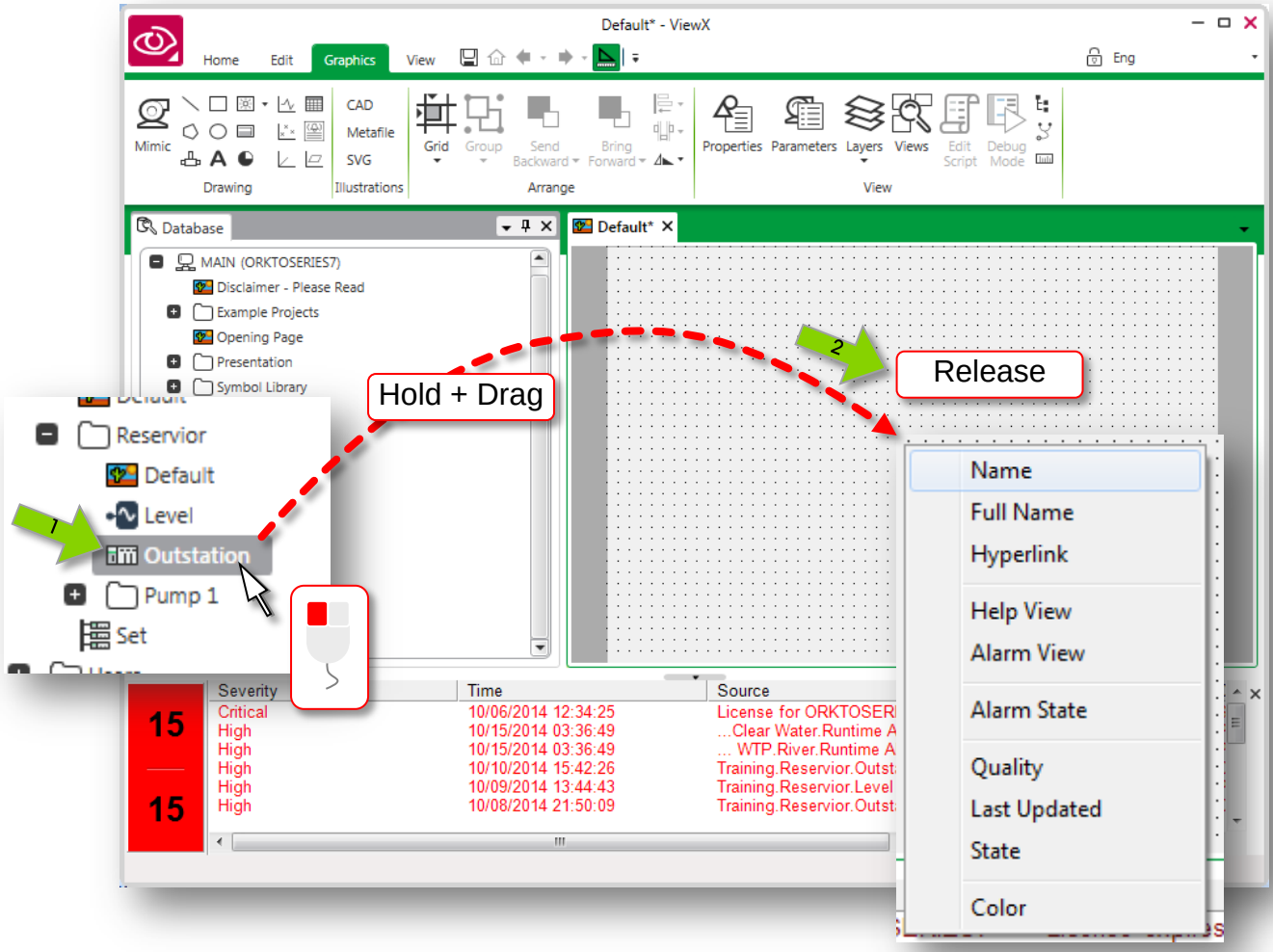
Step by Step



Outstation State

- Select the **Outstation**. Click, hold and drag into the mimic, then release.

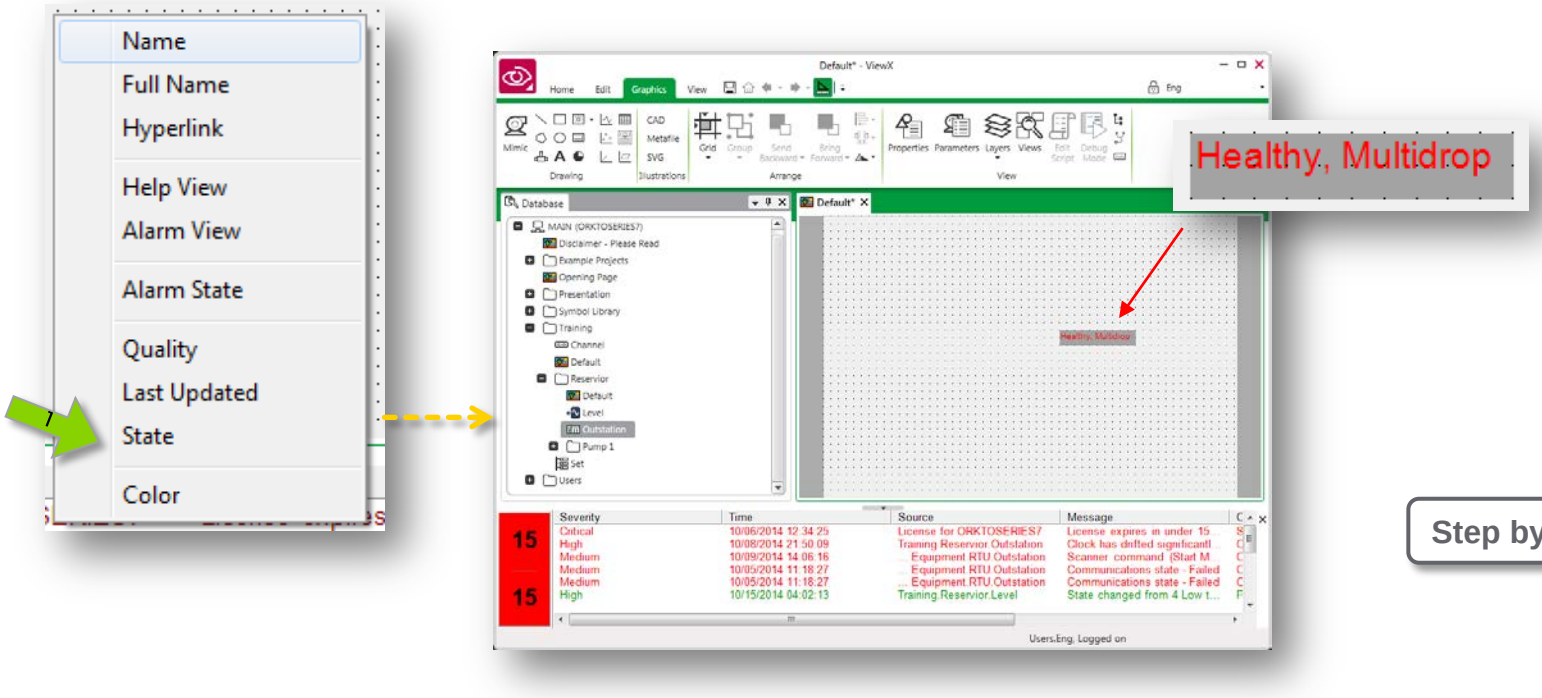
Step by Step



Confidential Property of Schneider Electric

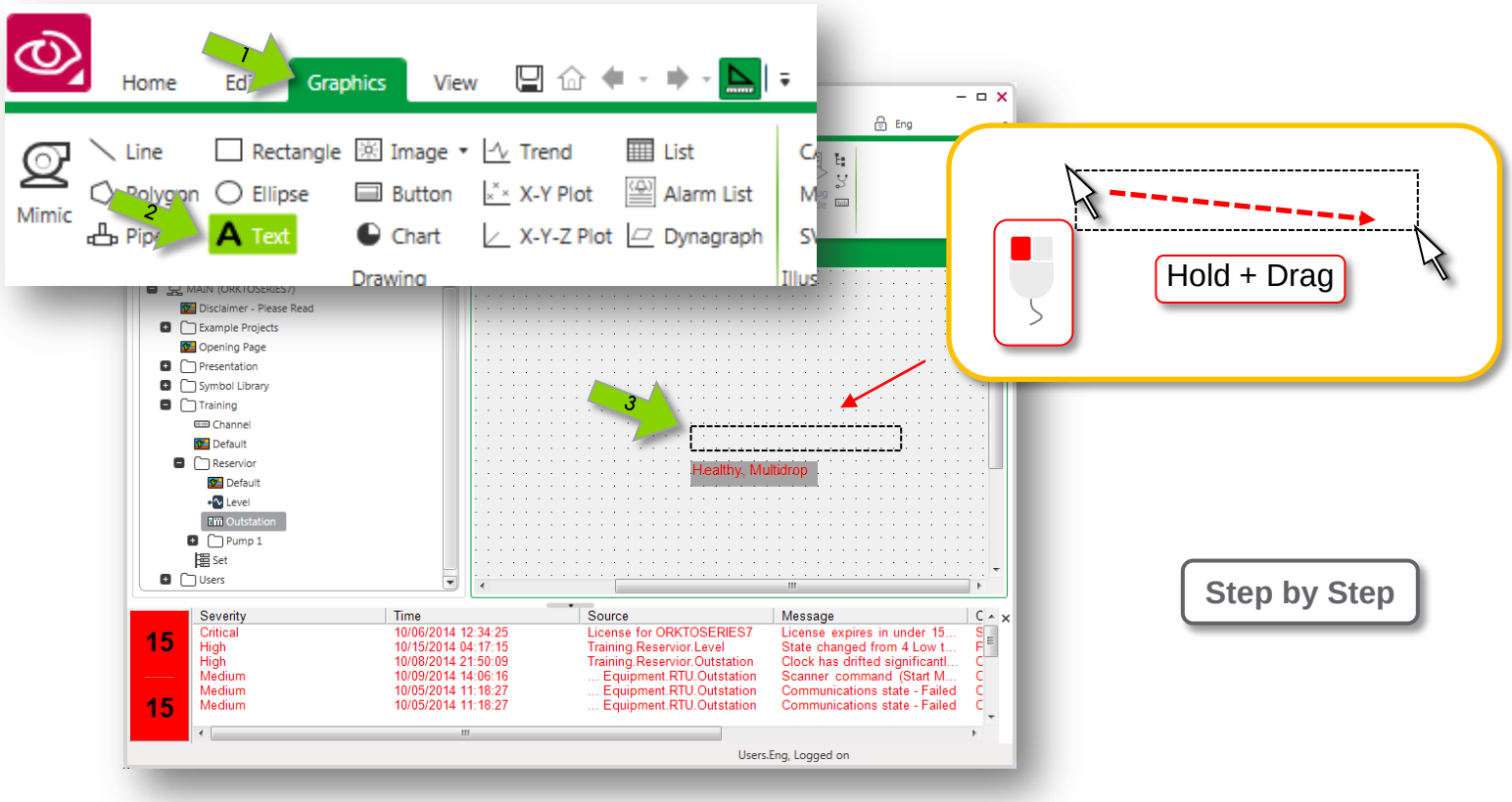
Outstation State

- Select **State**. You will now be able to see the communication status between CS and the RTU (**Outstation Set** and the **Outstation**).



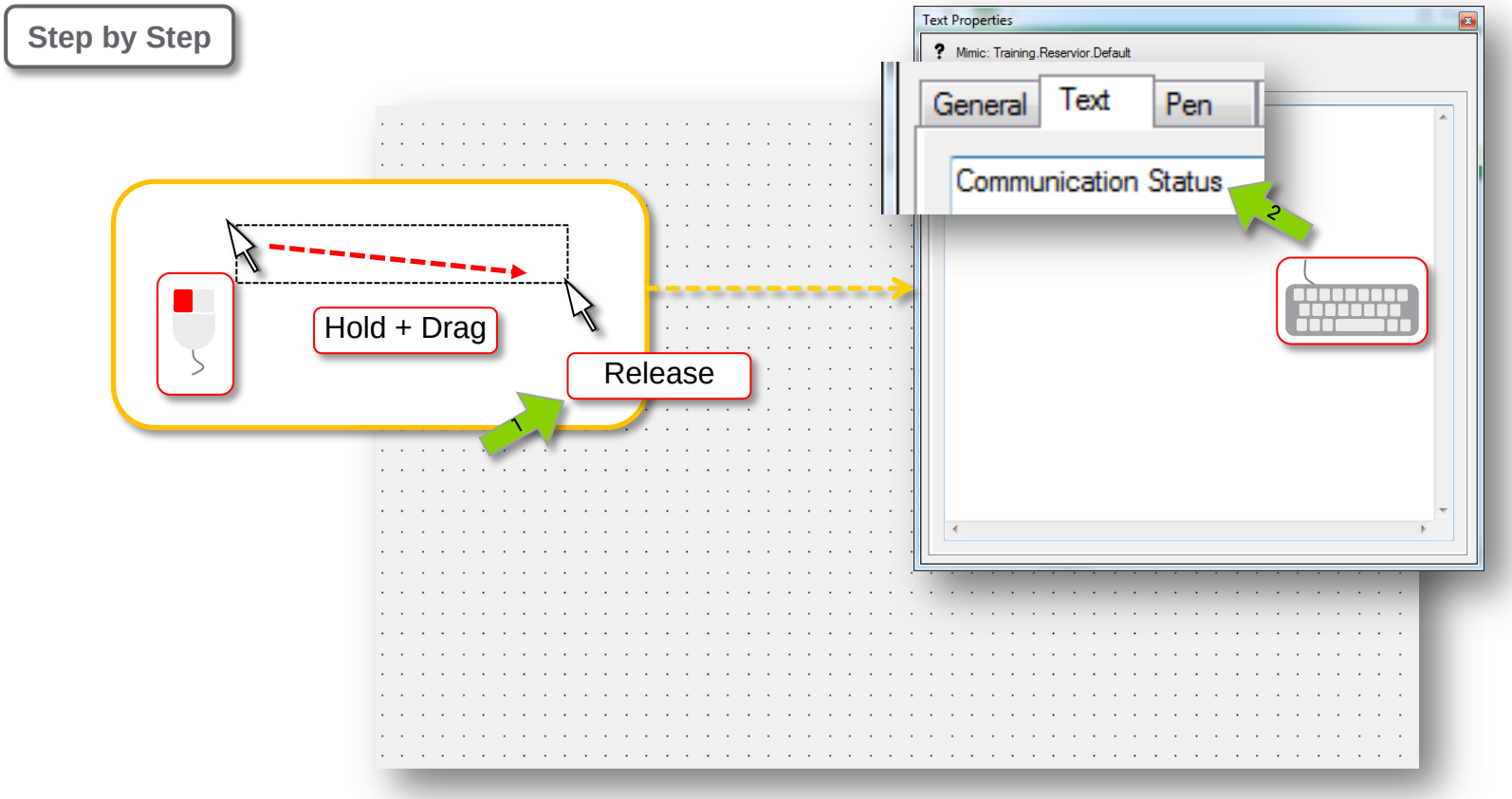
Text Tool

- Select the **Text** tool. In order to place the text, click anywhere on the screen, click hold & drag to create a text box. Release where you want the text box to end.



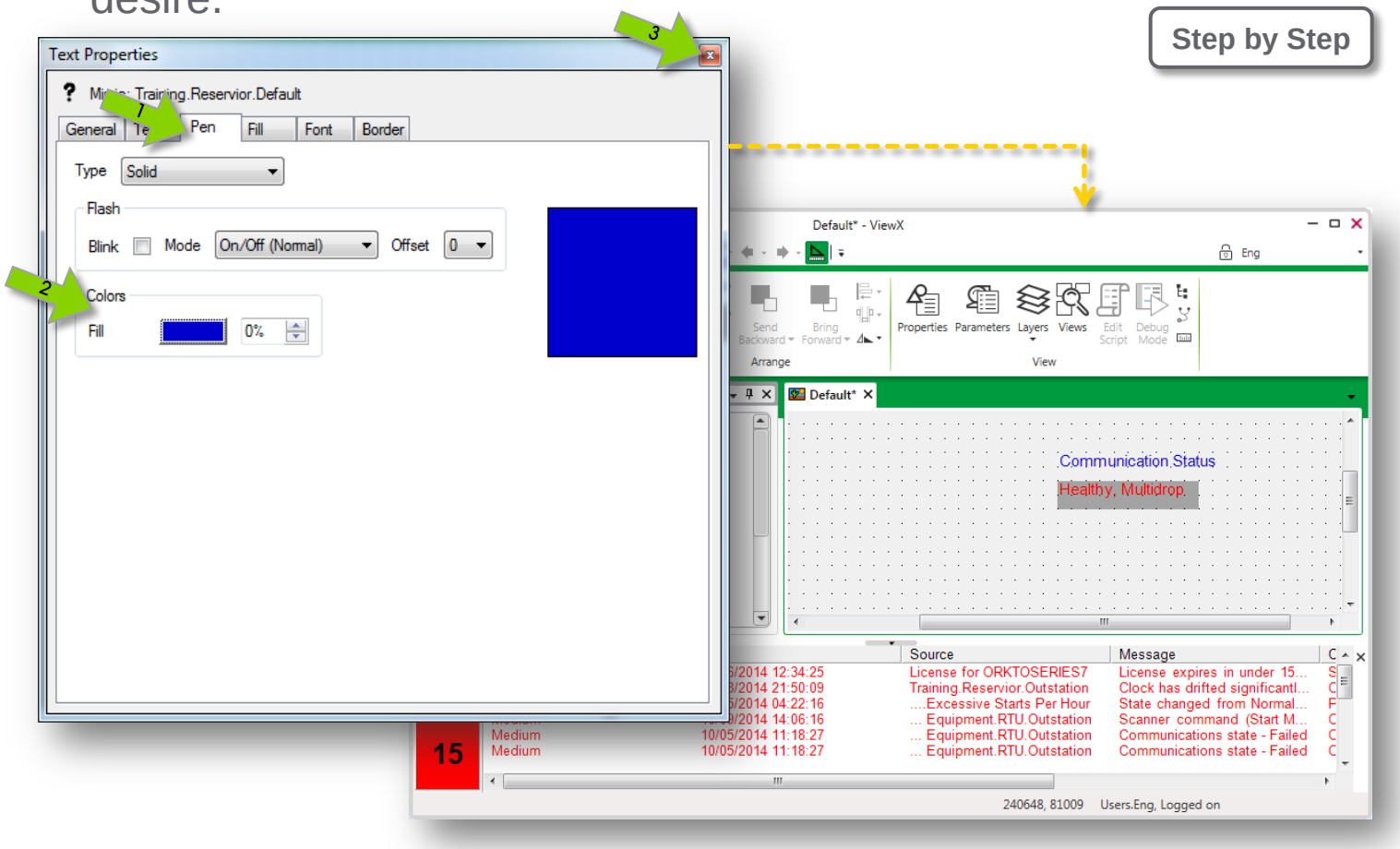
Text Tool

- Once the text box is created by releasing the mouse button, the **Text Properties** box would appear. Key in the word **Communication Status**.



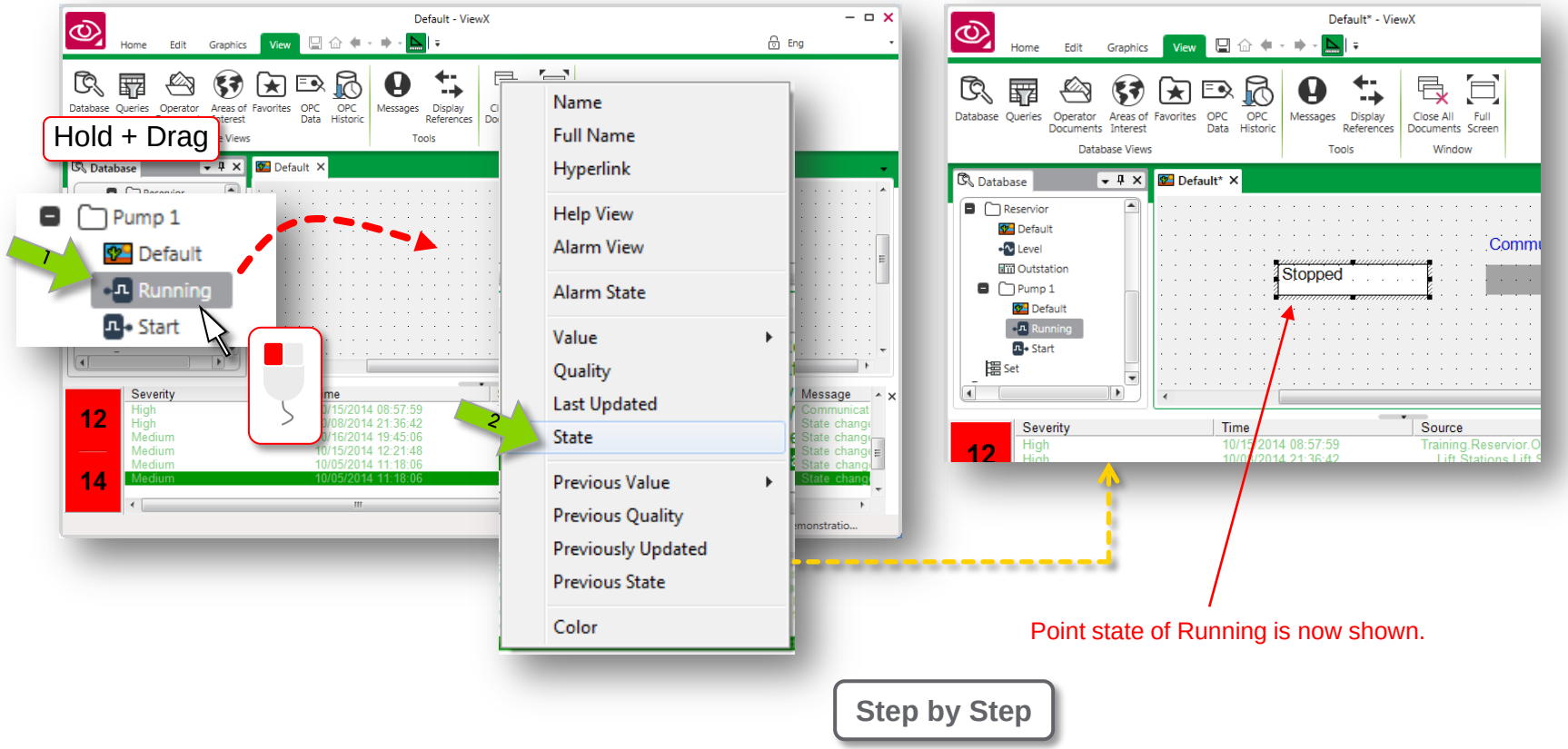
Text Tool

- To change the text color, click on the **Pen** tab and select the color you desire.



Point States and Values

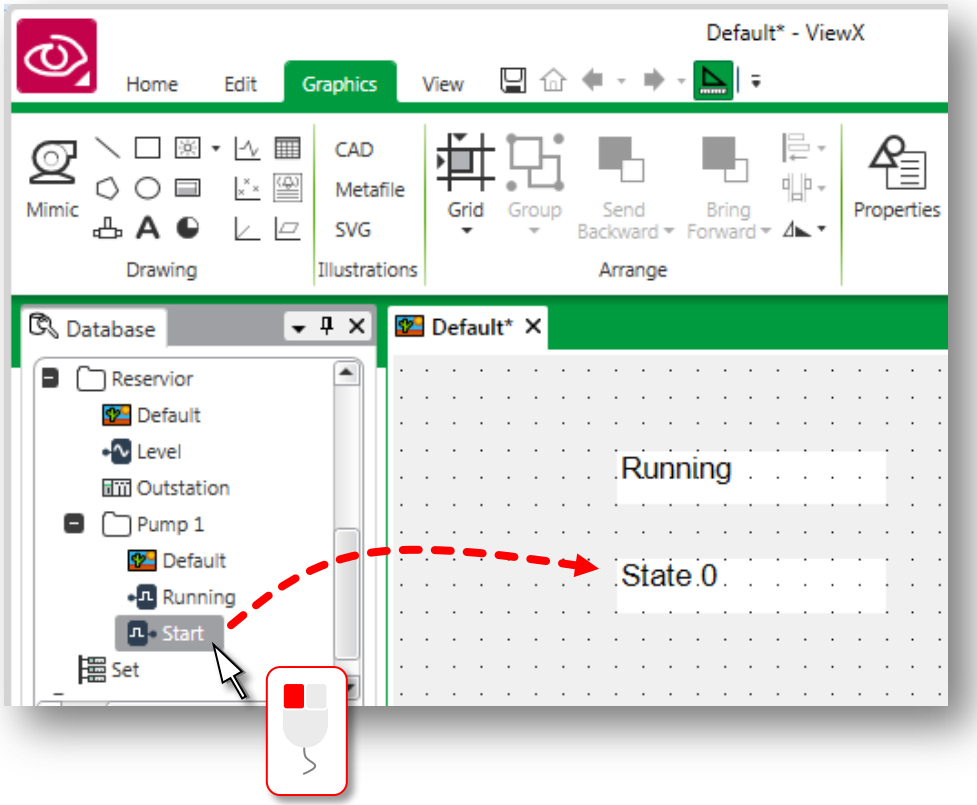
- The way to show point states and values is similar to how the **Outstation State** was configured. Follow as per below to show the status of **Running**.



Point States and Values

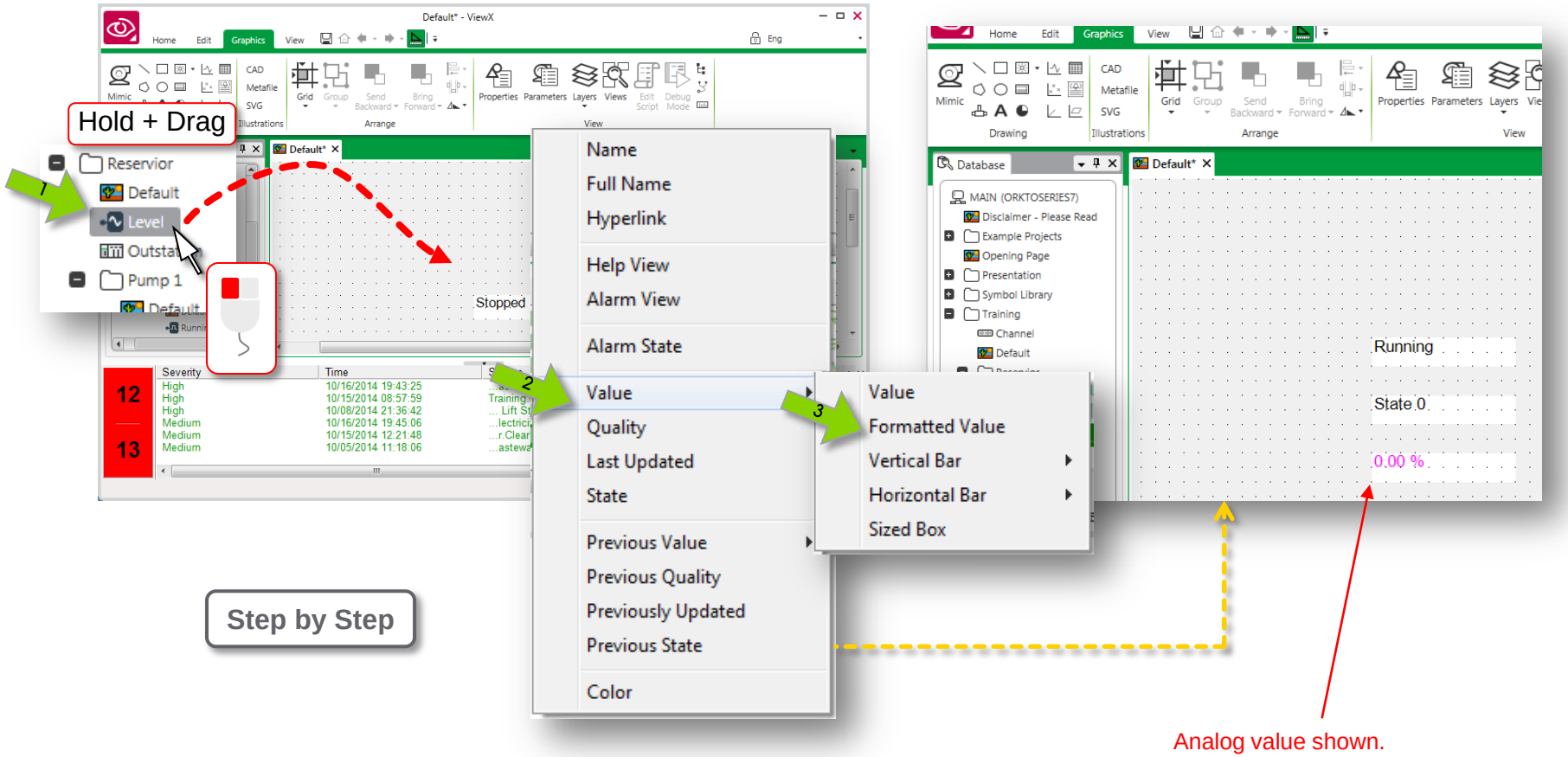
Action

- Next show the state for the **Start** DO point.



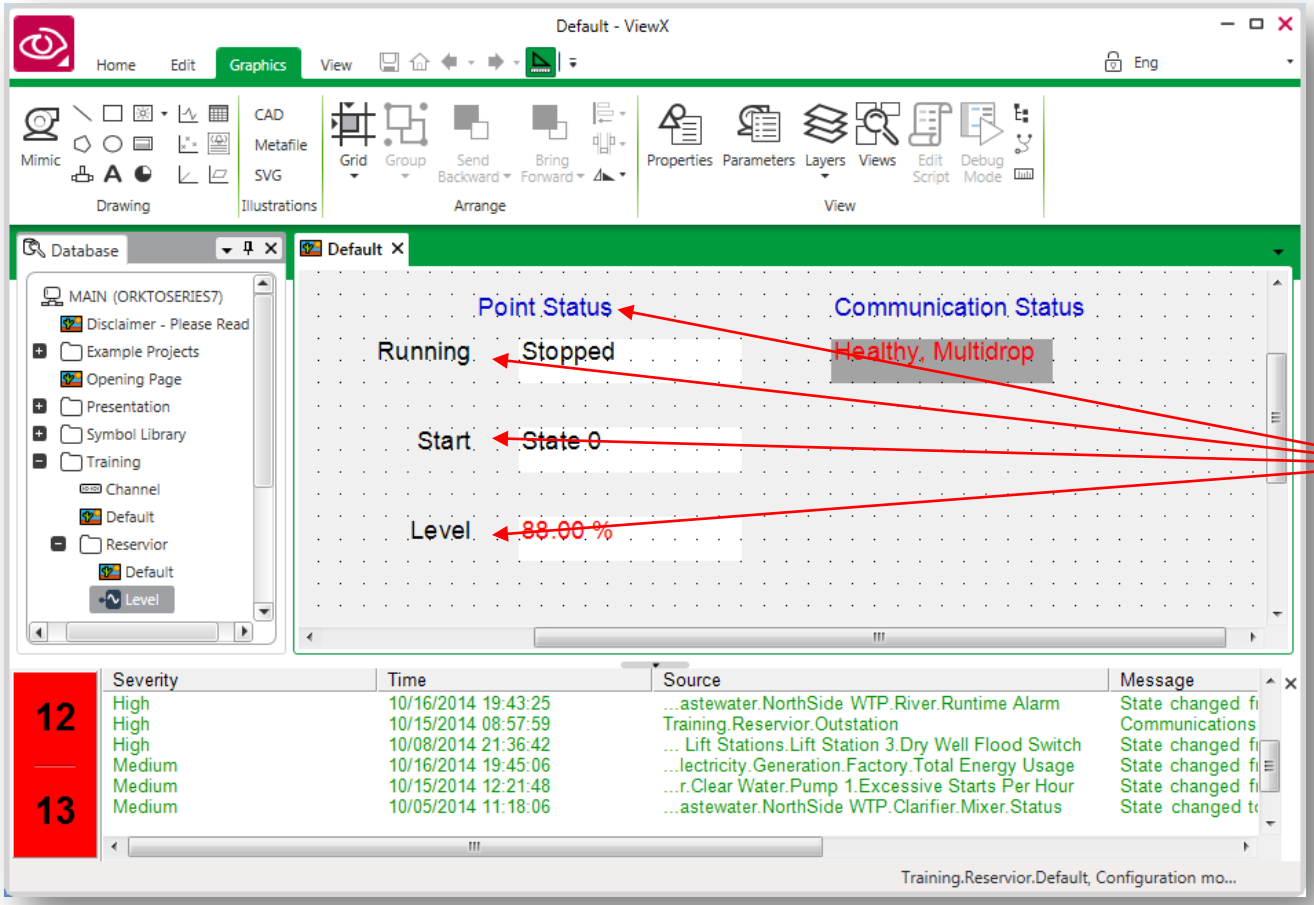
Point States and Values

- For the analog point Level, we will show the **Formatted Value** (formatted with units shown).



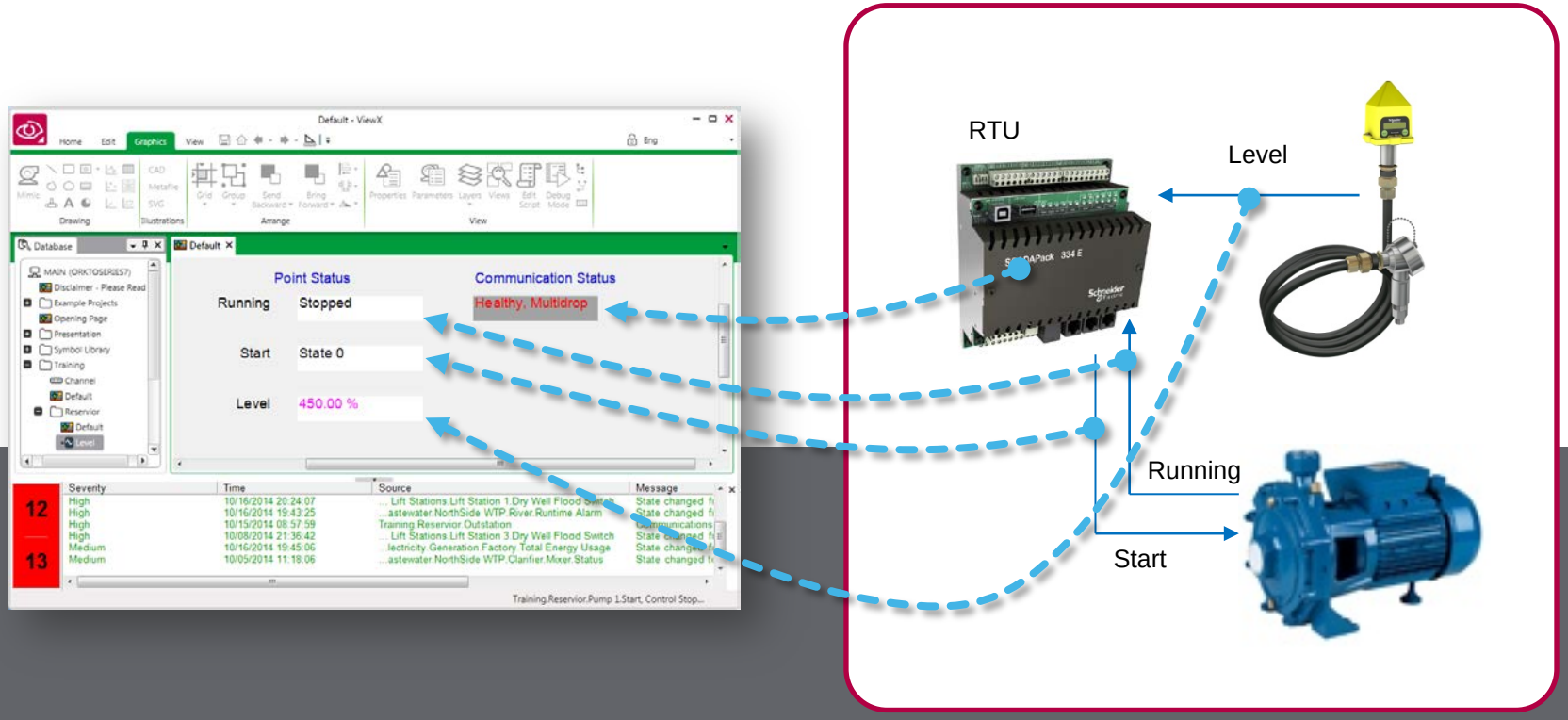
Point States and Values

- Using the **Text Tool** previously introduced, placed more text to make the mimic meaningful.



Checking your Points

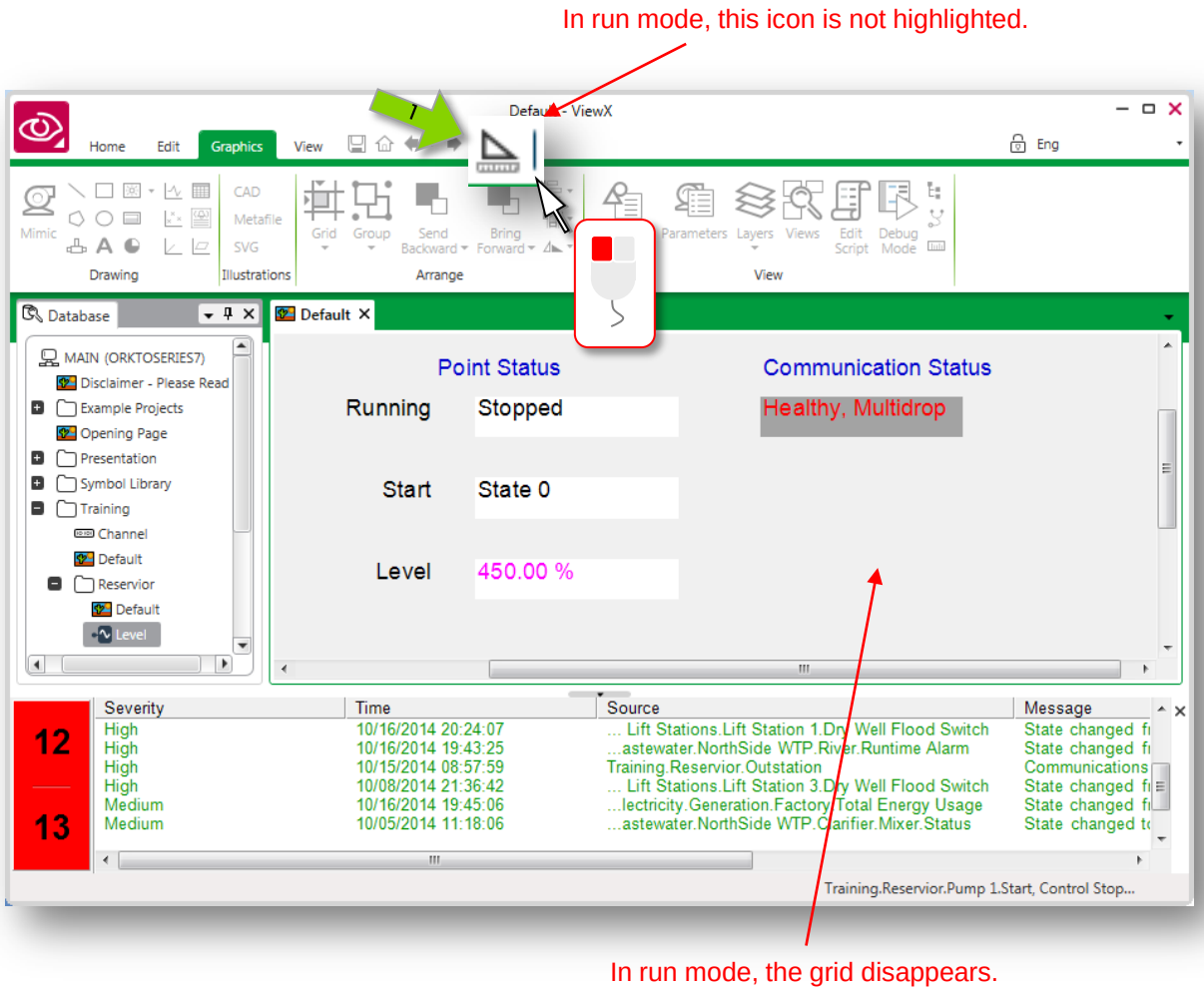
- Now that we have configured all the points from the RTU to be shown on the mimic, we need to test them to make sure they are working.



Viewing Events and History

Step by Step

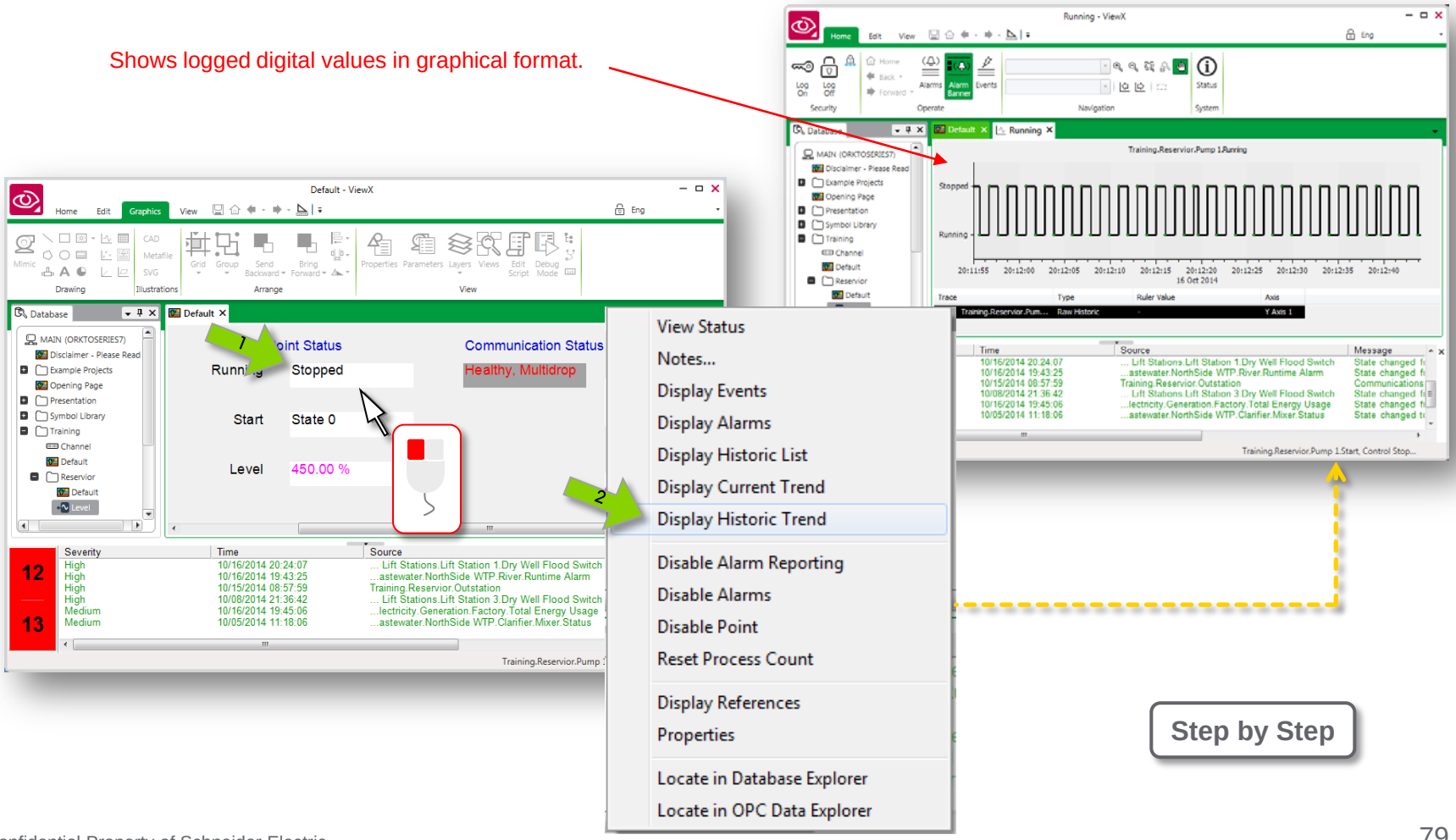
- Put the mimic into **Run Mode**.



Historical Trends

- Click on the **Running** status and select **Historic Trend**.

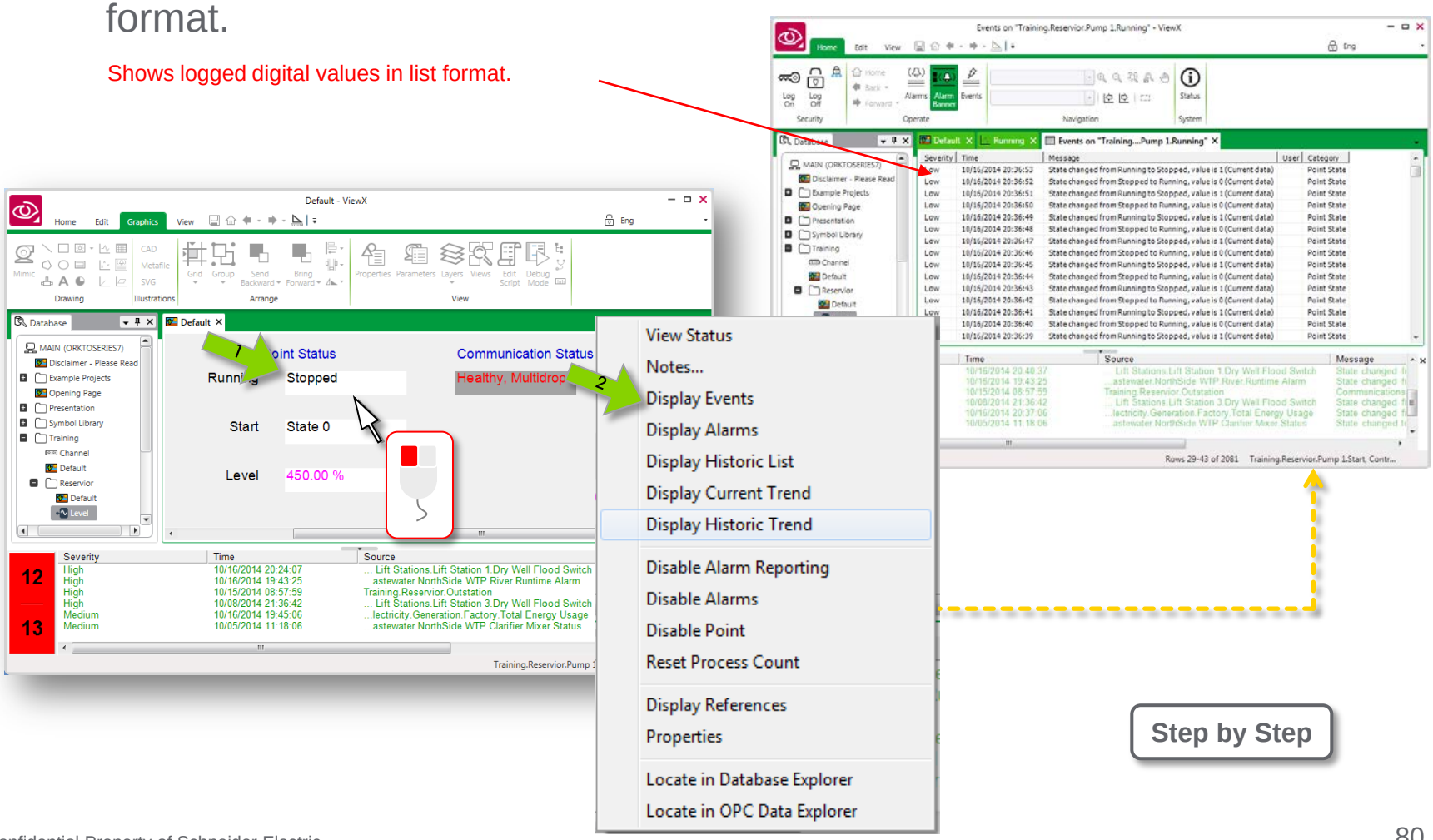
Shows logged digital values in graphical format.



Events

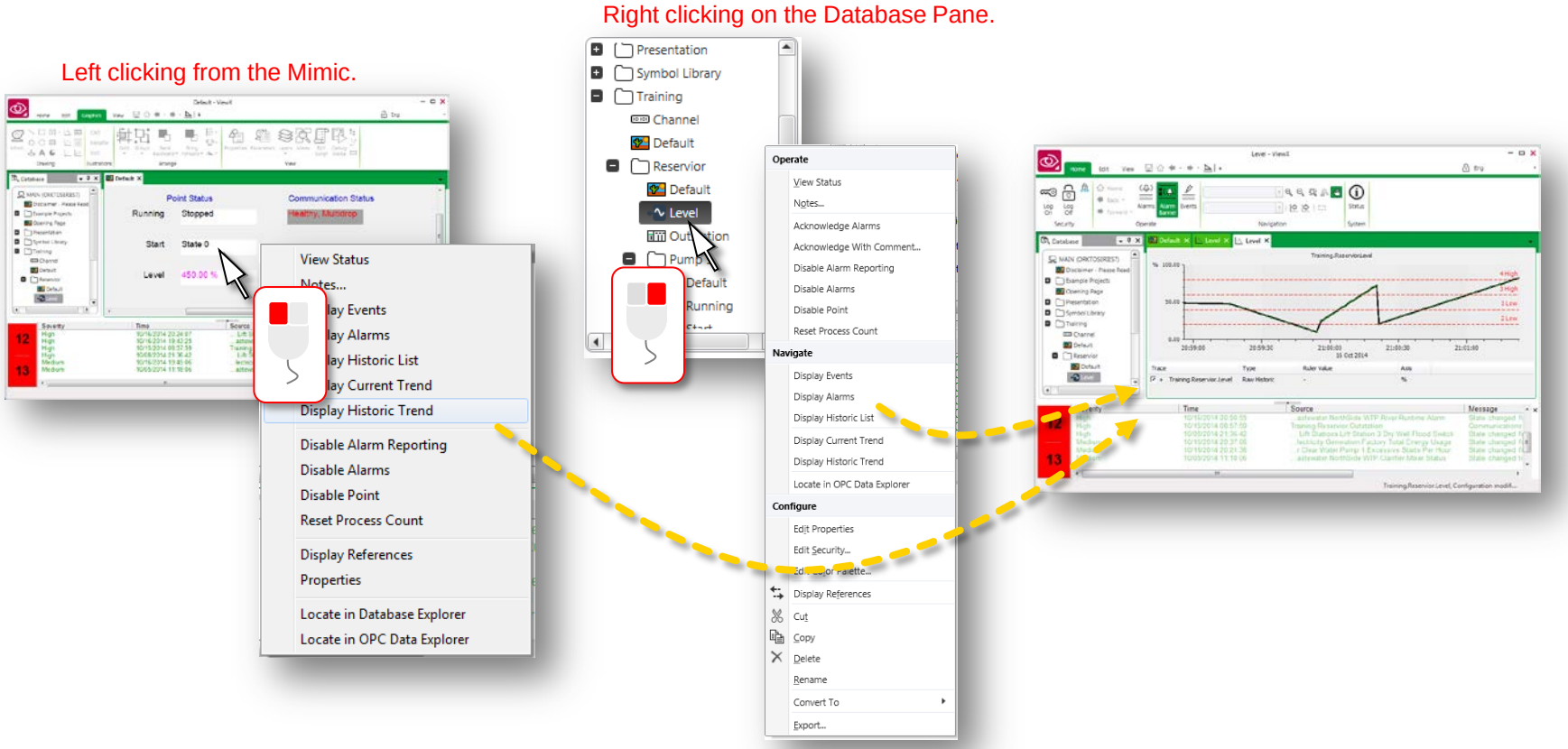
- Click on Events in the tool bar to display historical values in event list format.

Shows logged digital values in list format.



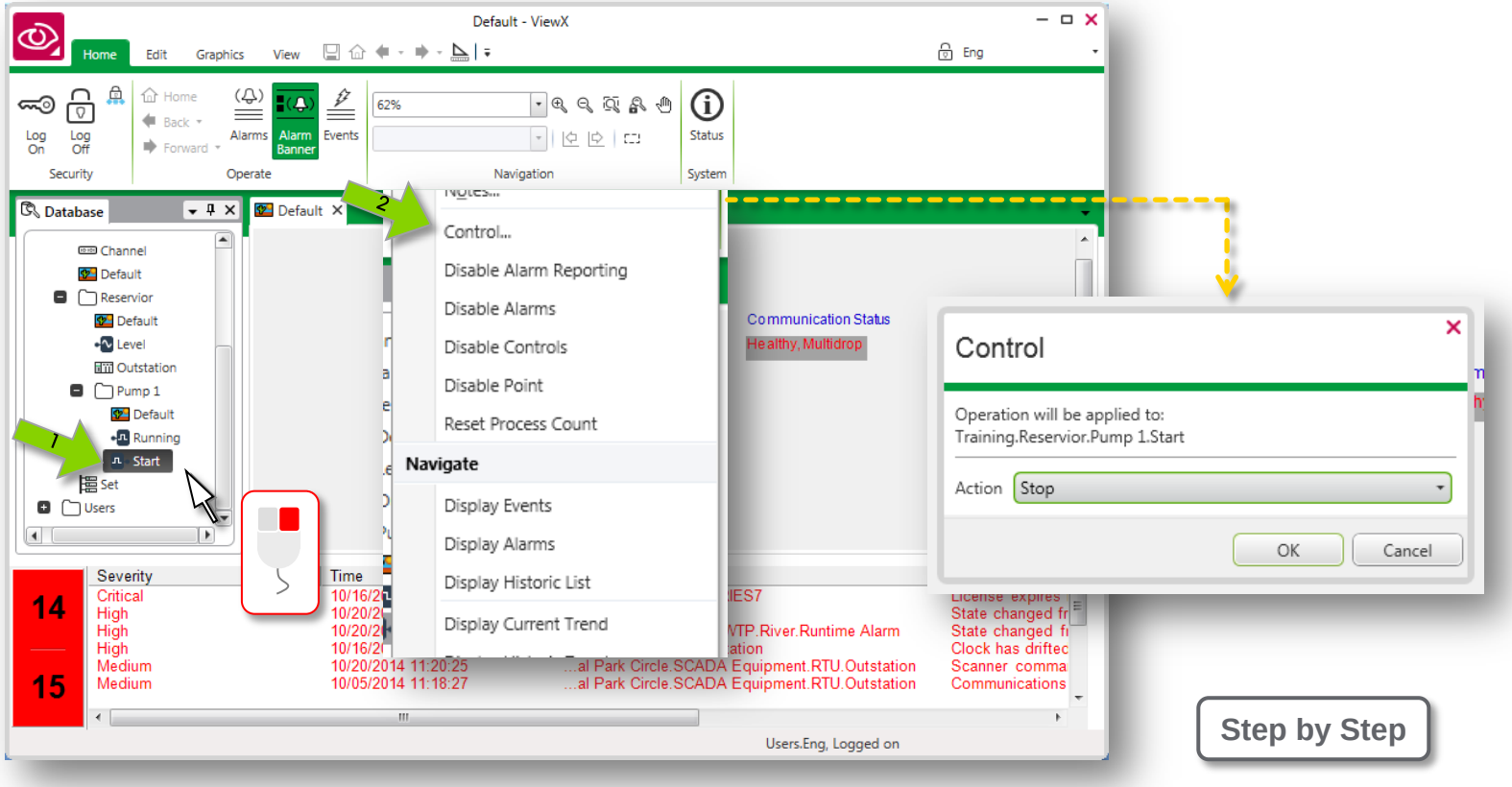
Viewing Events and History

- The same is for the rest of the points on the mimic.
- There are more then one ways on which we can navigate into the historical events and data. Do explore the functionalities by yourself.



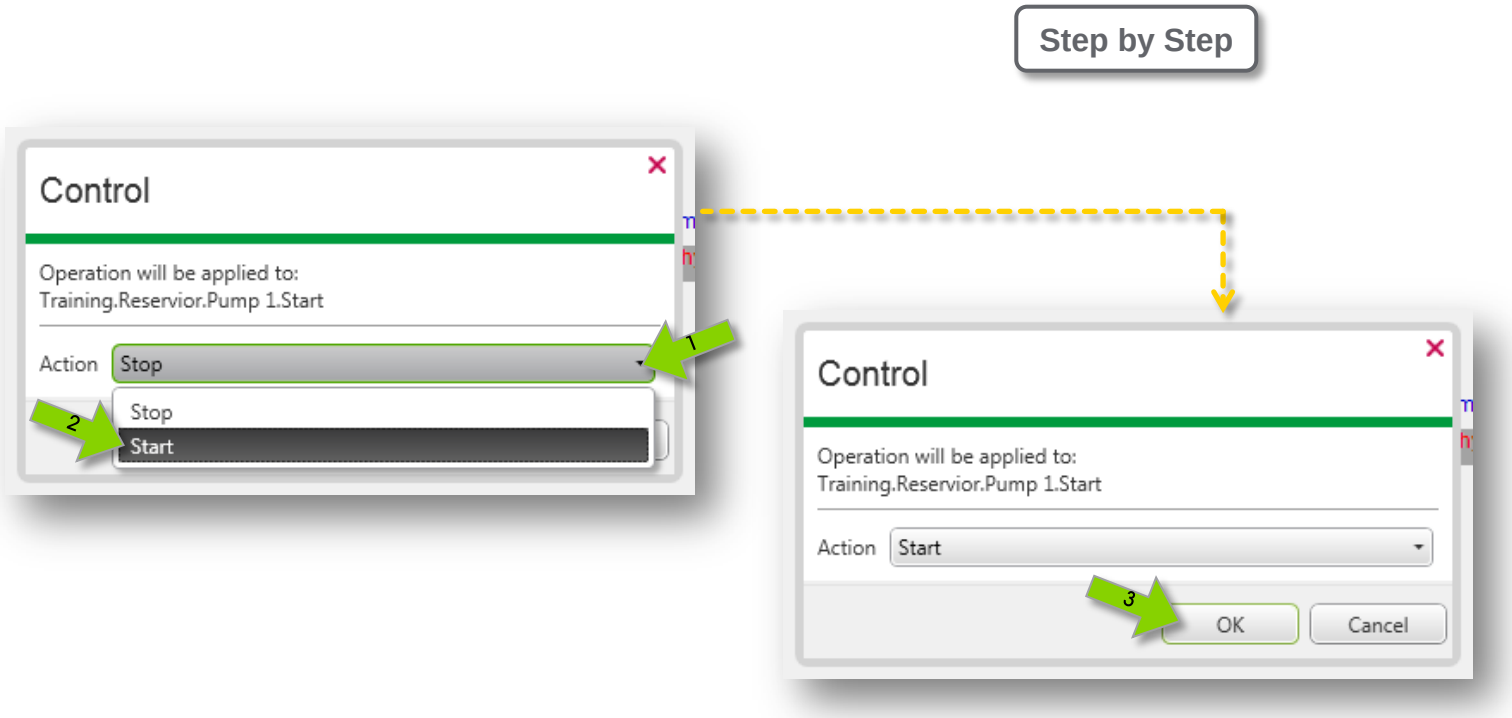
Direct DO Control

- We con control the DO point directly from the **Database Pane**. This is often not done so as controls shall be initiated from graphics in the mimic.
- Select the DO point and right click on it. Select **Control**.



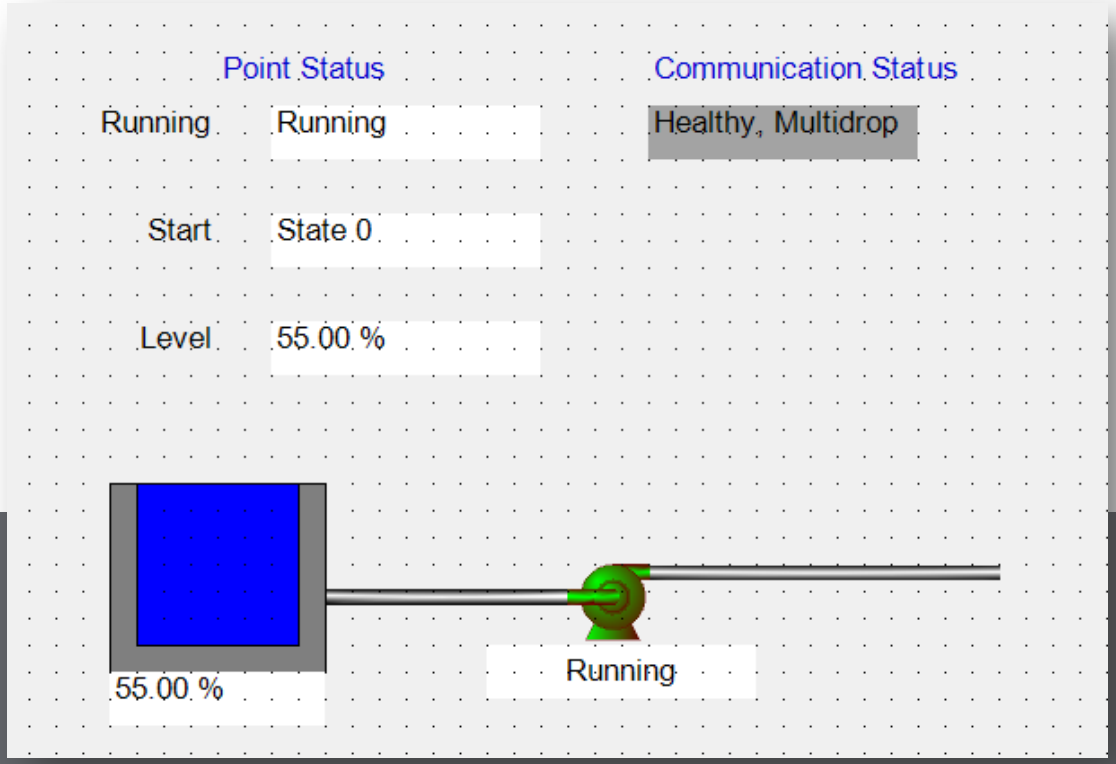
Direct DO Control

- Select the action designed and then click on **OK**. The command is send to the RTU.



Creating the Graphical Mimic

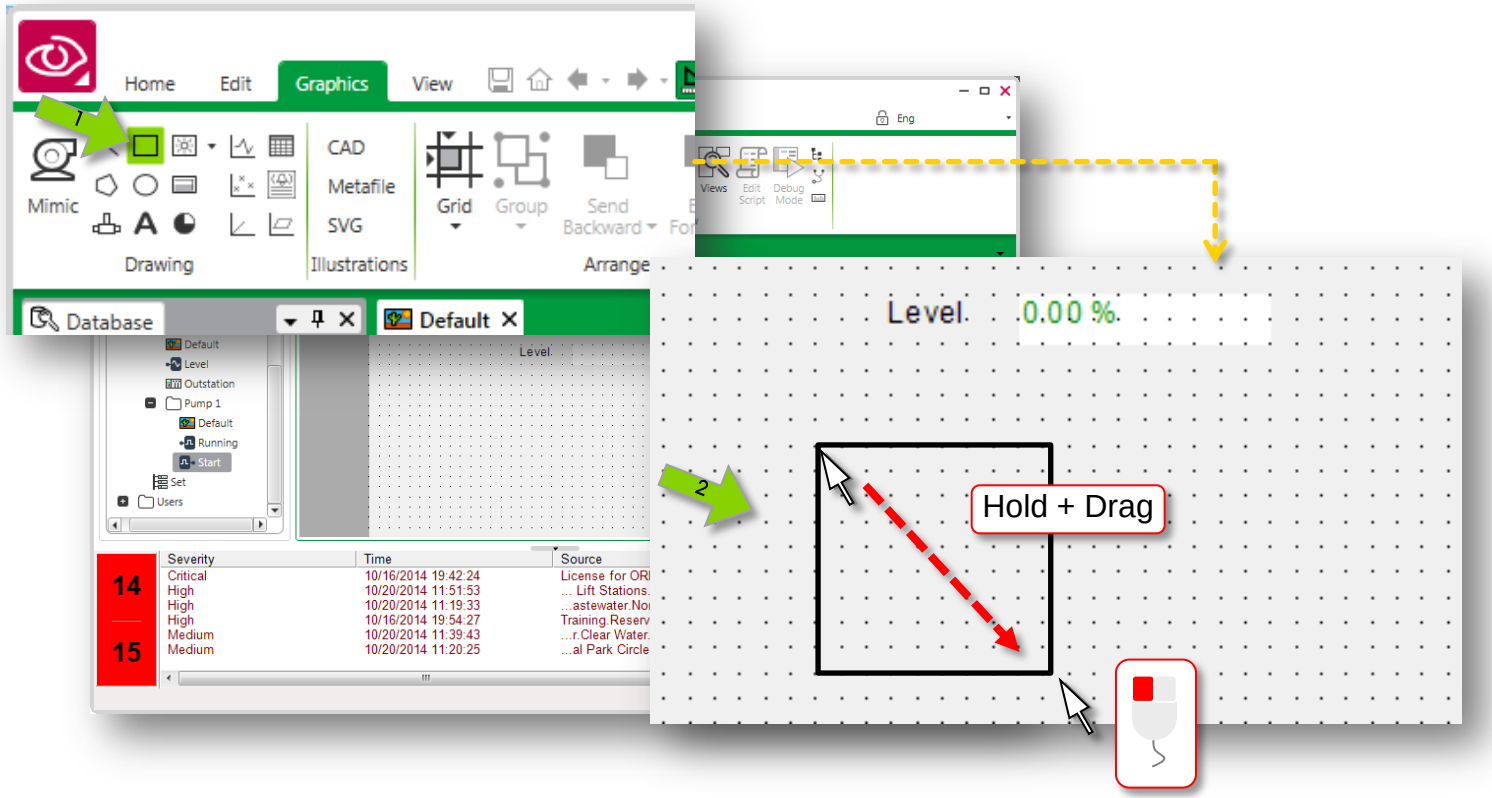
- A SCADA System is not just text driven, but naturally, graphical driven. We will next learn how to animate the mimic with graphical objects.



Drawing the Reservoir

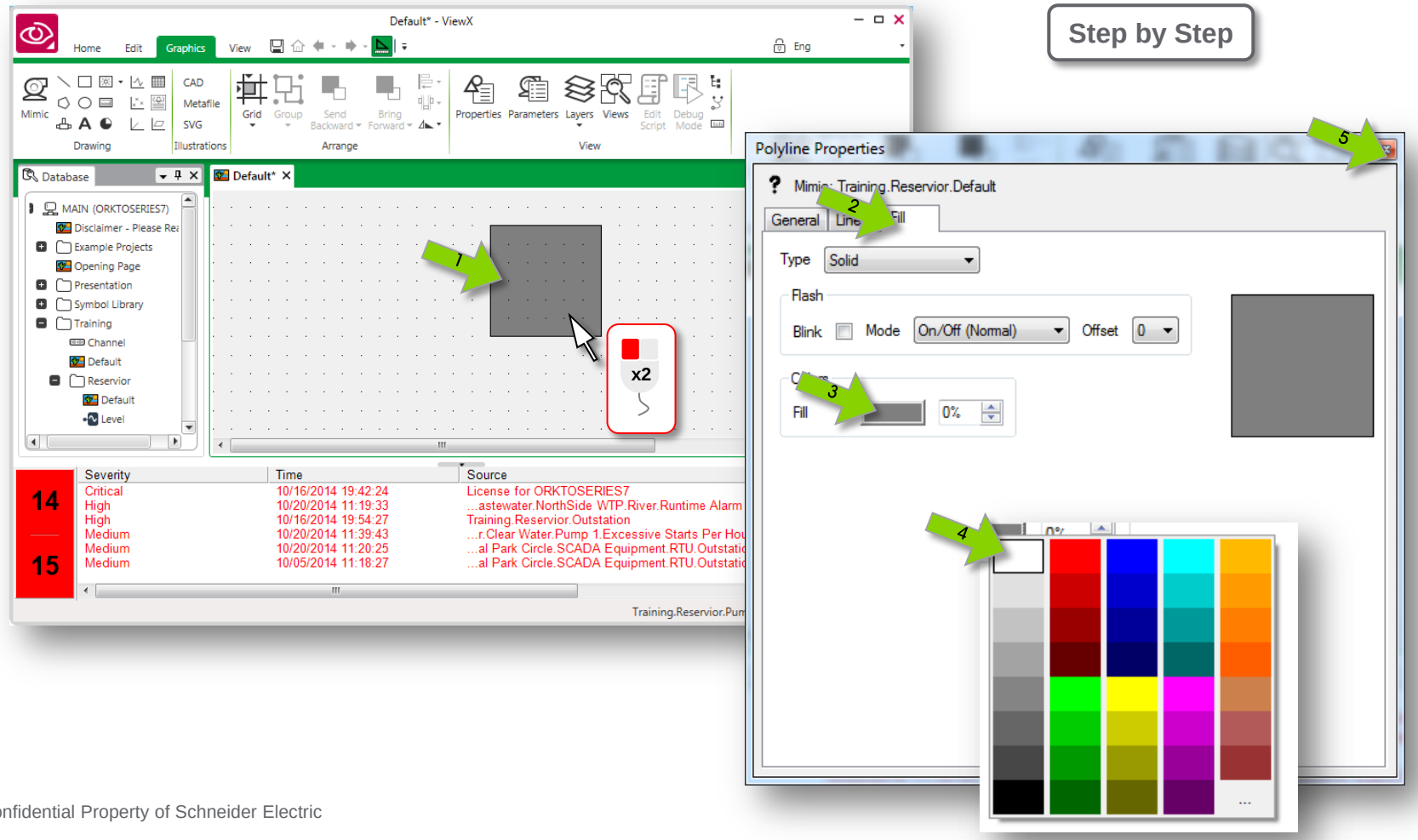
- Select the **Rectangle Tool**.
- On the mimic, draw a rectangle.

Step by Step



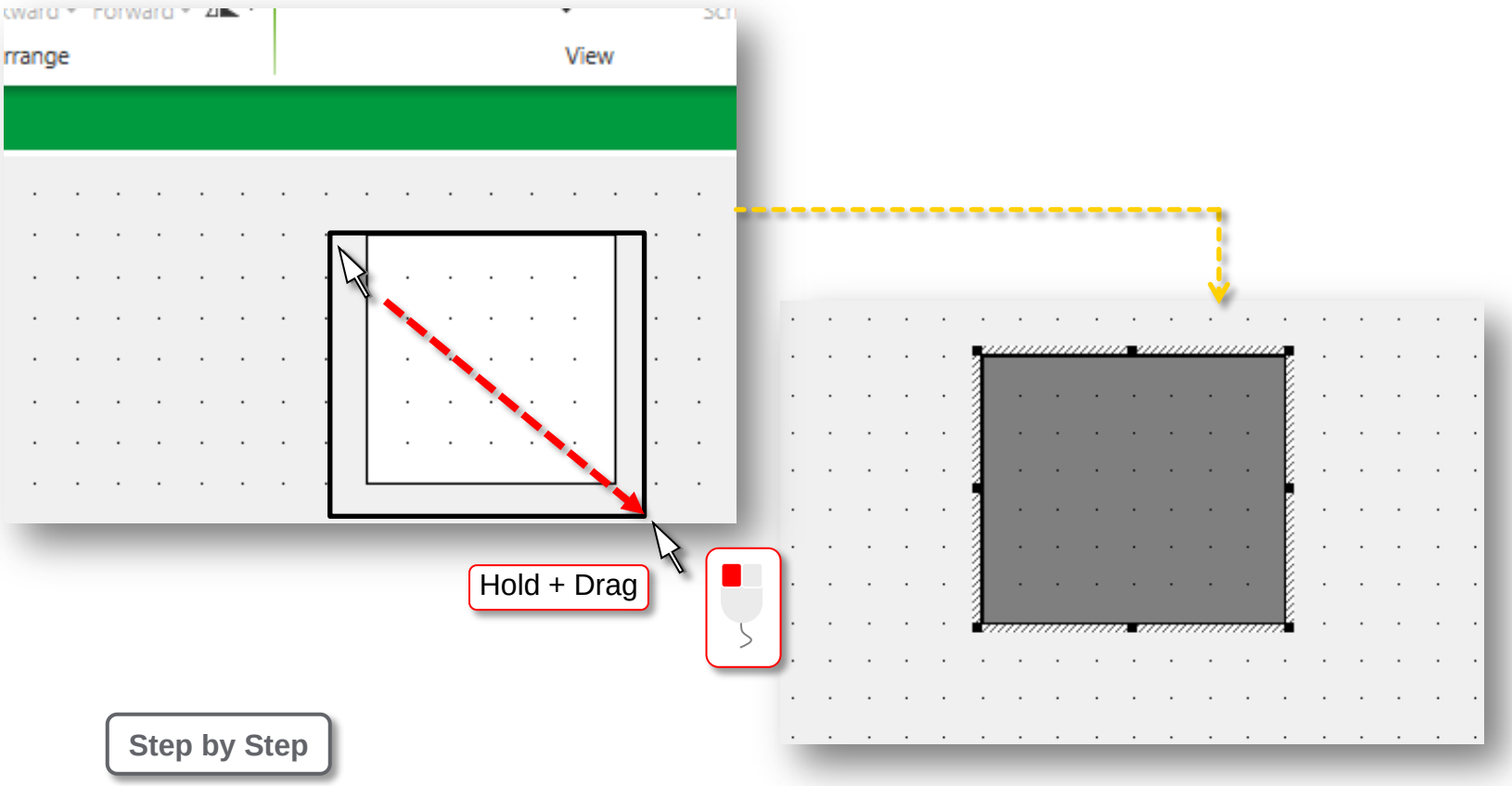
Drawing the Reservoir

- Change the color to white. Double click on the rectangle. Go to the **Fill** tab.



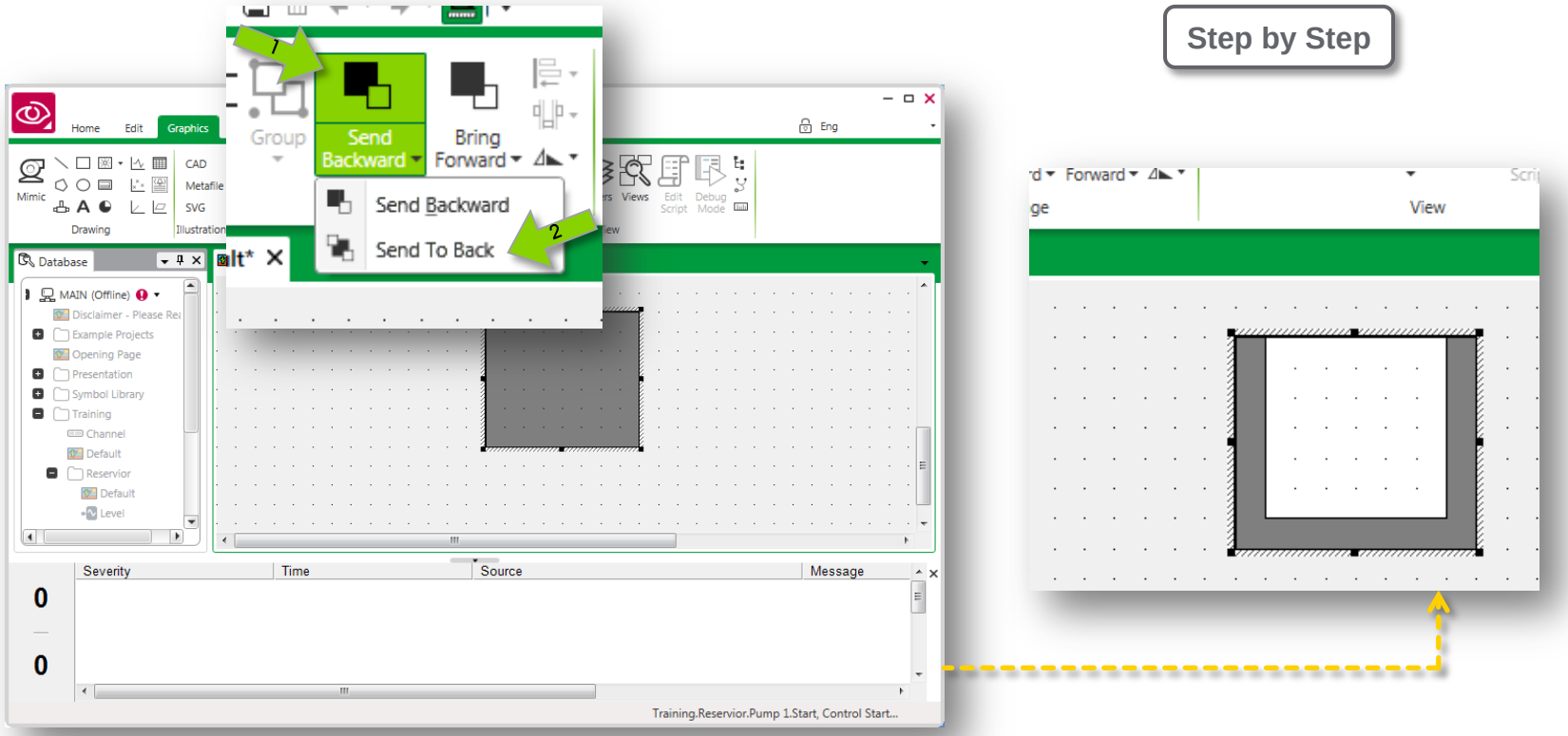
Drawing the Reservoir

- Next draw a larger rectangle over the smaller one.



Drawing the Reservoir

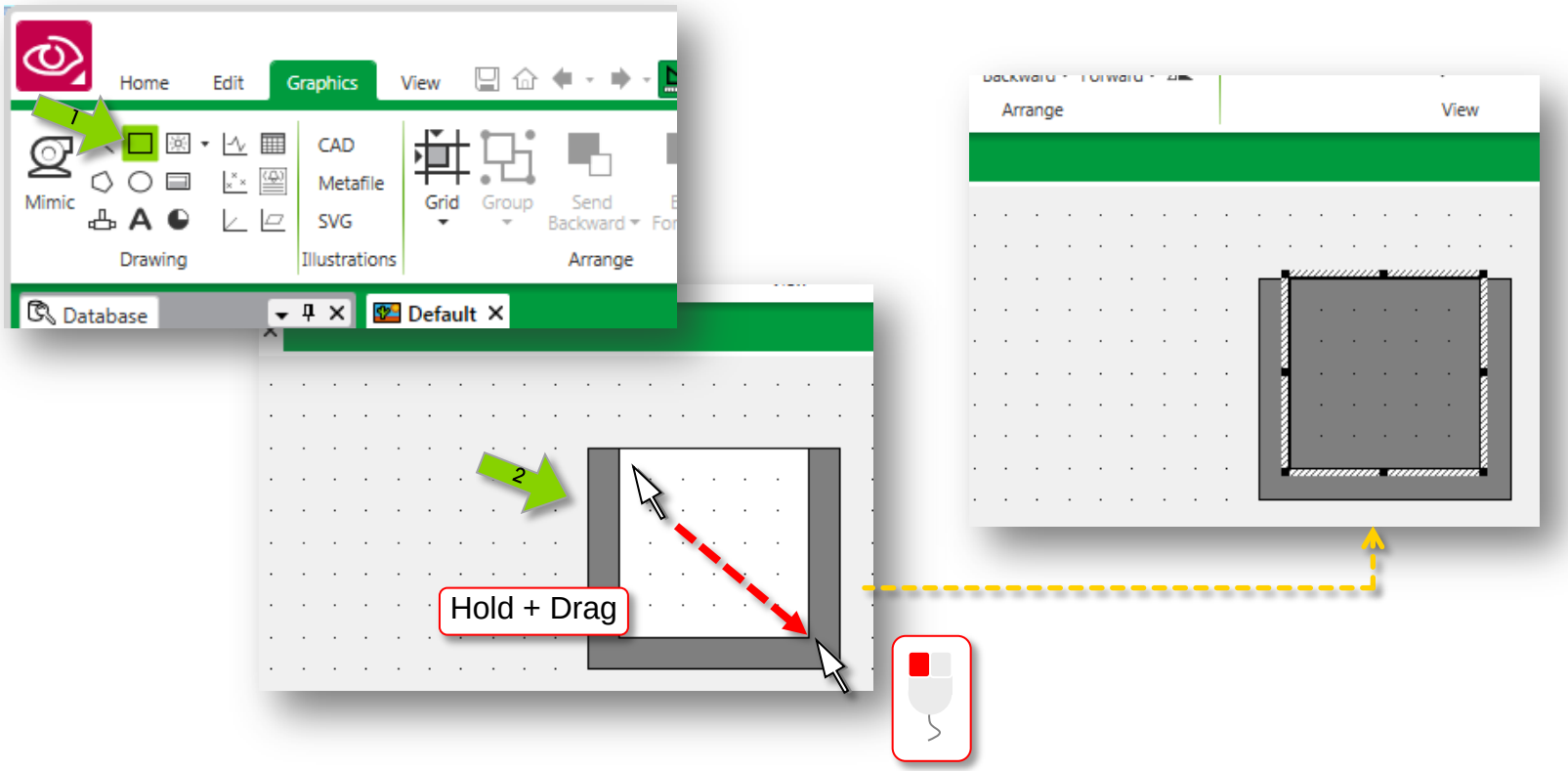
- With the new rectangle still selected, move it to the back behind the small rectangle.



Drawing the Reservoir

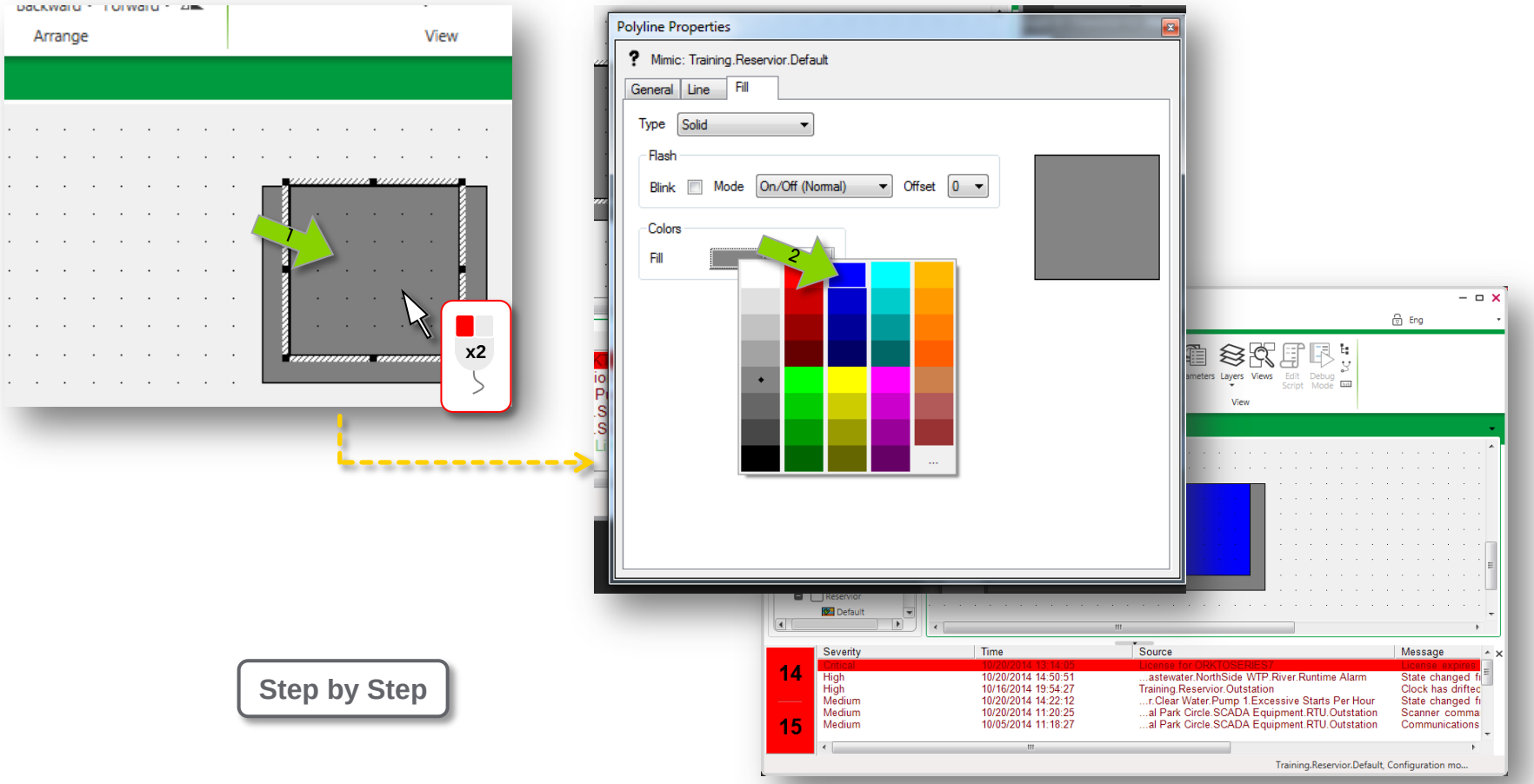
- We next need to draw the actual rectangle that will follow the level. Draw yet another rectangle overlapping the white one within, in exact same dimensions.

Step by Step



Drawing the Reservoir

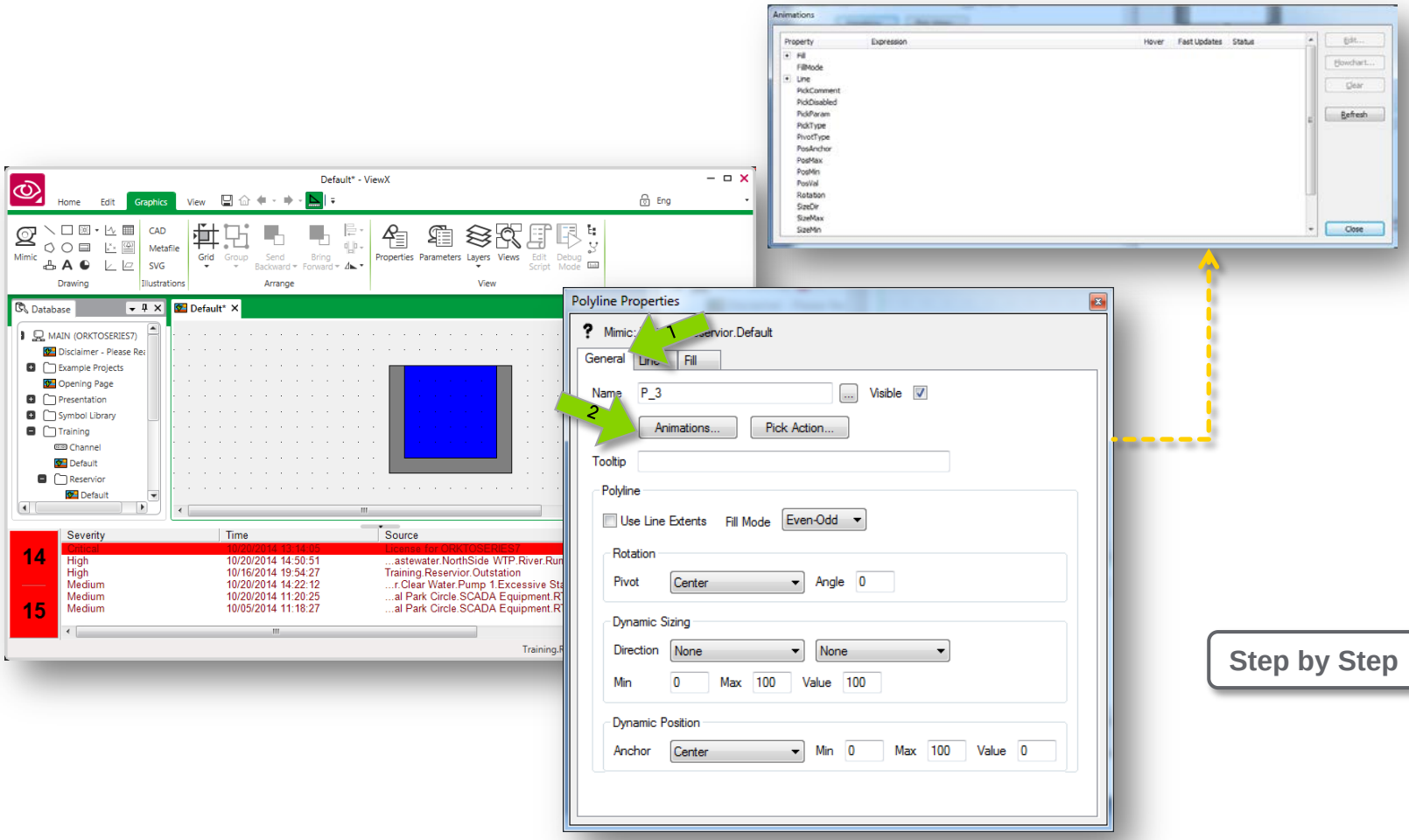
- Change this new rectangle to blue color.



Step by Step

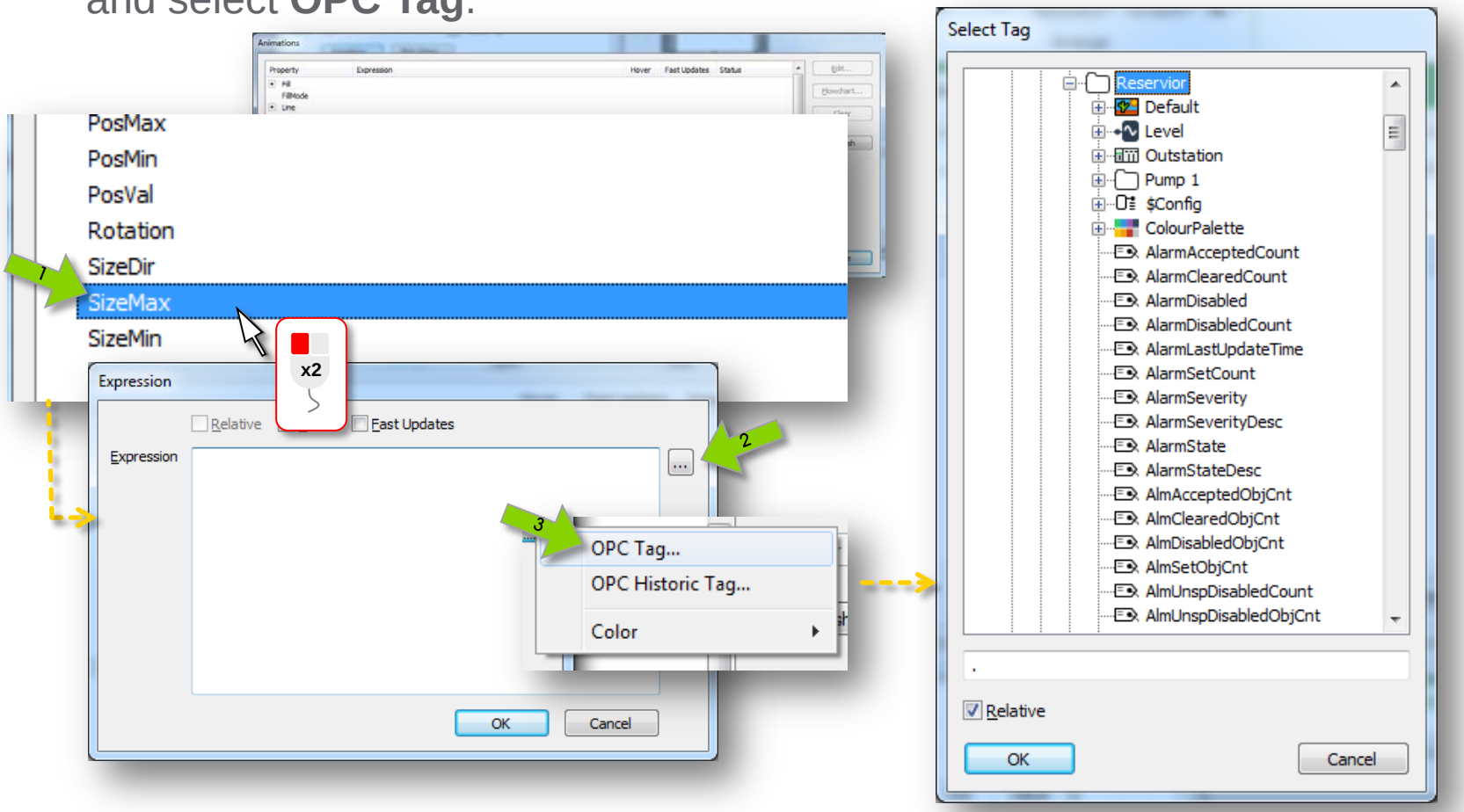
Animating the Level

- Switch over to **General** tab and then select **Animations**.



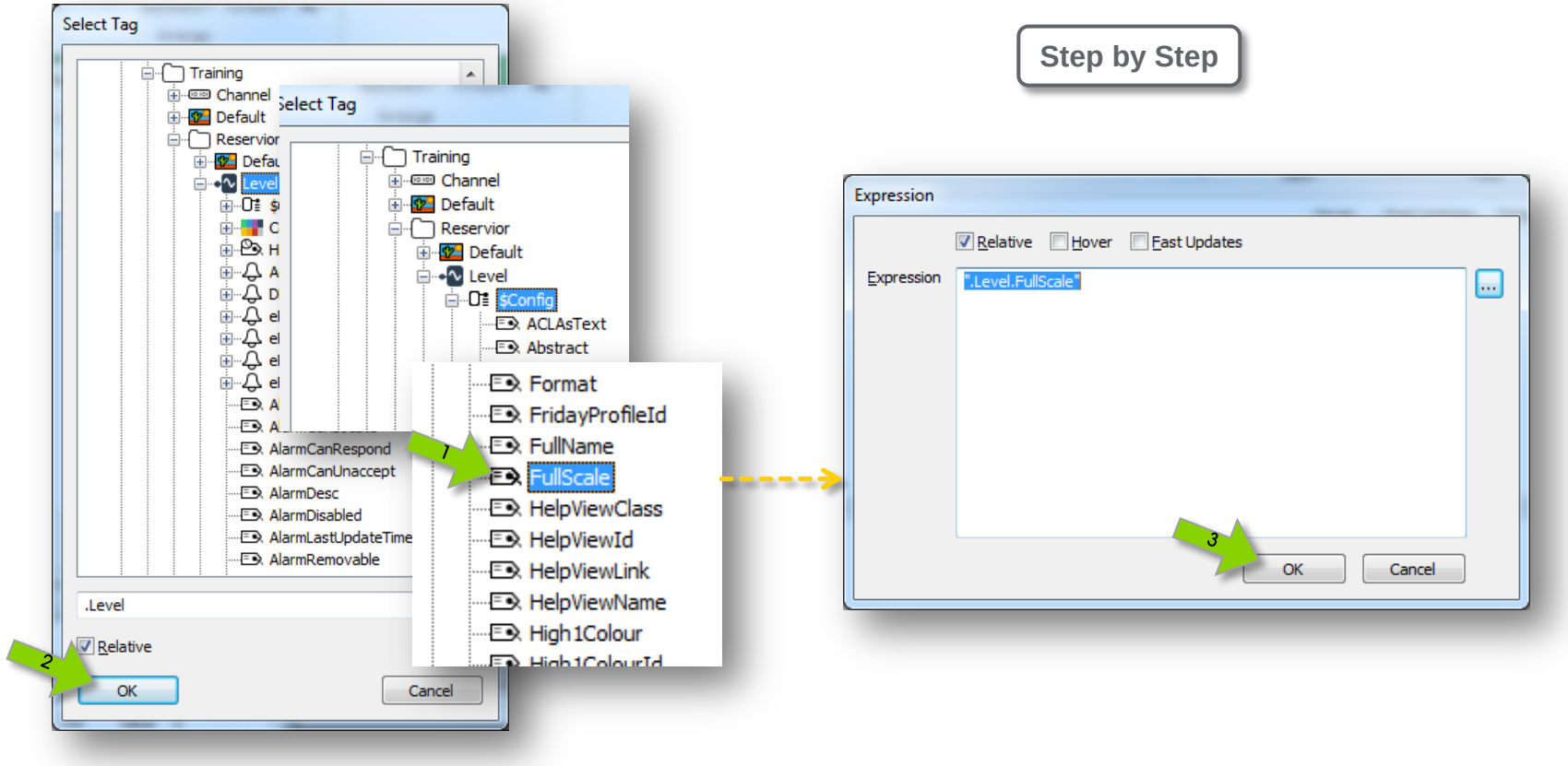
Animating the Level

- Scroll down and double click on **SizeMax**. The click on the **(…)** button and select **OPC Tag**.



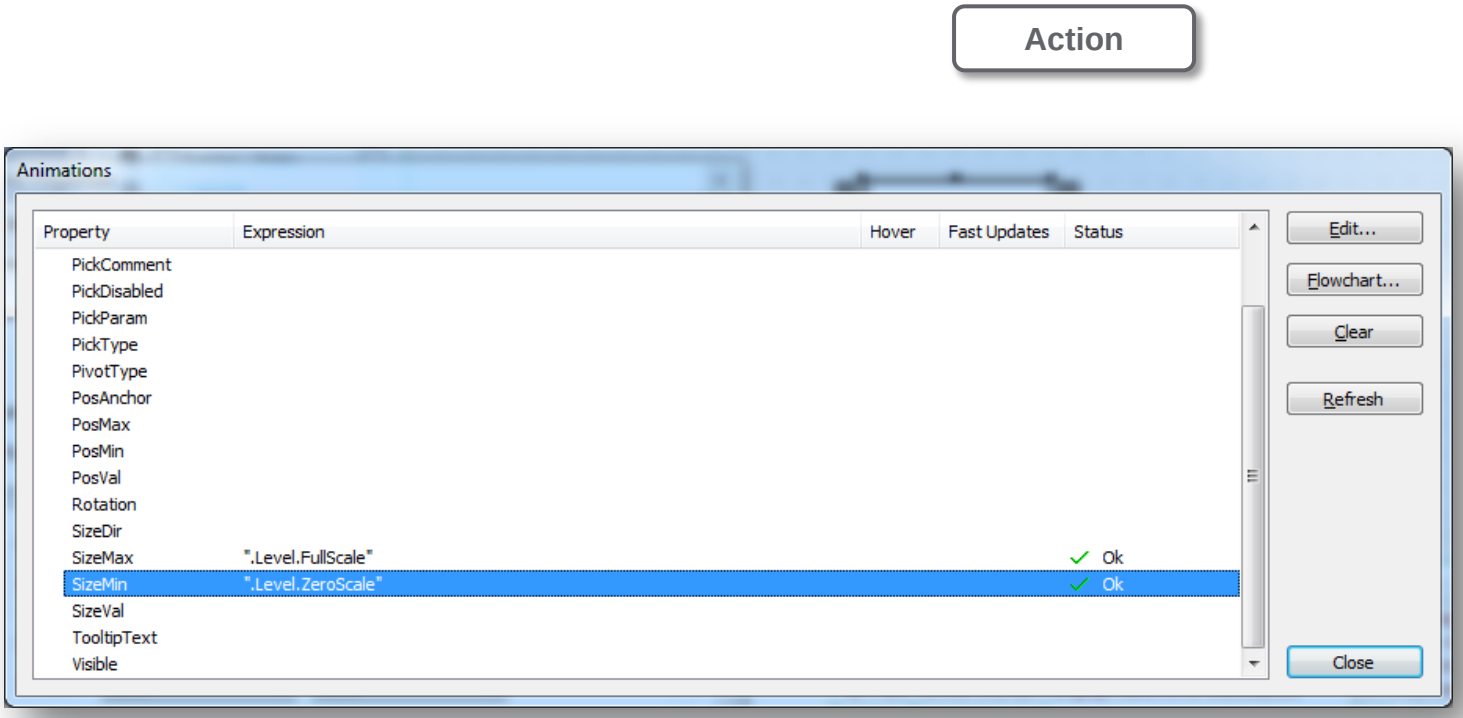
Animating the Level

- Select **Level->$Config->FullScale** then click on **OK** buttons.



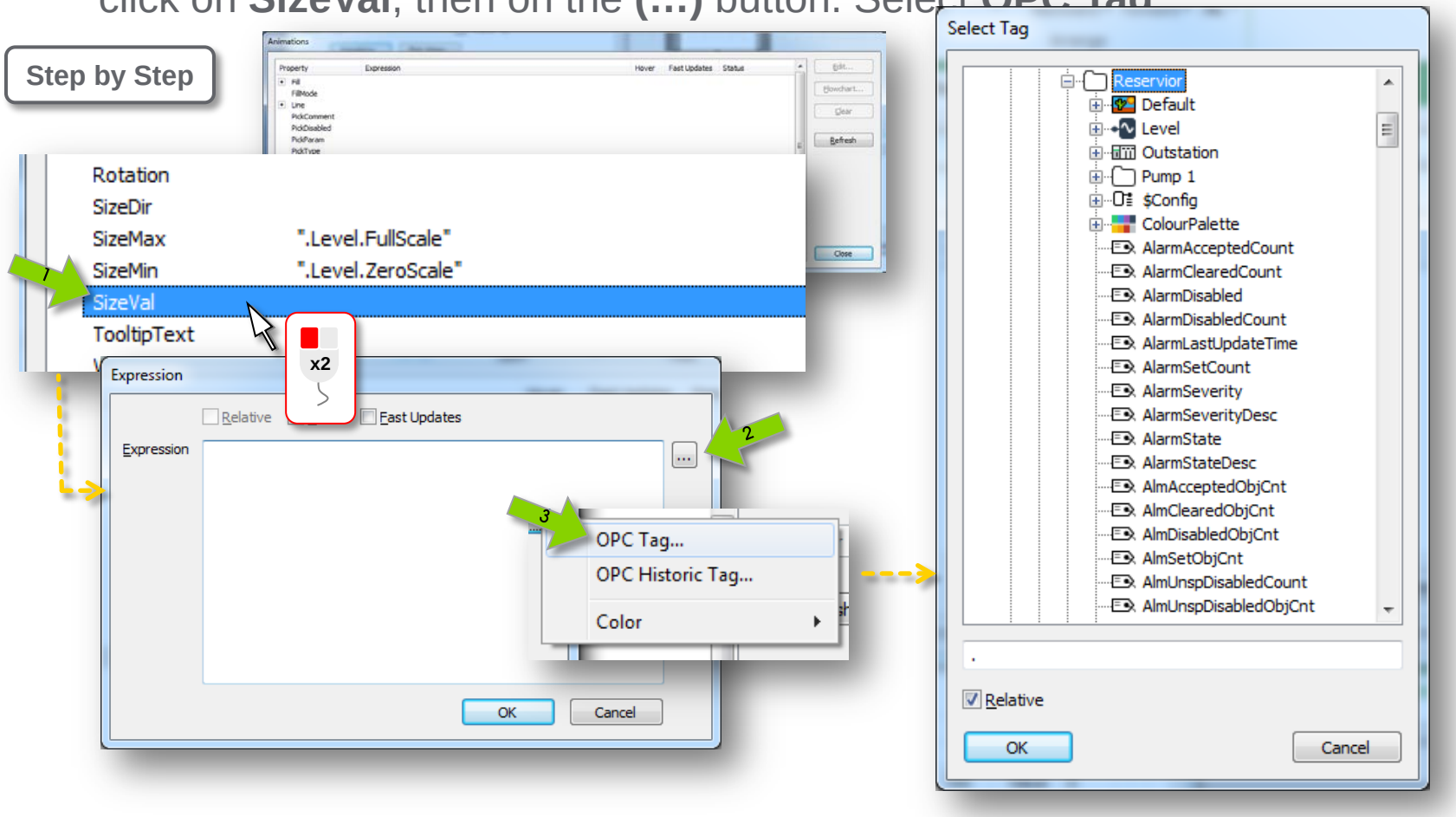
Animating the Level

- Next for **SizeMin**, set it to **Level->$Config->ZeroScale**.



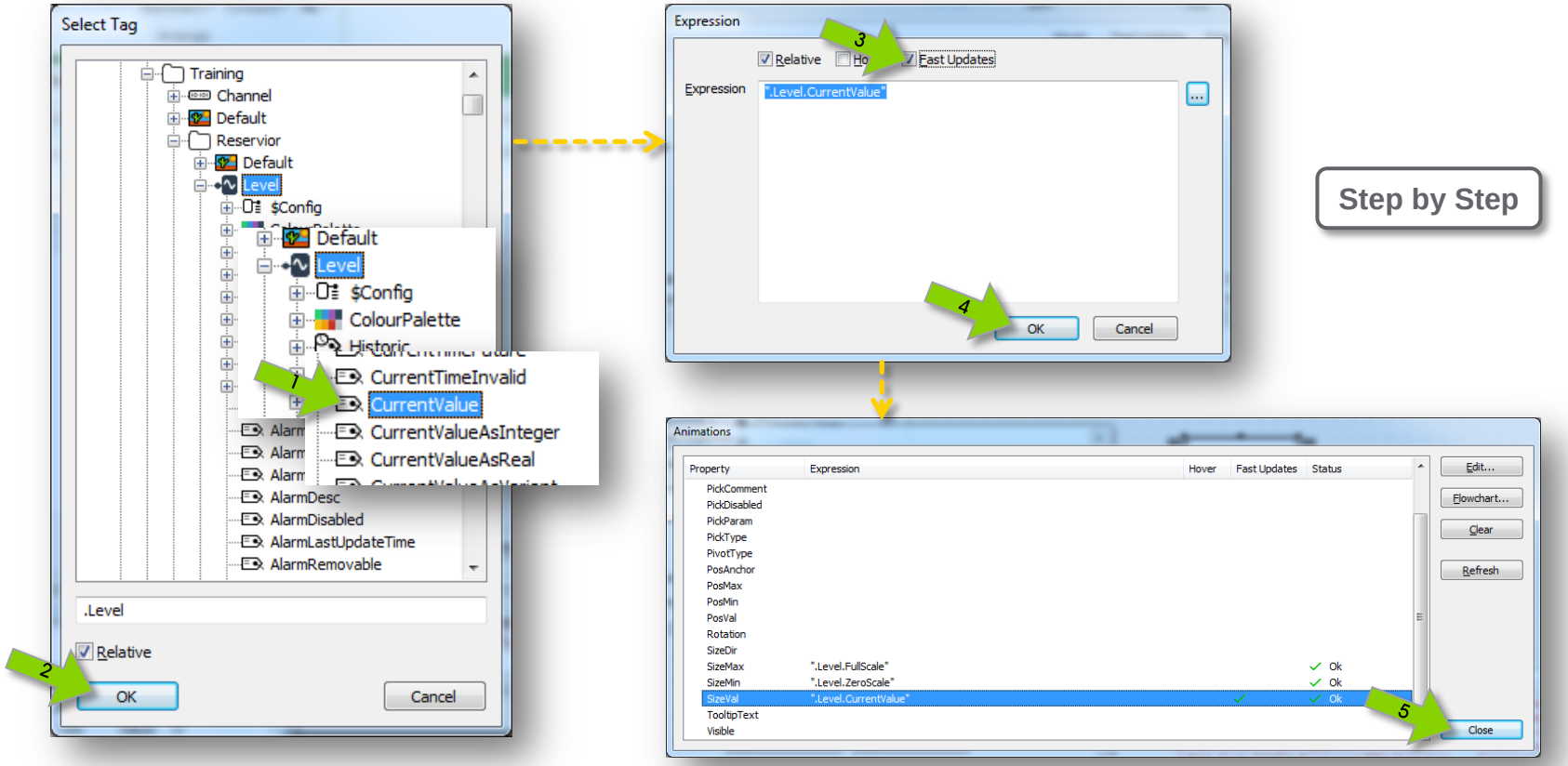
Animating the Level

- To make the rectangle size changes that will follow the AI value, double click on **SizeVal**, then on the **(...)** button. Select **OPC Tag**



Animating the Level

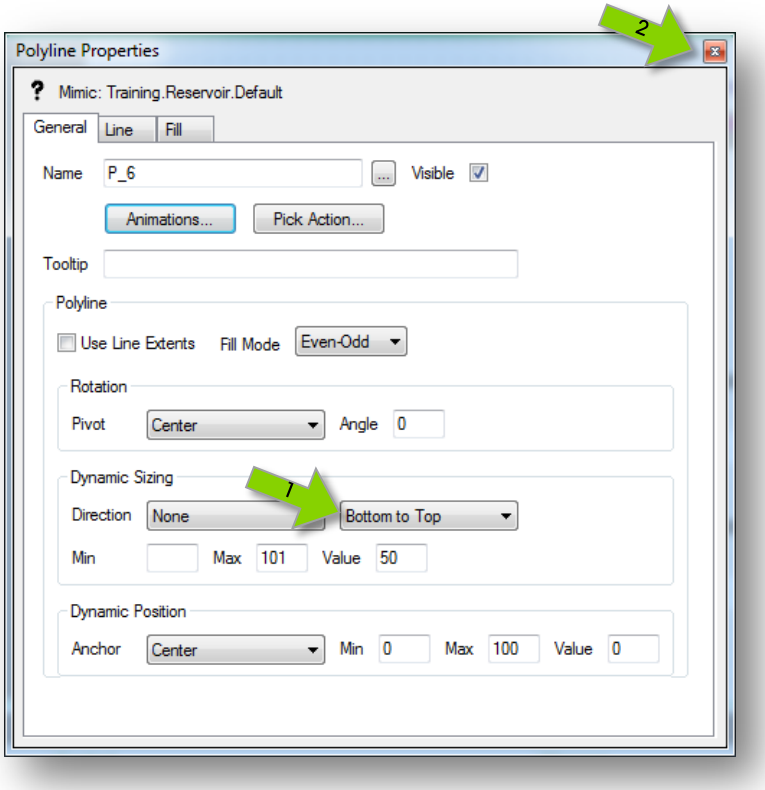
- Select **Level->CurrentValue**, check **Fast Updates** and then on the **OK** and then on **Close**.



Animating the Level

- You would want the rectangle to grow in size from bottom to top. Therefore select the **Dynamic Sizing Direction** as **Bottom to Top**.
- Close the form.

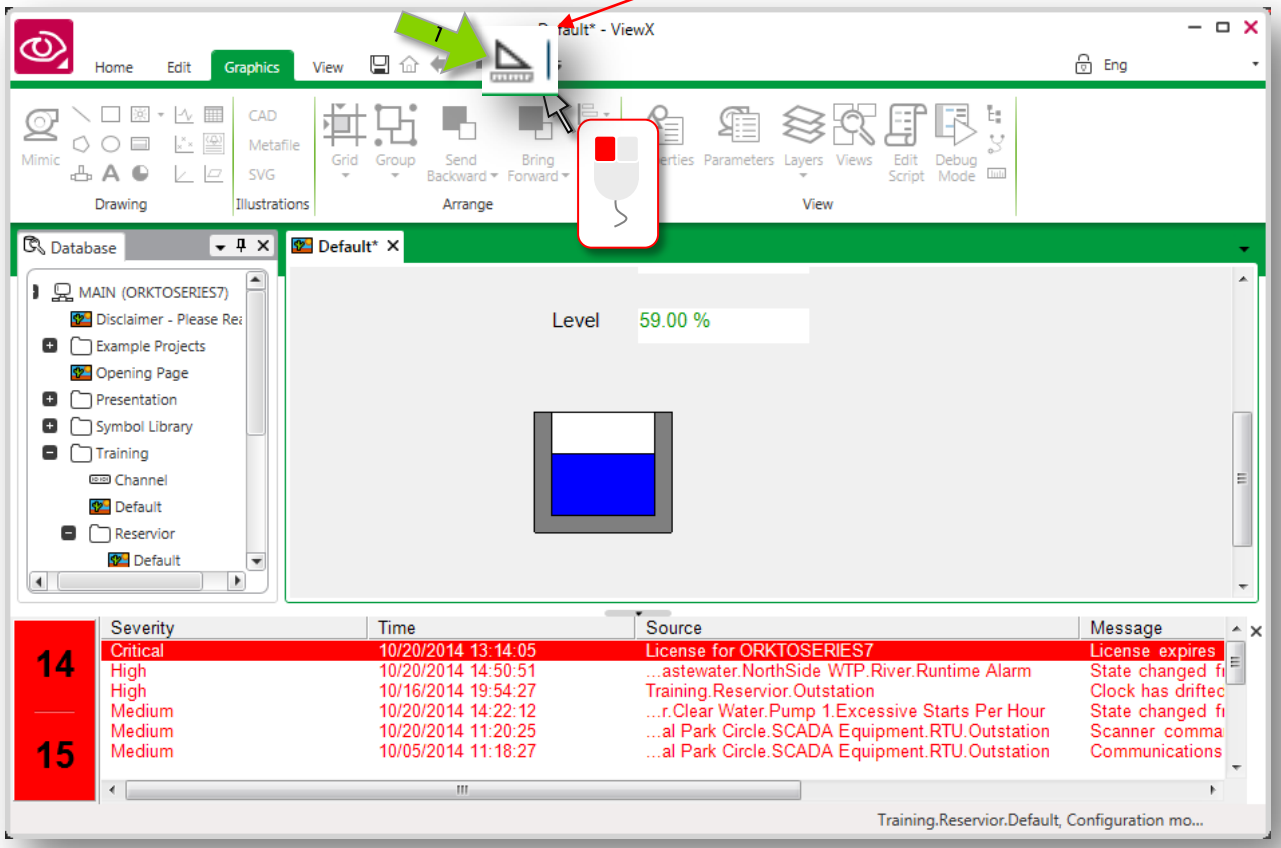
Step by Step



Animating the Level

- Put the project into **Run** mode. You should now see the reservoir level animated, following the level of the AI point.

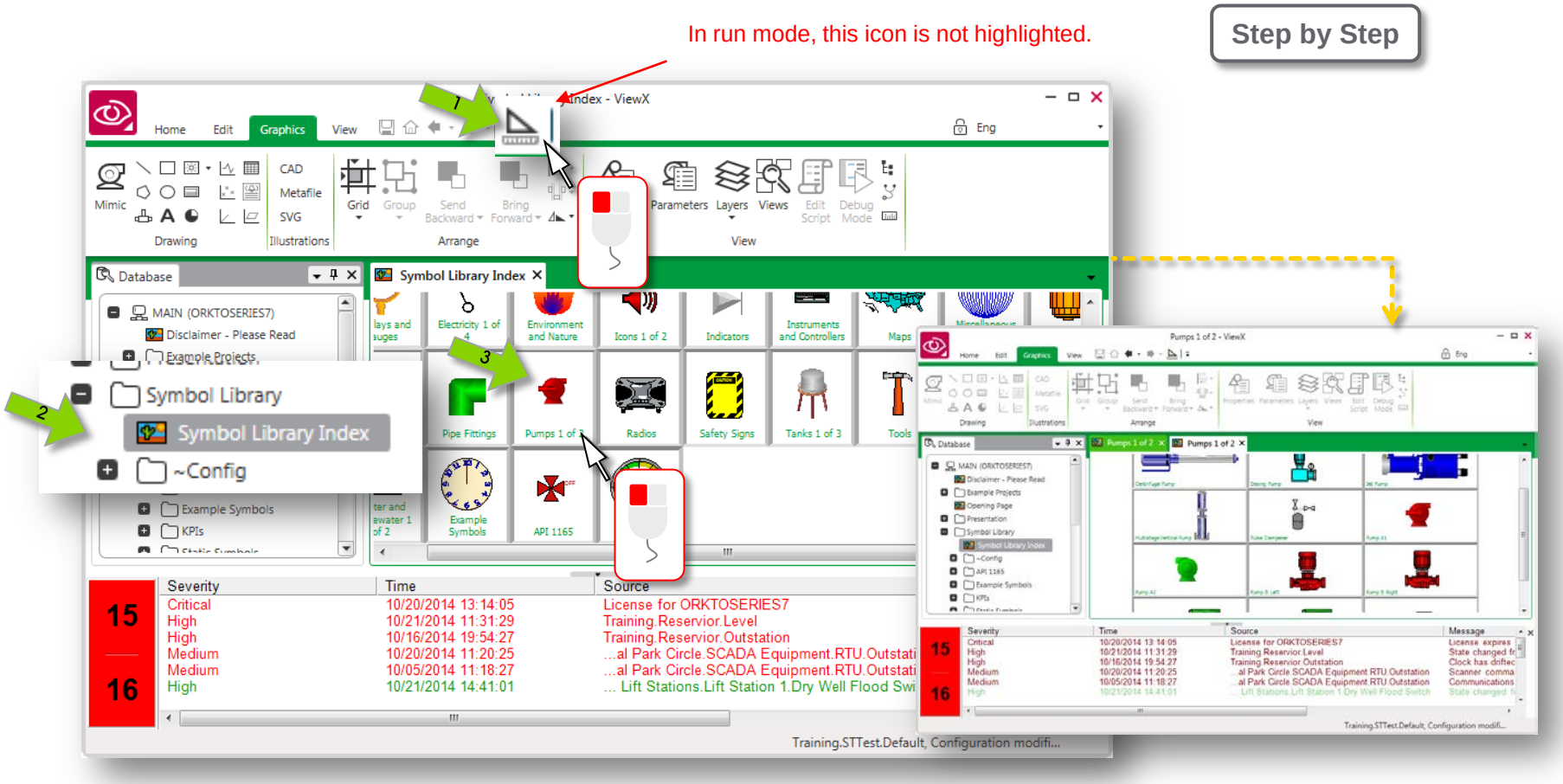
Step by Step



Add a Pump

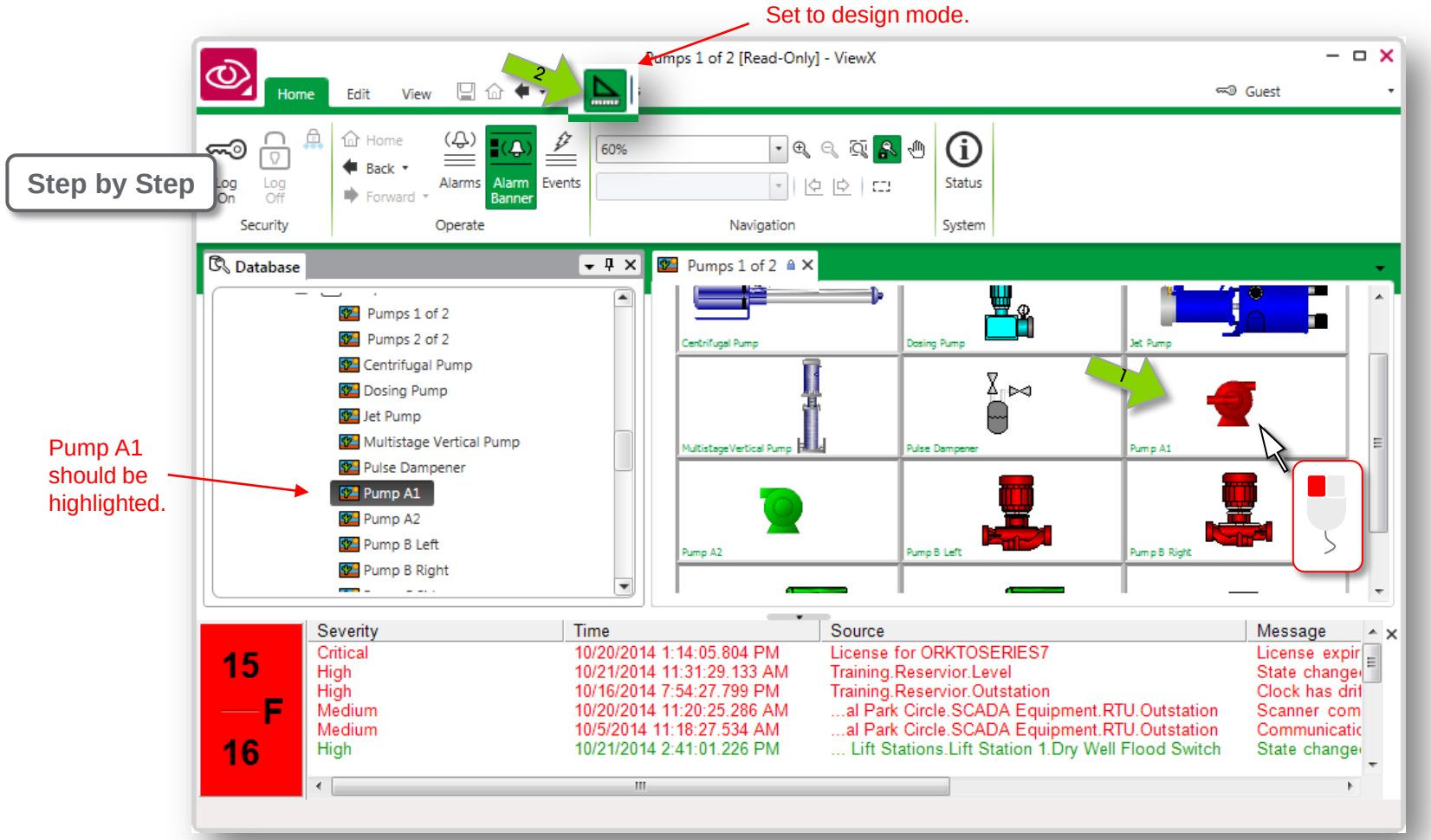
- We need to add a pump and the easiest way is to copy it put from the symbols library. Set the project into **Run** mode.

Step by Step



Add a Pump

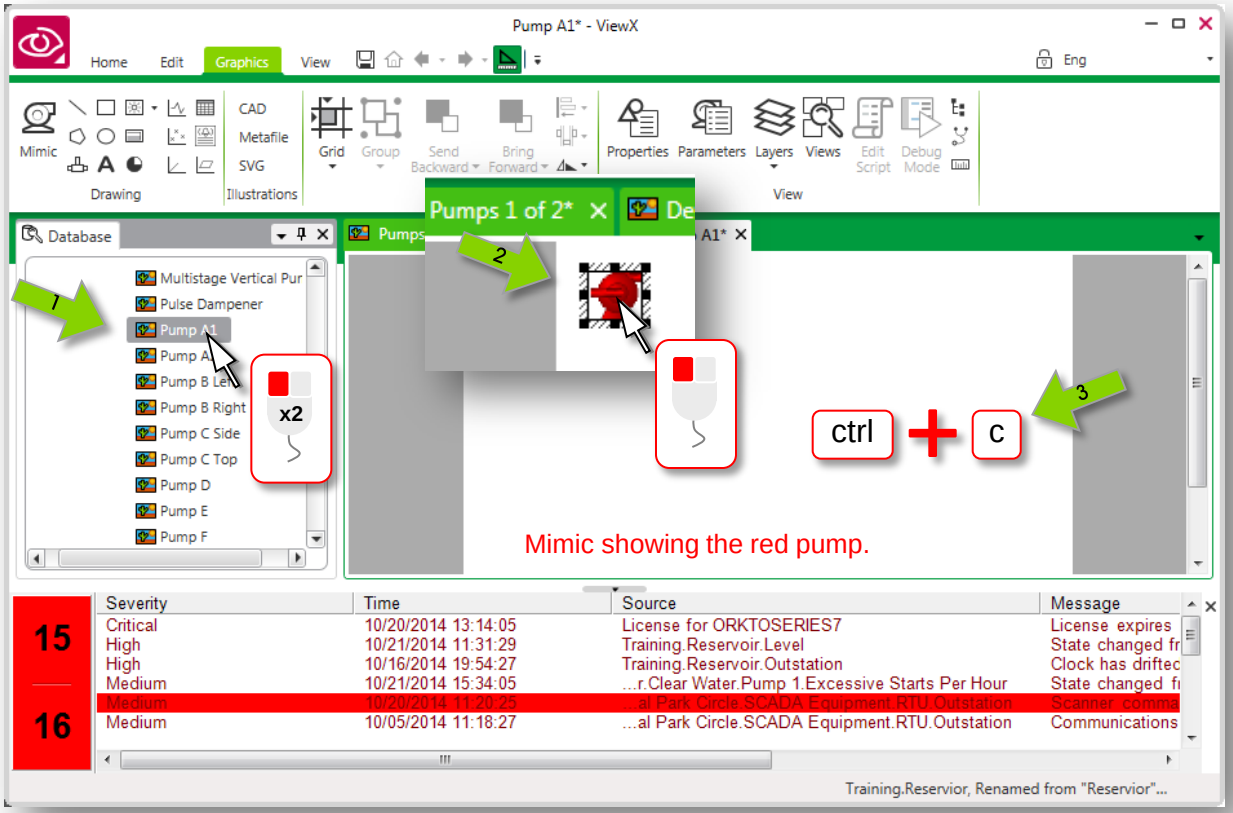
- Click on the red **Pump A1** and set the project onto **Design Mode**.



Add a Pump

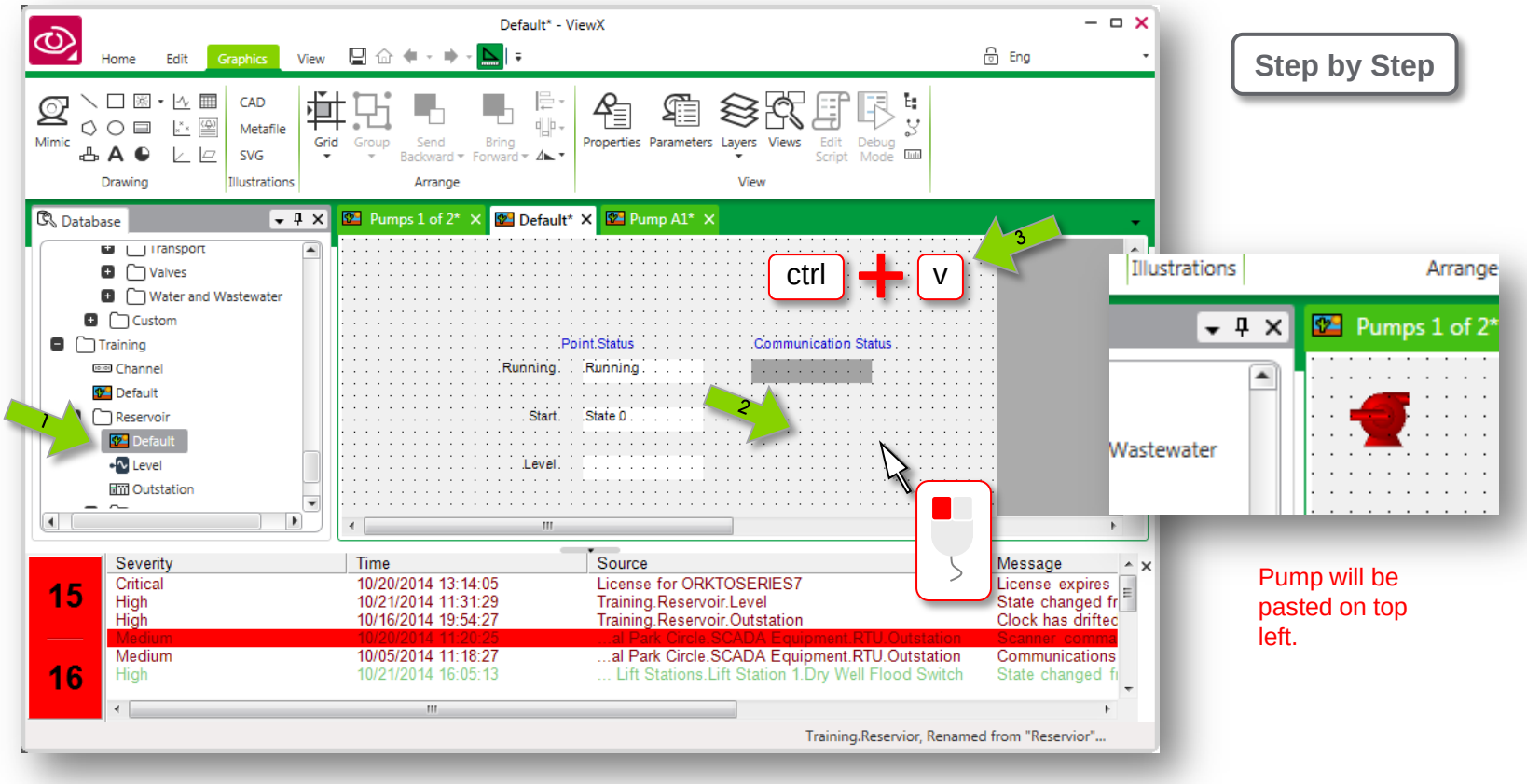
- Double click on **Pump A1** in the **Database Pane** to bring out the mimic showing the red pump. **View X** will turn **Design Mode** by default.
- Select the pump in the mimic and press **ctrl-c**.

Step by Step



Add a Pump

- Go back to the **Reservoir -> Default** mimic, click anywhere on the screen and then paste the pump onto the screen by pressing **ctrl-v**.



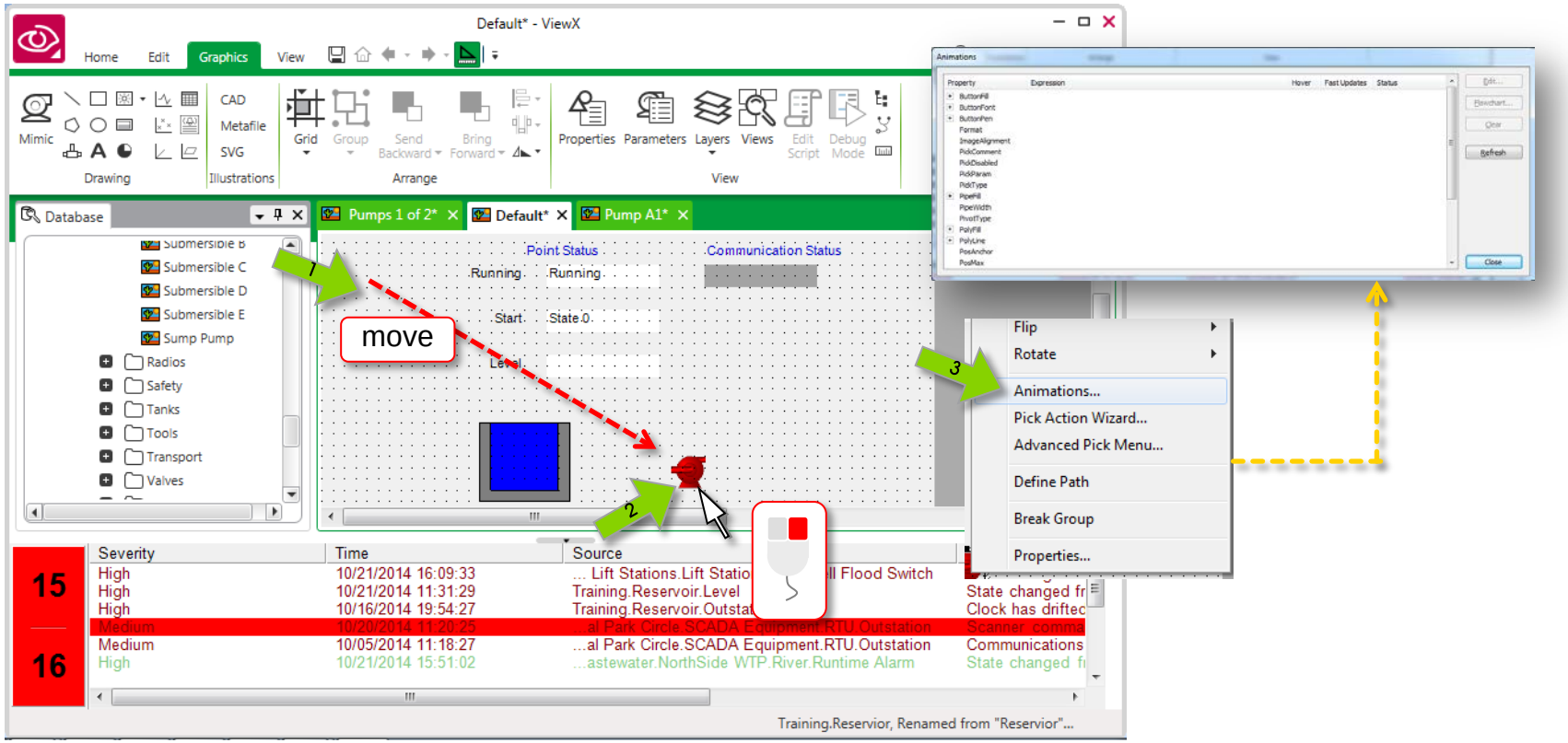
Step by Step

Pump will be pasted on top left.

Animating the Pump

- Move the pump into the correct position.
- Right click on the pump and select **Animations**.

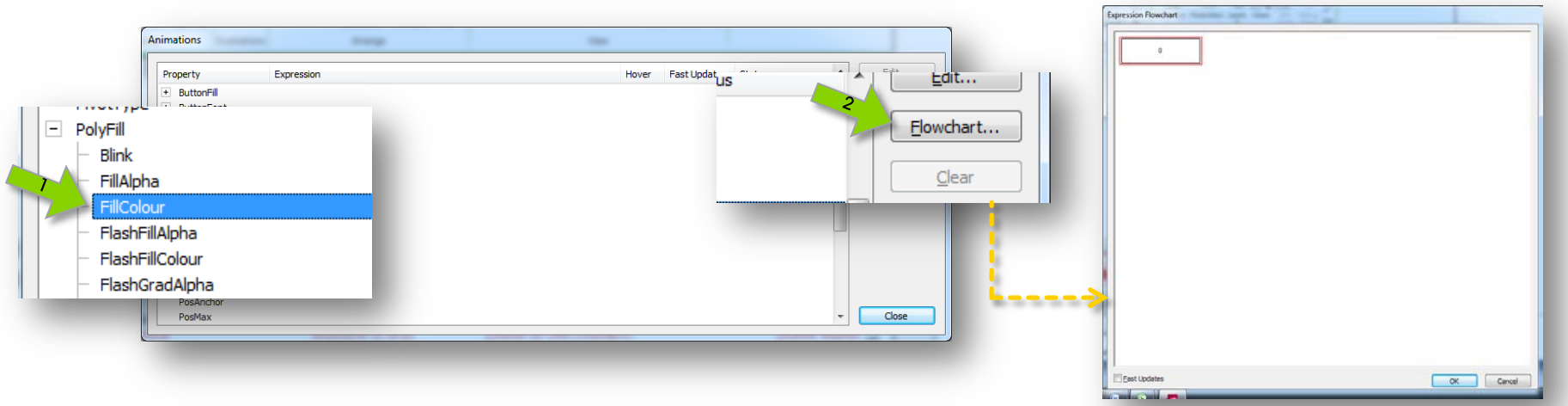
Step by Step



Animating the Pump

- Select **PolyFill -> FillColor**. Then click on **Flowchart**.

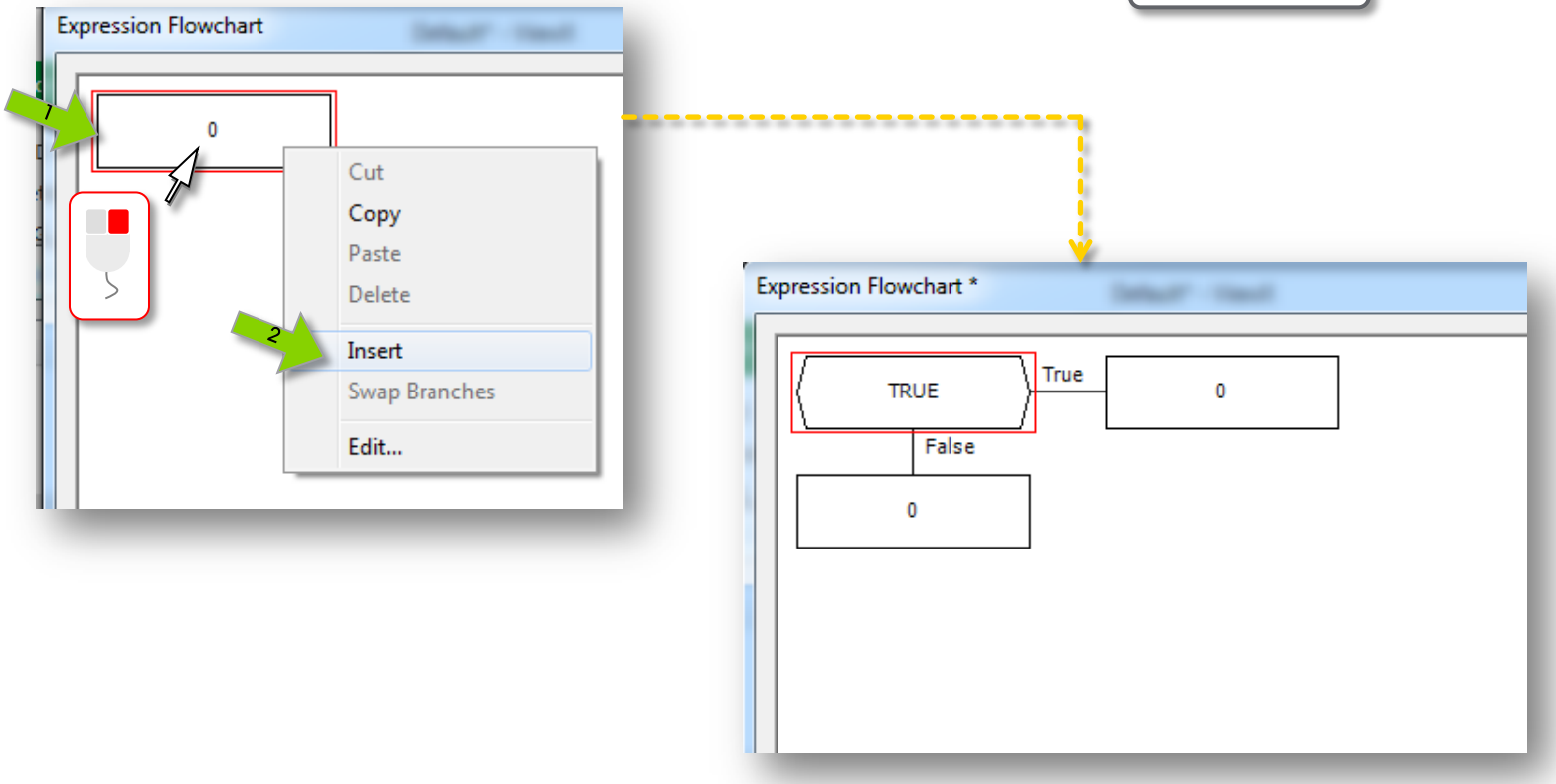
Step by Step



Animating the Pump

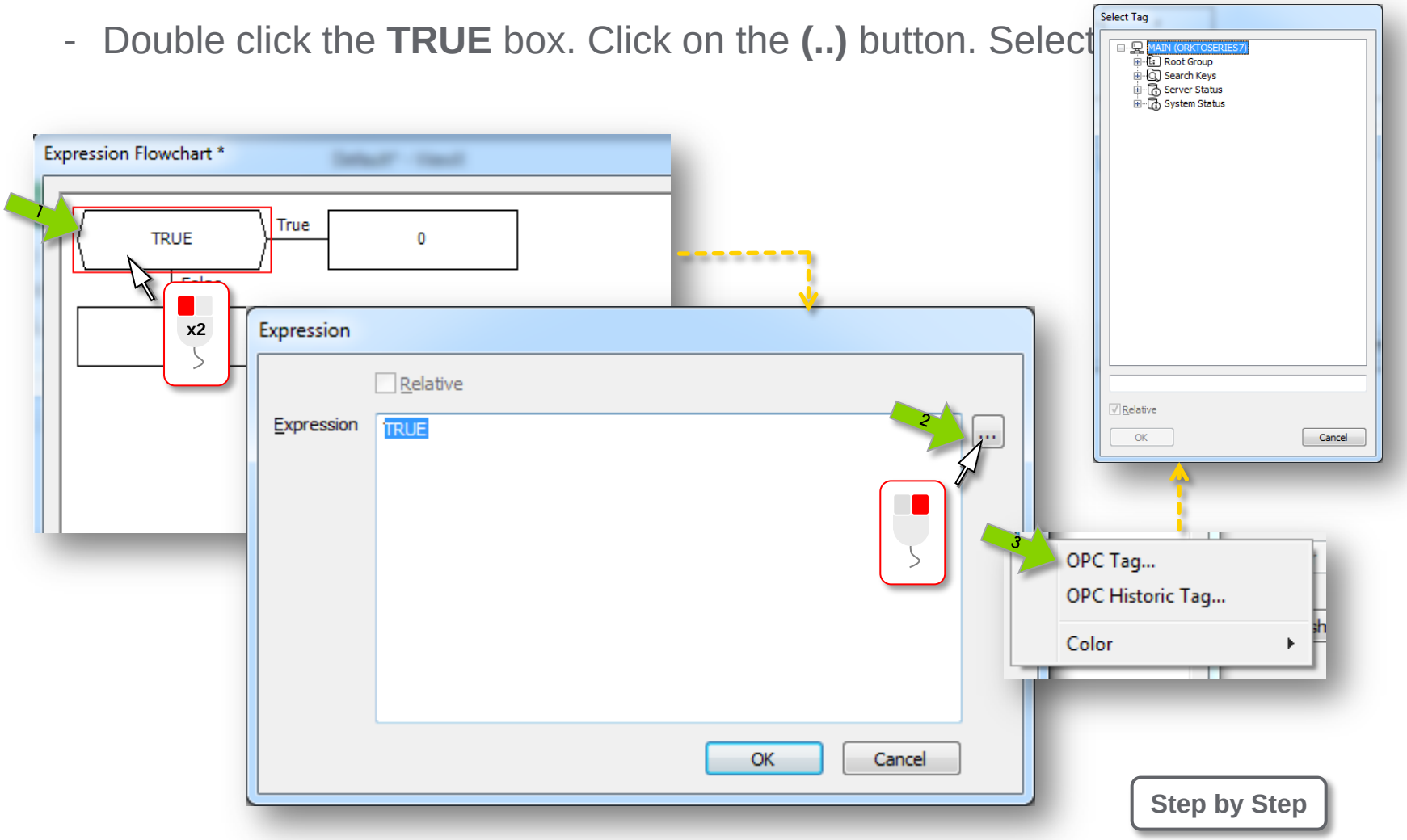
- Right click the **0** box and select **Insert**.

Step by Step



Animating the Pump

- Double click the **TRUE** box. Click on the **(..)** button. Select

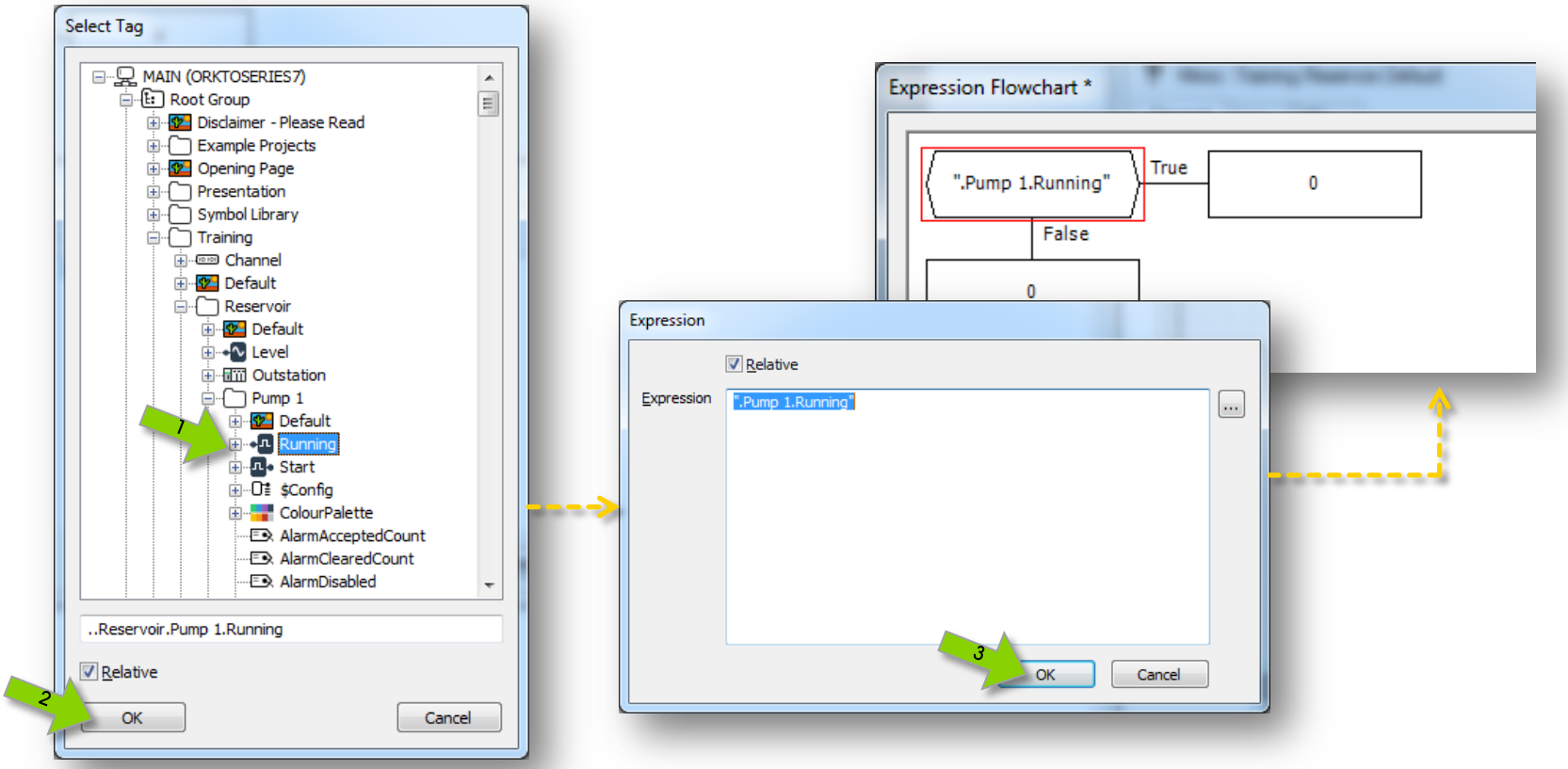


Step by Step

Animating the Pump

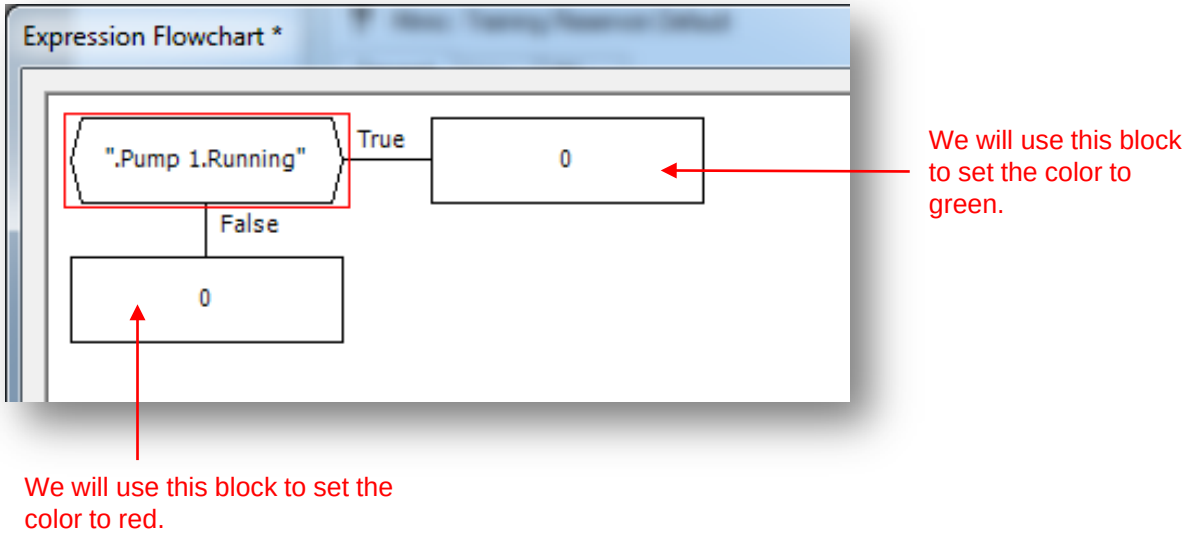
- Select the **Running** signal (**Root Group -> Training ->Reservoir -> Pump 1 -> Running**). Then click **OKs**.

Step by Step



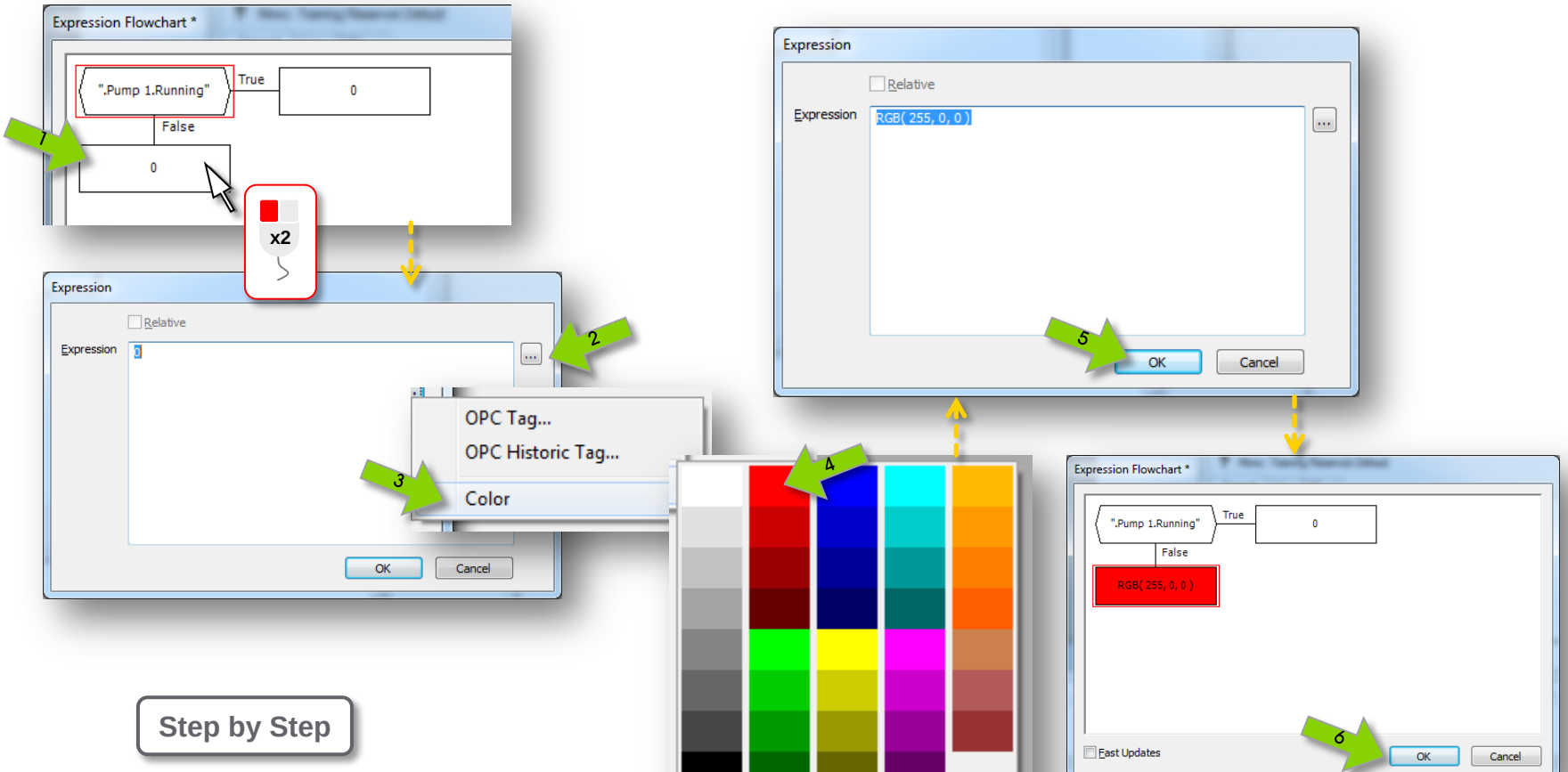
Animating the Pump

- Looking at this flow chart, it is used to determine what to do when pump is running and when not running.
- In this case, we can use the action blocks to set the color of the symbol.



Animating the Pump

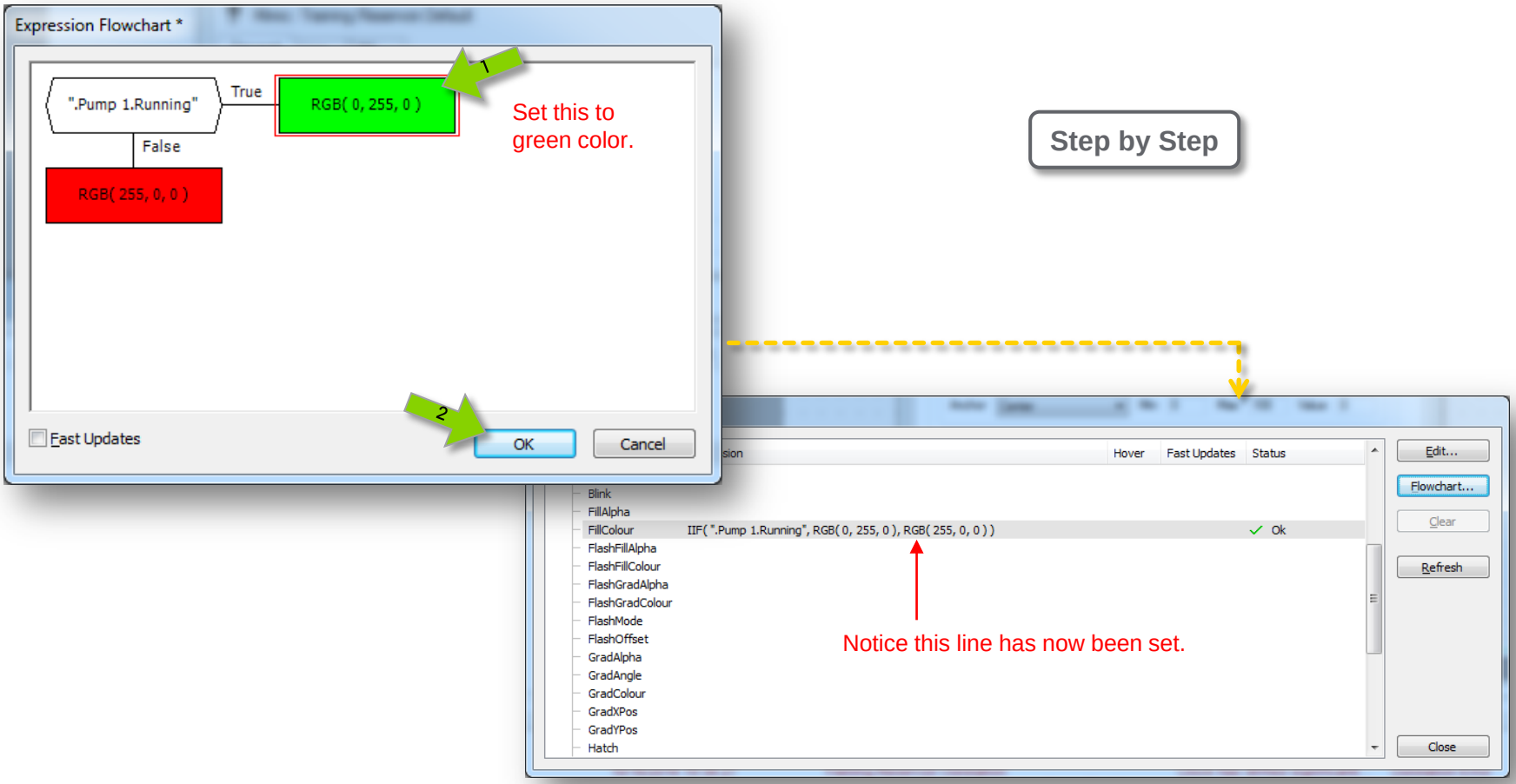
- Double click the box below and do as follows to set the color red.



Step by Step

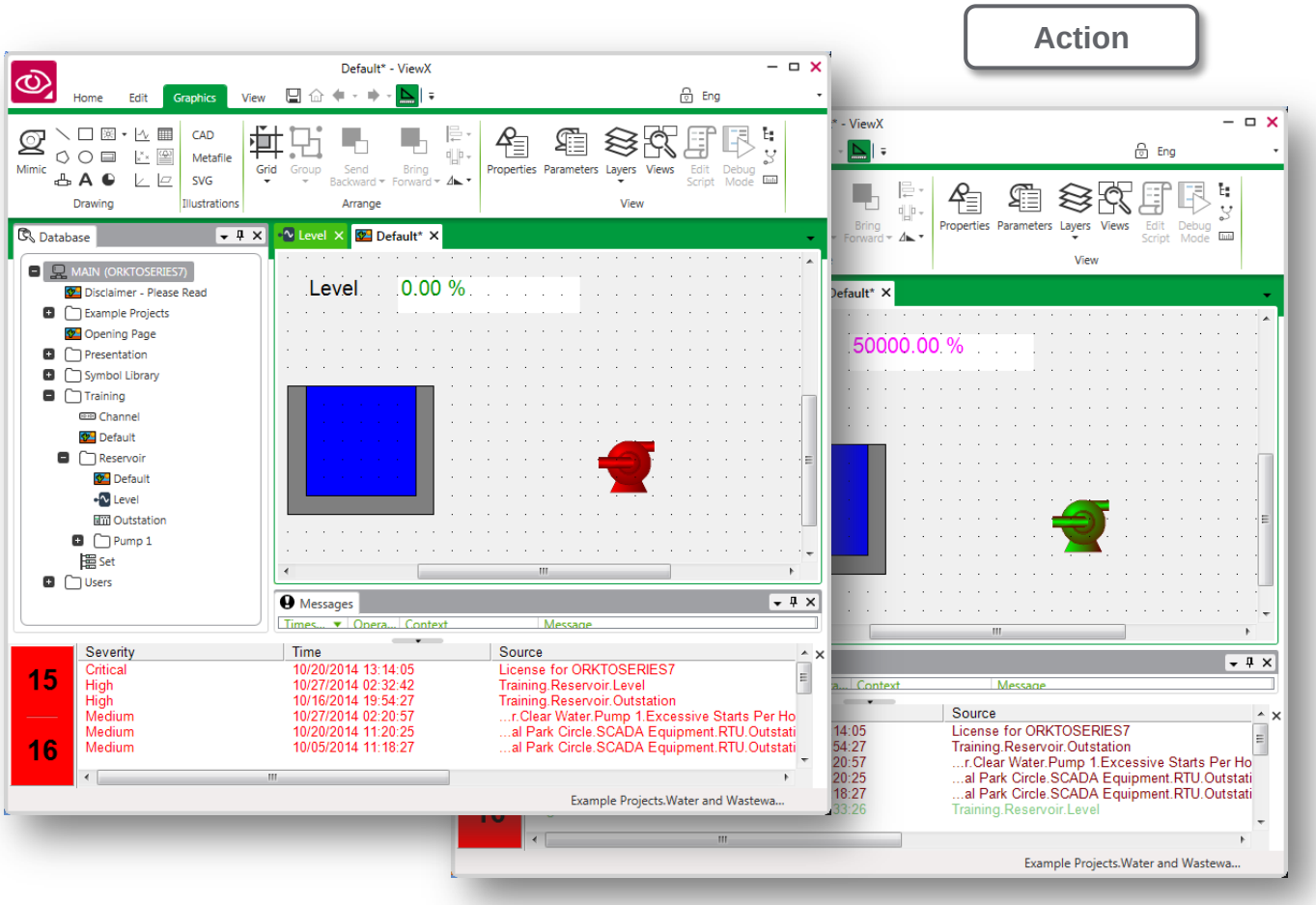
Animating the Pump

- Repeat the same method and set the **True** box green. Then click on the OK button.



Animating the Pump

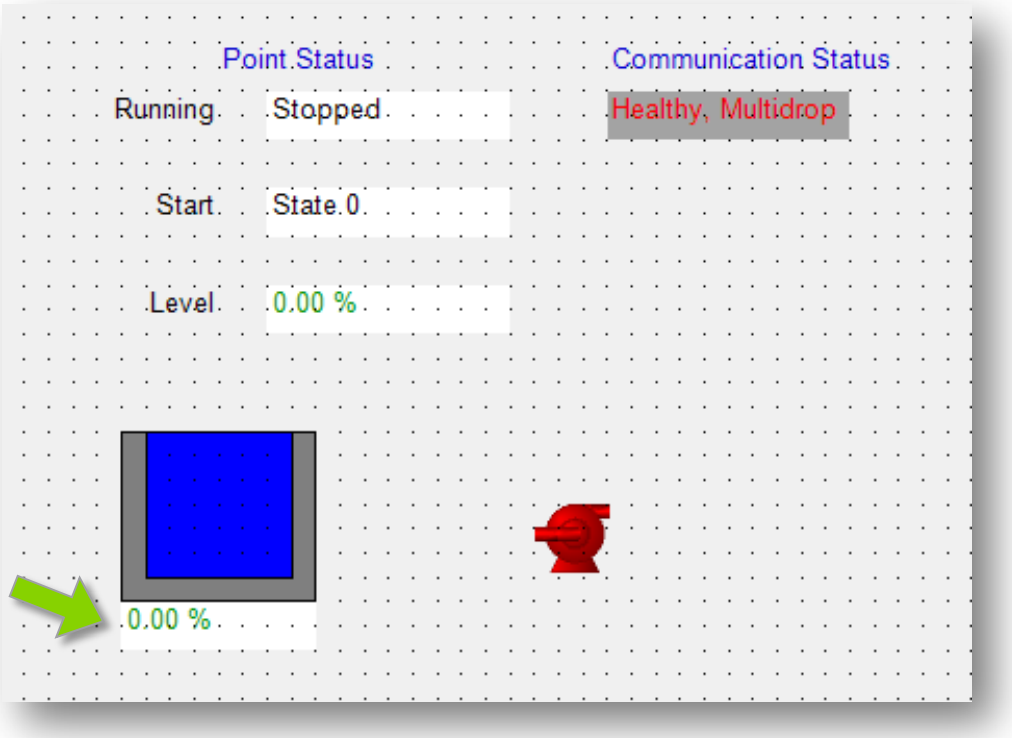
- Put the mimic into run mode and verify that the symbol work accordingly.



Complete the Mimic

- Using the skills learned, add in the water level text below the tank.

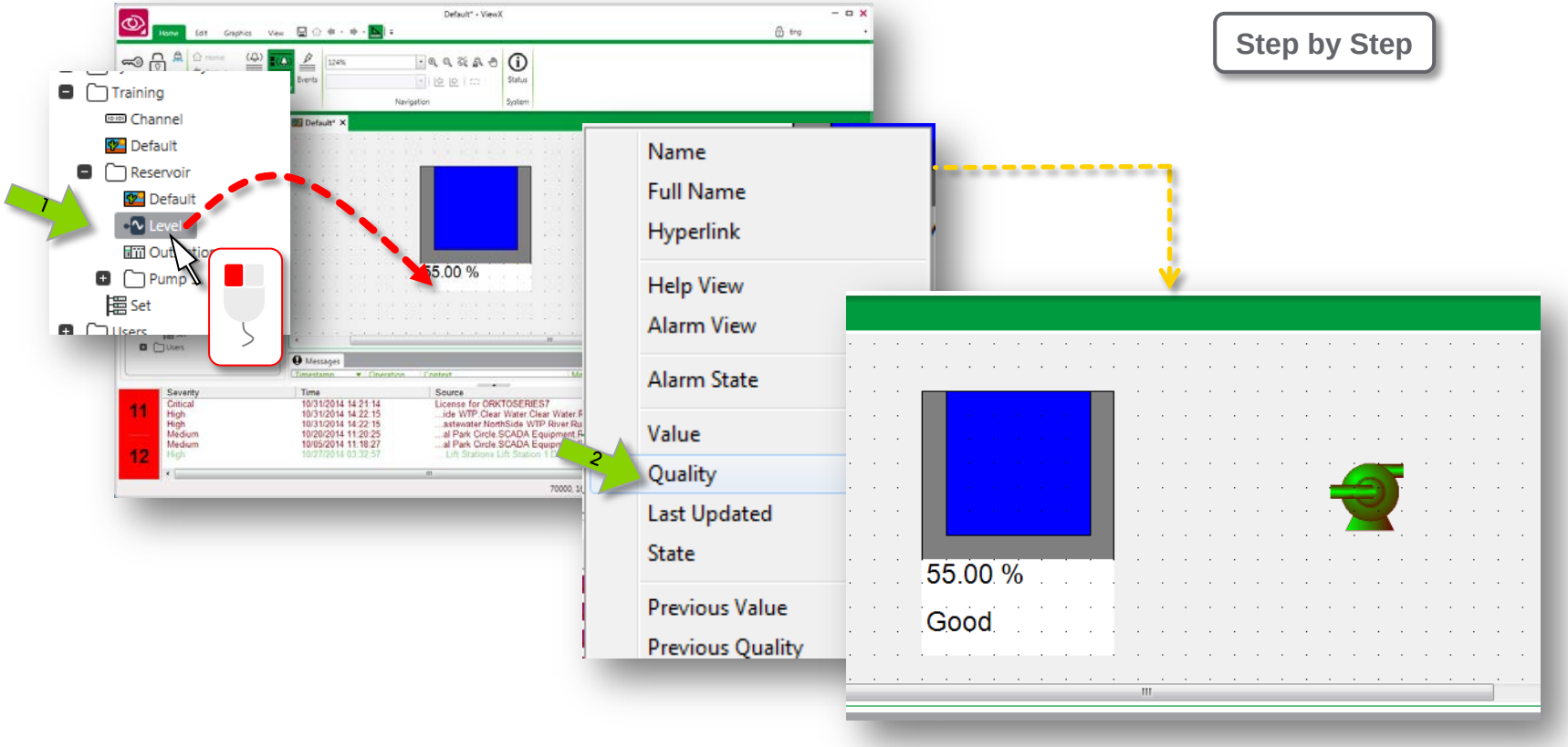
Action



Just simply using copy paste and resize will do this one.

Complete the Mimic

- Next we add the water level point's **Quality** signal to the bottom.
- This is done by dragging the Level point over the mimic and selecting **Quality**. You may need to resize the field.



Complete the Mimic

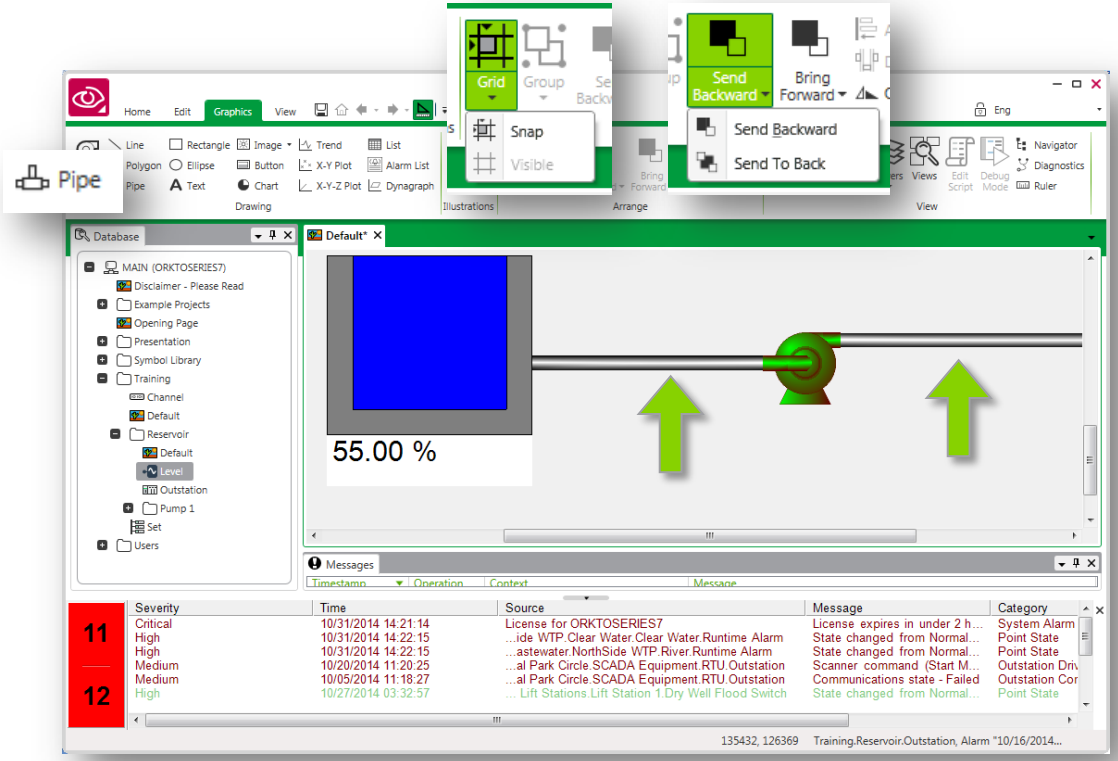
- And then draw some pipes using the **Pipe** tool. You will need to turn off **Snap to Grid** and also change the size of the pipe. **Snap** can also be disabled temporary holding down the **ALT** key.

Action

For precise movement and alignment of pipe to pump, turn off Snap to Grid.

Use Bring to Front and Send to Back for placing the pipes behind the tank and pump.

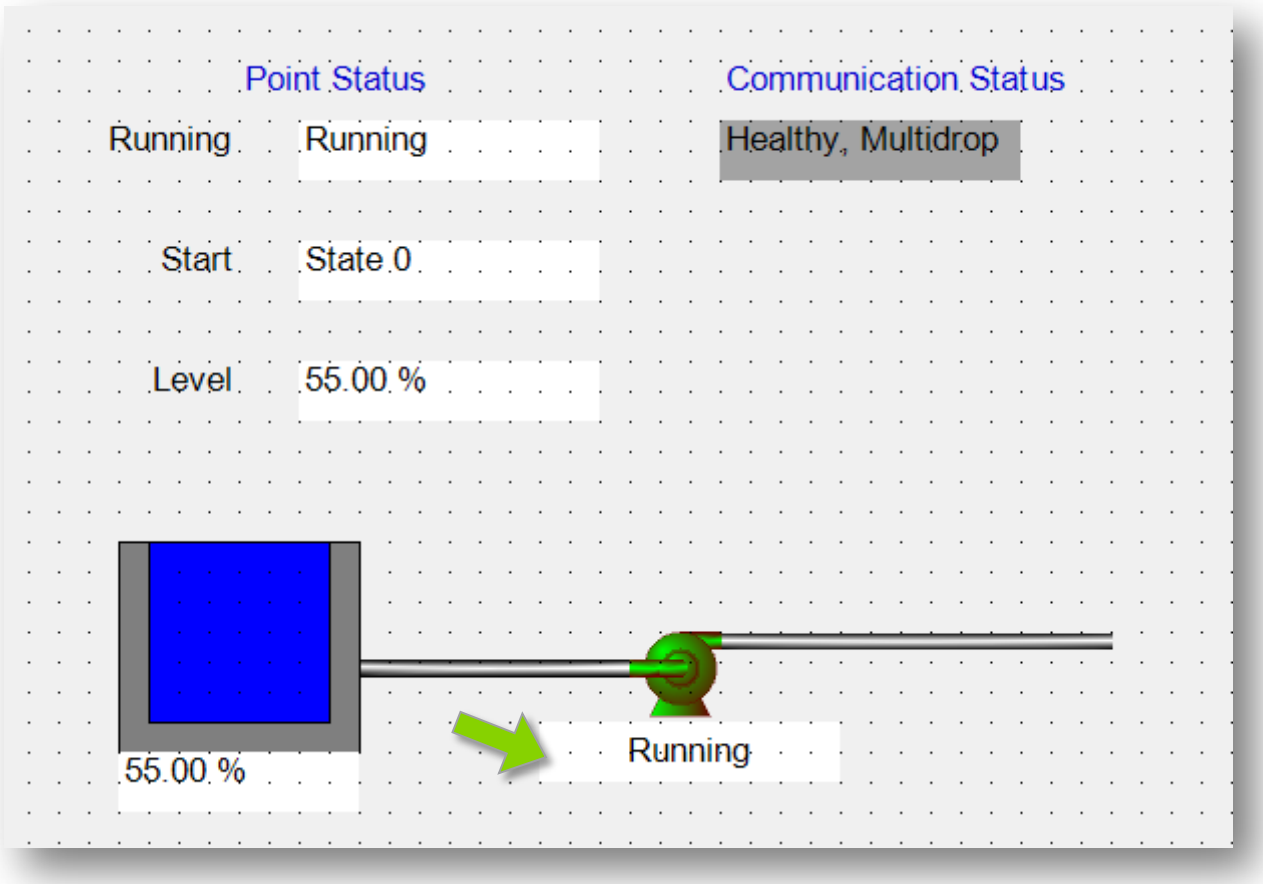
Use the Pipe Tool to dray pipes. Change its size in it's properties page.



Complete the Mimic

- Add the status of the pump below the animated pump symbol.

Action



Embedded Mimics & Symbols

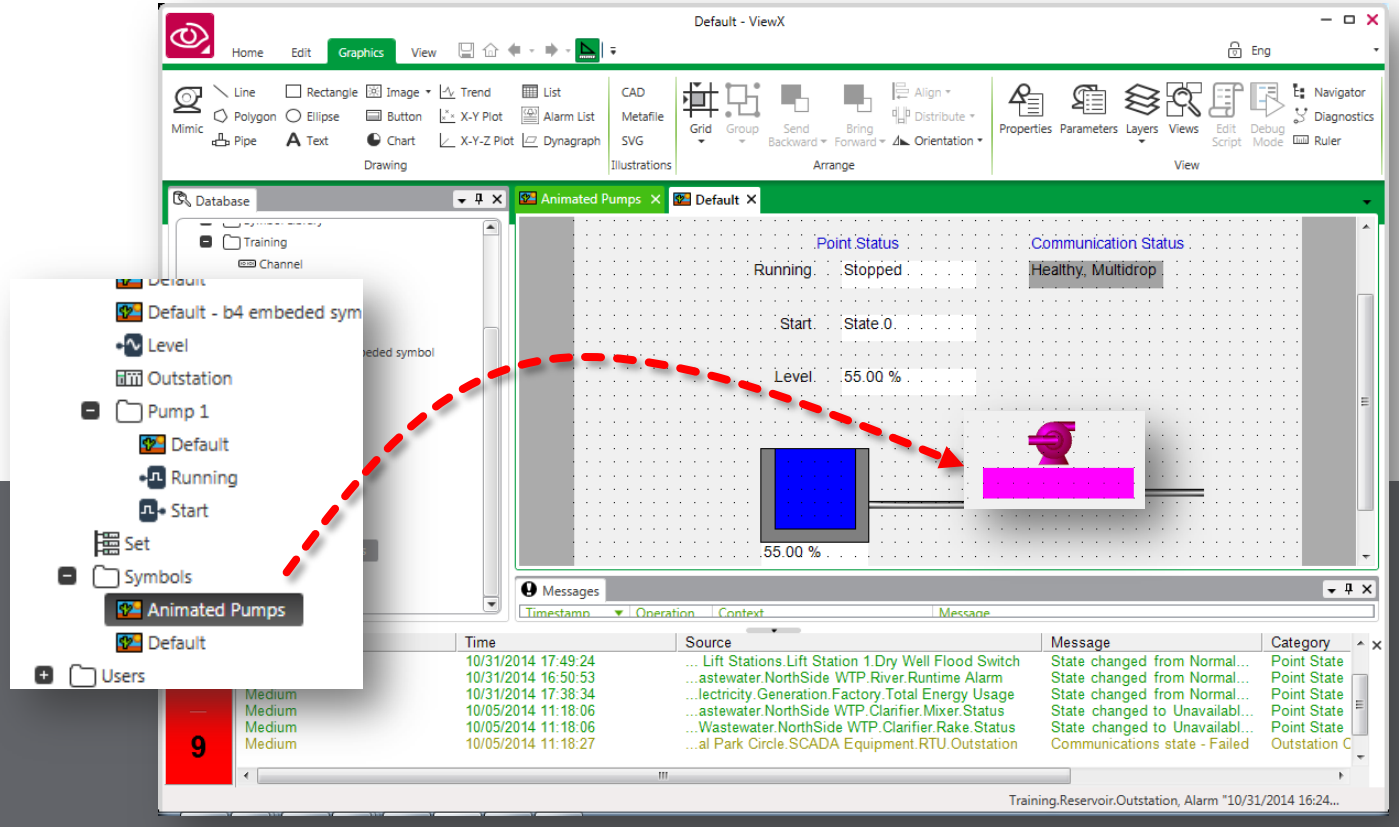
Section 3

Reusability

Confidential Property of Schneider Electric

What are Embedded Objects?

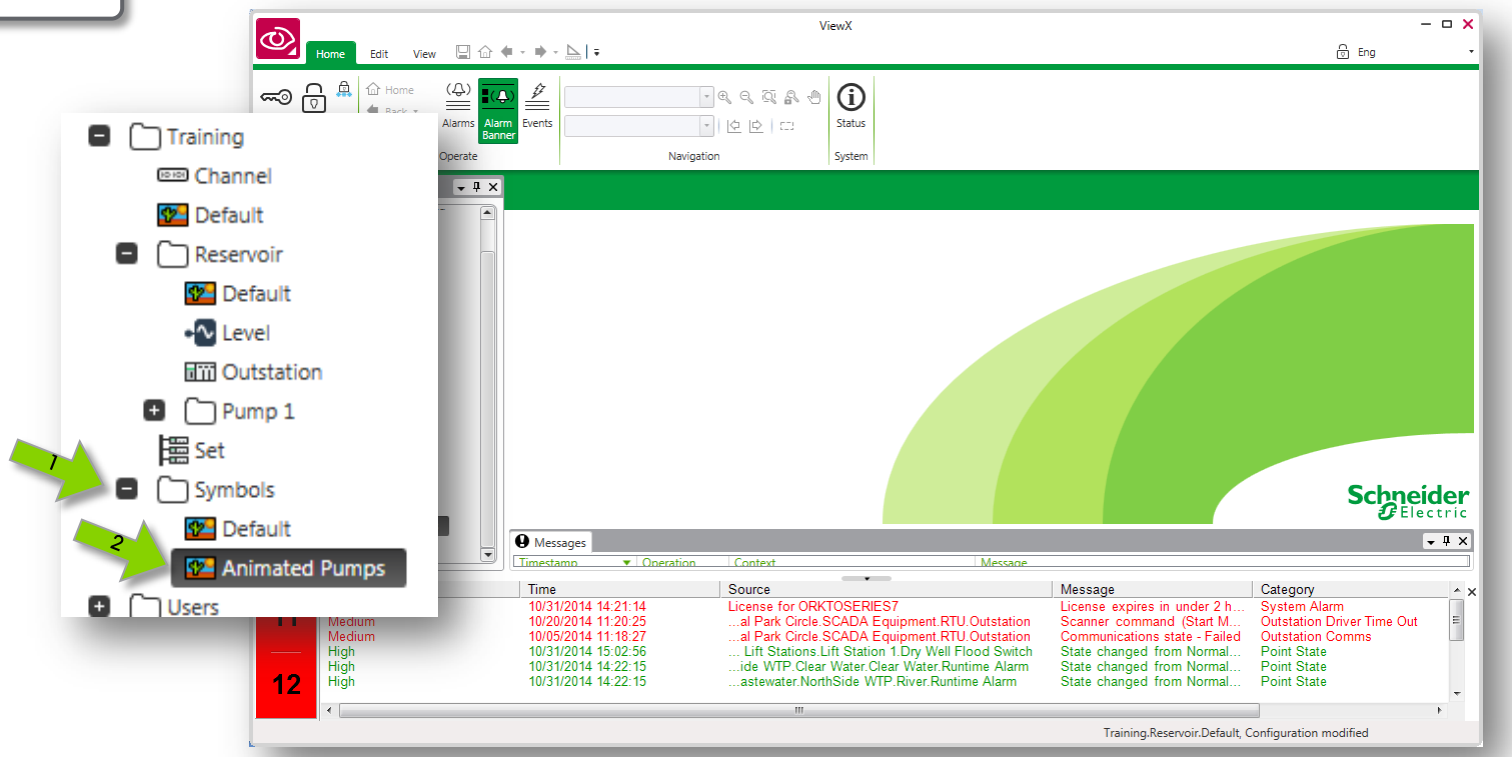
- An embedded mimic inherits the appearance and much of the functionality of its parent, and when you make changes to the parent, the changes are automatically applied to all embedded versions of the mimic.



Creating an Embedded Symbol

- Create a new group and call it **Symbols**.
- And then create a new mimic within called **Animated Pumps**.

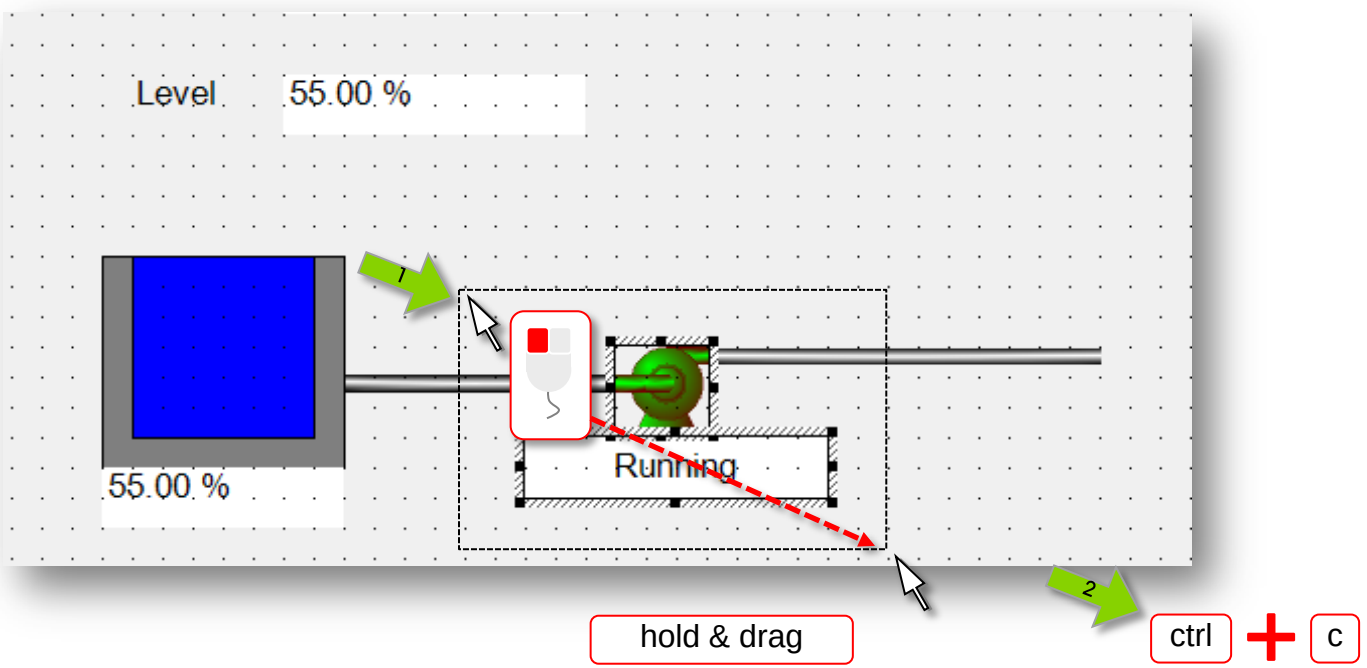
Action



Creating an Embedded Symbol

- Back to the **Reservoir's** mimic, select the pump components by using the mouse and dragging it across the objects. Then press **ctrl-c** to copy the contents into the clipboard.

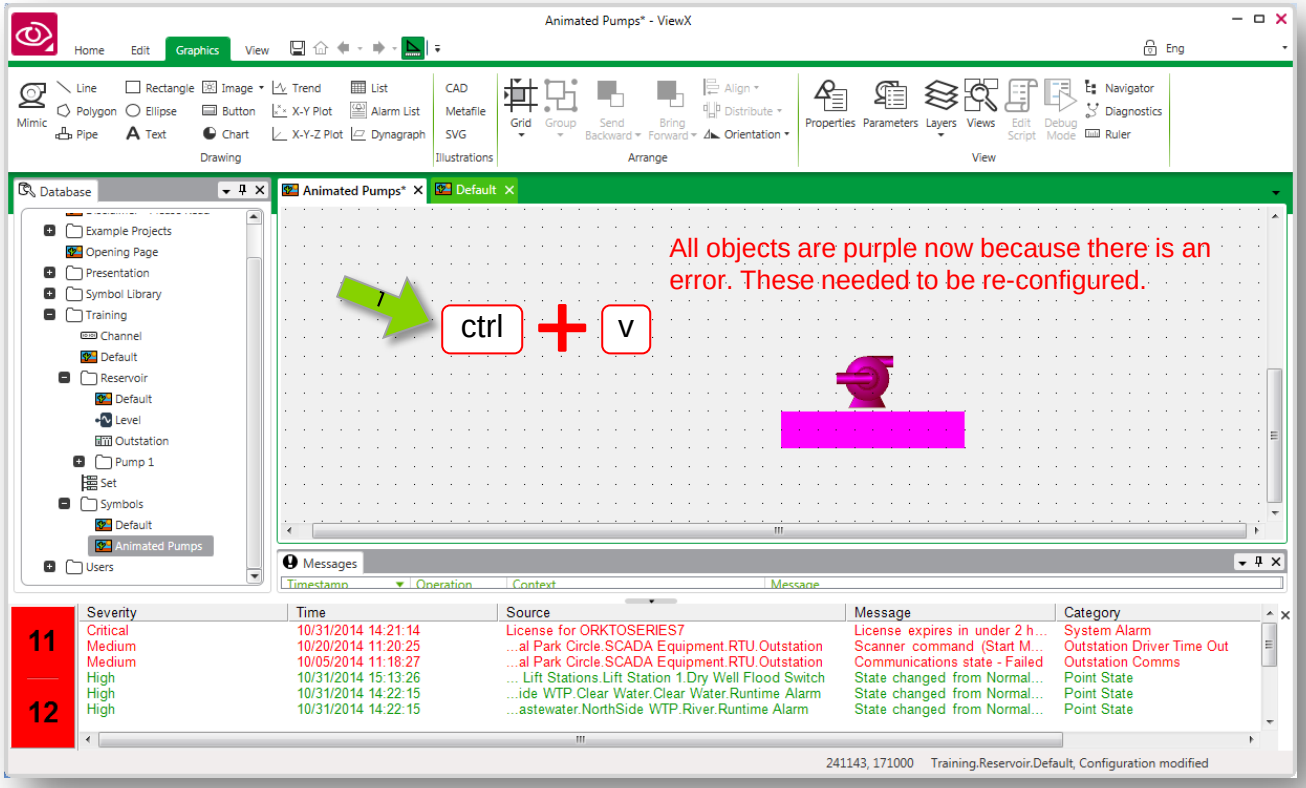
Step by Step



Creating an Embedded Symbol

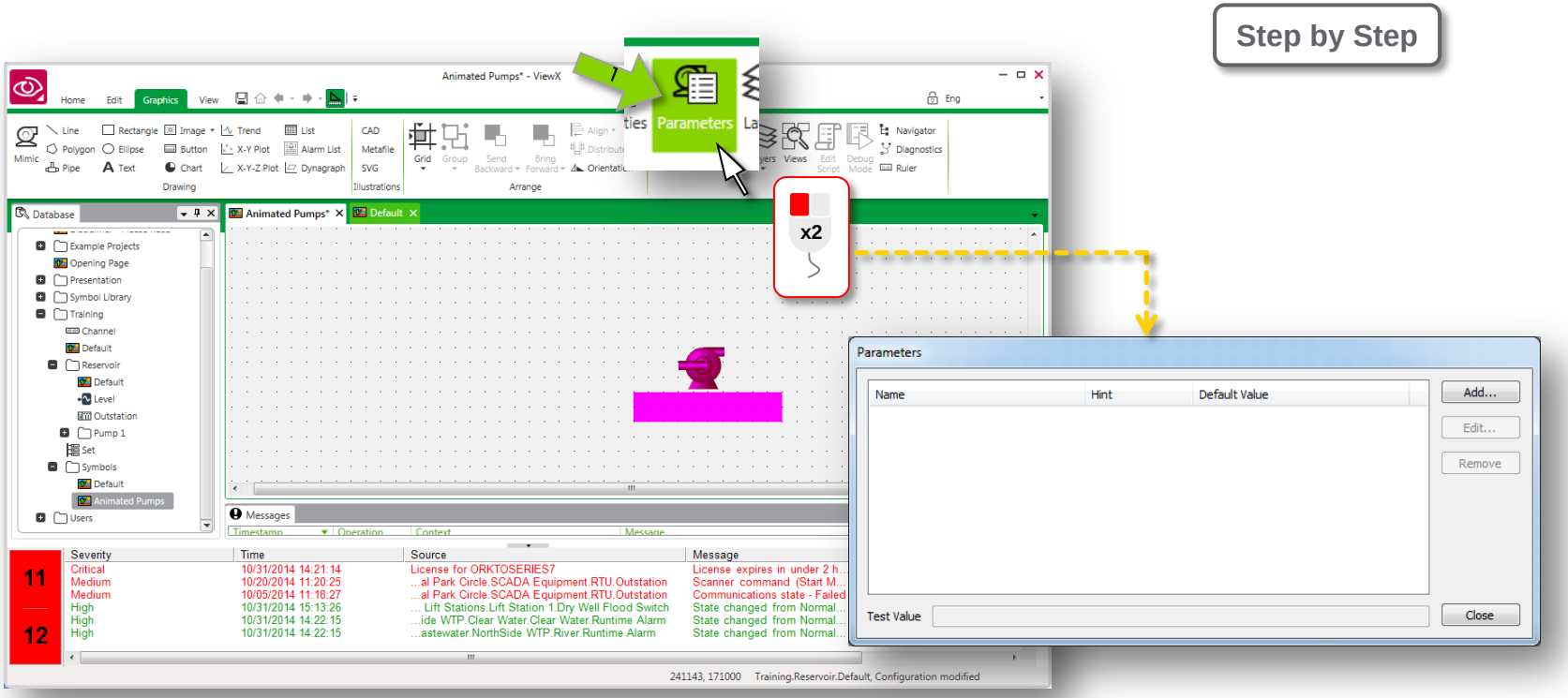
- Open the **Animated Symbols** mimic and the press **ctrl-v** to paste the previously copied content into here.

Action



Creating an Embedded Symbol

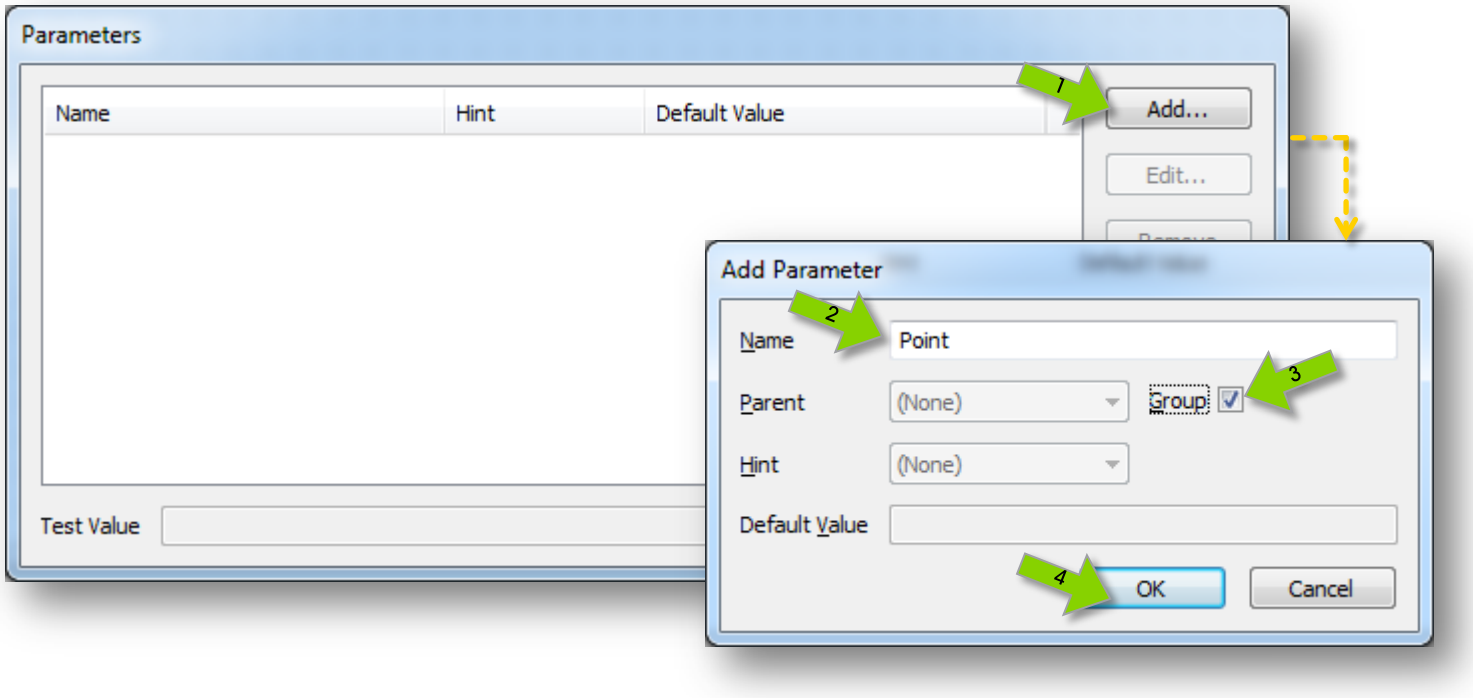
- We need to prep this symbol to accept parameters that we can enter later. Do as per follows.



Creating an Embedded Symbol

- Click on **Add**.
- In the **Name** field, enter the text **Point**. Make sure the **Group** check box is checked.
- Then click on **OK**.

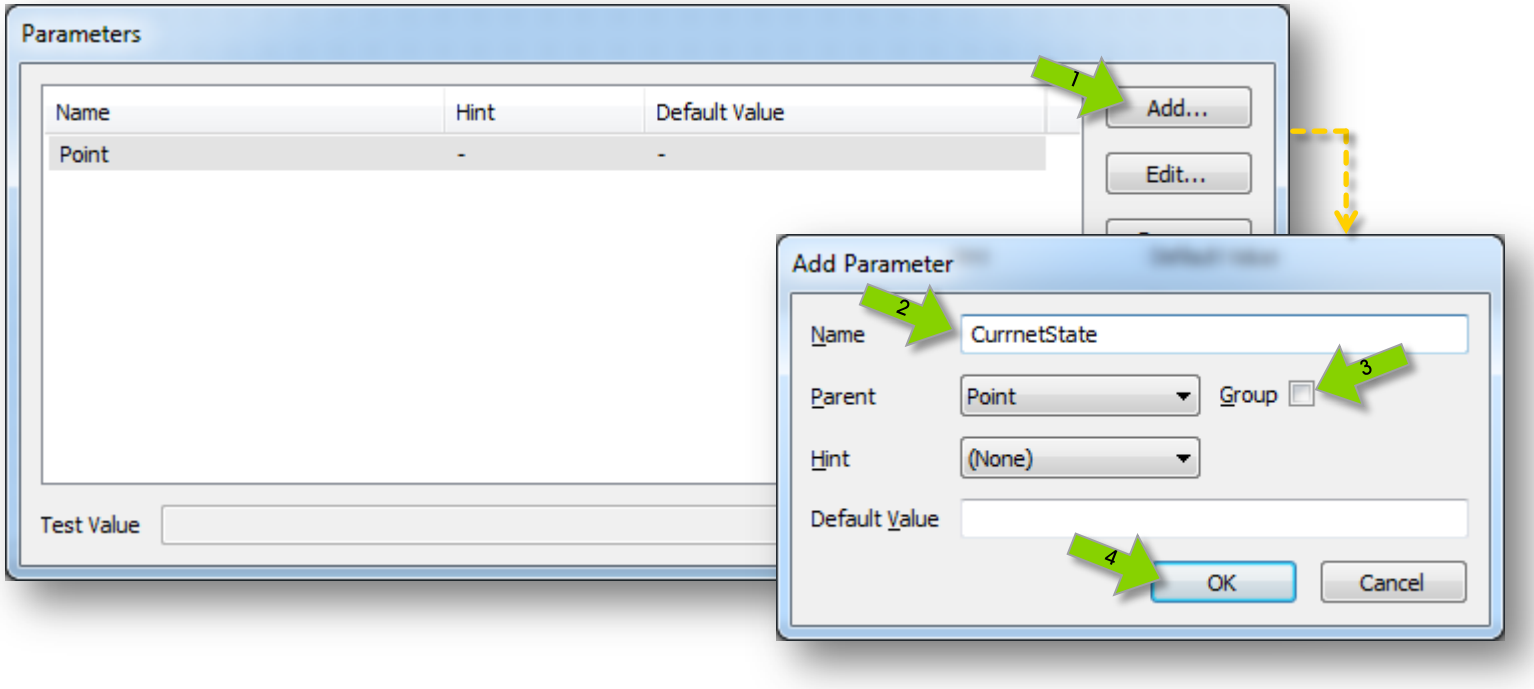
Step by Step



Creating an Embedded Symbol

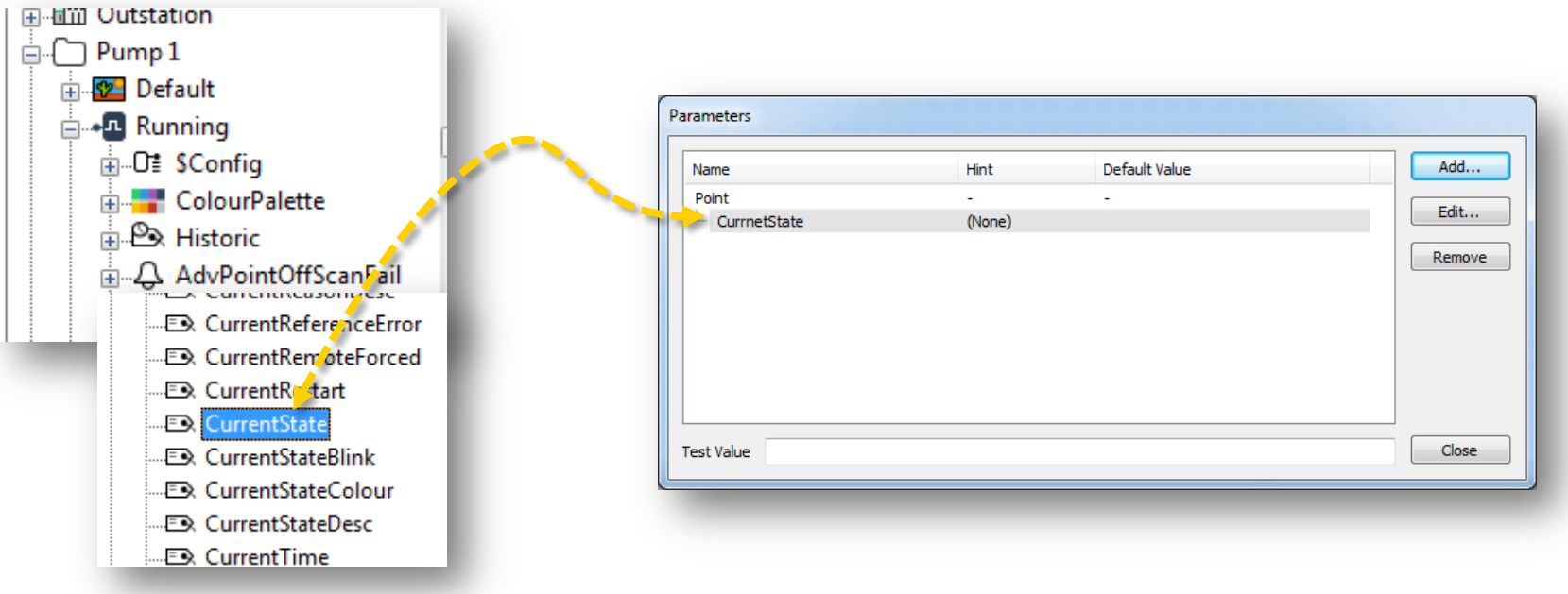
- Click on **Add**.
- In the **Name** field, enter the text **CurrentState**. Make sure the **Group** check box is NOT checked.
- Then click on **OK**.

Step by Step



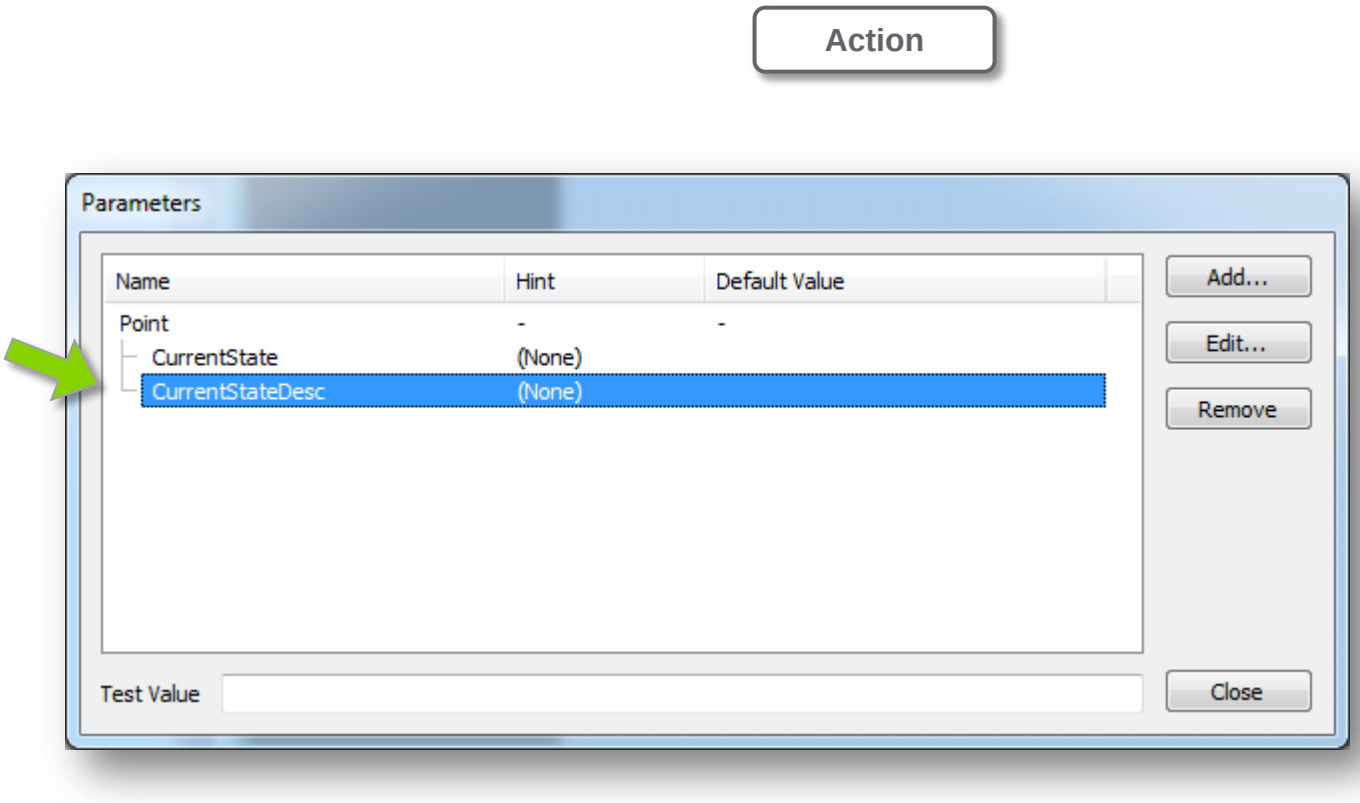
Creating an Embedded Symbol

- What we are trying to do is to reference the **CurrentState** of a point, which is one of the default properties of any points in CS.



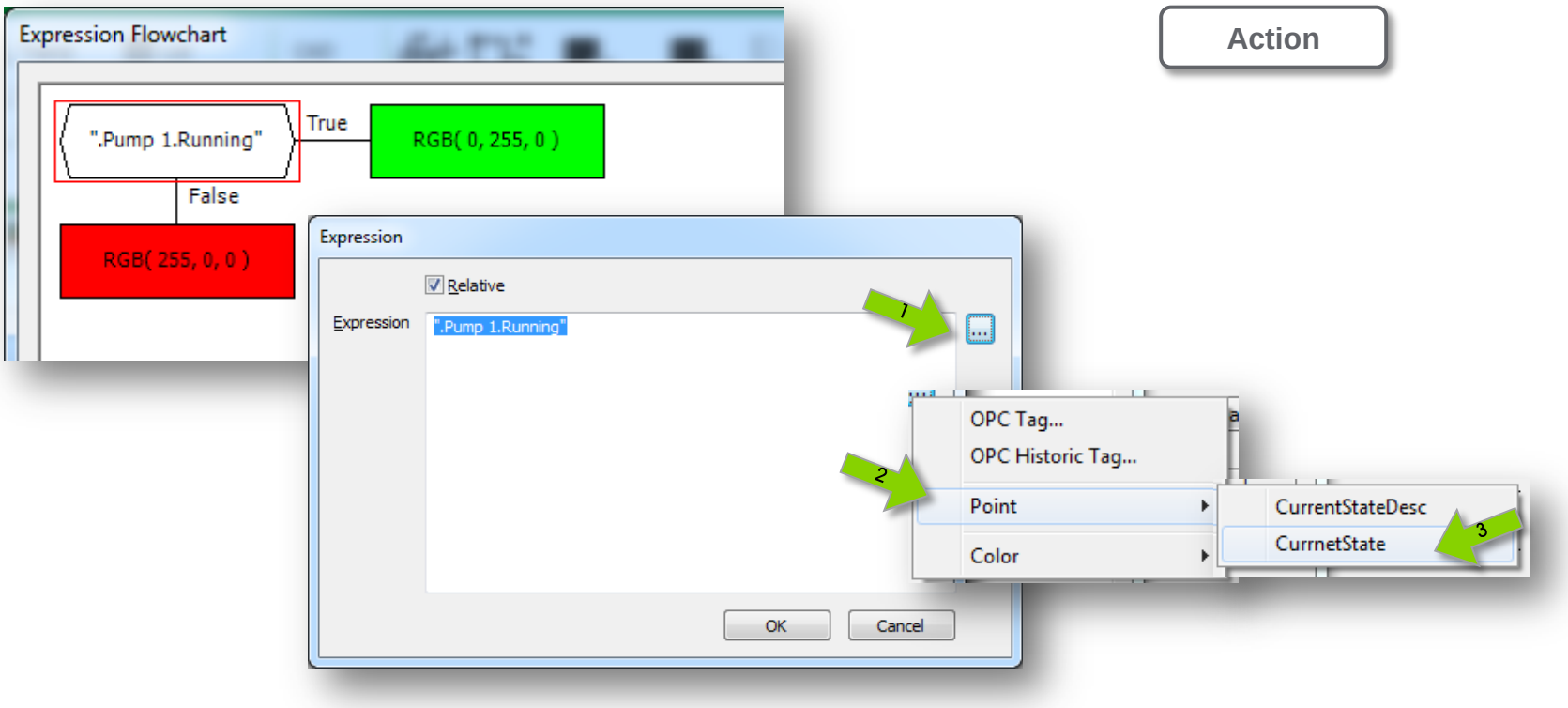
Creating an Embedded Symbol

- Next add **CurrentStateDesc** as the name of yet another parameter you add to **Point**.



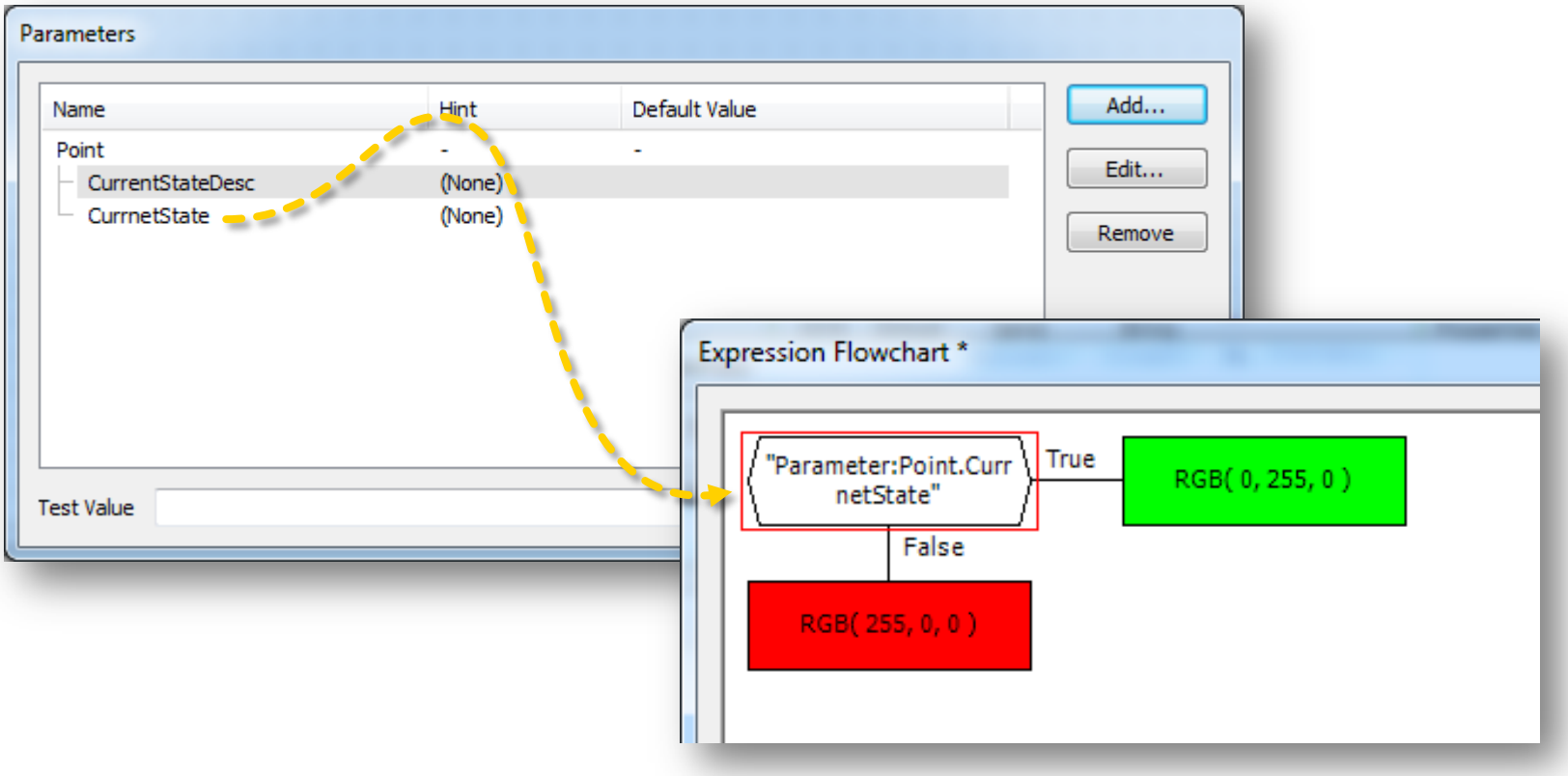
Creating an Embedded Symbol

- Open the pump object's flowchart and change the **PolyFill->FillColor** to follow the new parameter created.



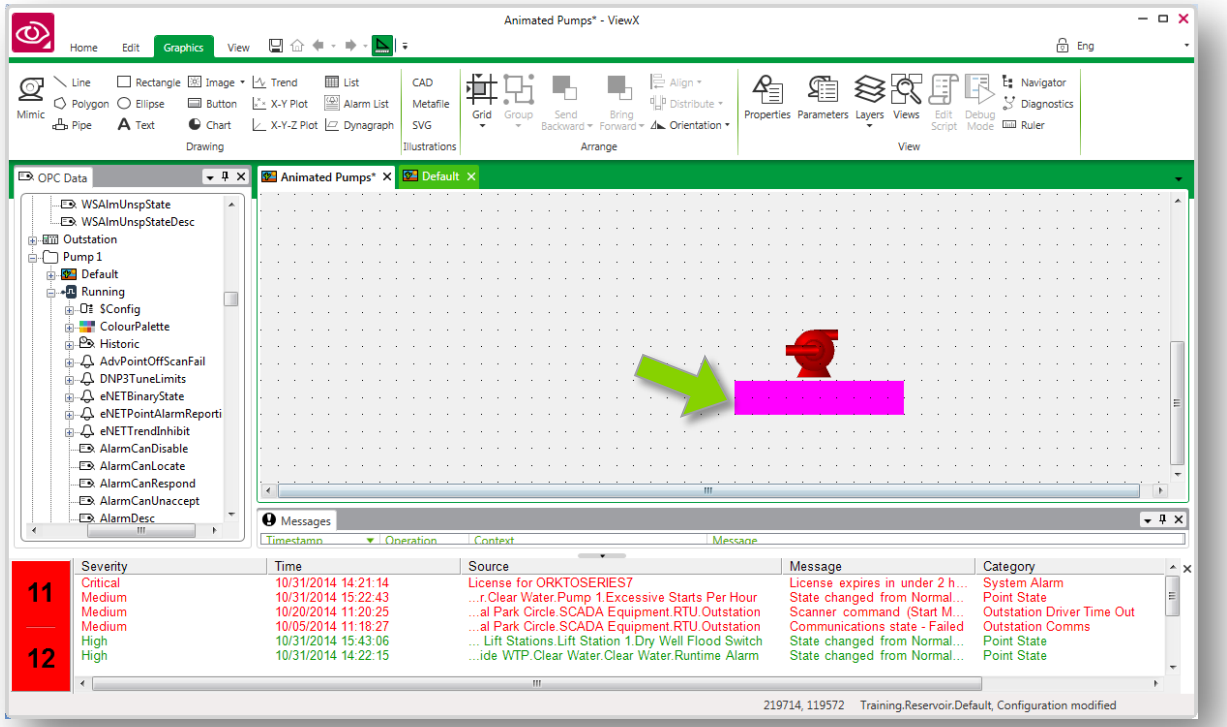
Creating an Embedded Symbol

- What you have done now is to indicate that the decision of the color fill will be based upon a parameter's property that will be provided when this symbol is later used.



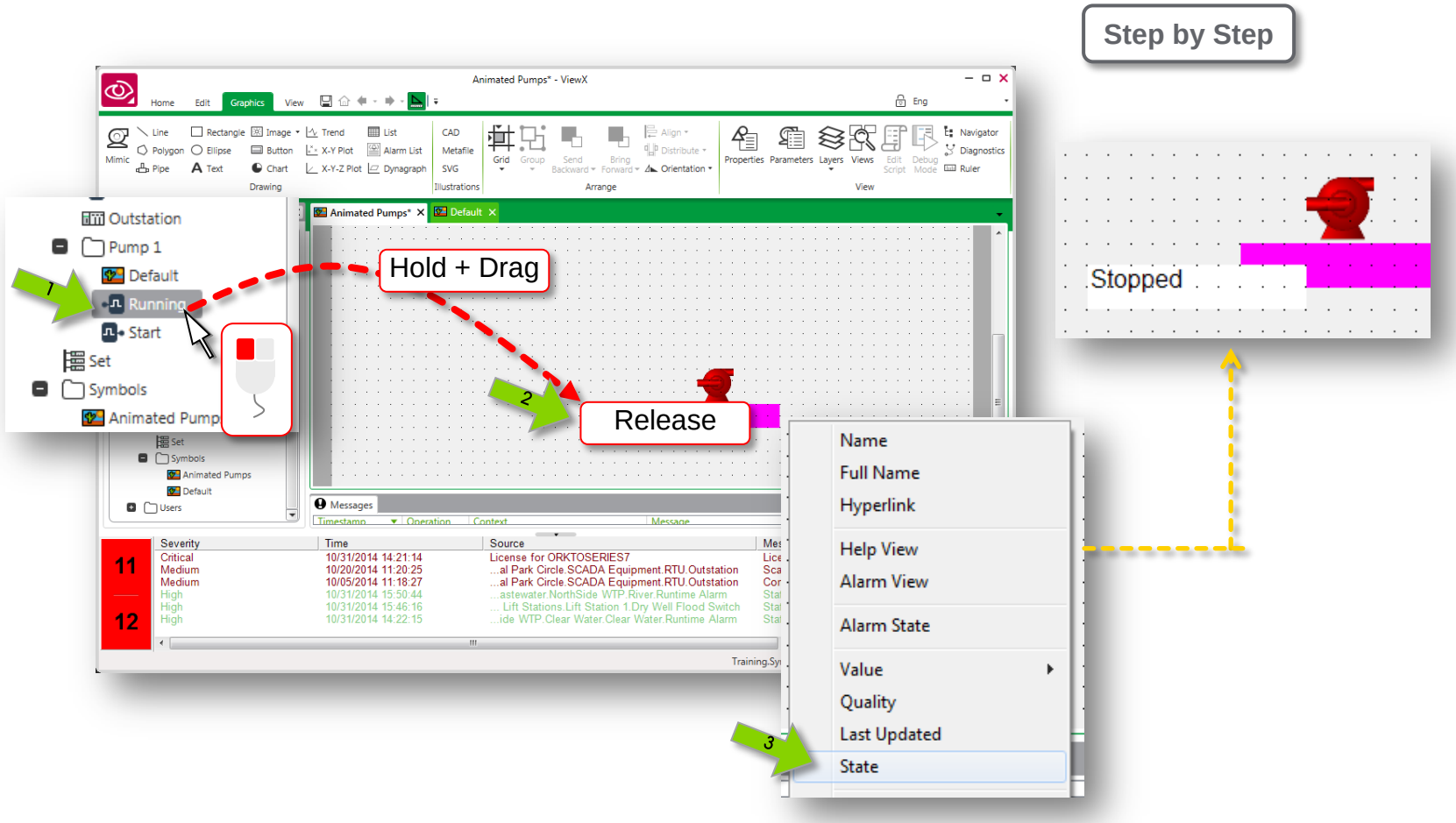
Creating an Embedded Symbol

- Next we would think that the state description below the pump could be set in the same way. **There were some problems when this was tested**. So we will do a different approach.



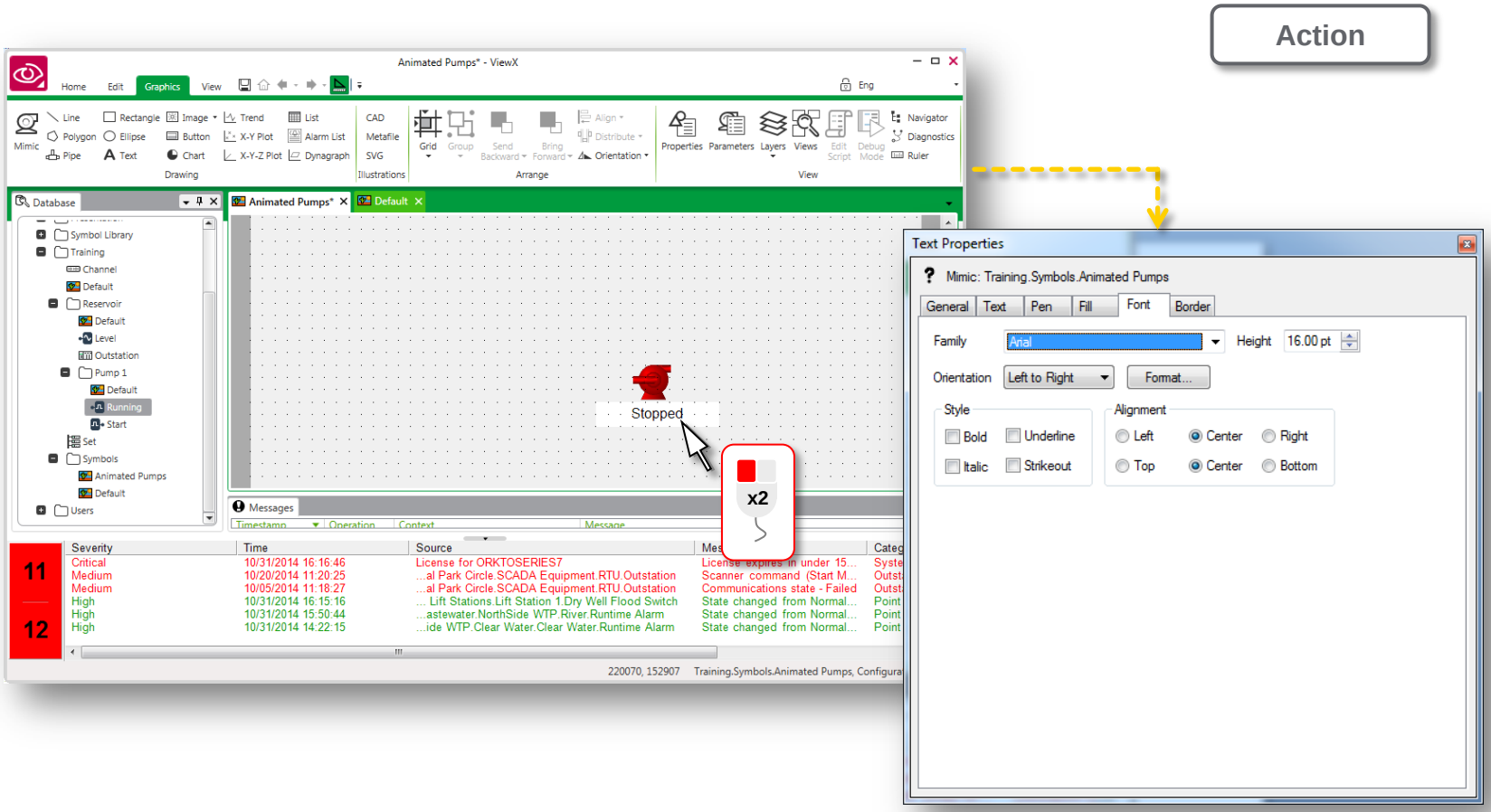
Creating an Embedded Symbol

- Drag the **Running** point from the **Database** pane over into this mimic. The select



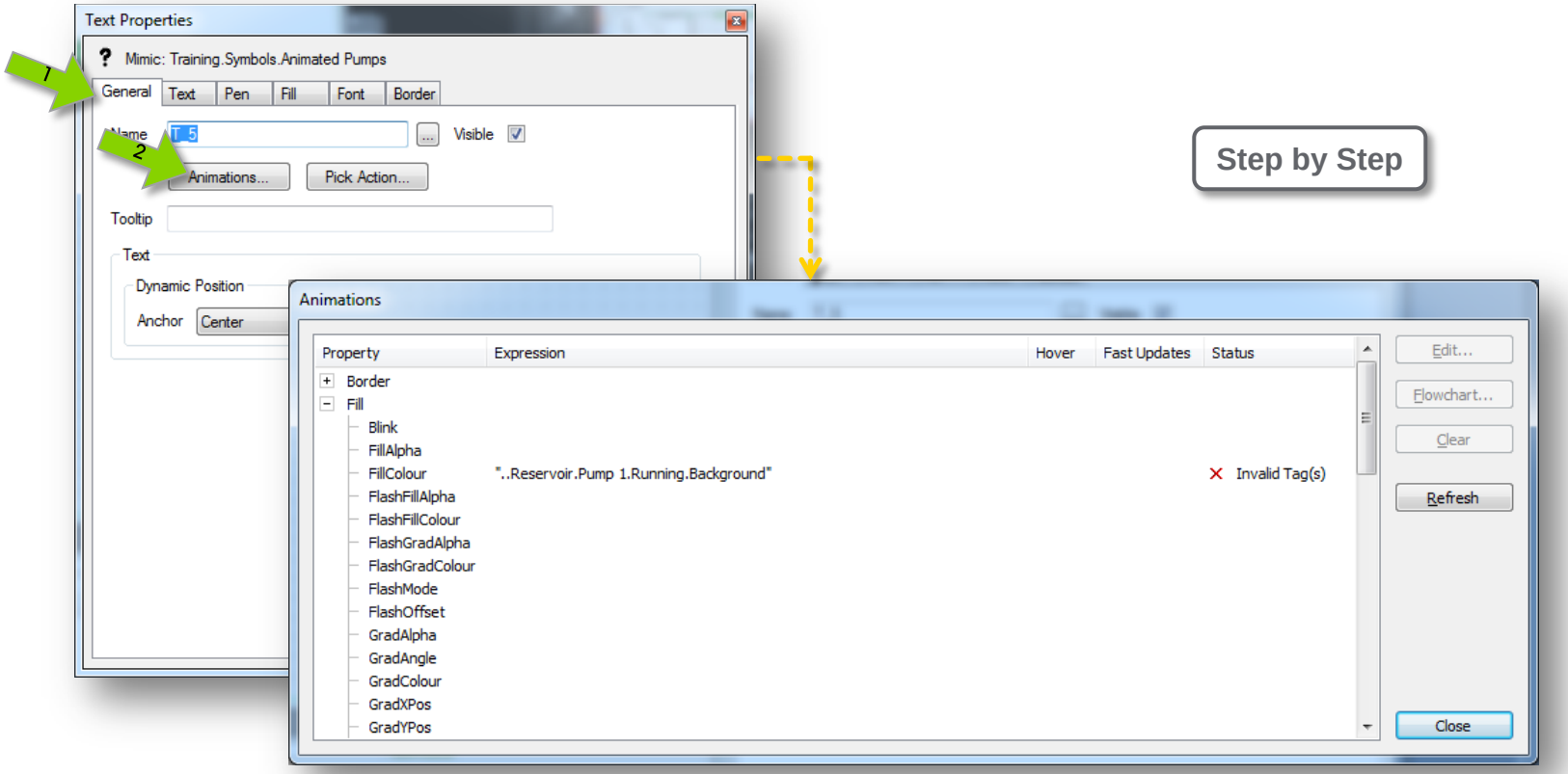
Creating an Embedded Symbol

- Delete away the purple box and position the new state description under the pump. Then double click to open the properties.



Creating an Embedded Symbol

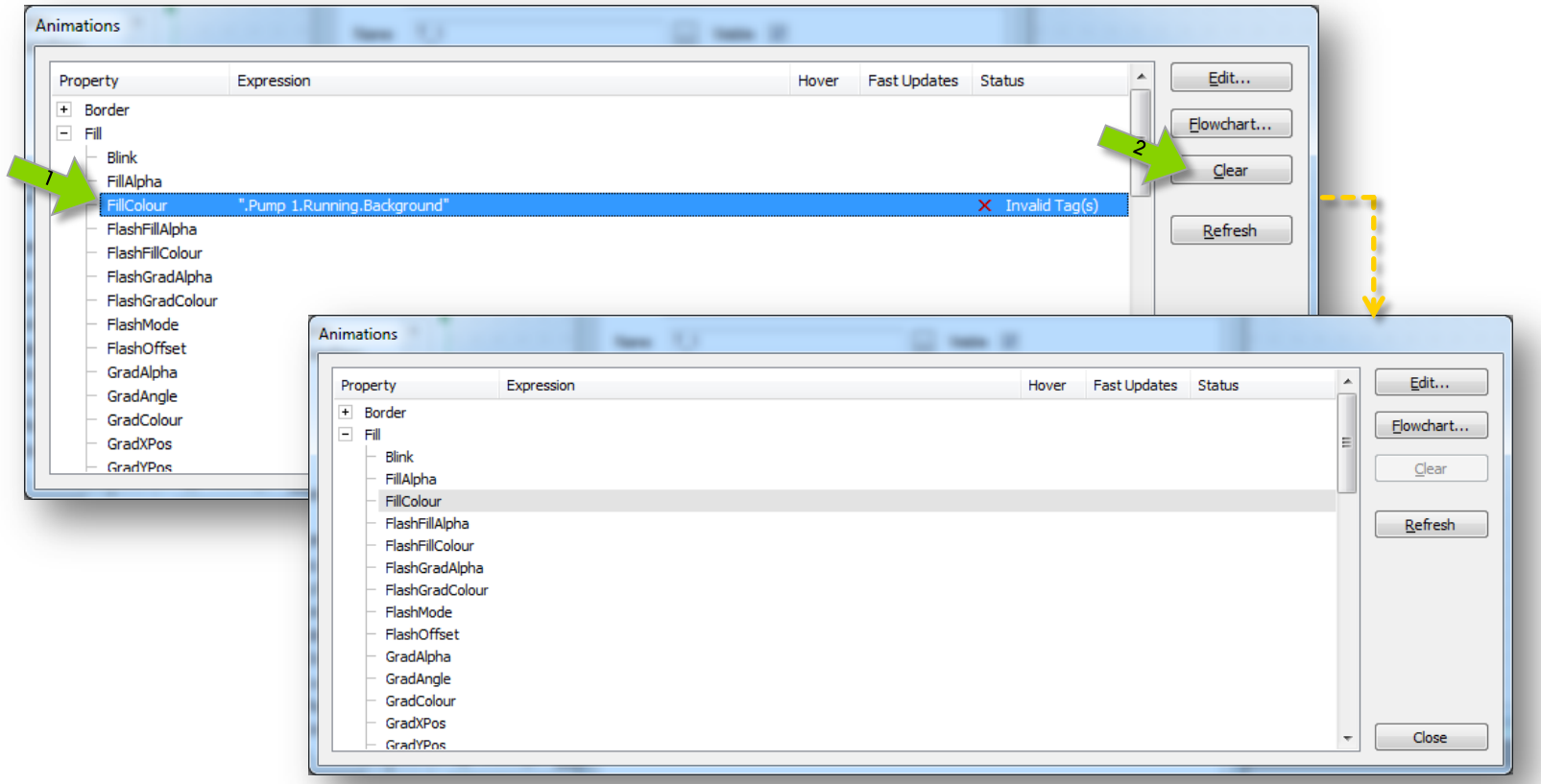
- Go to the **General** tab and then click on **Animation**.



Creating an Embedded Symbol

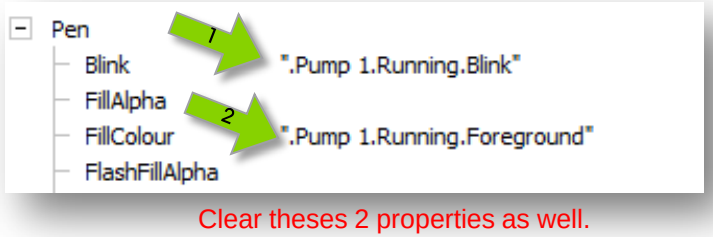
- Clear the **FillColor** properties we do not used.

Step by Step

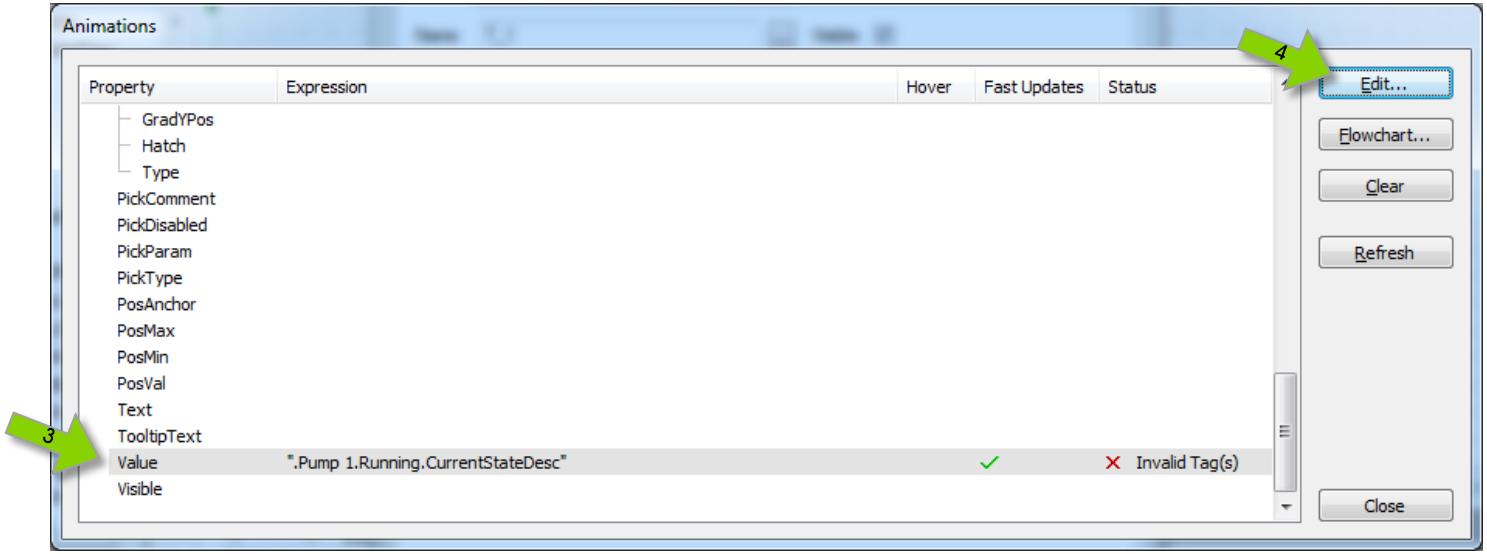


Creating an Embedded Symbol

- Clear all other properties not used leaving only **Value**. With **Value** selected, click on **Edit**.

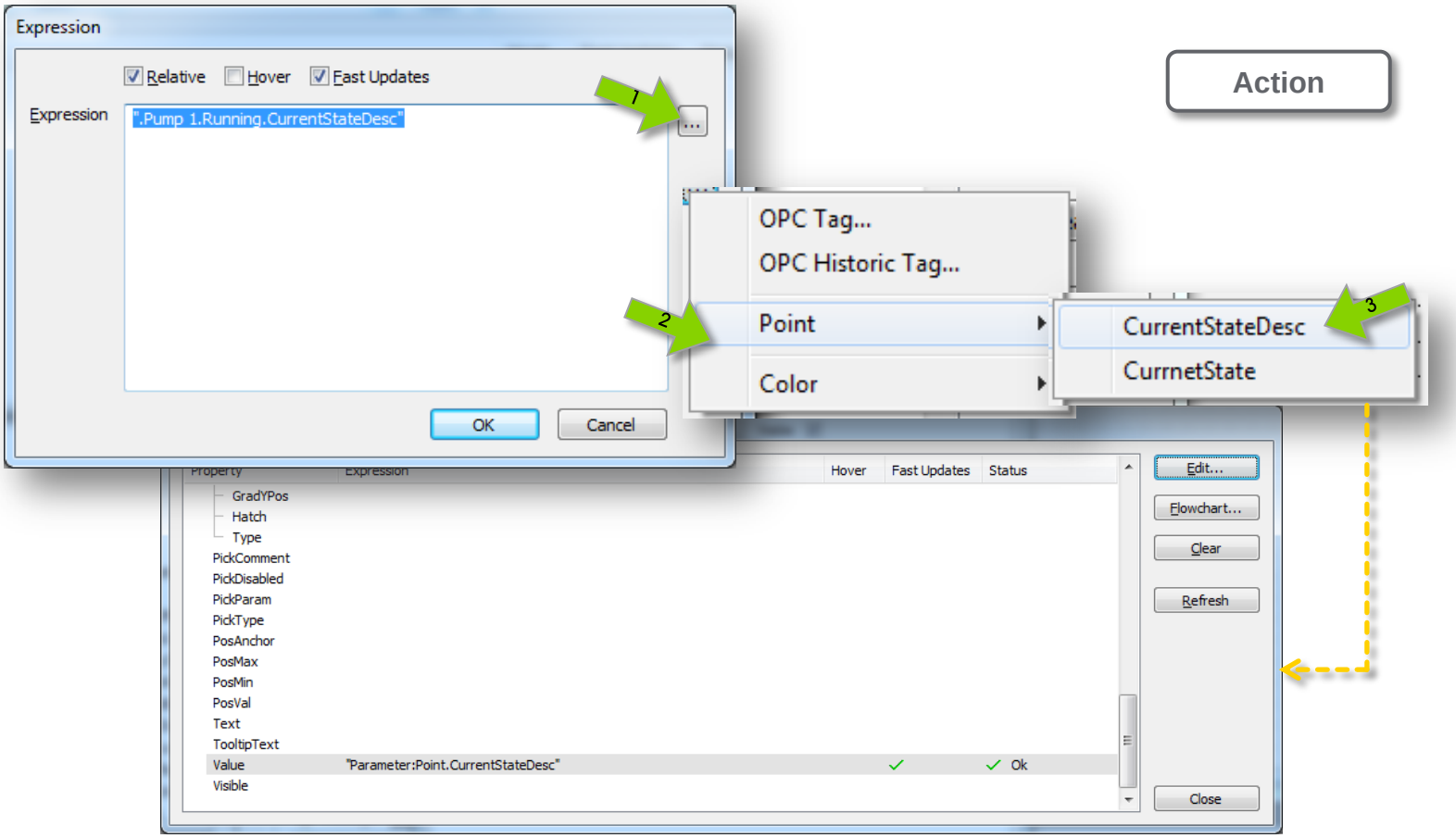


Action



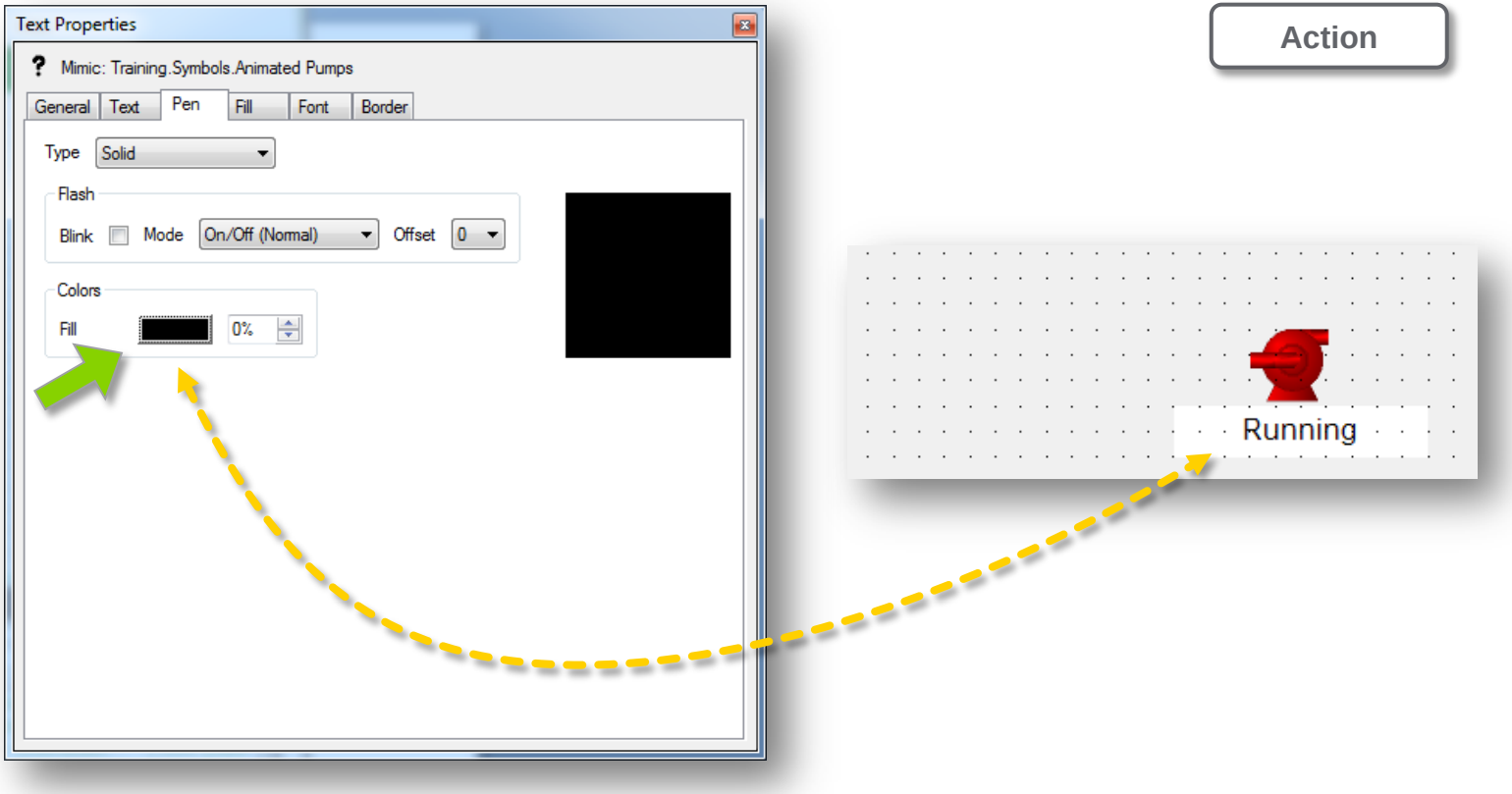
Creating an Embedded Symbol

- Click the (..) button and select **CurrentStateDesc** as the parameter.



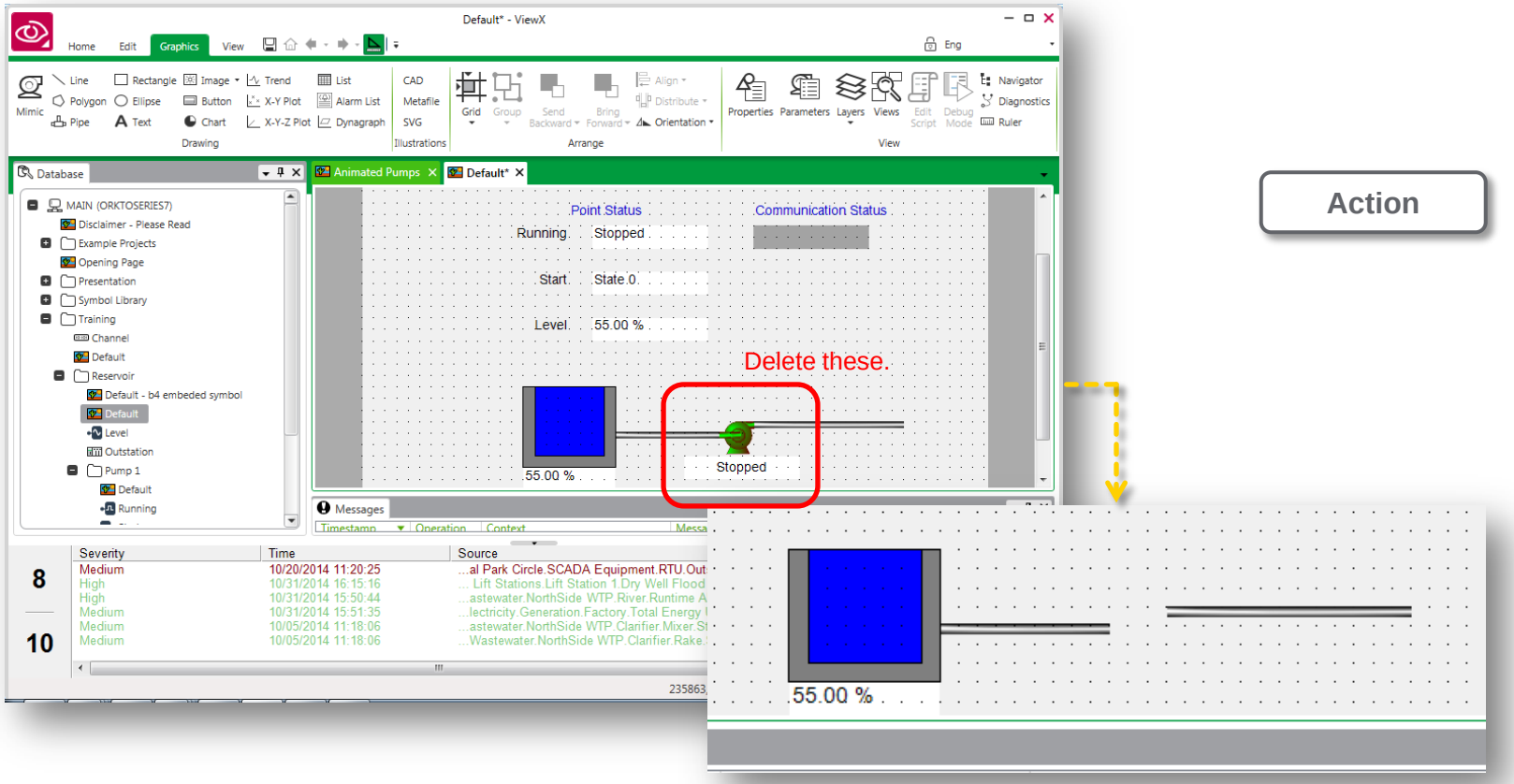
Creating an Embedded Symbol

- Lastly, change the **Pen** color form purple to black.



Using the Embedded Mimic

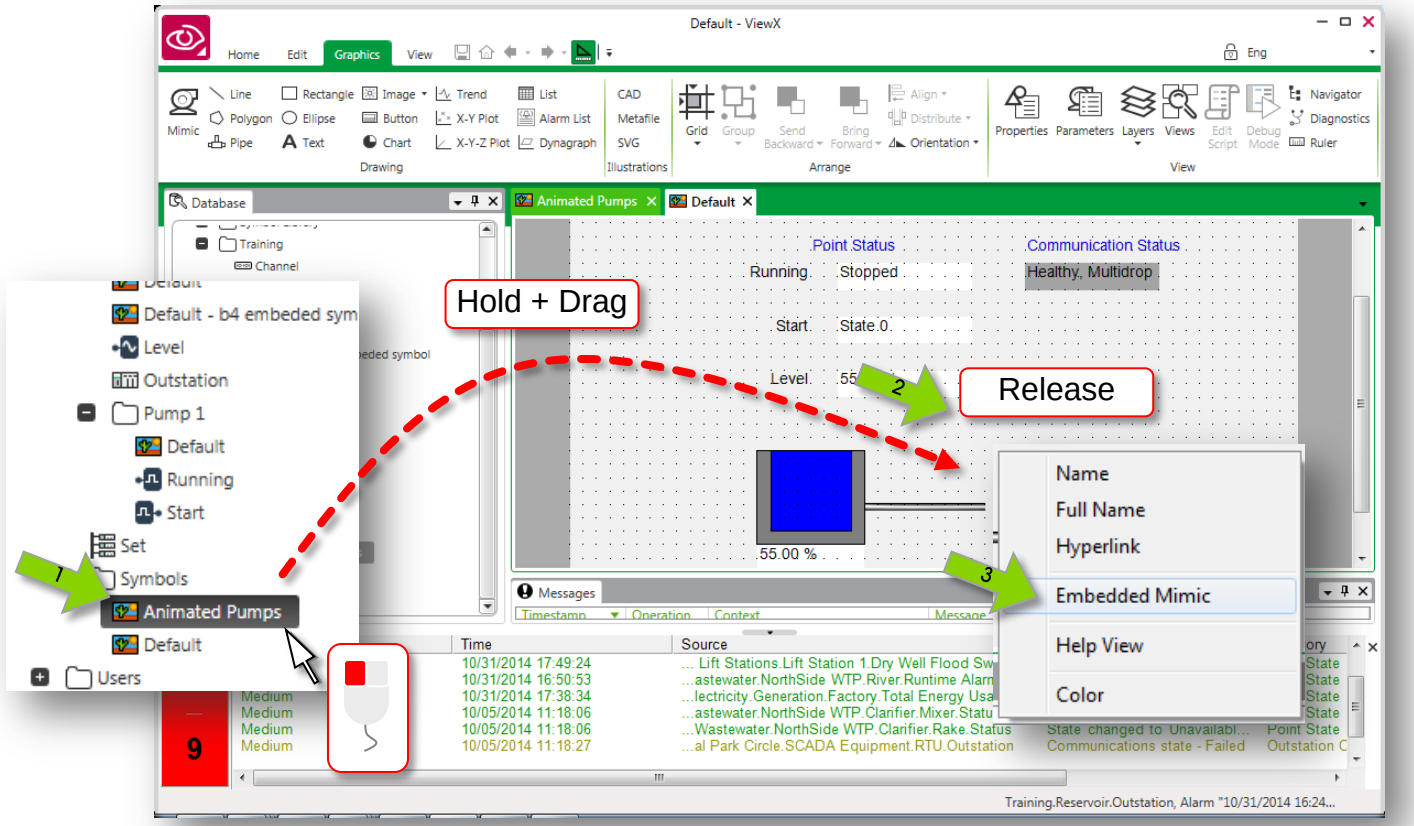
- Open the mimic under **Reservoir** and delete the existing pump symbol and text.



Using the Embedded Mimic

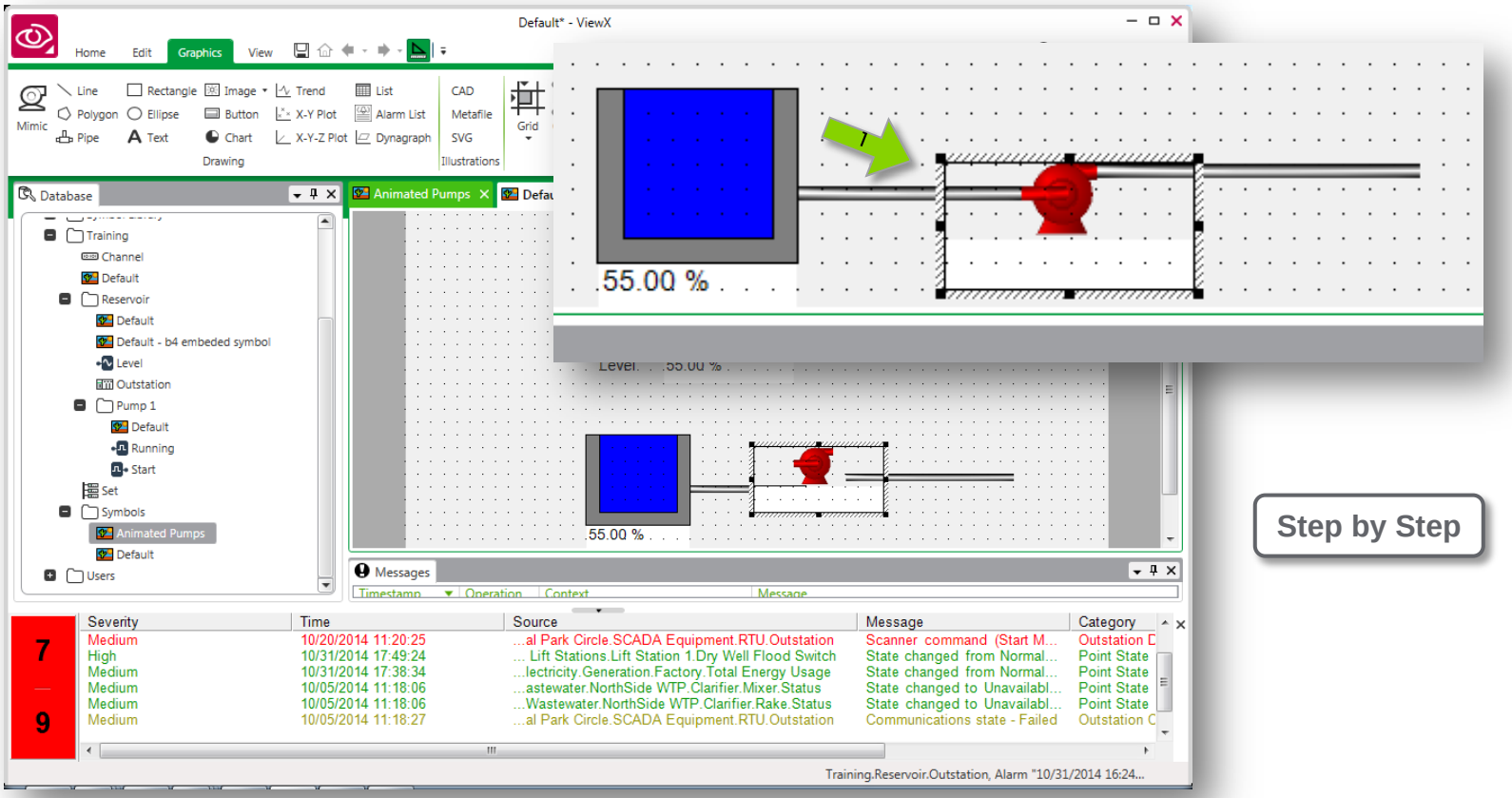
- The drag the newly created **Animated Pumps** into the mimic and select **Embedded Mimic**.

Step by Step



Using the Embedded Mimic

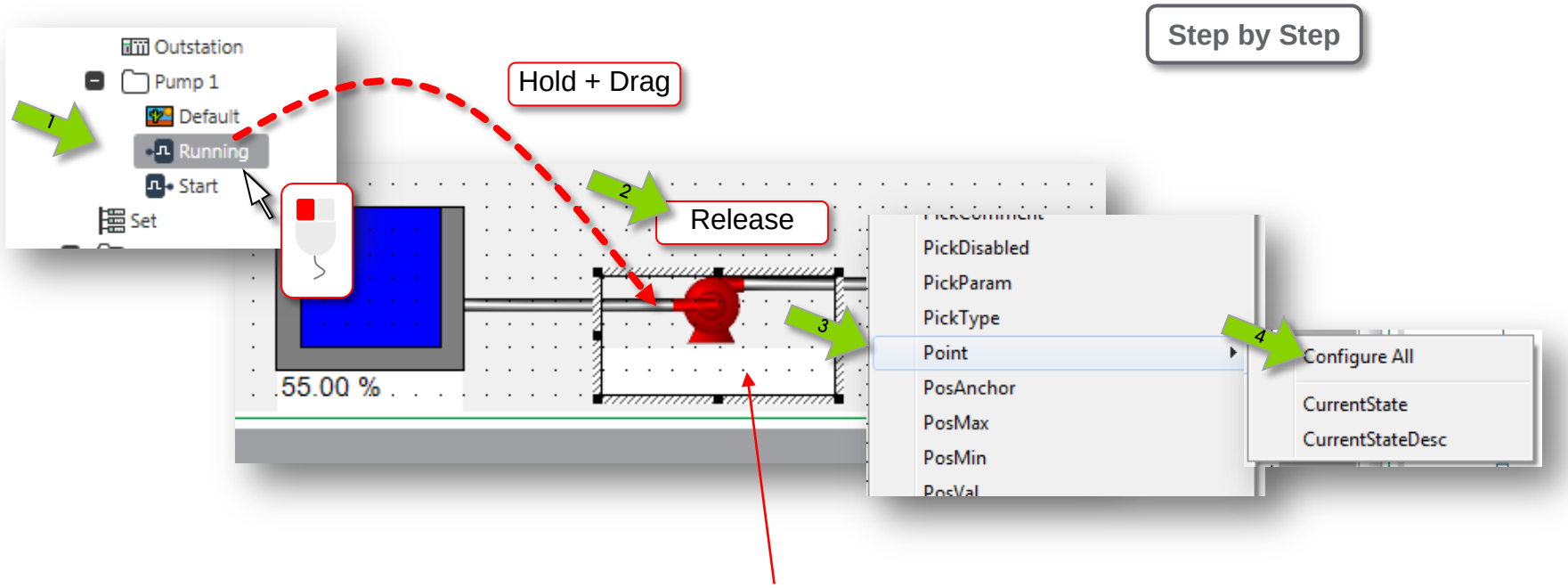
- Position the new symbol to align with the pipes.



Step by Step

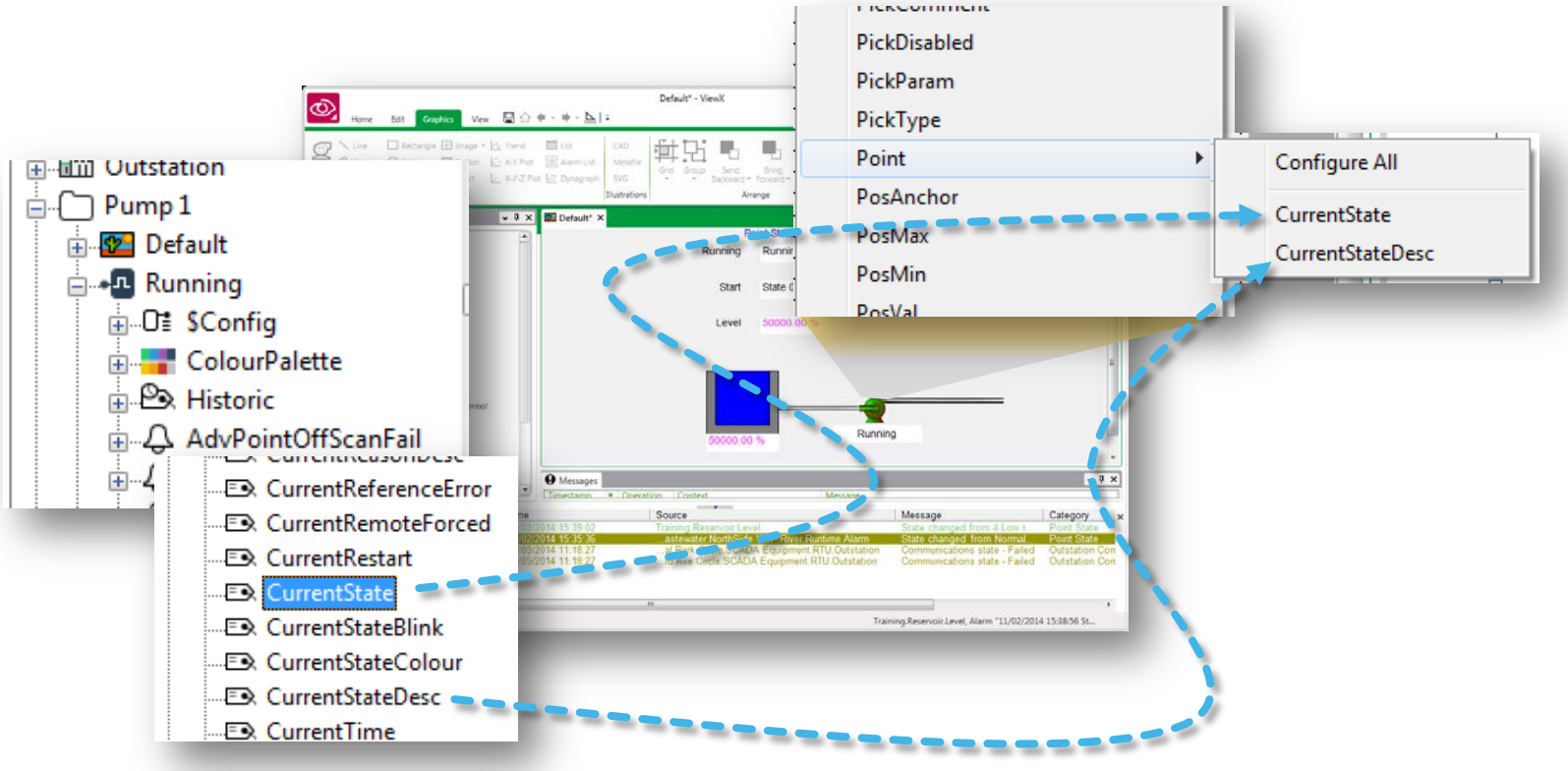
Using the Embedded Mimic

- With the newly placed symbol still selected, drag the **Pump 1 Running** point onto the mimic and then select as per follows.



Using the Embedded Mimic

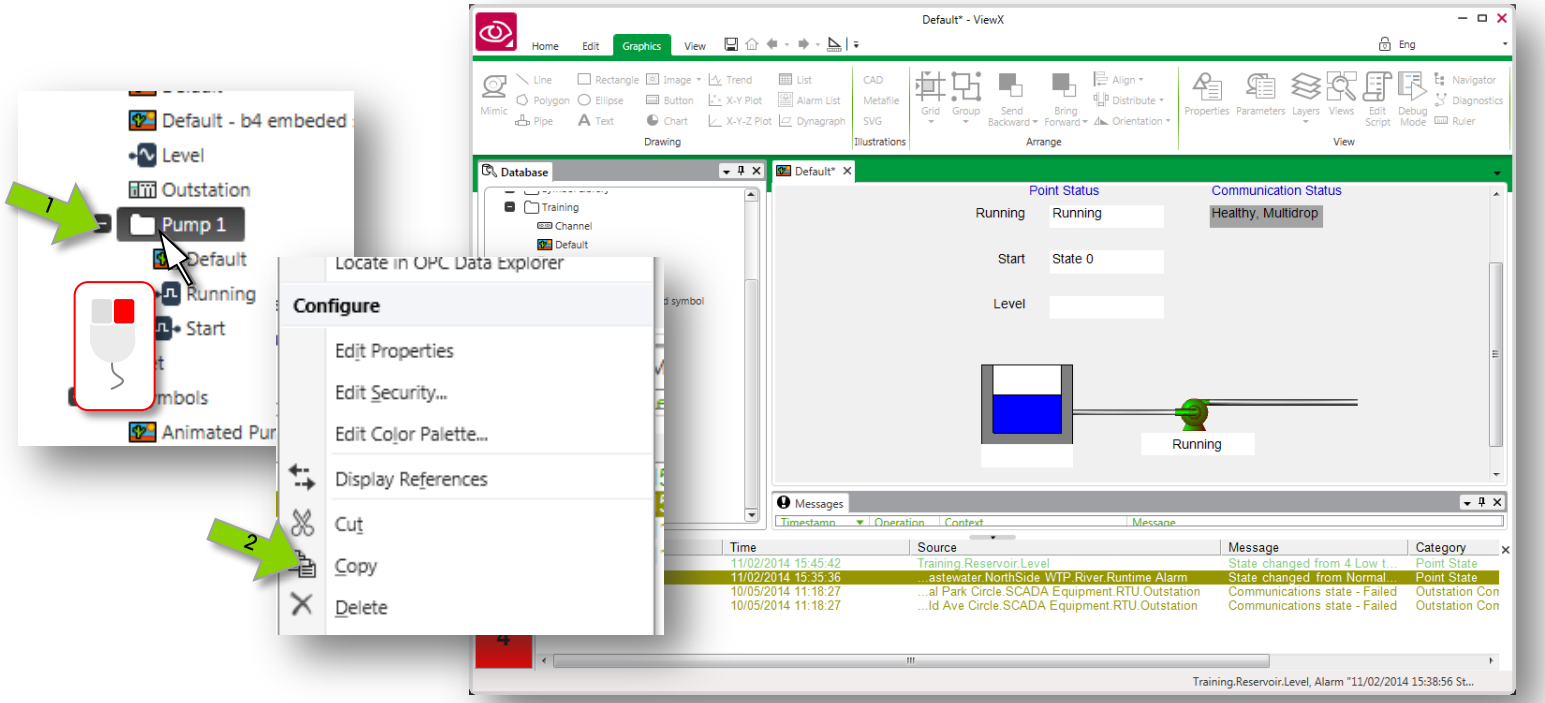
- The pump will now be running. What we did was to map the point's properties into the parameters of our mimic.



Easily Creating a 2nd Pump

- Your project will consist of 2 pumps, of identical equipment.
- In order to create the 2nd pump, just copy and paste from the first.

Step by Step

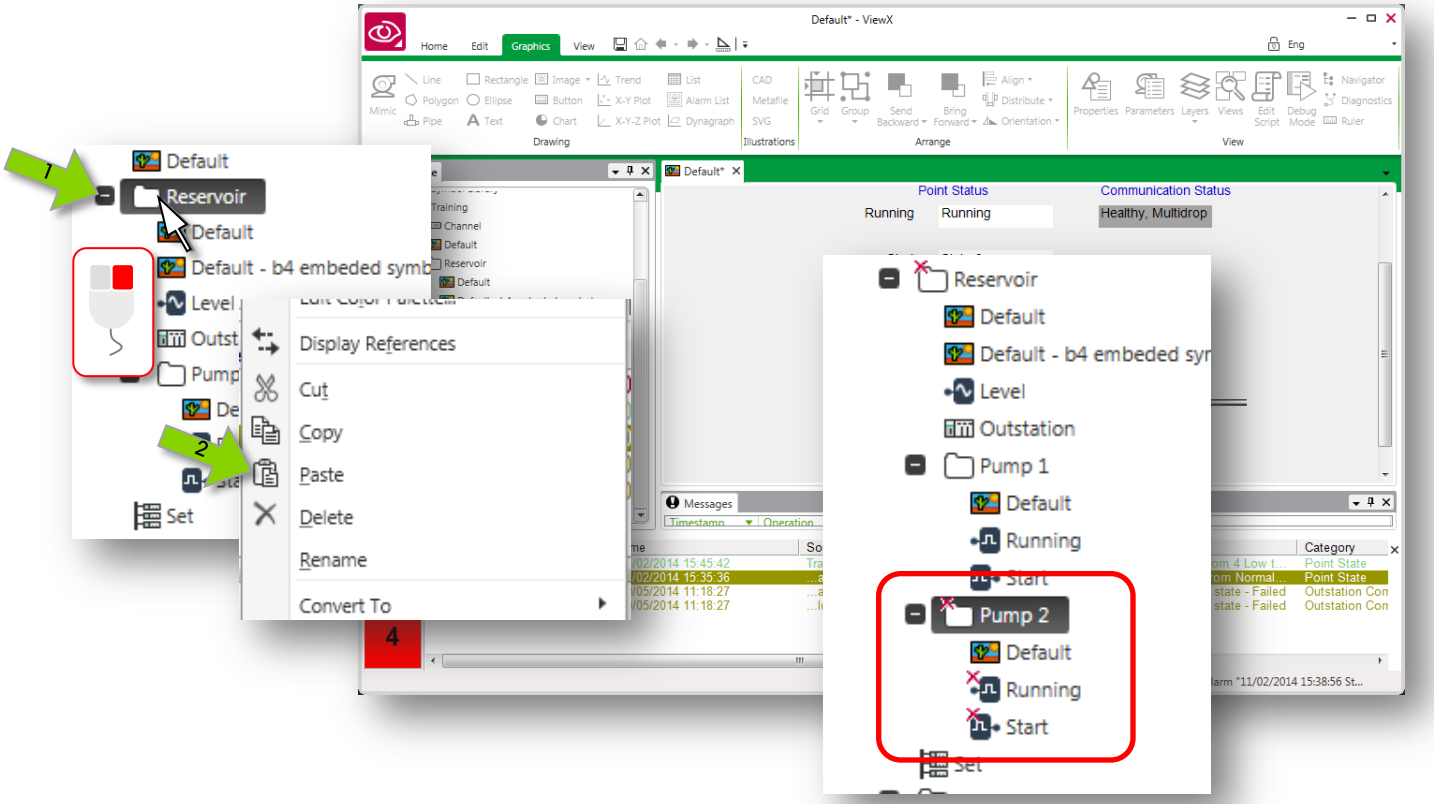


Confidential Property of Schneider Electric

Easily Creating a 2nd Pump

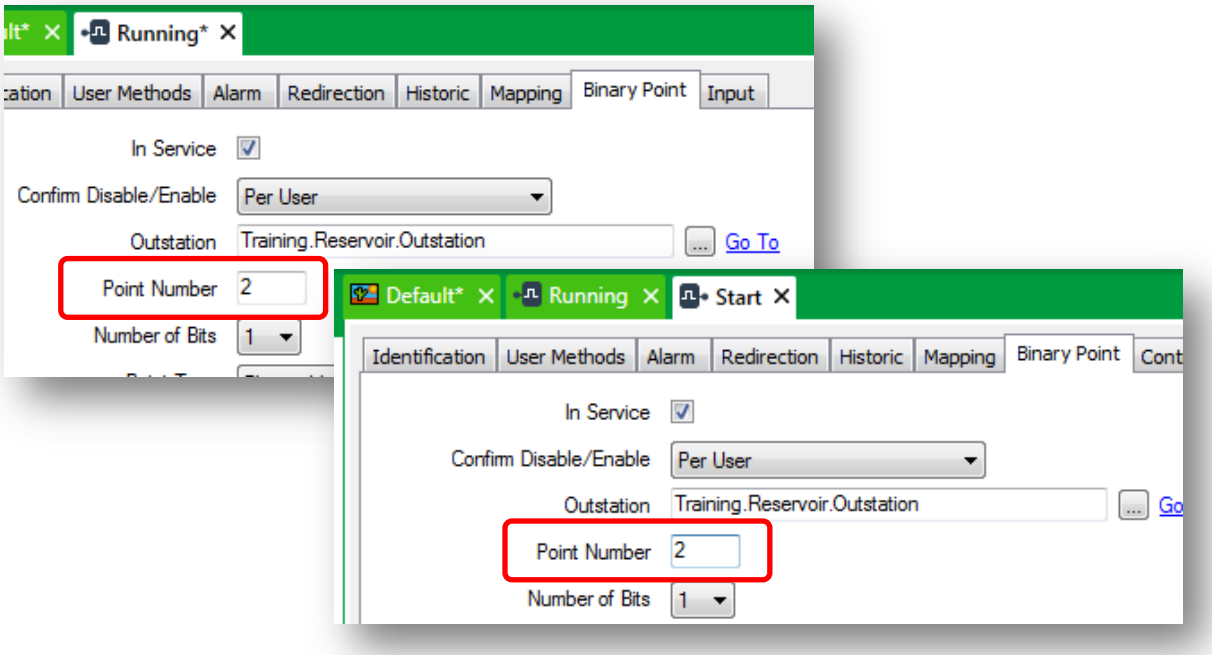
- Select the Reservoir folder and the click right. Then select paste.
- A new pump is now created.

Step by Step



Easily Creating a 2nd Pump

- The new pump is marked with a X because the points had already been used by Pump 1. Edit the **Running** to use DNP DI point **2** and the **Start** to use DNP DO point **2**.

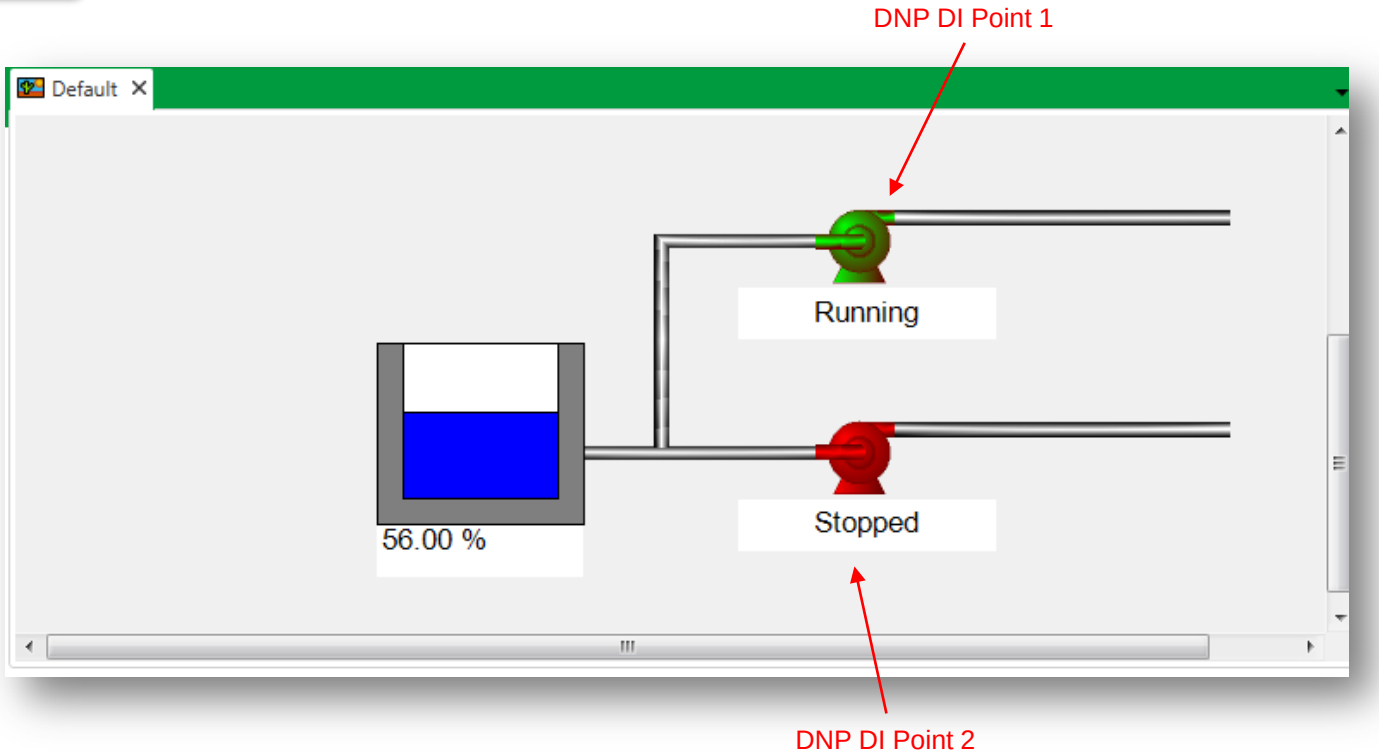


Action

Easily Creating a 2nd Pump

- Now modify the mimic so that it has 2 pumps as shown. You may want to move Pump 1 up and have the lower pump be Pump 2.

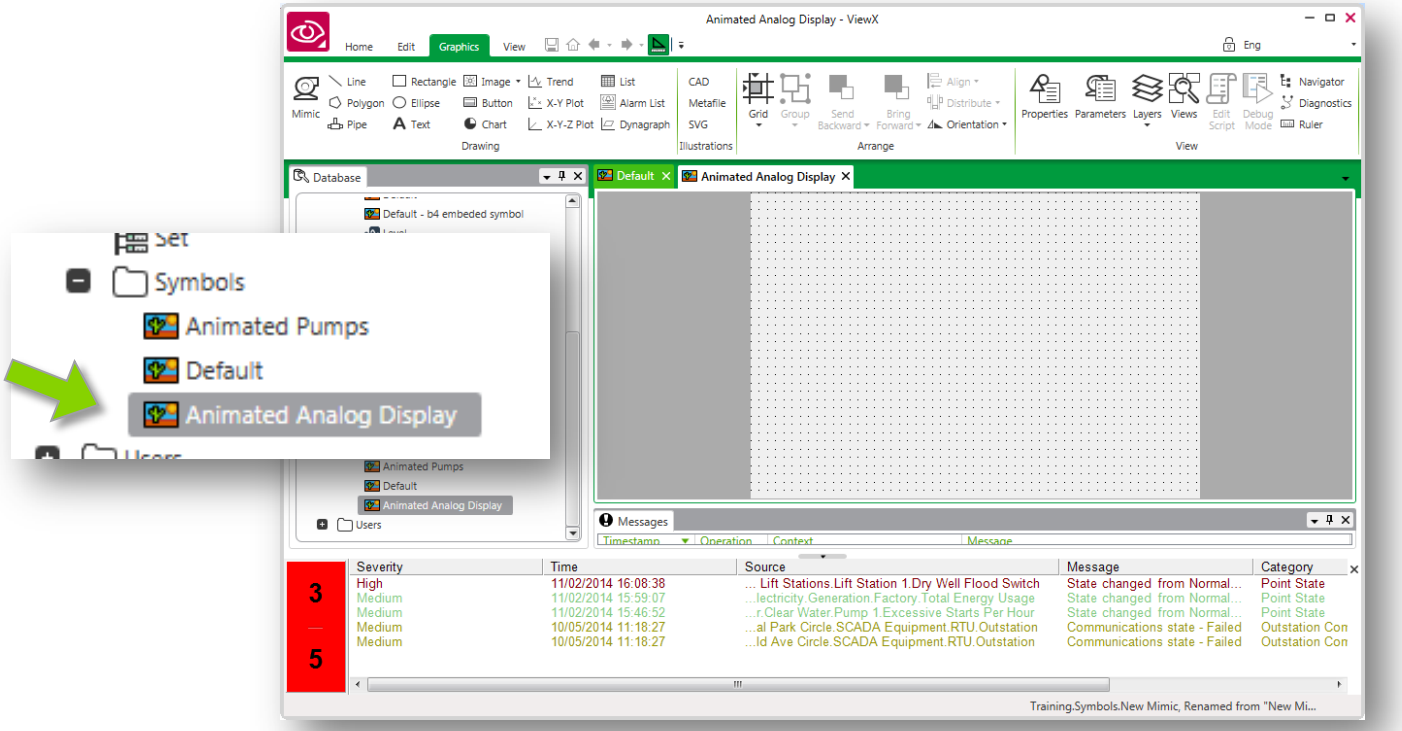
Action



Analog Display Embedded Mimic

- Create a new mimic called **Animated Analog Display** under the **Symbols** group.

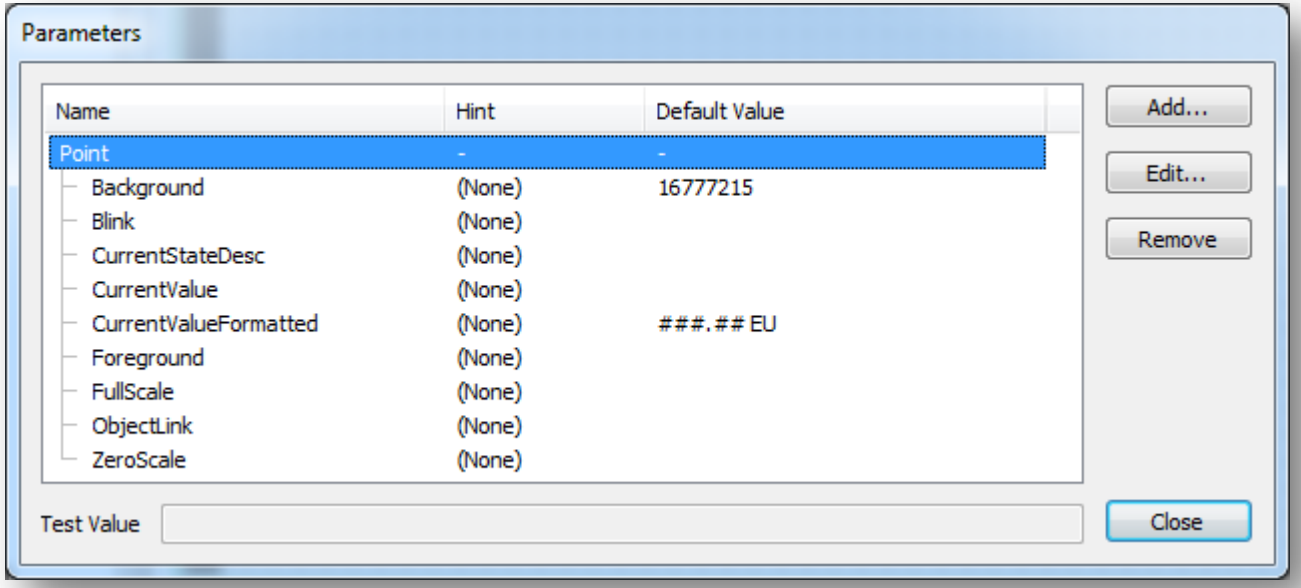
Action



Analog Display Embedded Mimic

- Create the following parameters under the **Point** group.

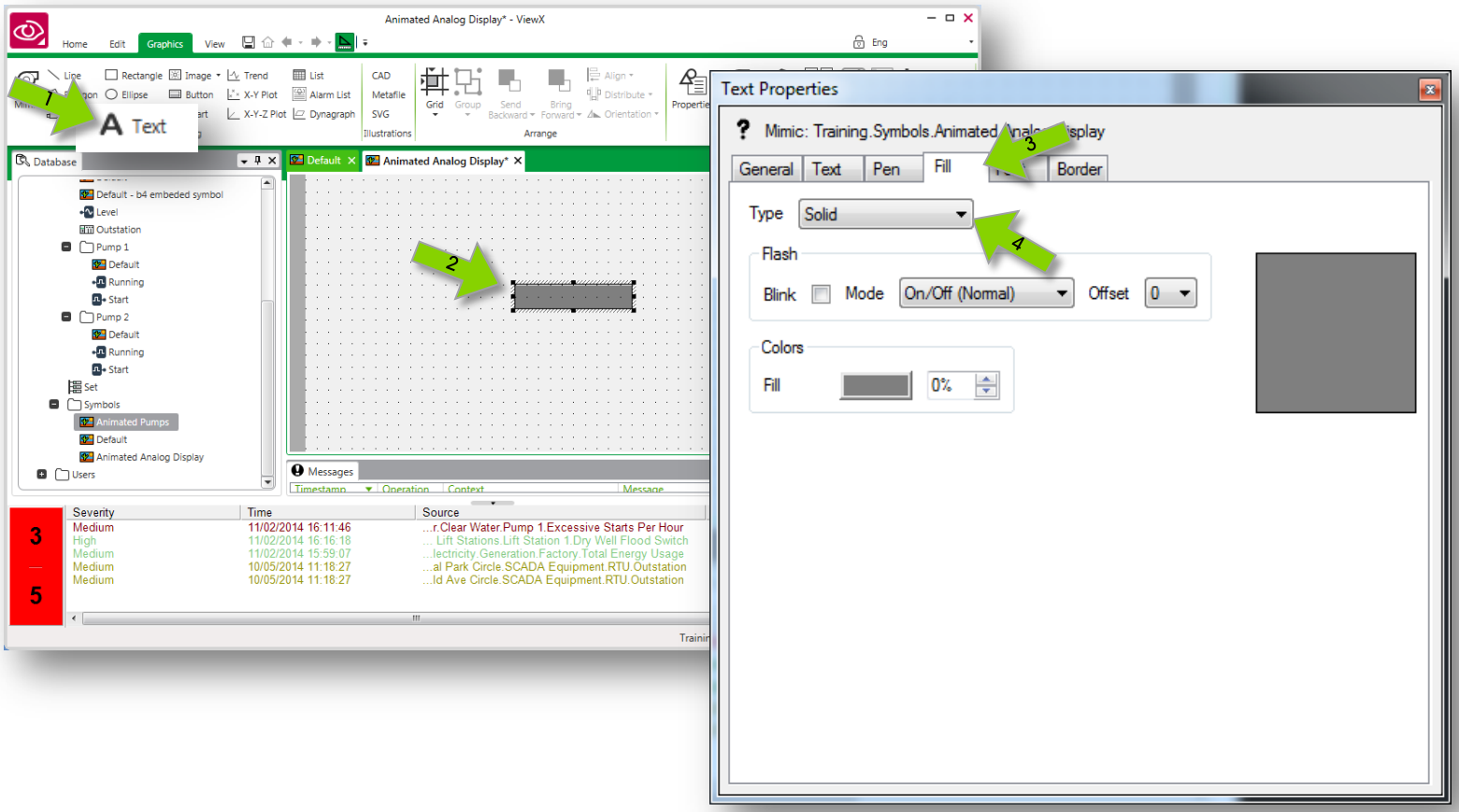
Action



Analog Display Embedded Mimic

- Create a **text box**. Set the fill type to **Solid**.

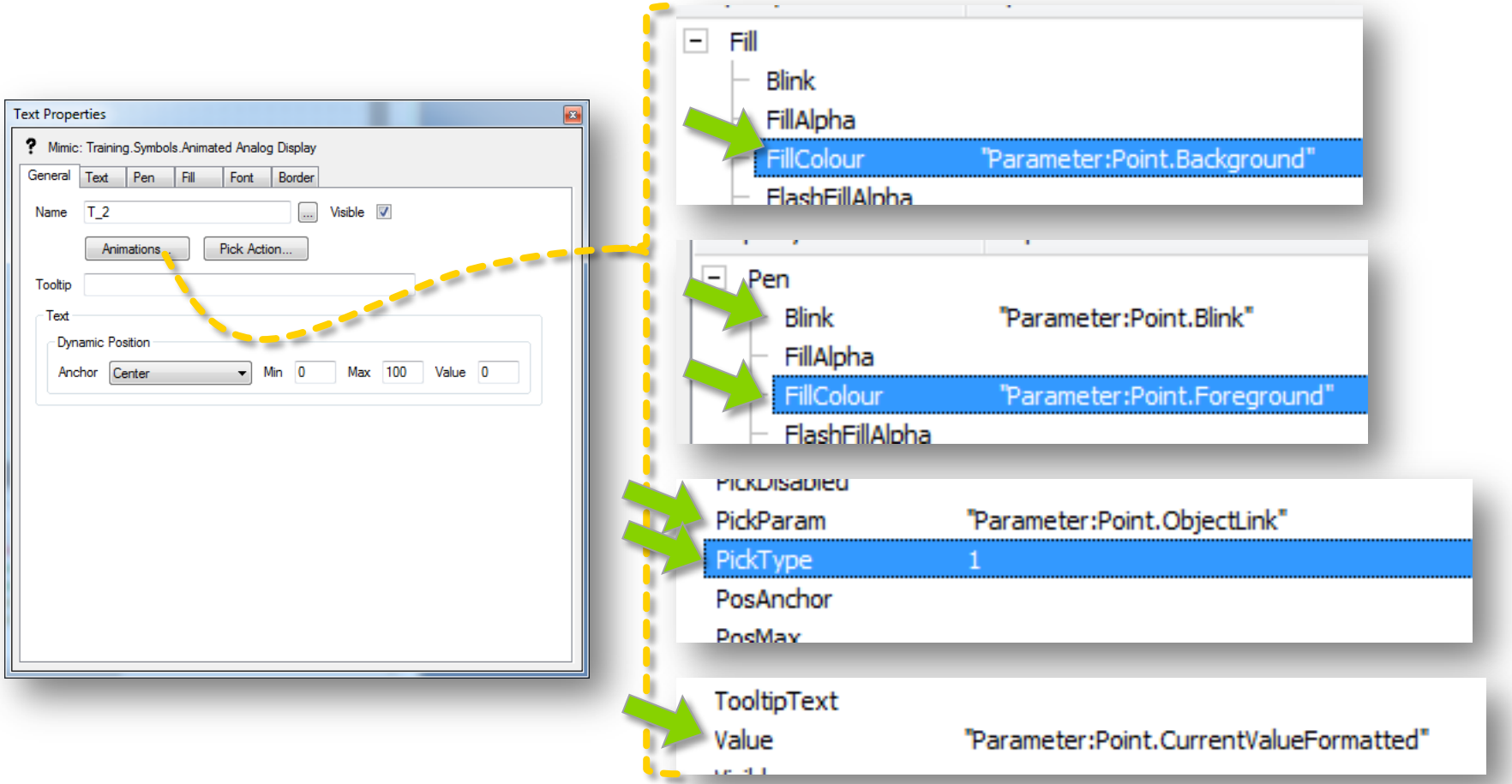
Action



Analog Display Embedded Mimic

Action

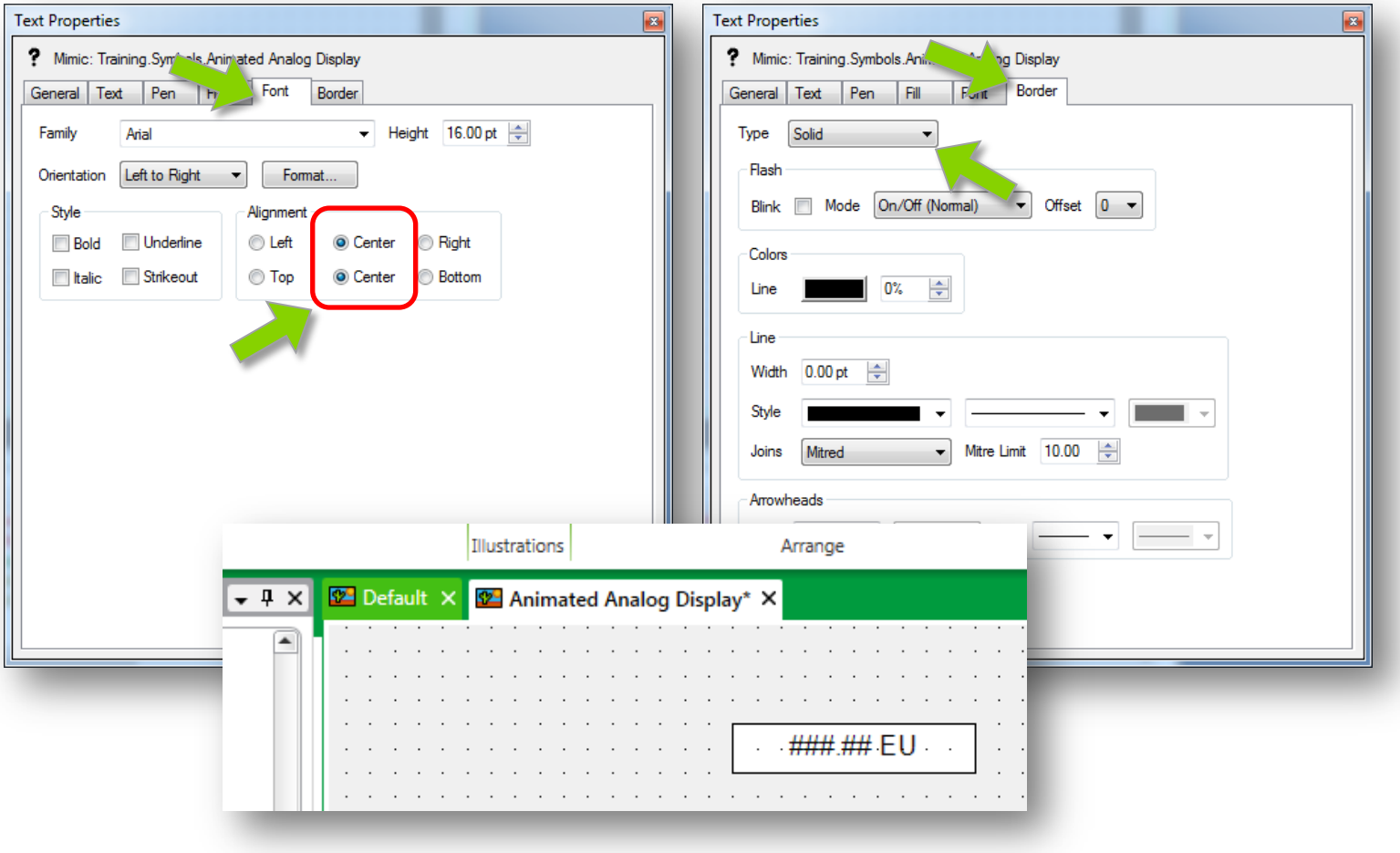
- Under the **Animations** properties, set as follows.



Analog Display Embedded Mimic

- Centralized the text. And set the border o the box to Solid.

Action



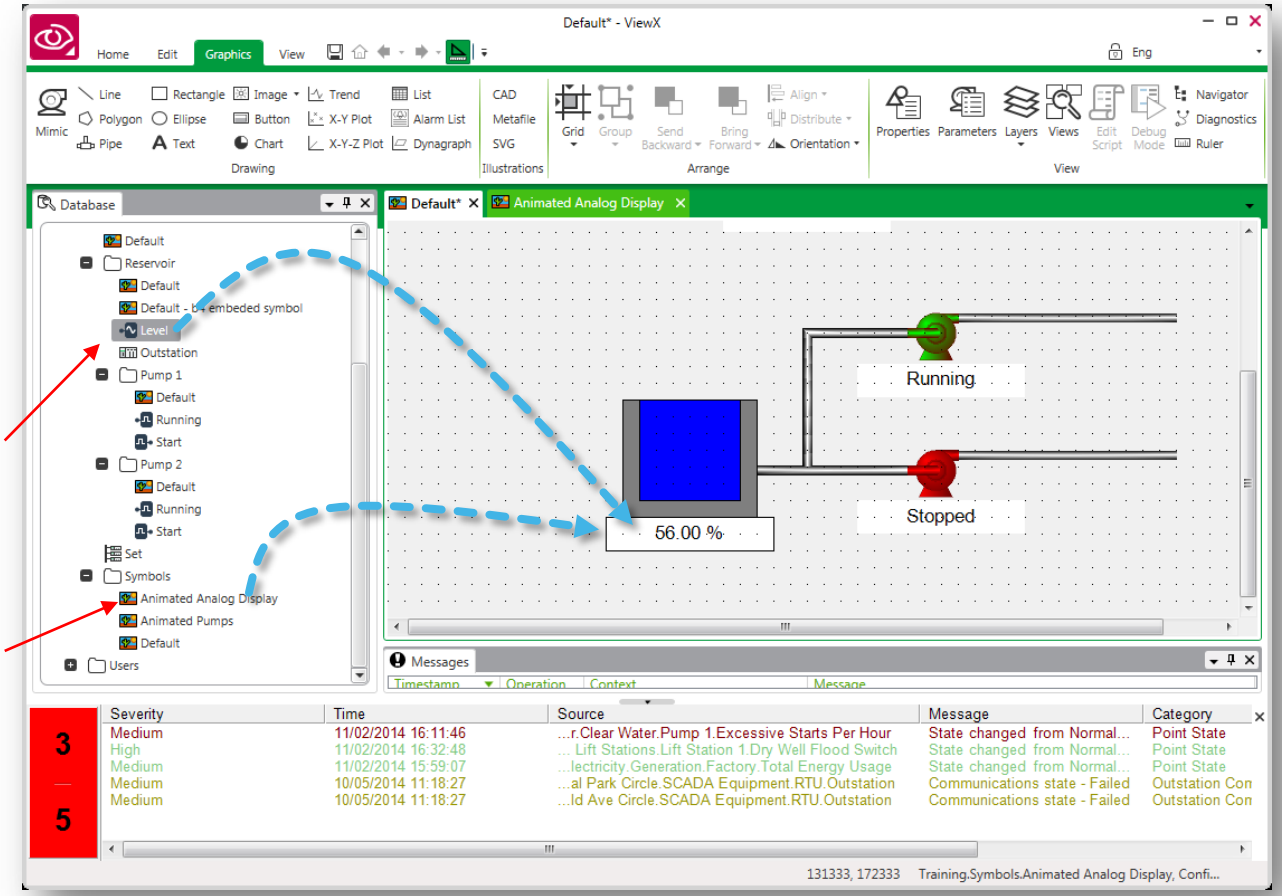
Analog Display Embedded Mimic

- And finally replace the analog value below the tank with this embedded mimic.

Action

1. Pull the Level point into the embedded mimic and Configure All.

2. Replace the animation here with the new embedded mimic.



More on Commands

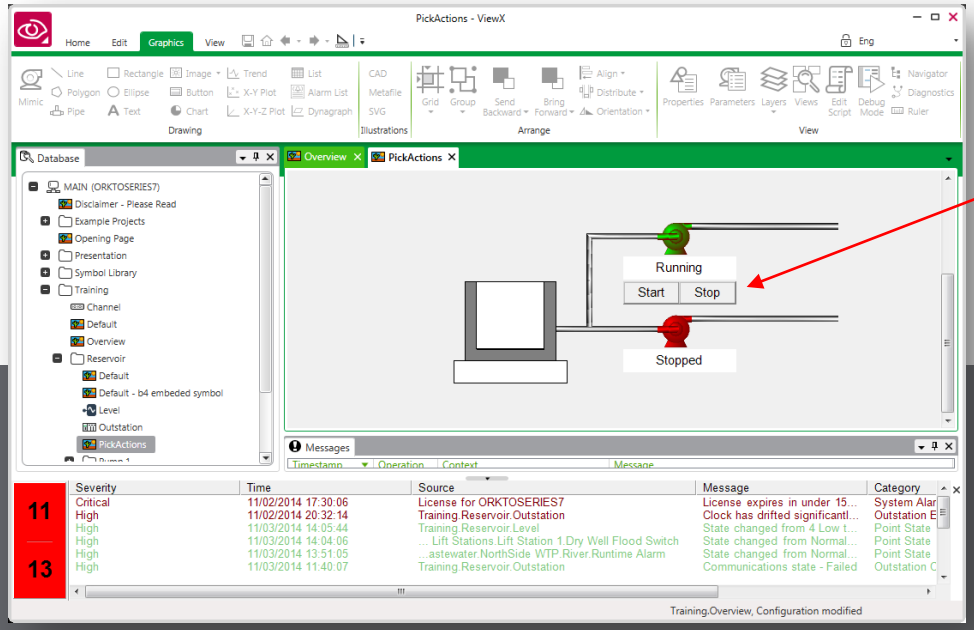
Section 4

The various ways of Commands, Links and Actions

Confidential Property of Schneider Electric

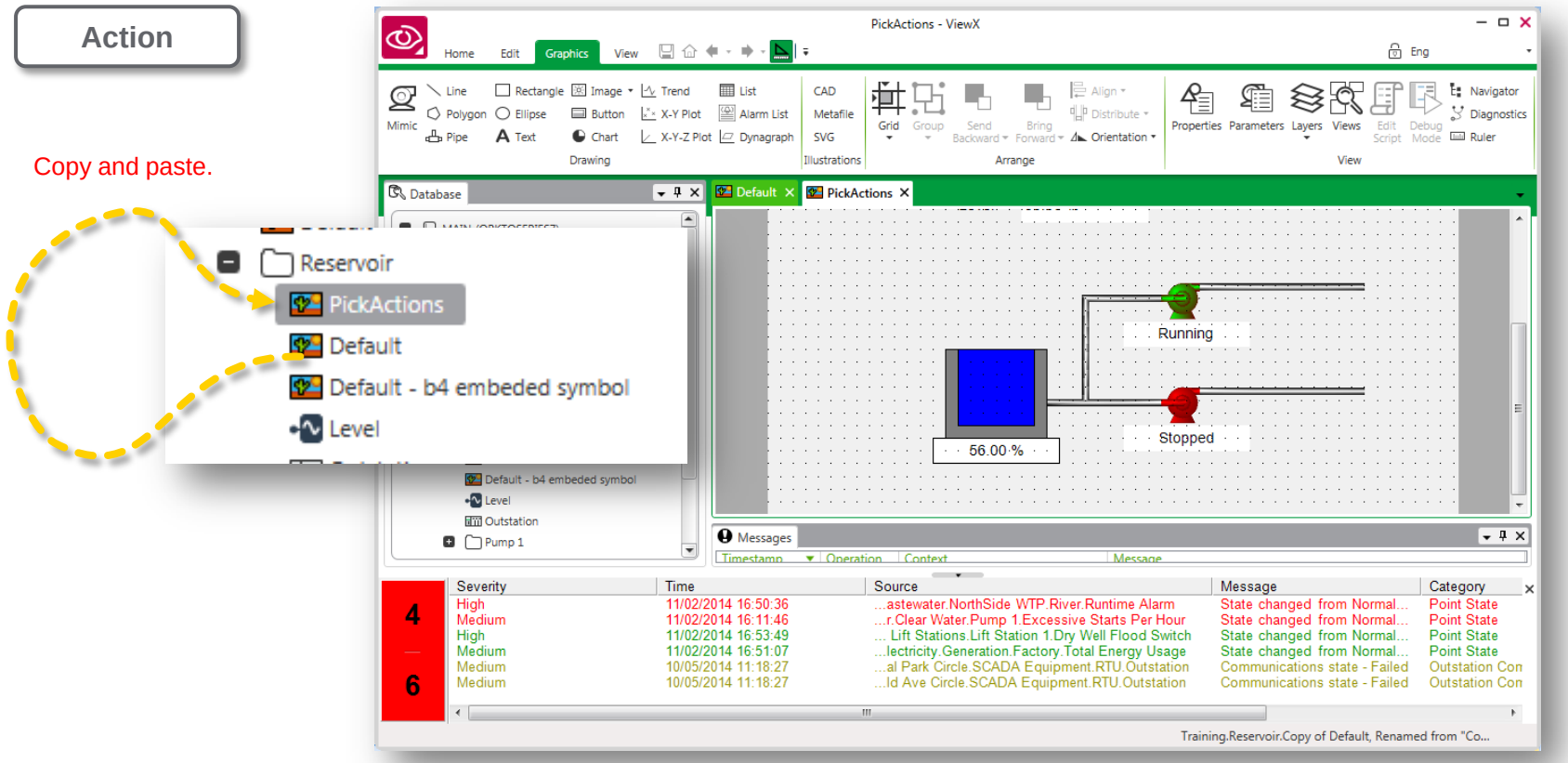
Pick Actions

- You can associate mimic items with pick actions. A pick action is an action that is executed when a user clicks on the mimic item for which the action has been configured. For example, a button could be configured to run a pick action to start a pump or open a circuit breaker. The mimic item on which the action is configured is known as the pick point



Pump Controls

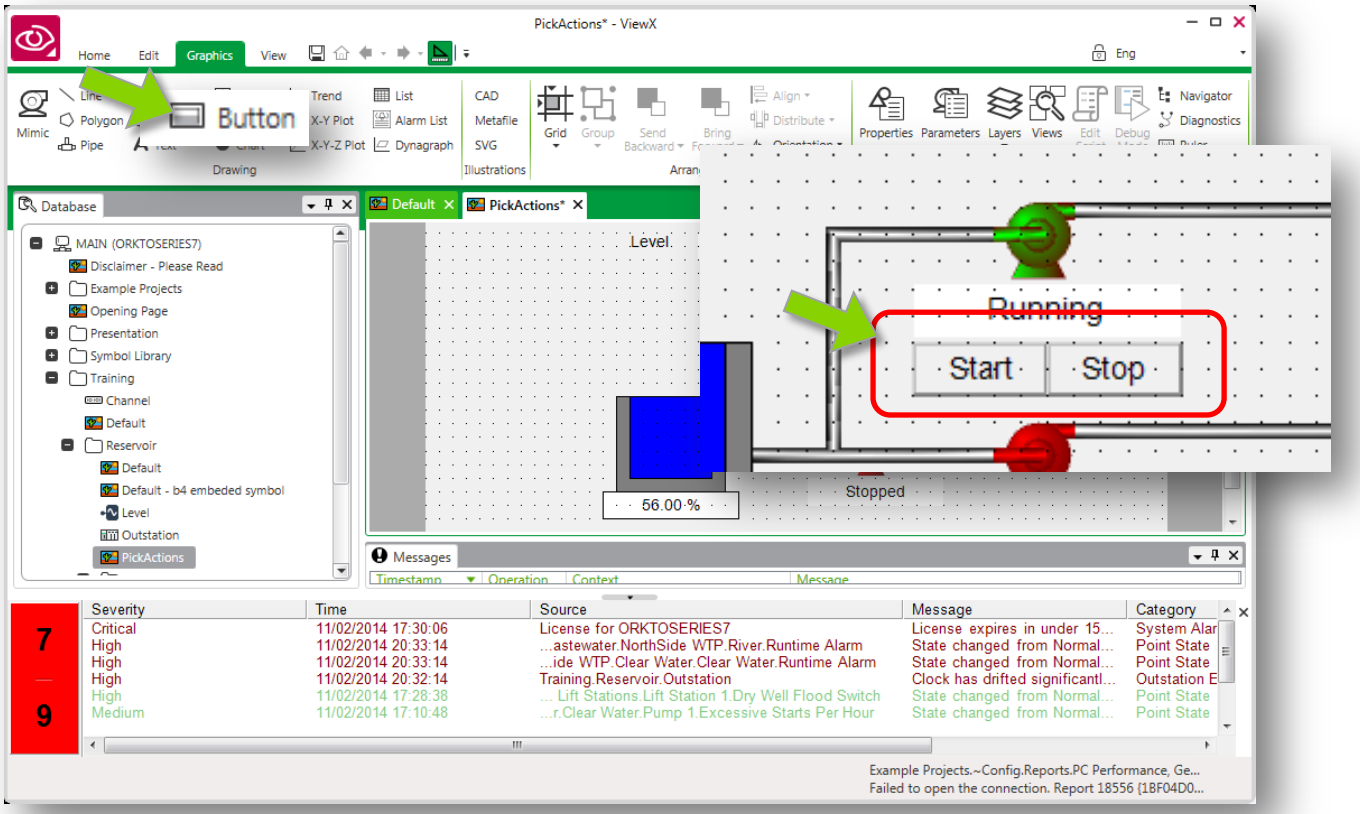
- Make a copy of **Reservoir's Default** mimic and rename it **PickActions**.



Pump Controls

- Use the button to draw 2 buttons and name them **Start Stop** as shown.

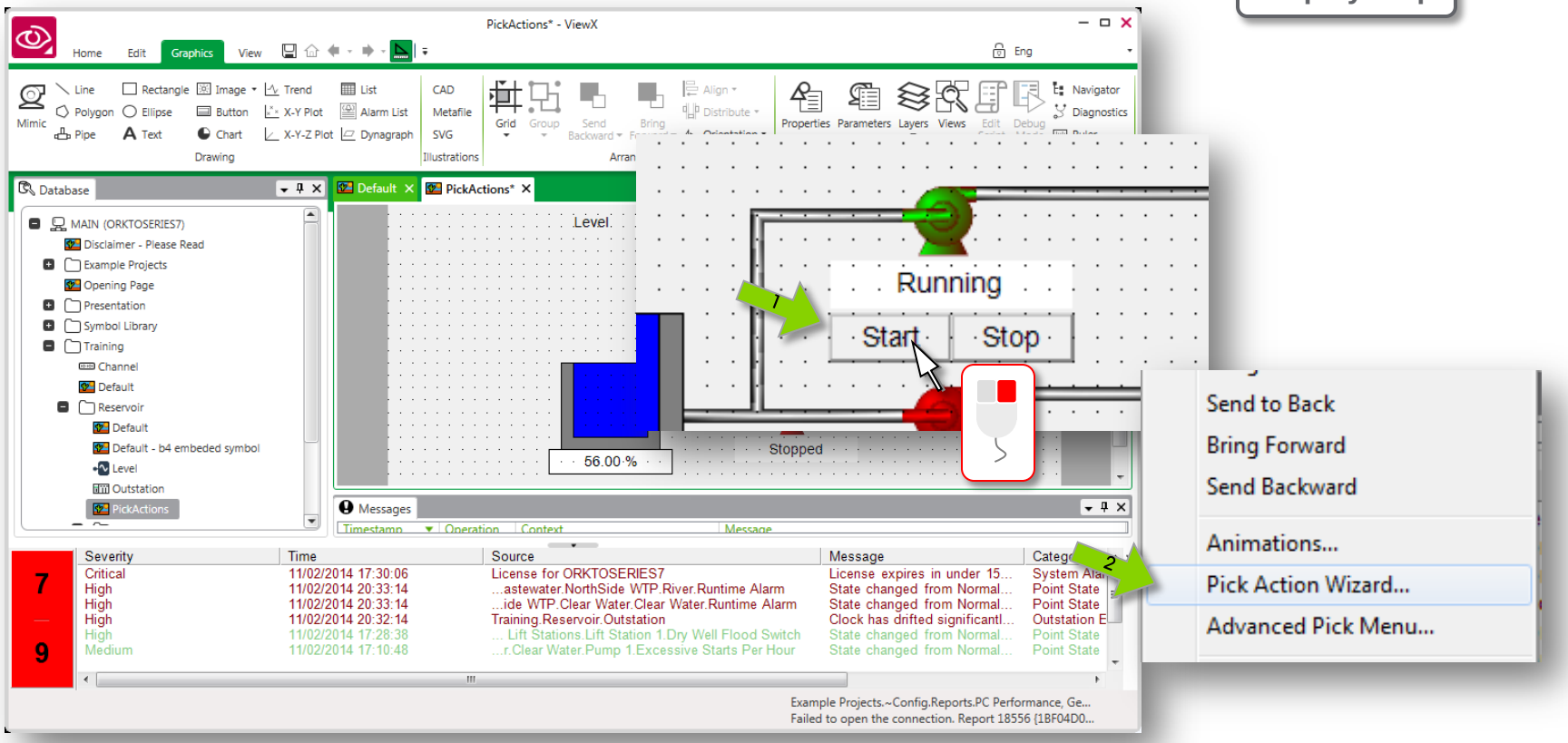
Action



Pump Controls

- Right click **Start** button and select **Pick Action Wizard**.

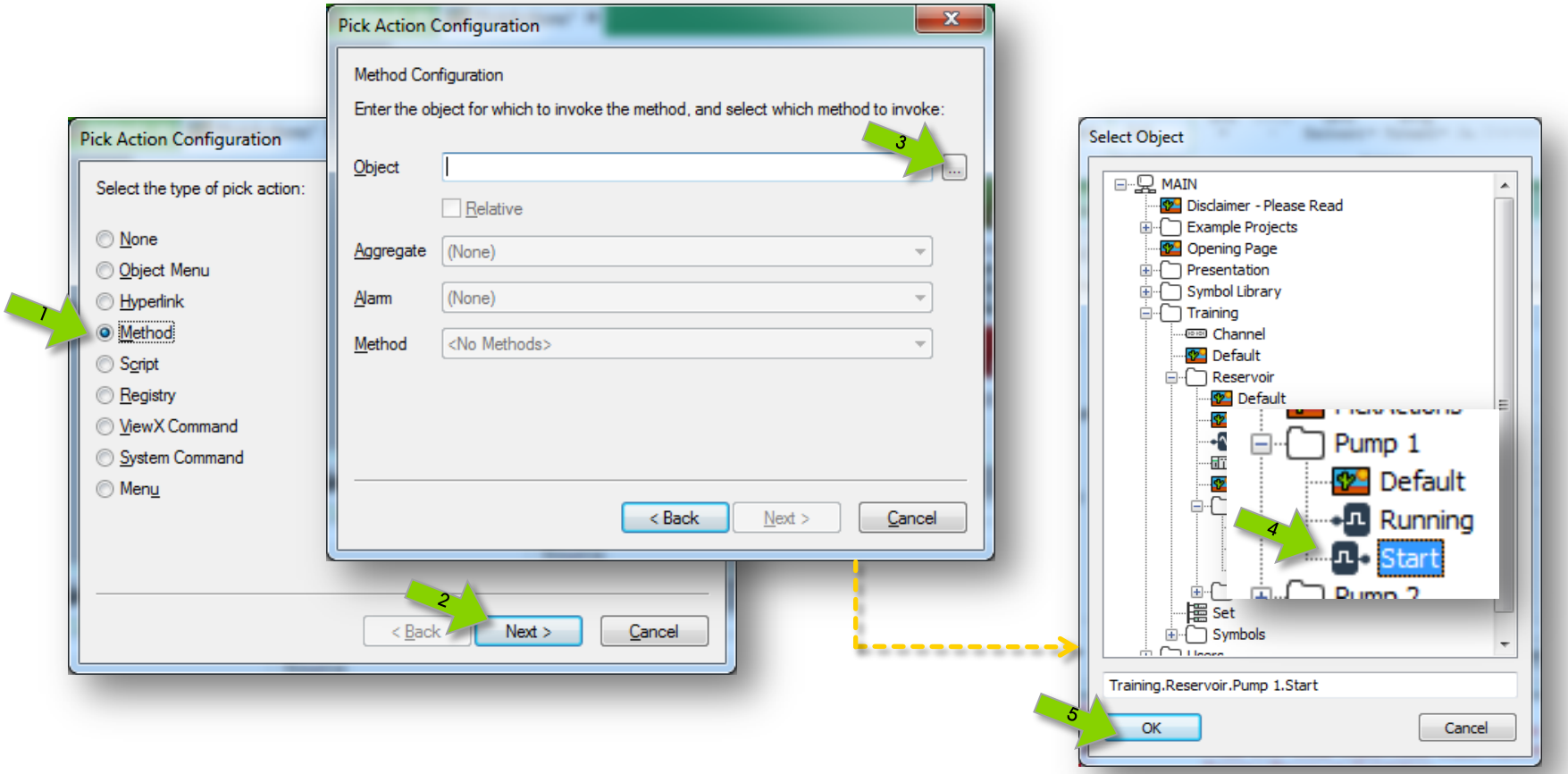
Step by Step



Pump Controls

Step by Step

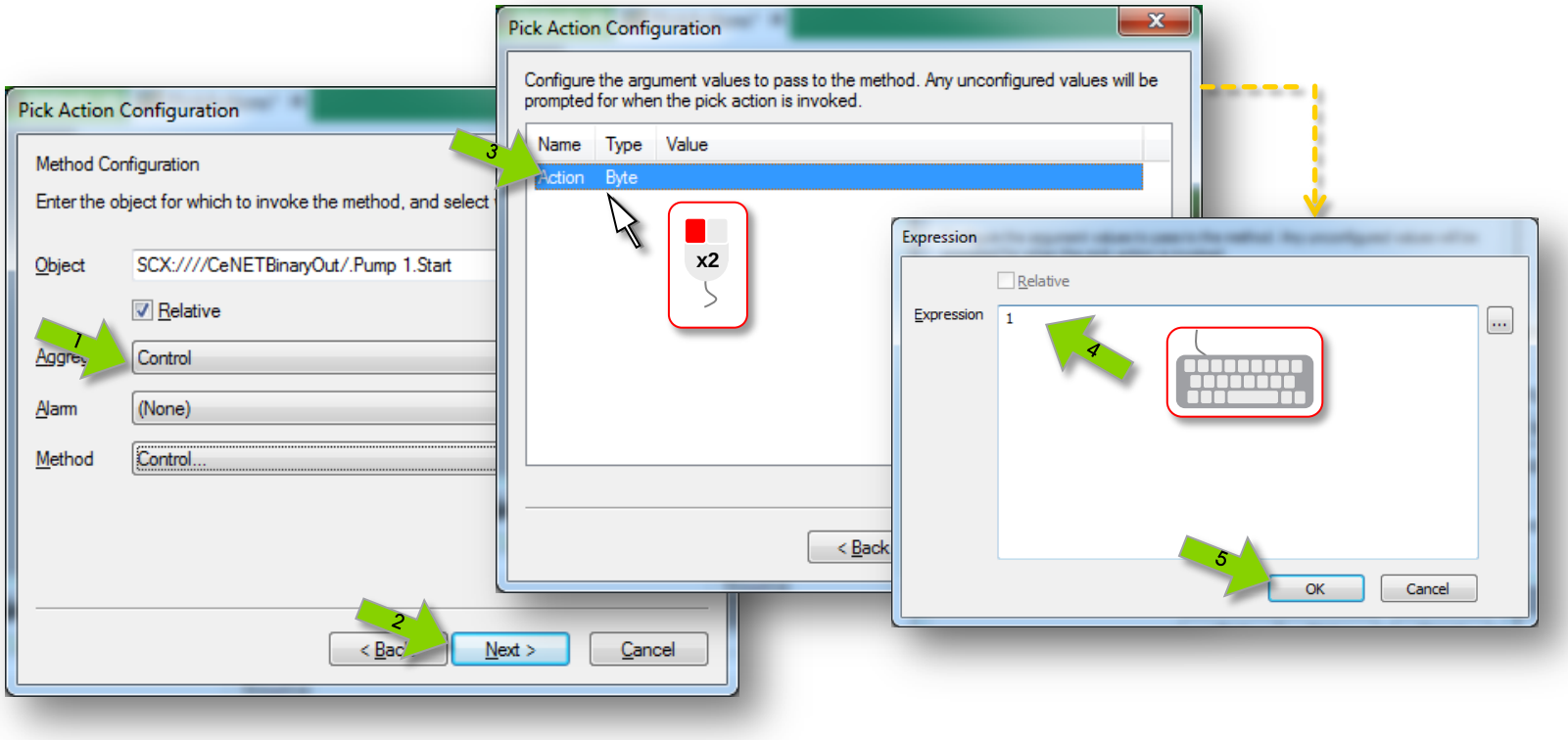
- Select **Method** and click **Next**. The follow thru to set this button to control **Pump 1 Start**.



Pump Controls

Step by Step

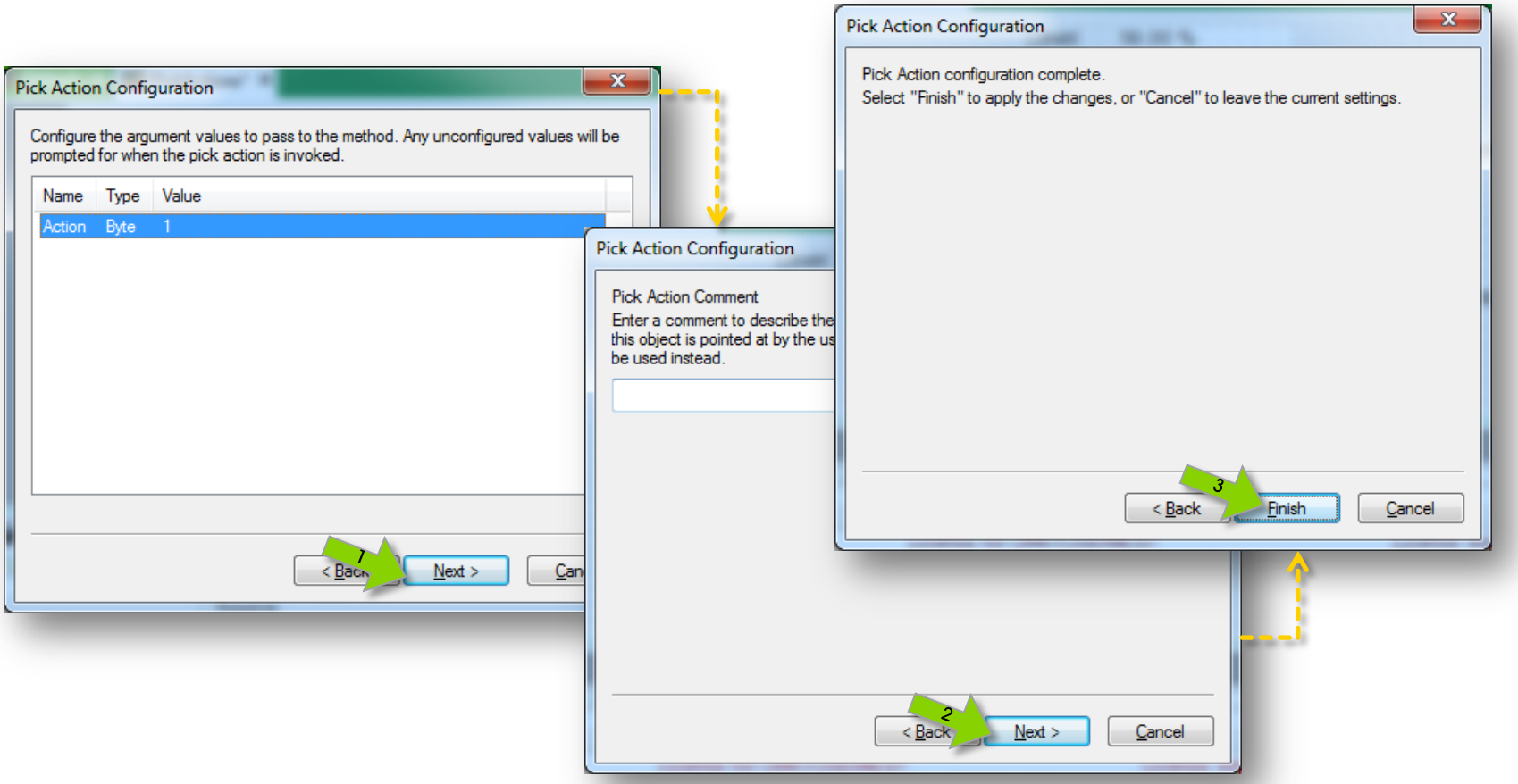
- Set the **Aggregate** type to **Control**. Then **Next**. Then double click the **Action** line. Print **1** into the **Expression** field. Then **OK**.



Pump Controls

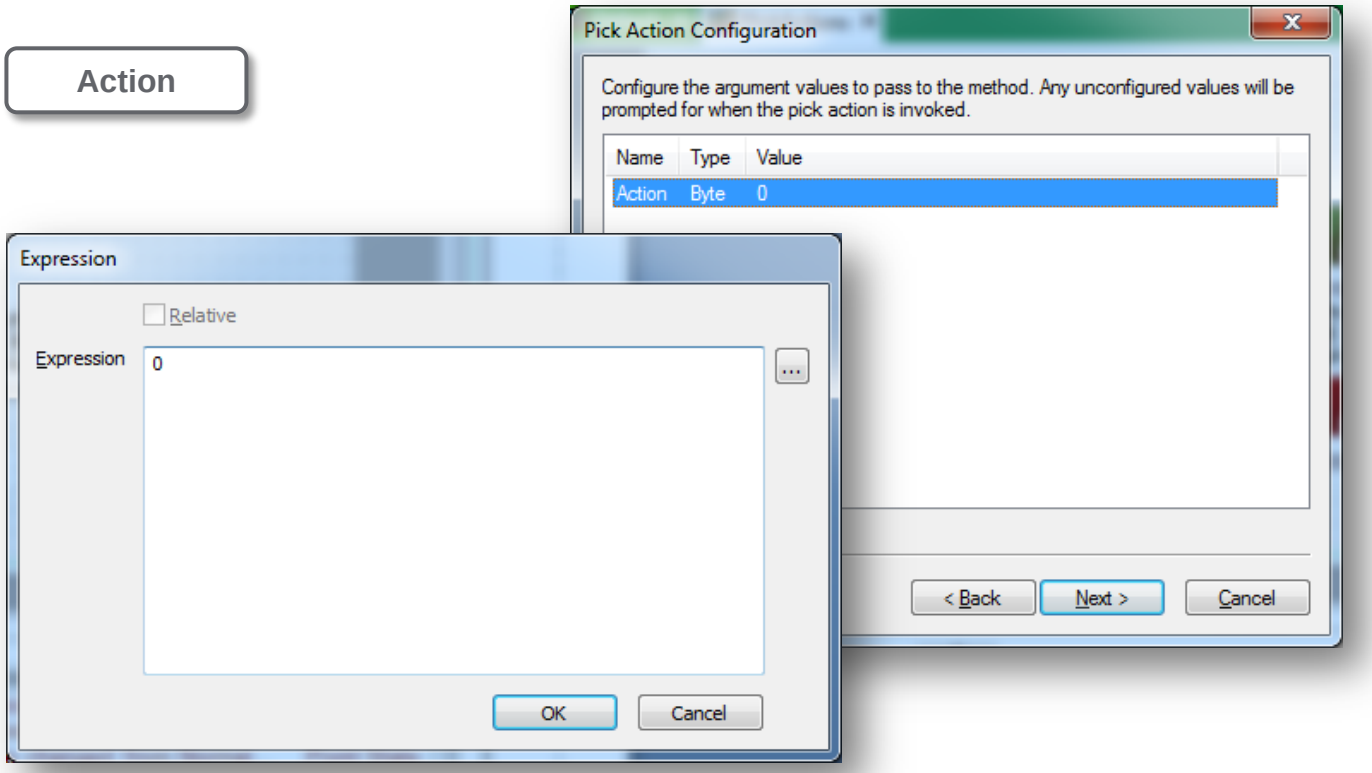
Step by Step

- Then follow thru to complete the button control.



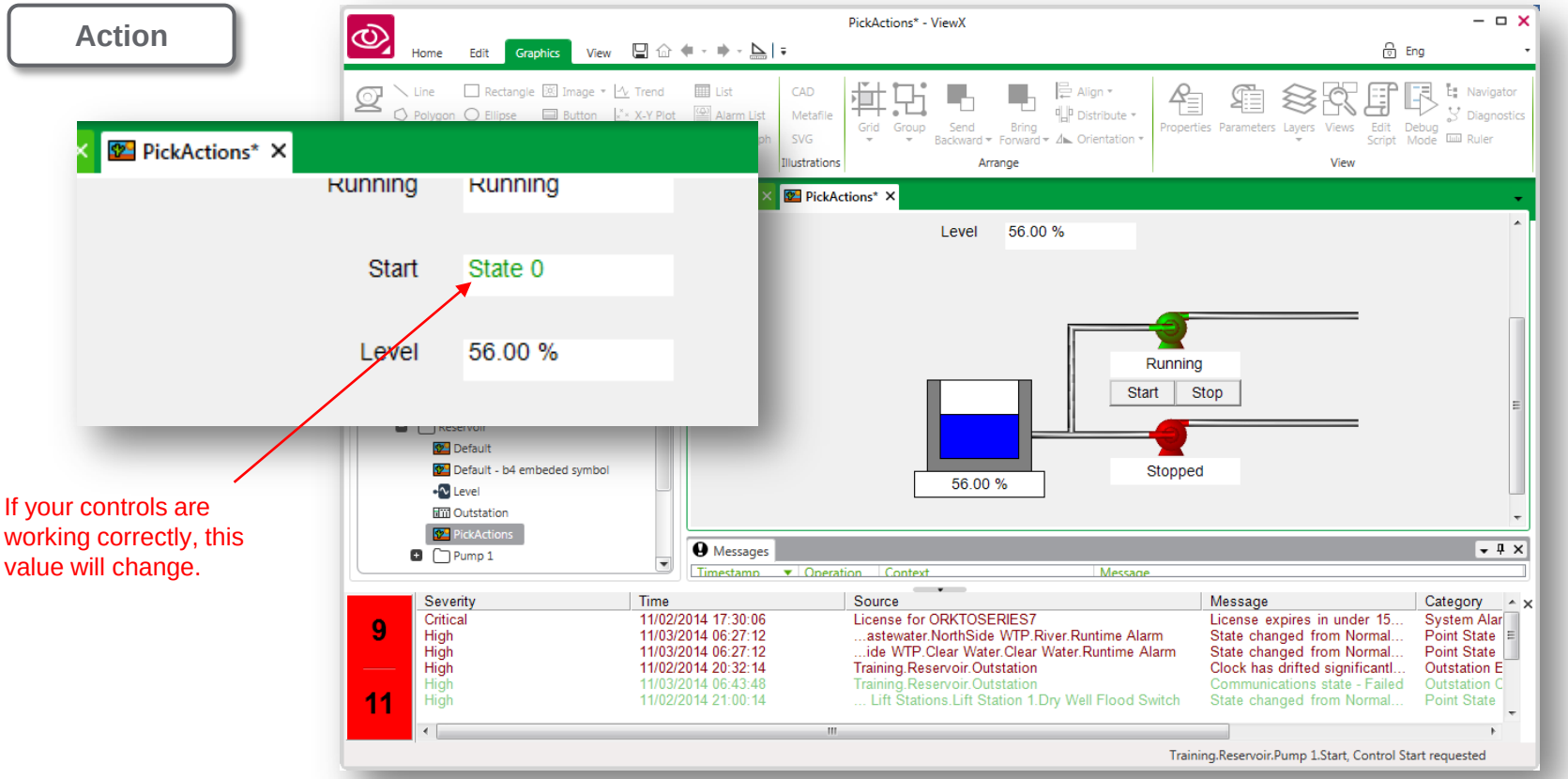
Pump Controls

- Now as for the Stop button, using what you had learned, set **Action** type to value of 0.



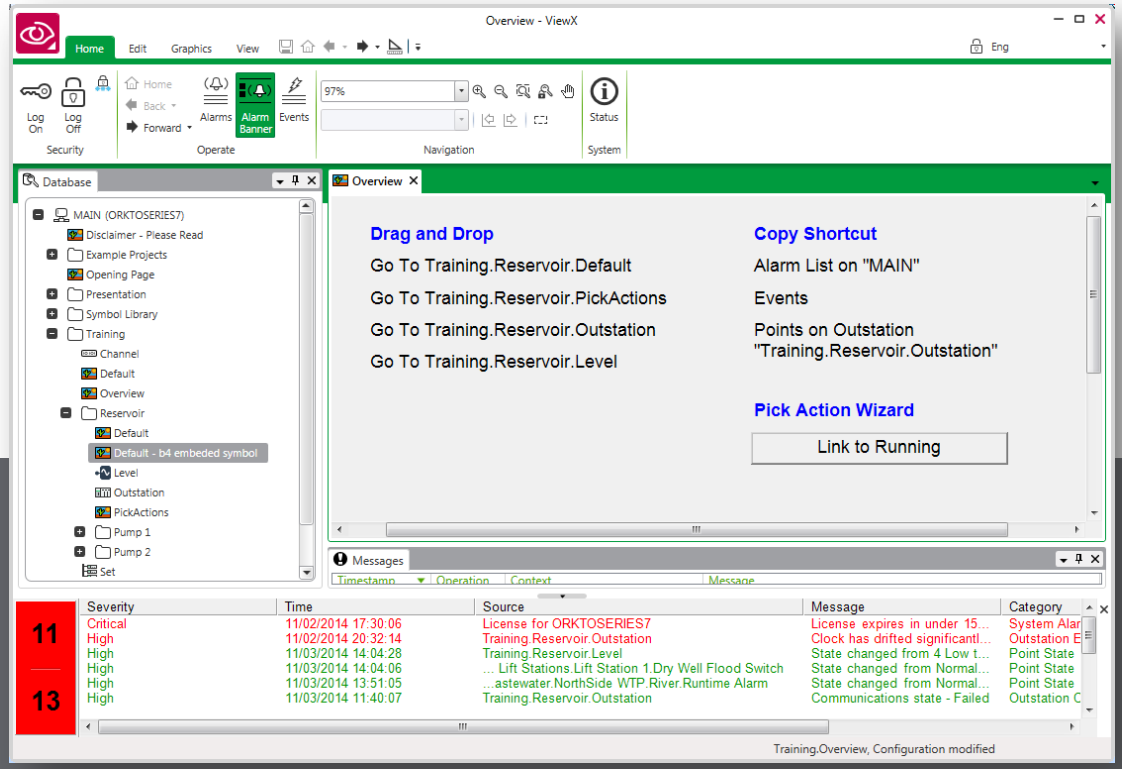
Pump Controls

- Put the mimic into run mode and test out your pump controls.



Hyperlinks

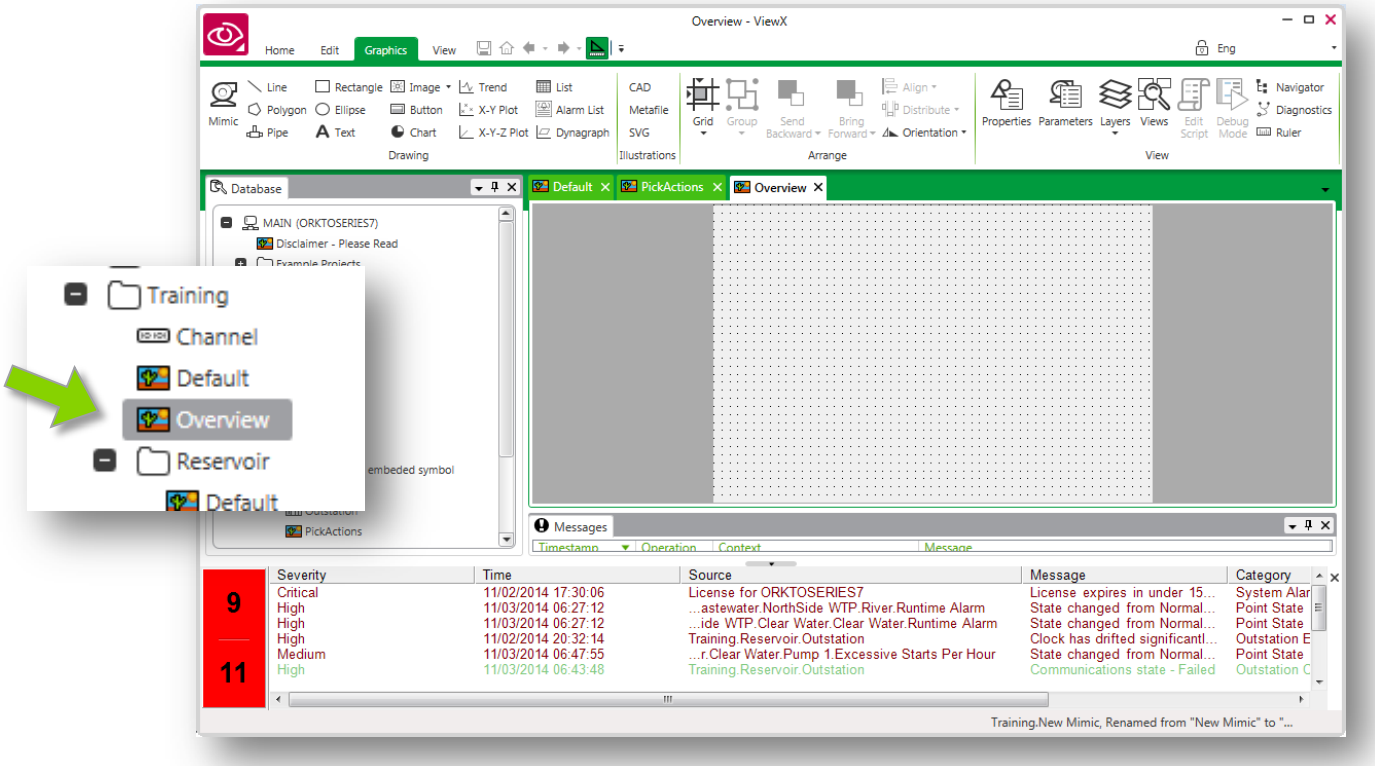
- You can edit a mimic so that it contains hyperlinks to other displays. This is useful for providing access to related displays from a single mimic. Hyperlinks in ClearSCADA are the same as hyperlinks on the internet, they provide a means of linking from one mimic to another.



Hyperlinks

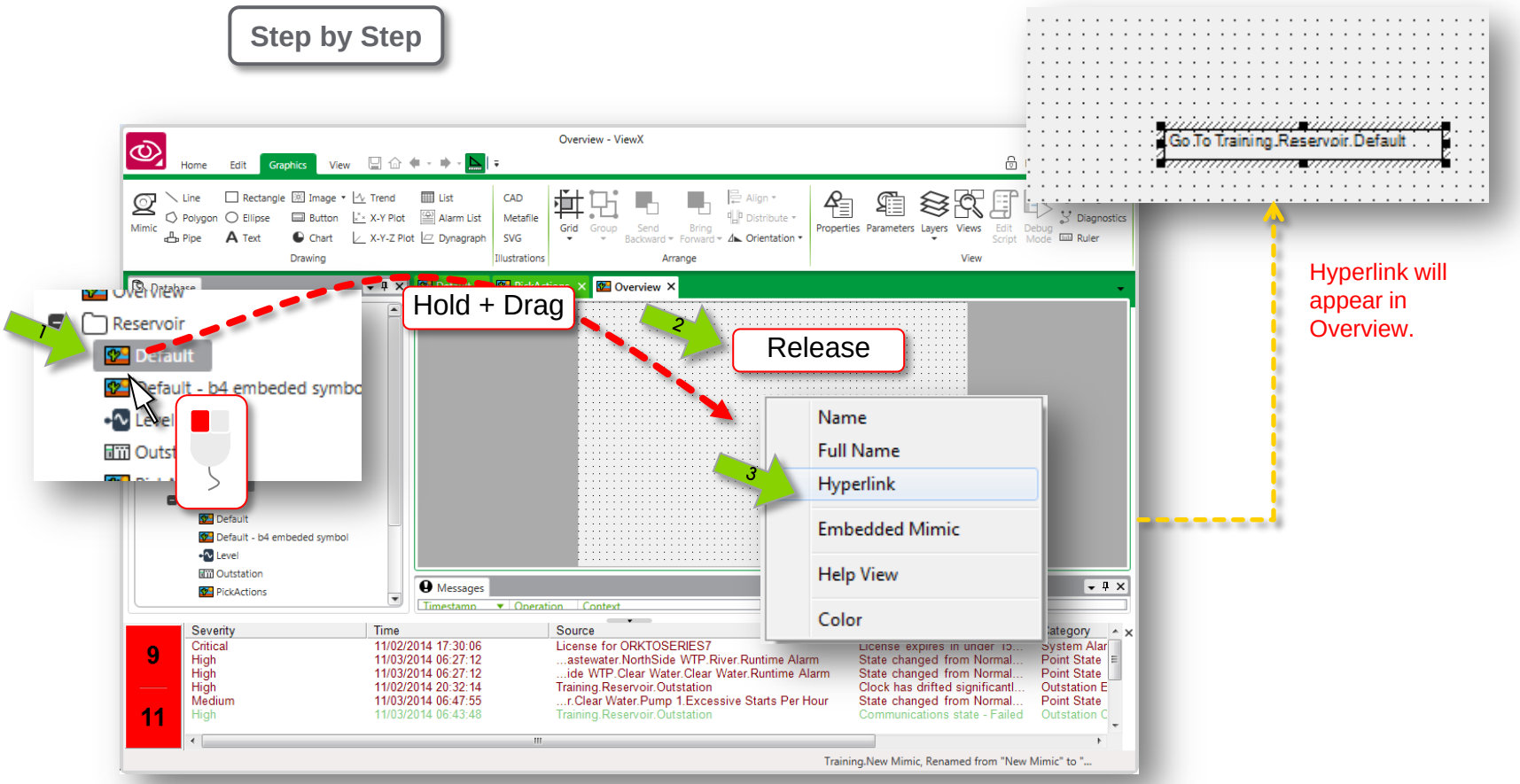
- Create a new mimic directly under the **Training** folder and call it **Overview**.

Action



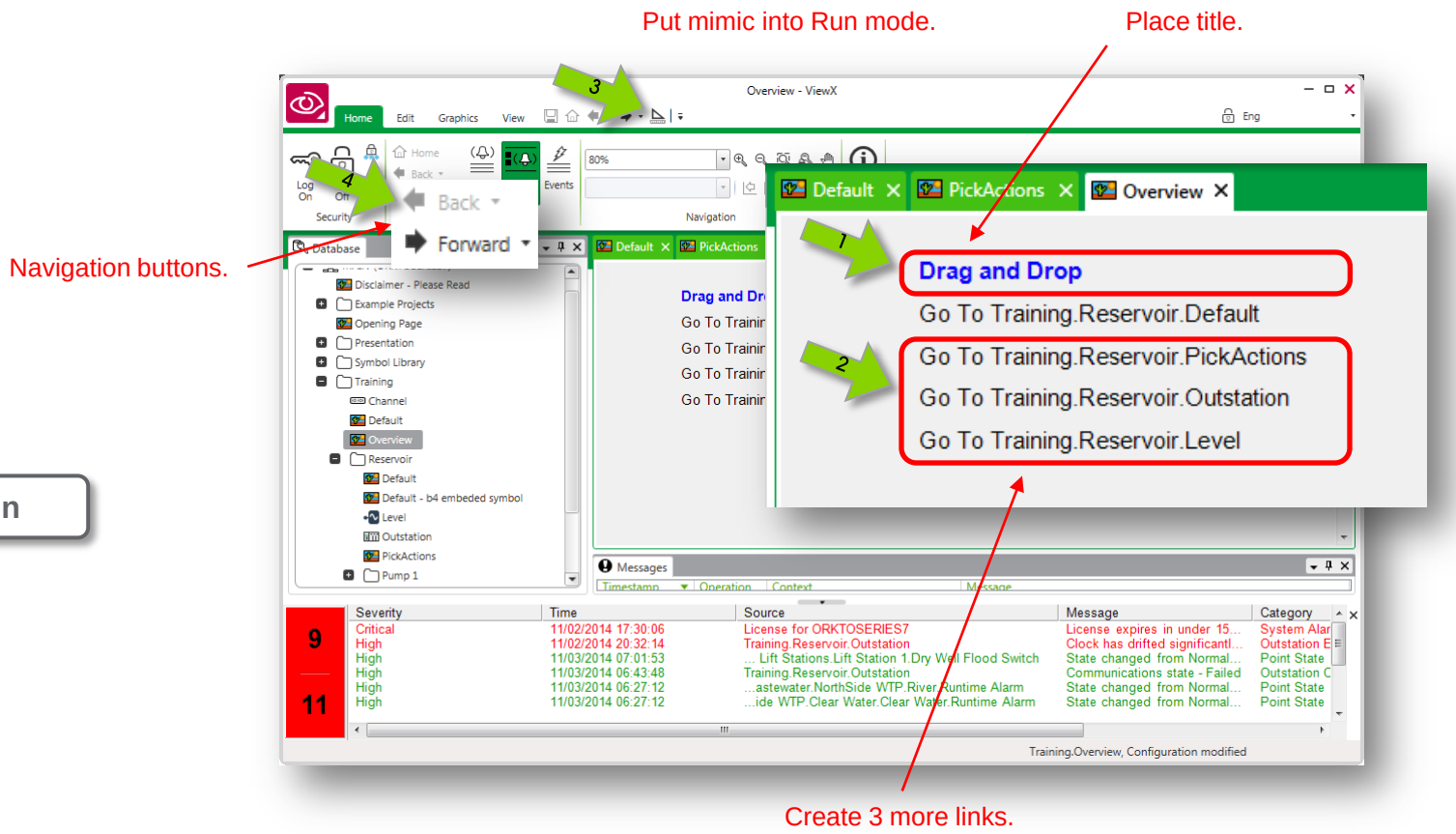
Hyperlinks

- Simply drag the **Reservoir -> Default** mimic over into **Overview**, release the mouse and select **Hyperlink**.



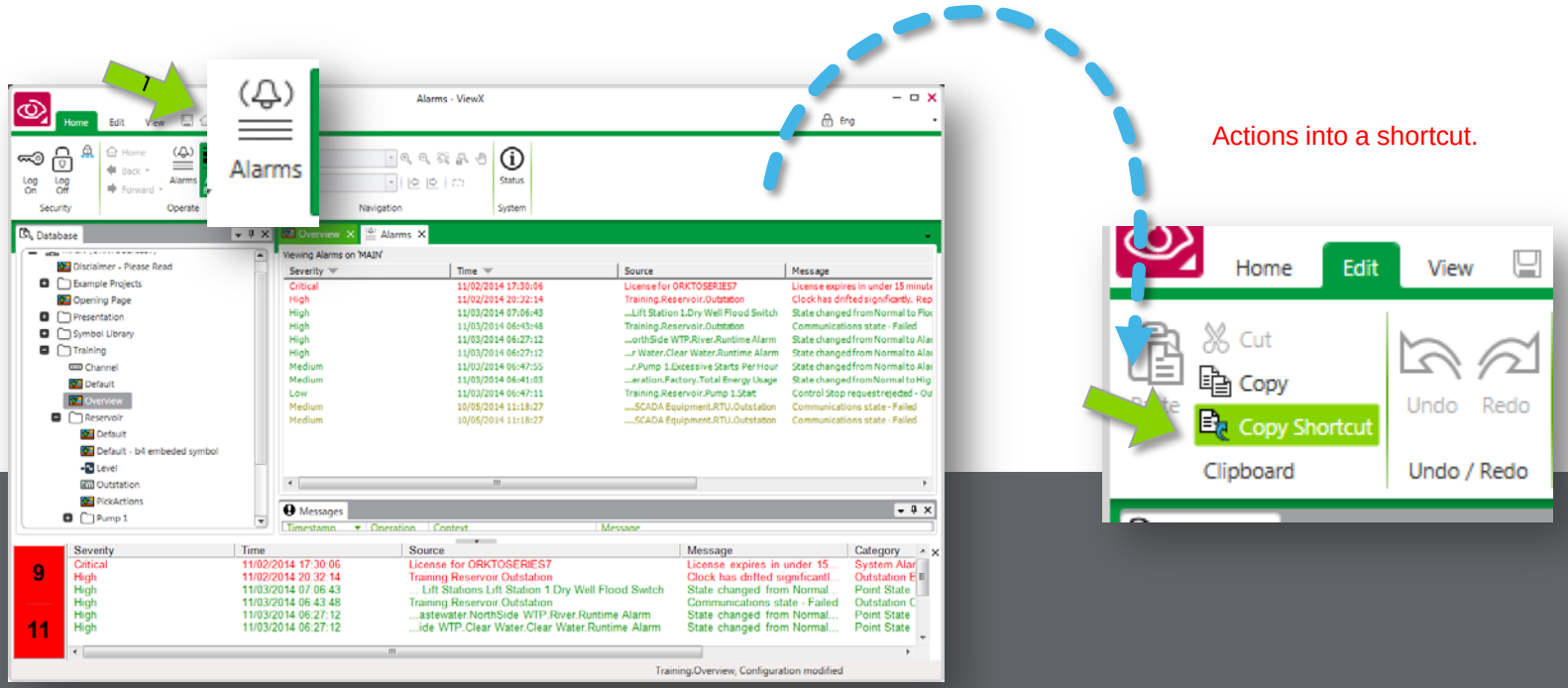
Hyperlinks

- Create the other 3 hyperlinks and put a title on top. Put the mimic into **Run** mode and test it out. Use the navigation button to conveniently move back to the **Overview** page.



Hyperlinks - Copy Shortcuts

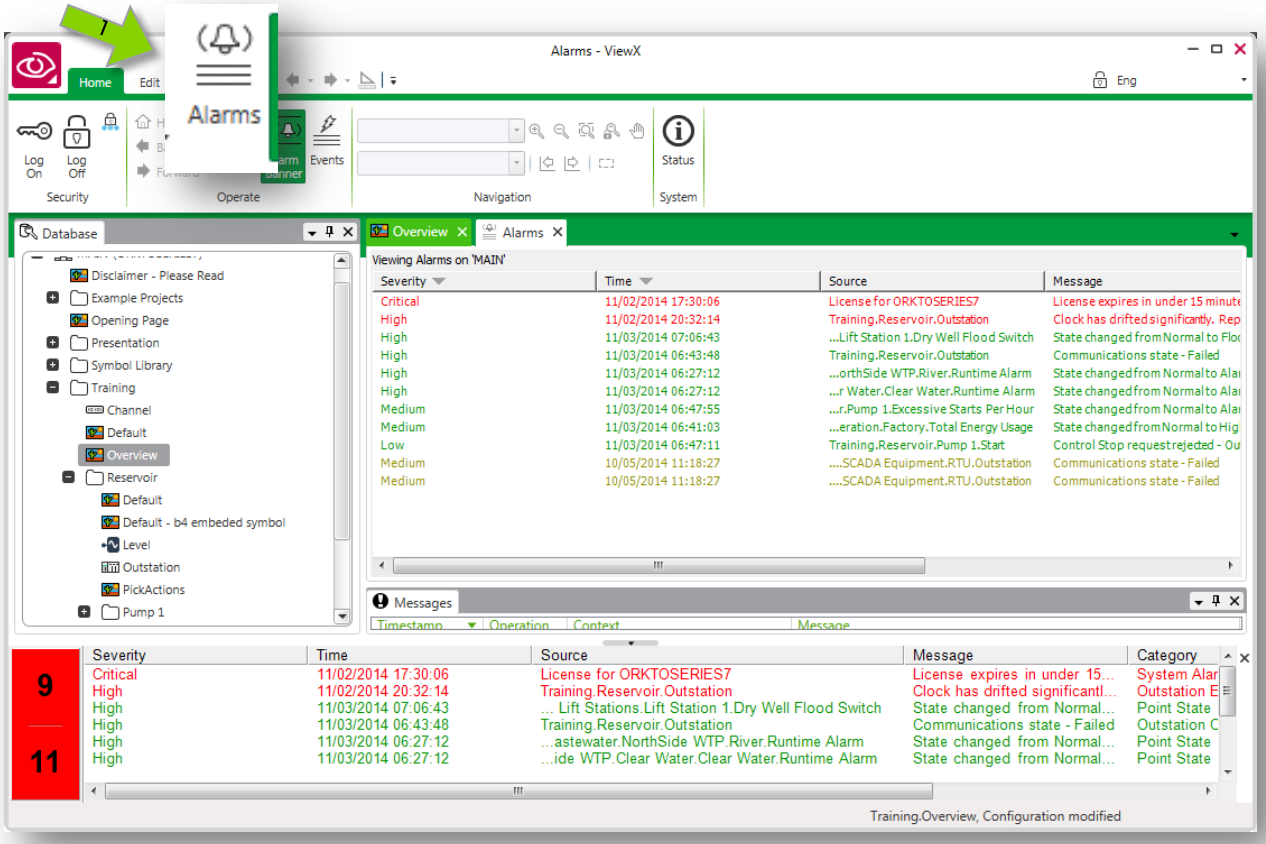
- The second method for configuring hyperlinks is to copy an existing hyperlink. Whenever any object is on display in the ViewX window, you can select the Copy Shortcut option from the Edit menu and paste the hyperlink into any mimic.



Hyperlinks - Copy Shortcuts

- Click on the **Alarm** to get to the **Alarms Page**.

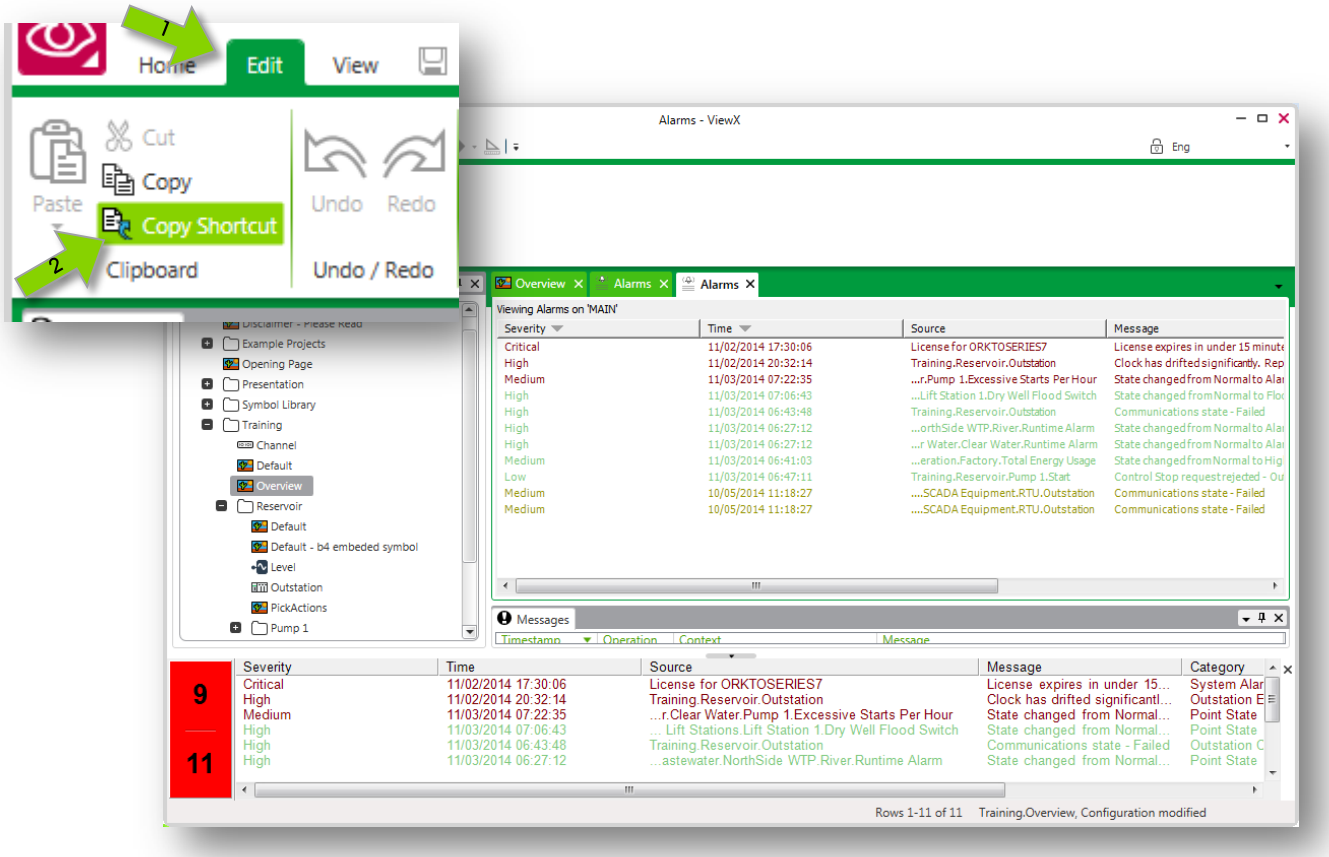
Step by Step



Hyperlinks - Copy Shortcuts

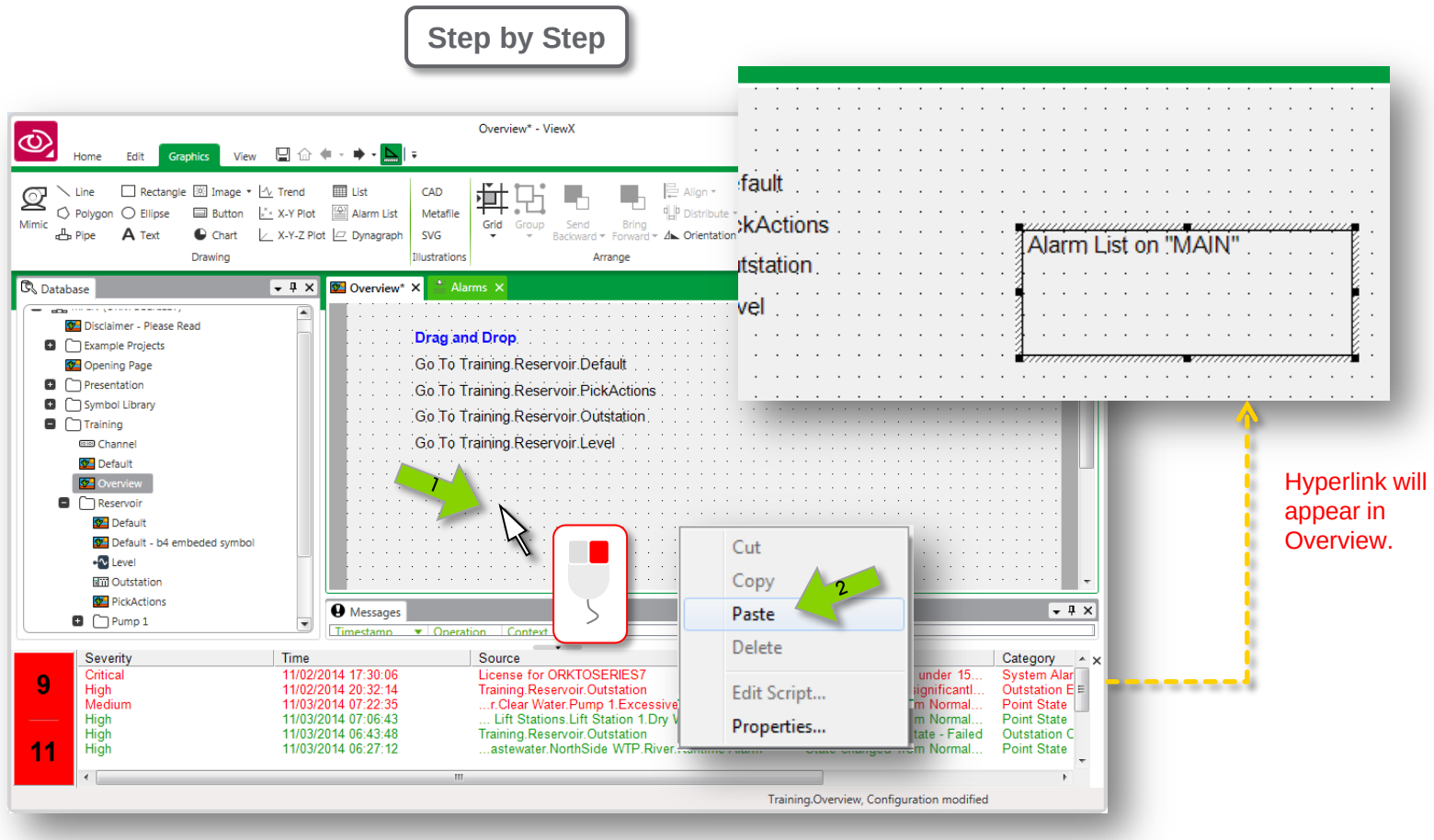
- Go to the **Edit** tab and then select **Copy Shortcut**.

Step by Step



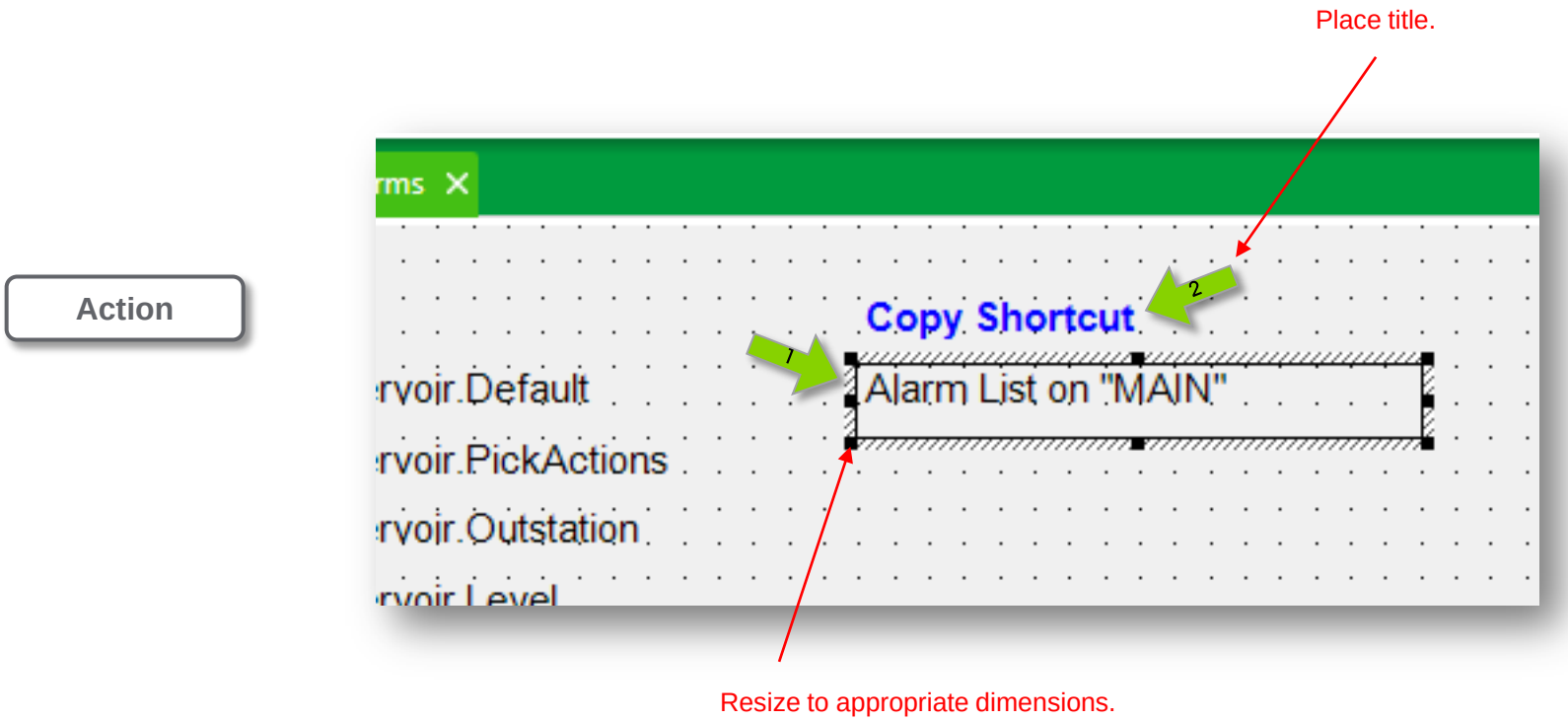
Hyperlinks - Copy Shortcuts

- Back into the **Overview** mimic, go anywhere on the mimic and right click, select **Paste**.



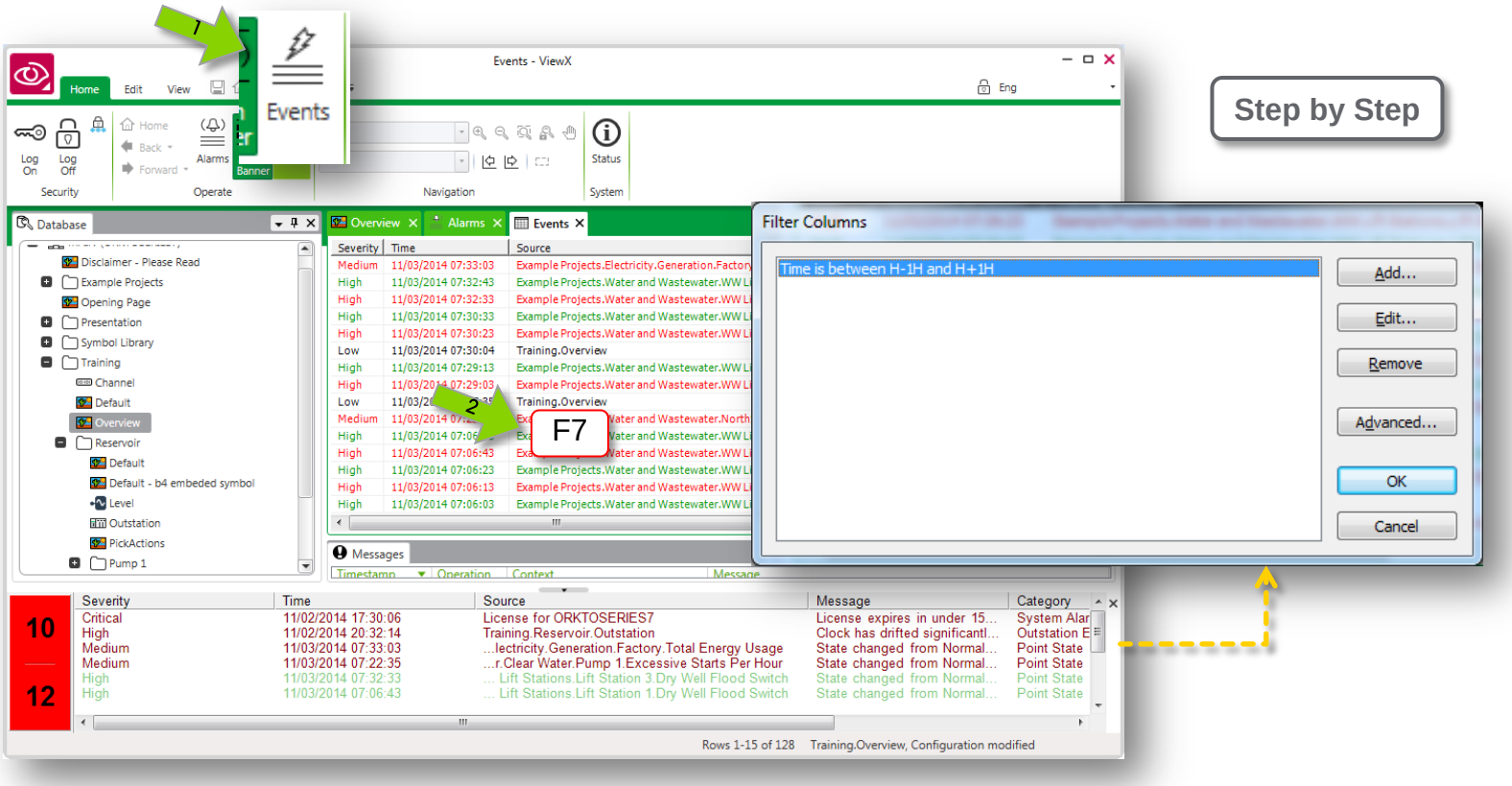
Hyperlinks - Copy Shortcuts

- Shrink down the hyperlink to appropriate size and add the title **Copy Shortcut** above. You can test this out by putting the mimic into **Run** mode.



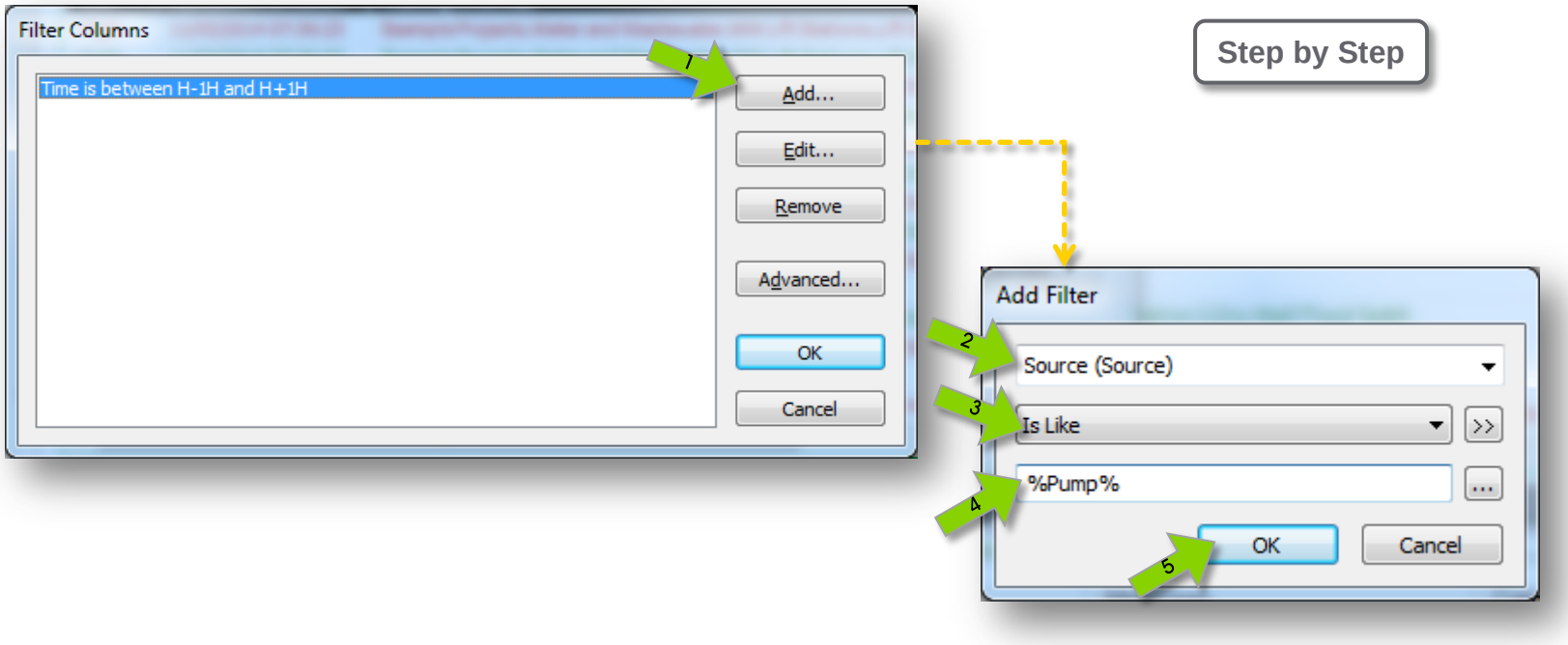
Hyperlinks - Copy Shortcuts

- Shortcuts can be complex, a combination of moves.
- Click on **Events** to bring out the **Events List**. Then press F7 to bring out the **Filter**.



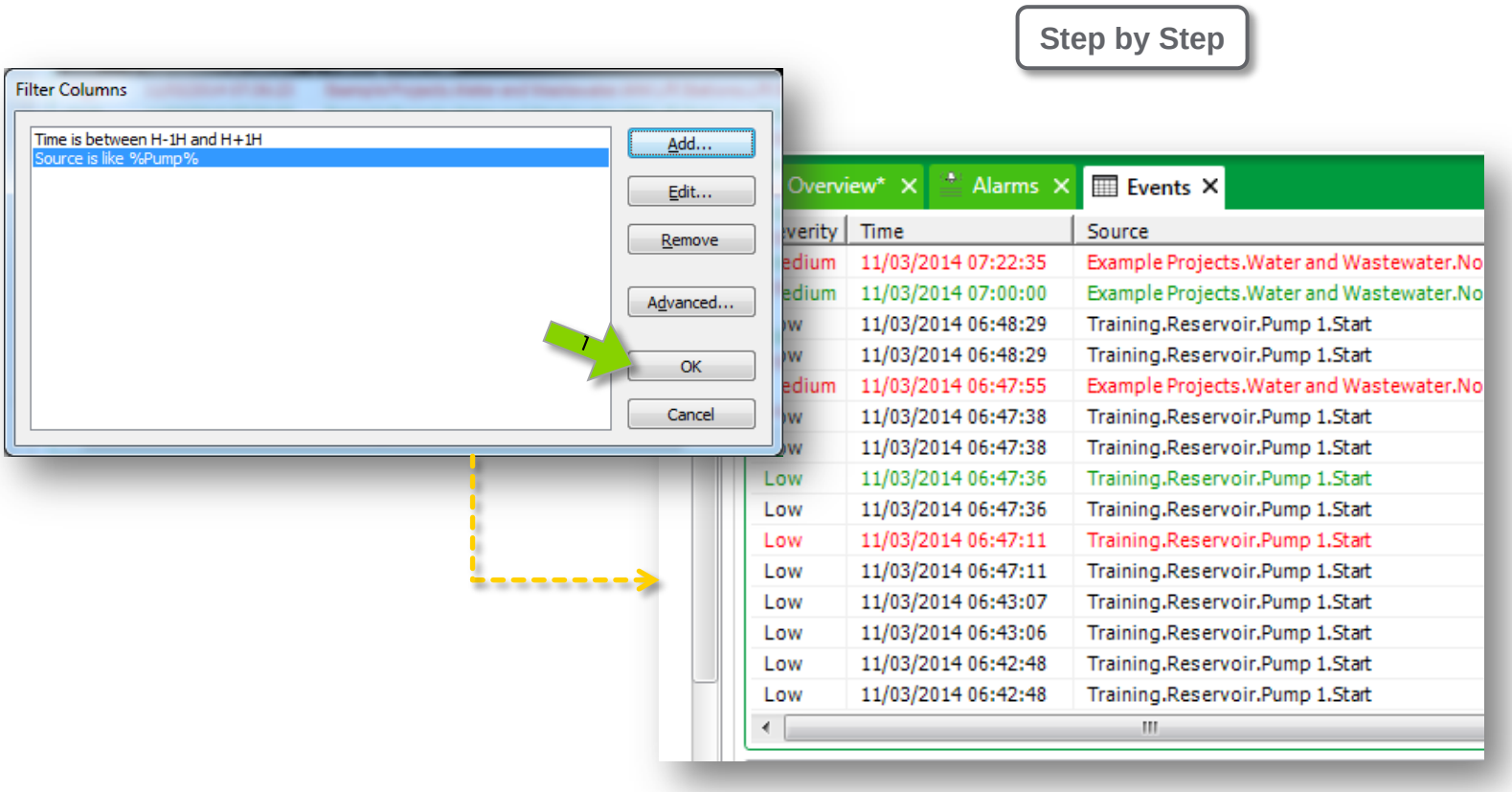
Hyperlinks - Copy Shortcuts

- Click on **Add** the apply a filter **%Pump%** to the **Source** filed.



Hyperlinks - Copy Shortcuts

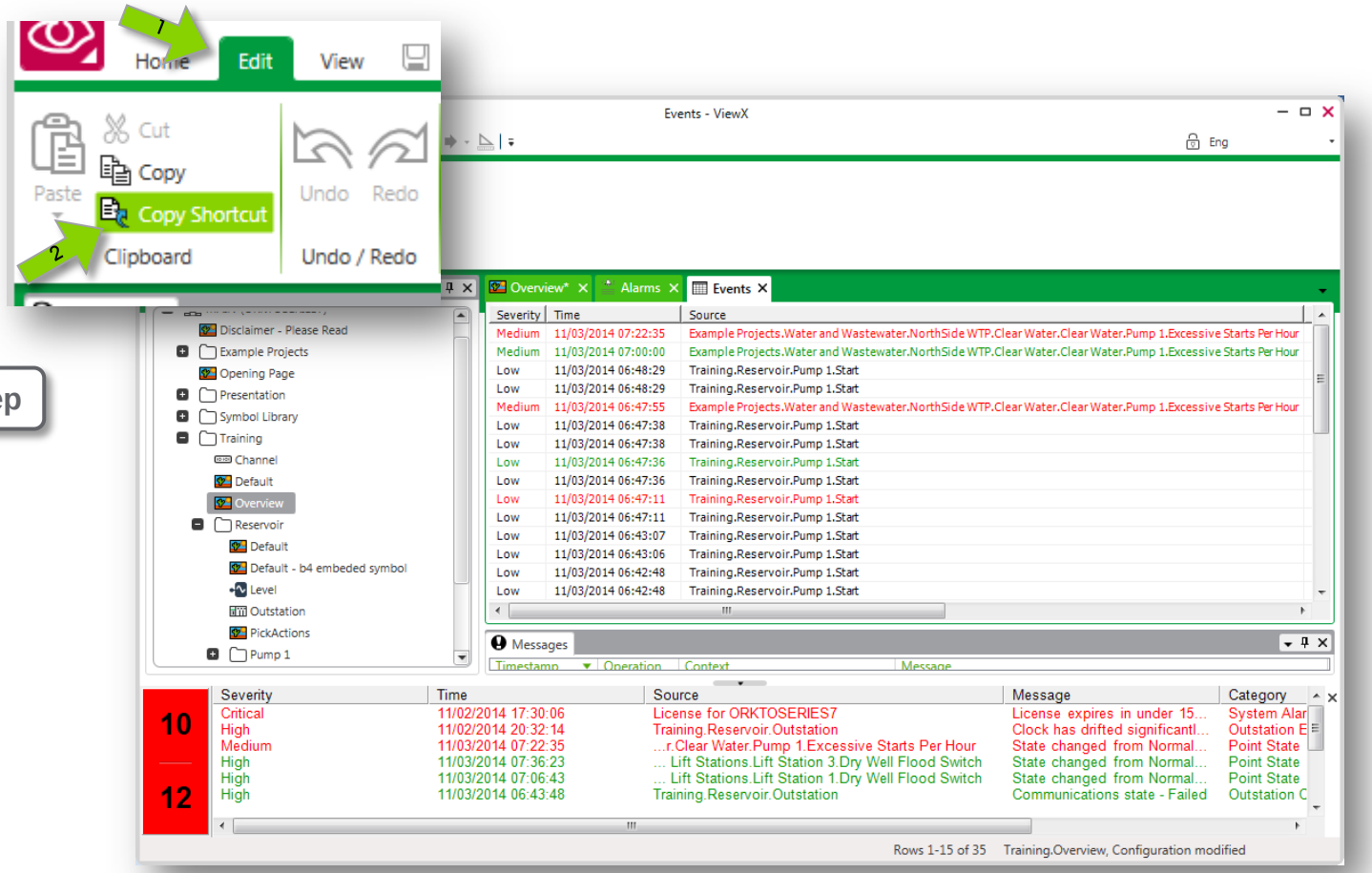
- Follow thru and click on **OK** and you will see the **Event List** is now filtered.



Hyperlinks - Copy Shortcuts

- Go to the **Edit** tab and select **Copy Shortcut**.

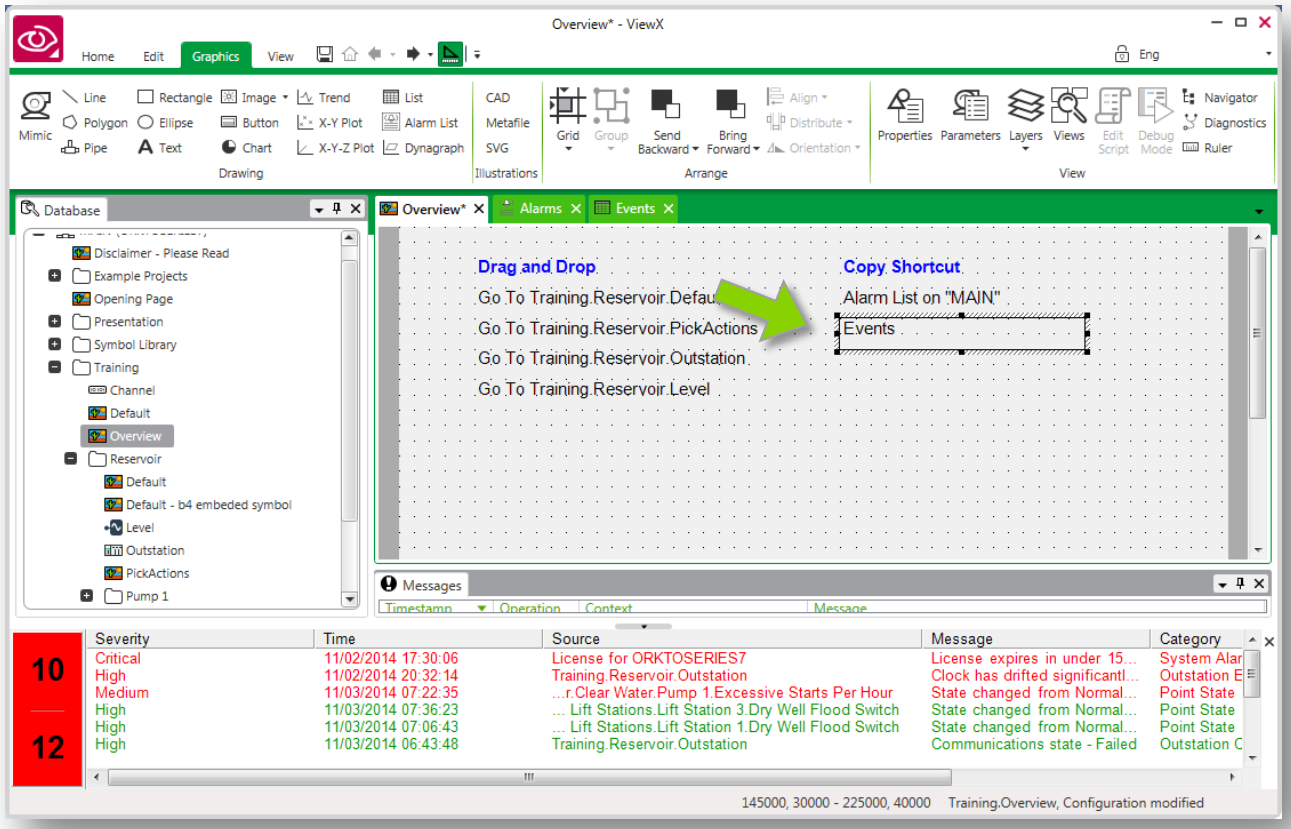
Step by Step



Hyperlinks - Copy Shortcuts

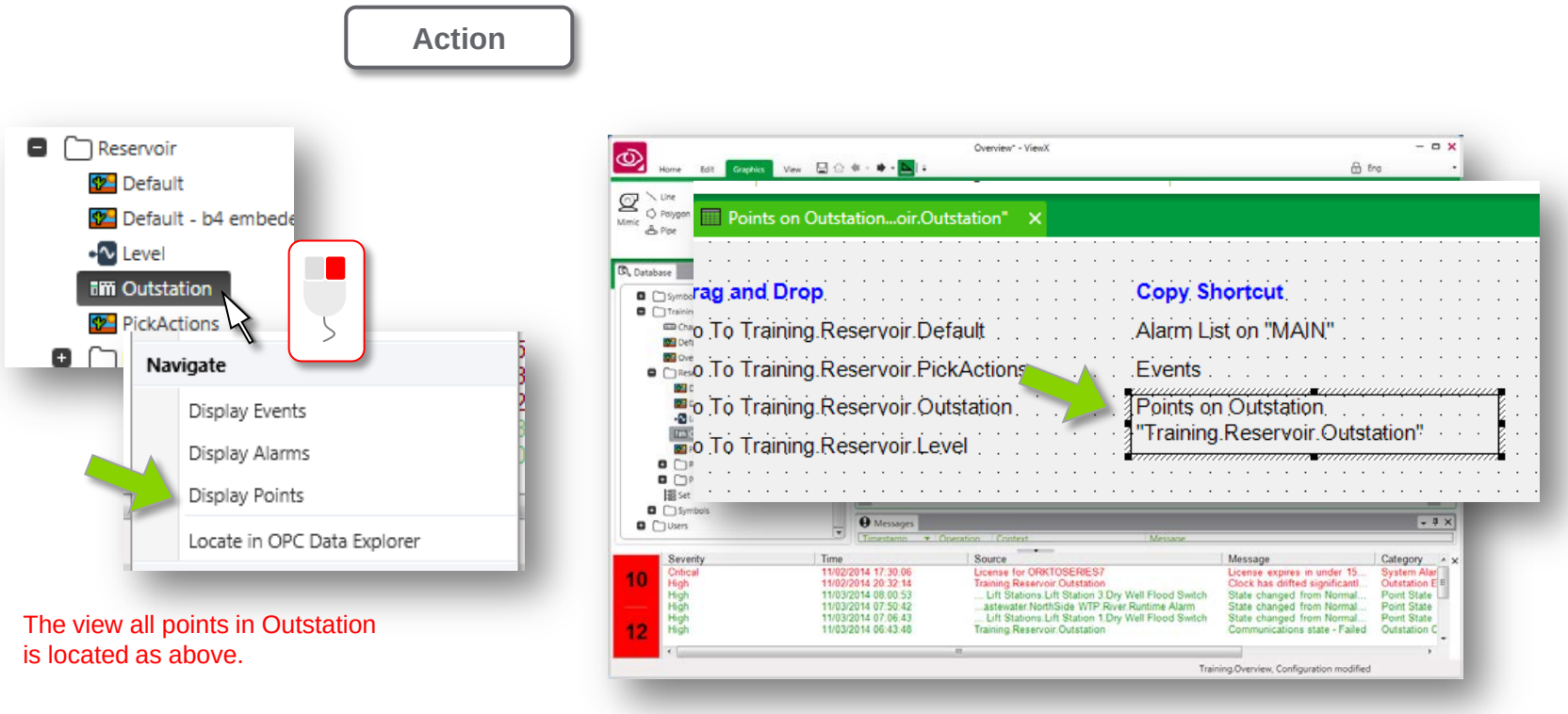
- Go to the **Overview** mimic and paste the shortcut, resize the dimensions to appropriate size.

Action



Hyperlinks - Copy Shortcuts

- Next create a new shortcut to view all point in the system.

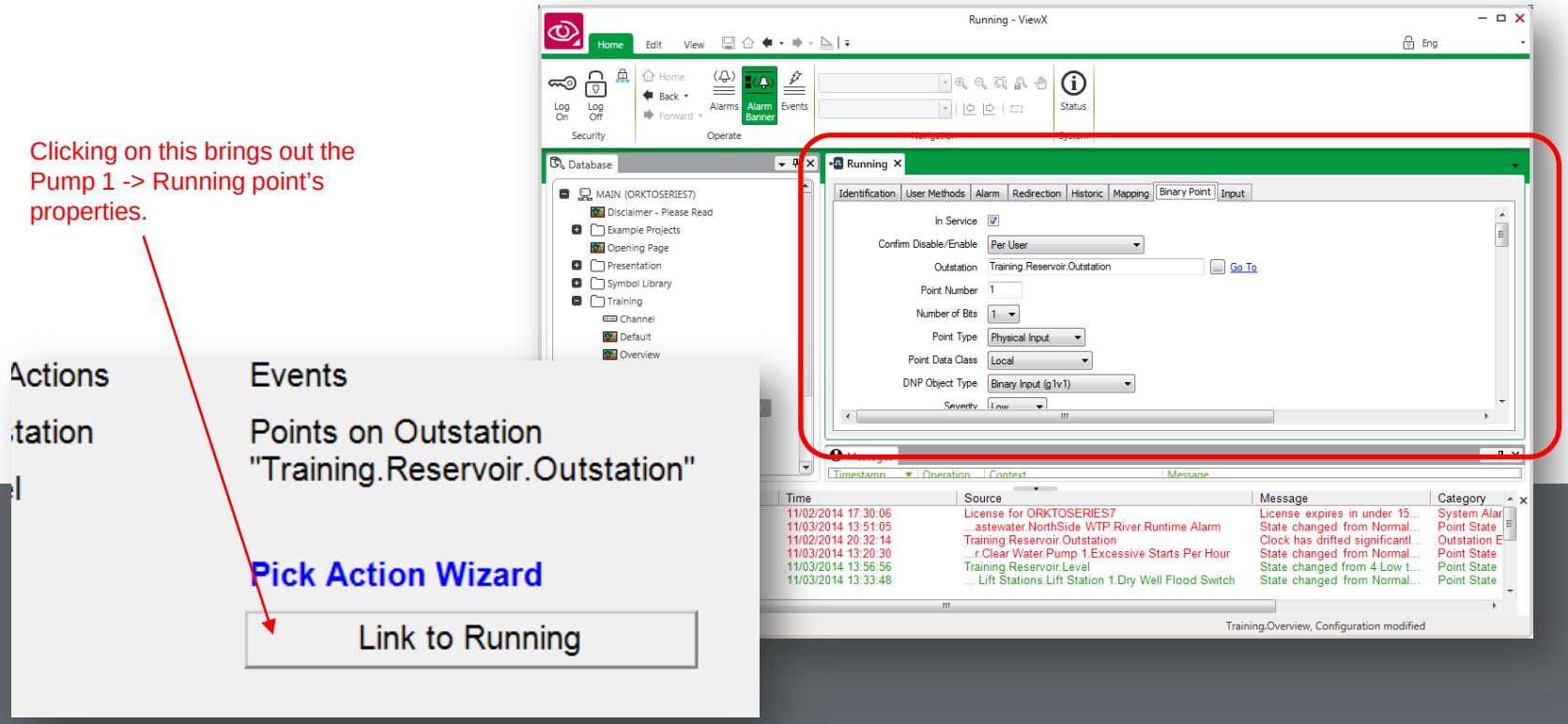


The view all points in Outstation is located as above.

Hyperlinks - Pick Action

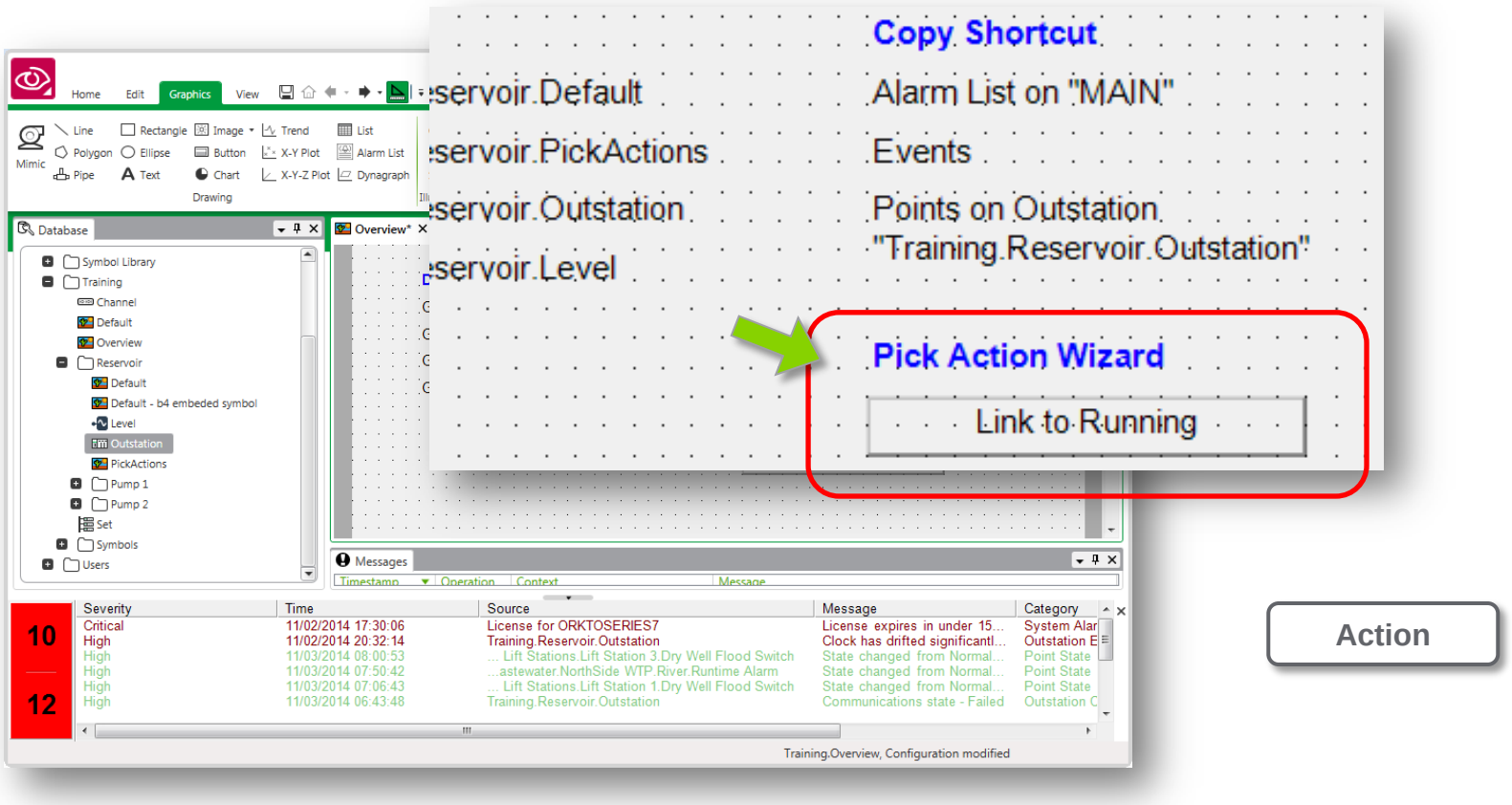
- The final method for configuring hyperlinks is to use the Hyperlinks option on the Pick Action Configuration wizard to manually link to the required object.

Clicking on this brings out the Pump 1 -> Running point's properties.



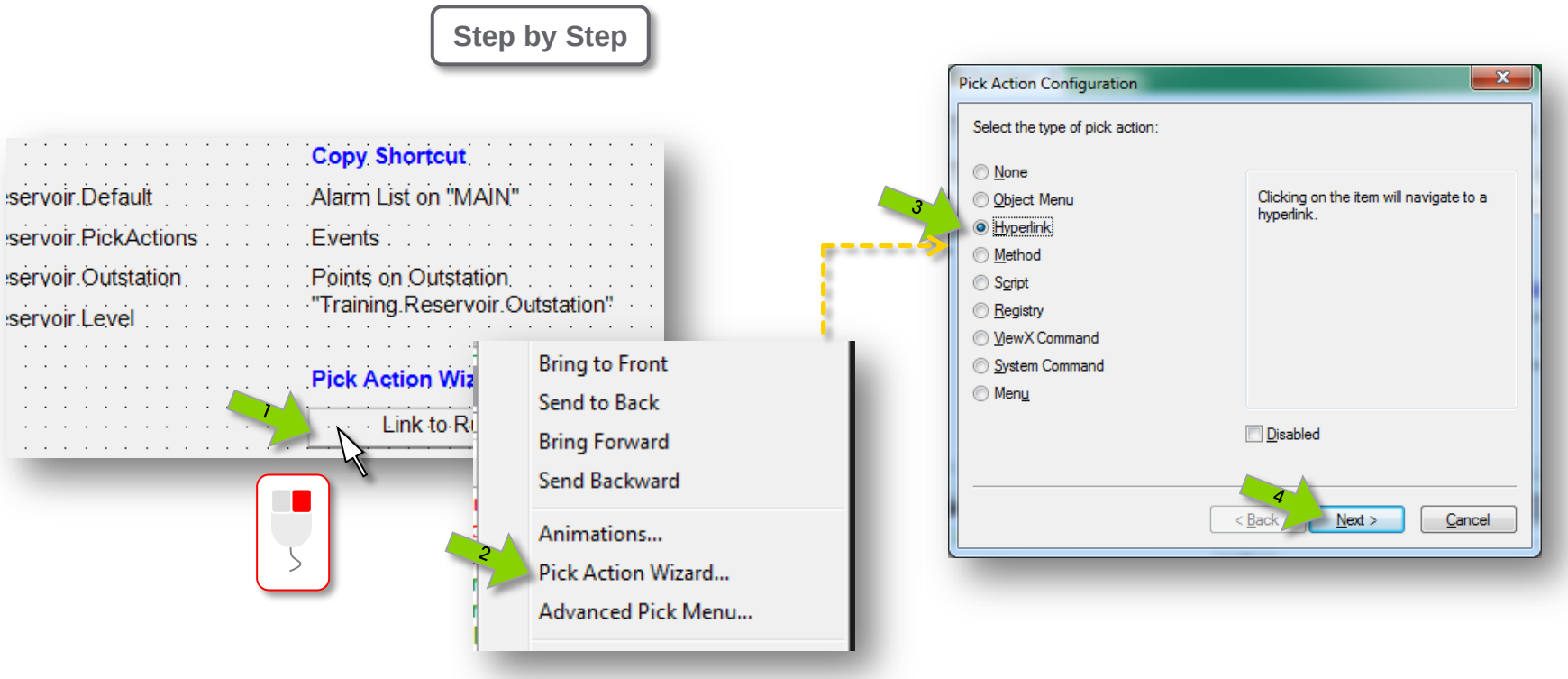
Hyperlinks - Pick Action

- Create a new title called **Pick Action Wizard** and a new button called **Link to Running**.



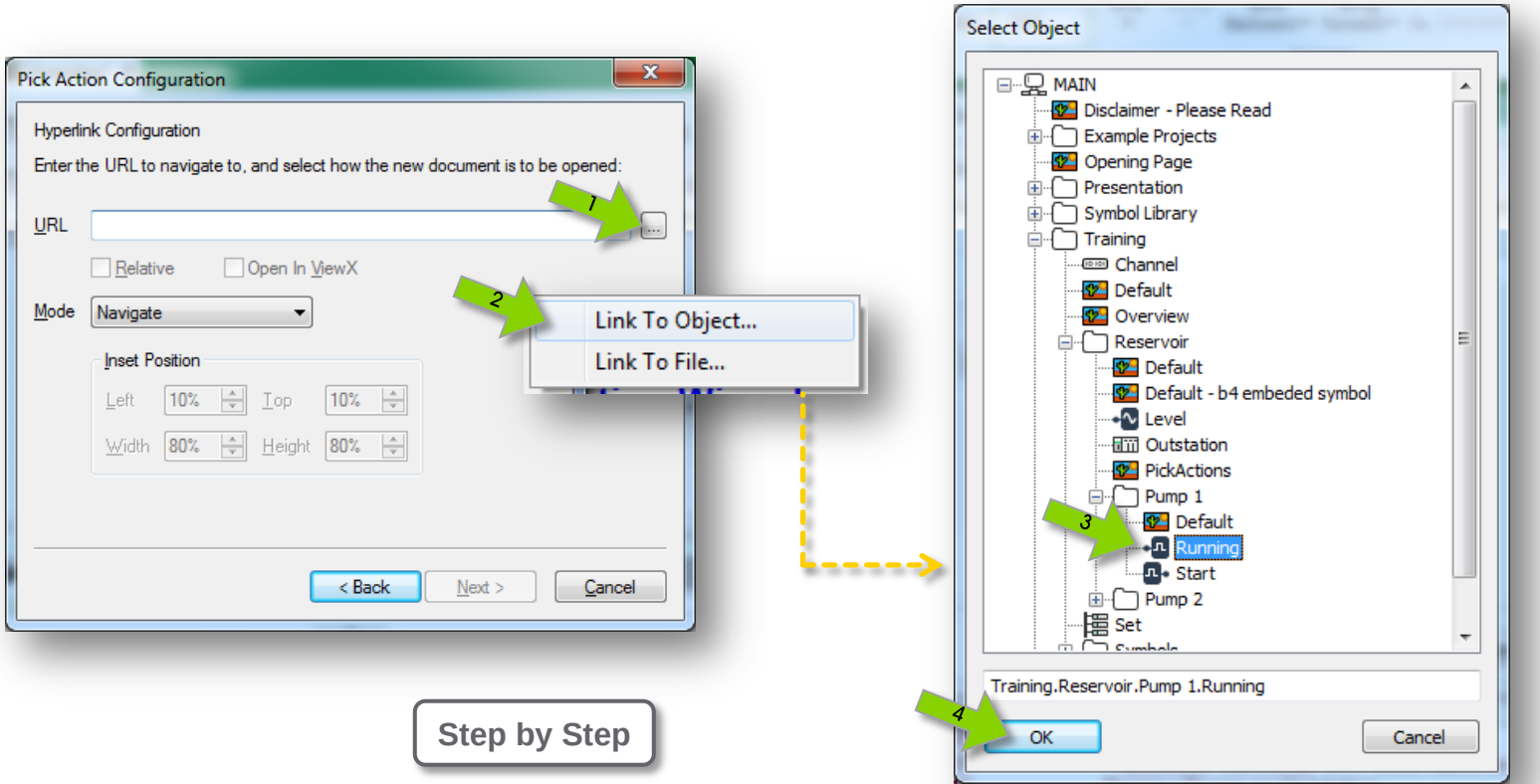
Hyperlinks - Pick Action

- Right click the button and select **Pick Action Wizard**. Select **Hyperlink** and then on **Next**.



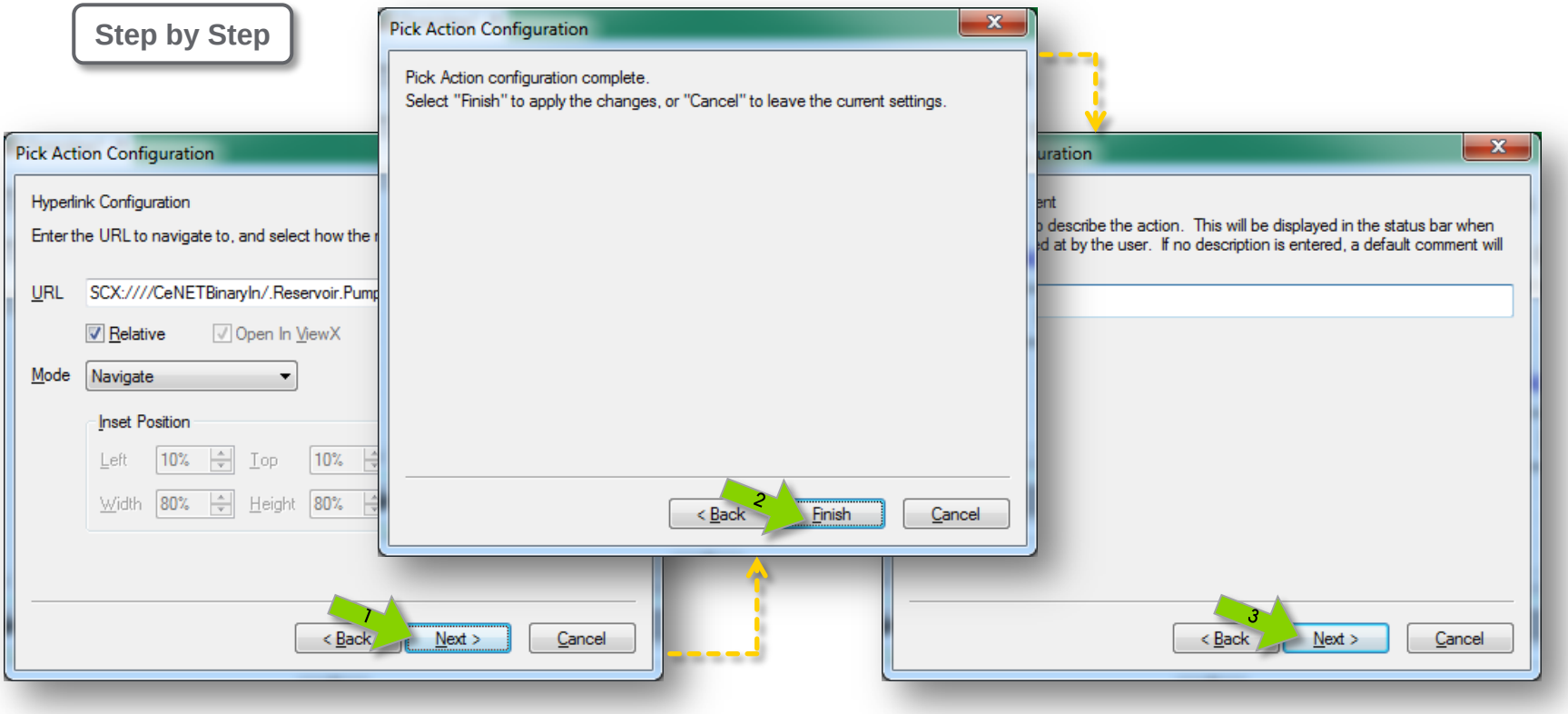
Hyperlinks - Pick Action

- Click on the **(..)** button and then select **Link to Object**. Select the **Pump 1 -> Running** point.



Hyperlinks - Pick Action

- Click on the **(..)** button and then select **Link to Object**. Select the **Pump 1 -> Running** point. Put the mimic into **Run** mode and test the link.



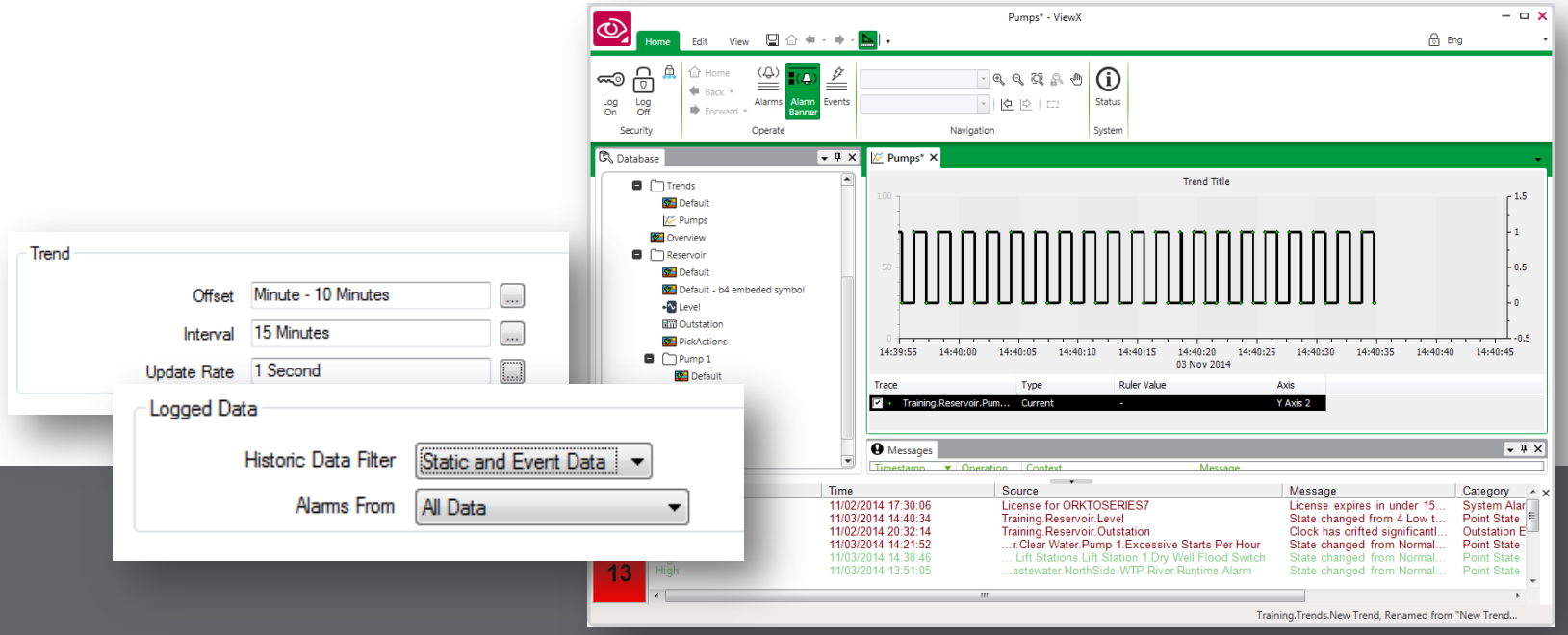
Trends

Section 5
The Trend Object

Confidential Property of Schneider Electric

Trends, The Historian System

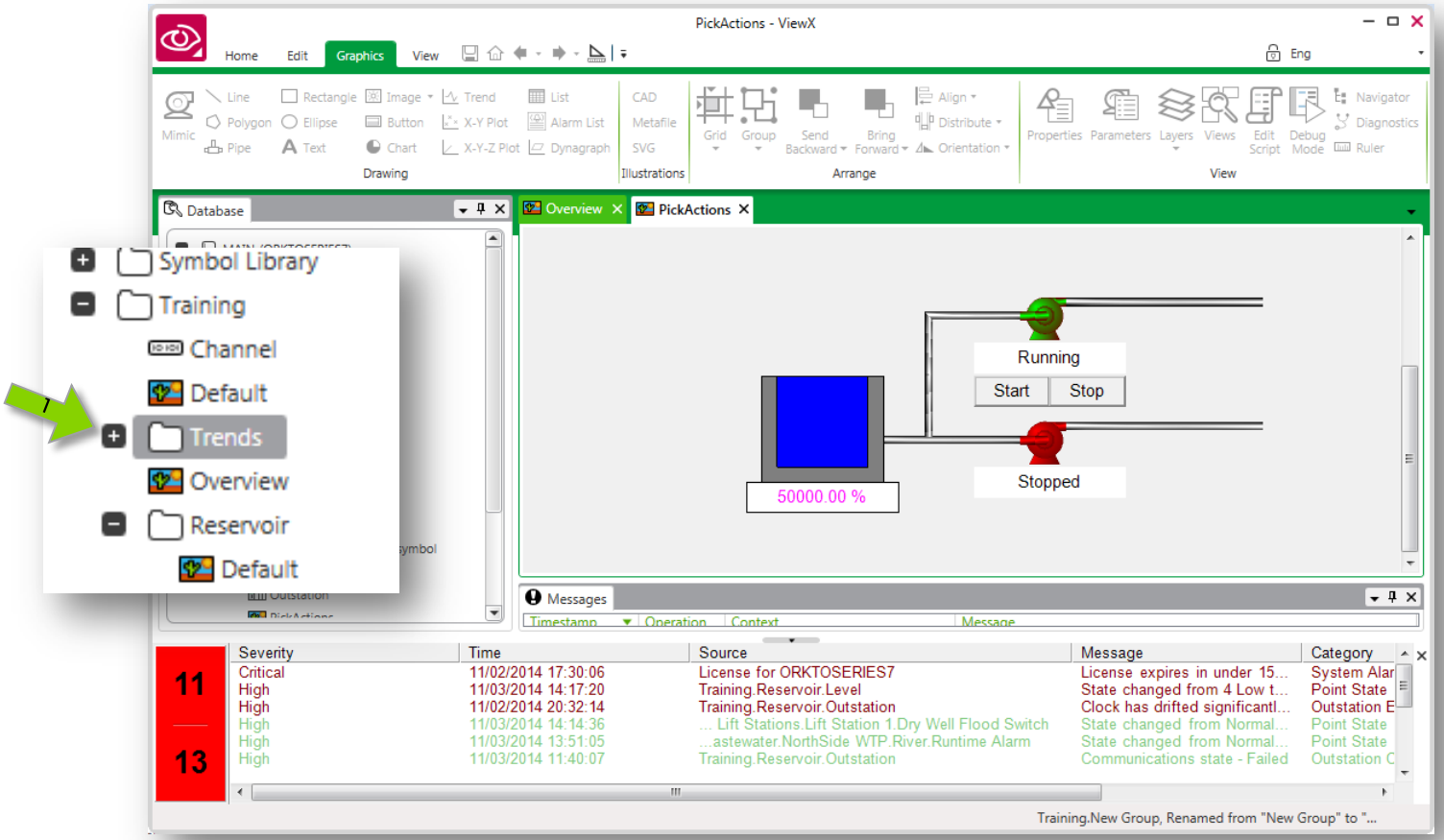
- One of **ClearSCADA's** advanced features is an integrated data historian. The historian functionality is tied in to the point configuration.



Current Trace

Action

- Create a new group called **Trends**.

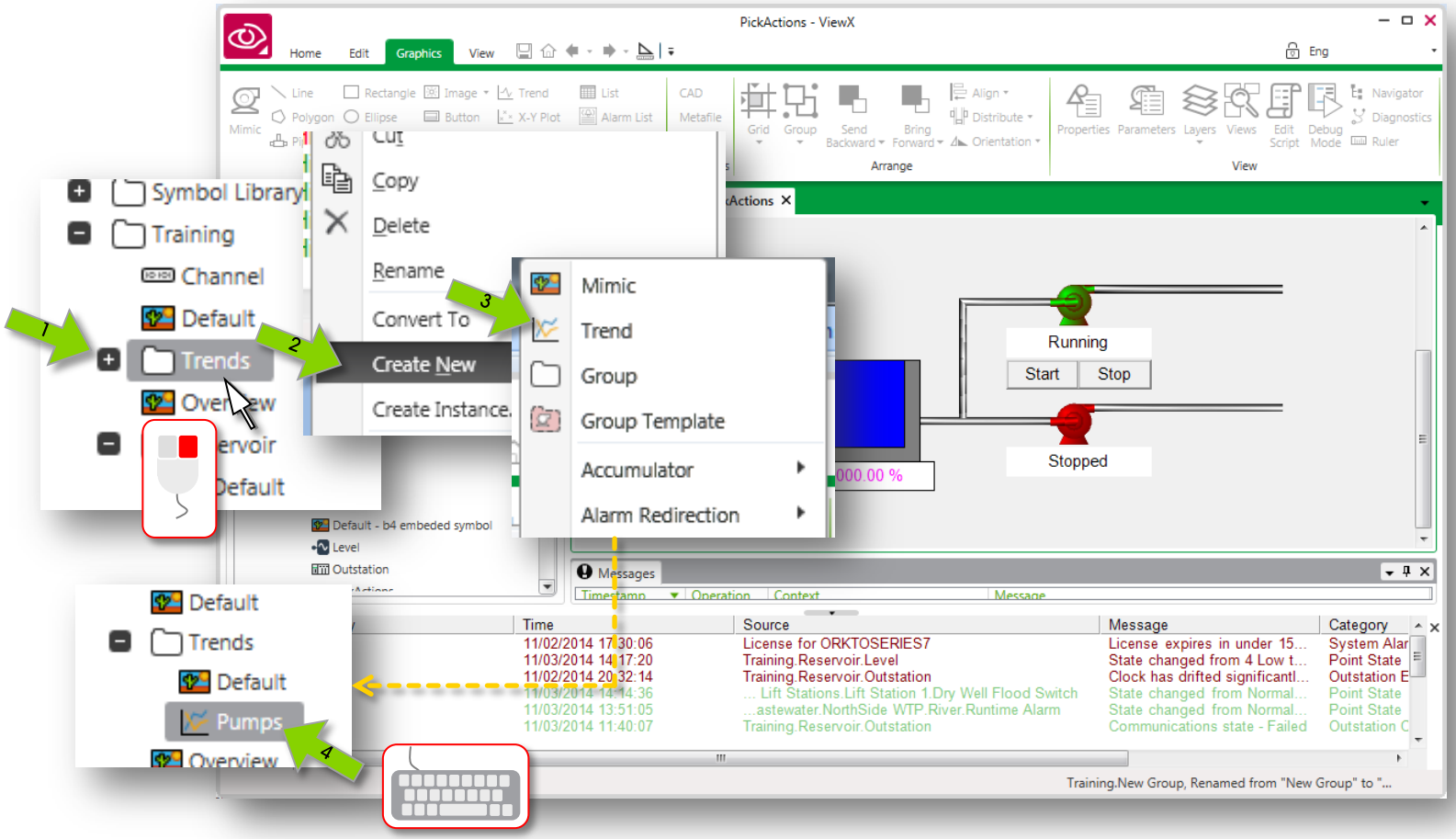


Confidential Property of Schneider Electric

Current Trace

Step by Step

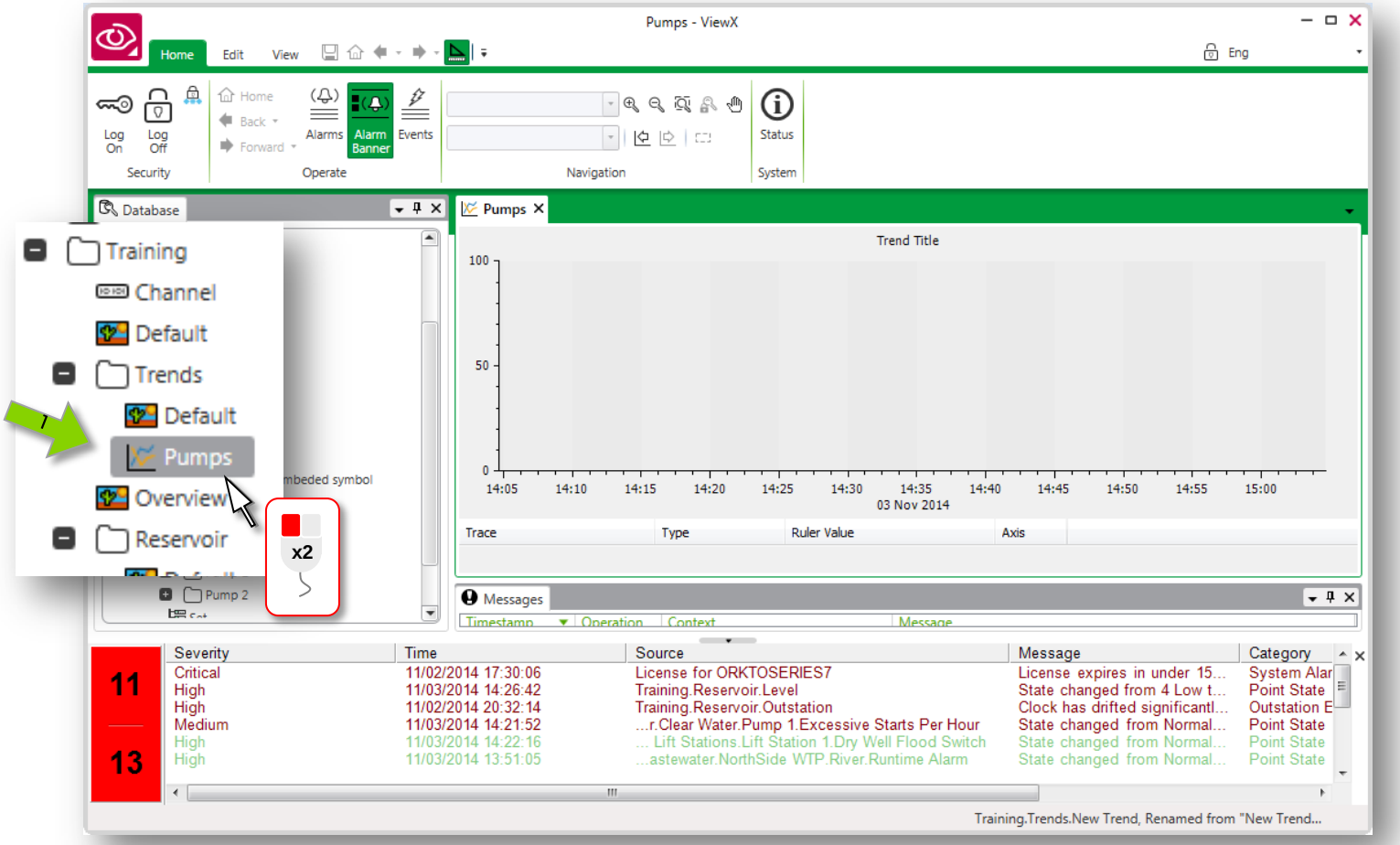
- Right click on the Trends folder and create a new **Trend** and call it **Pumps**.



Current Trace

Step by Step

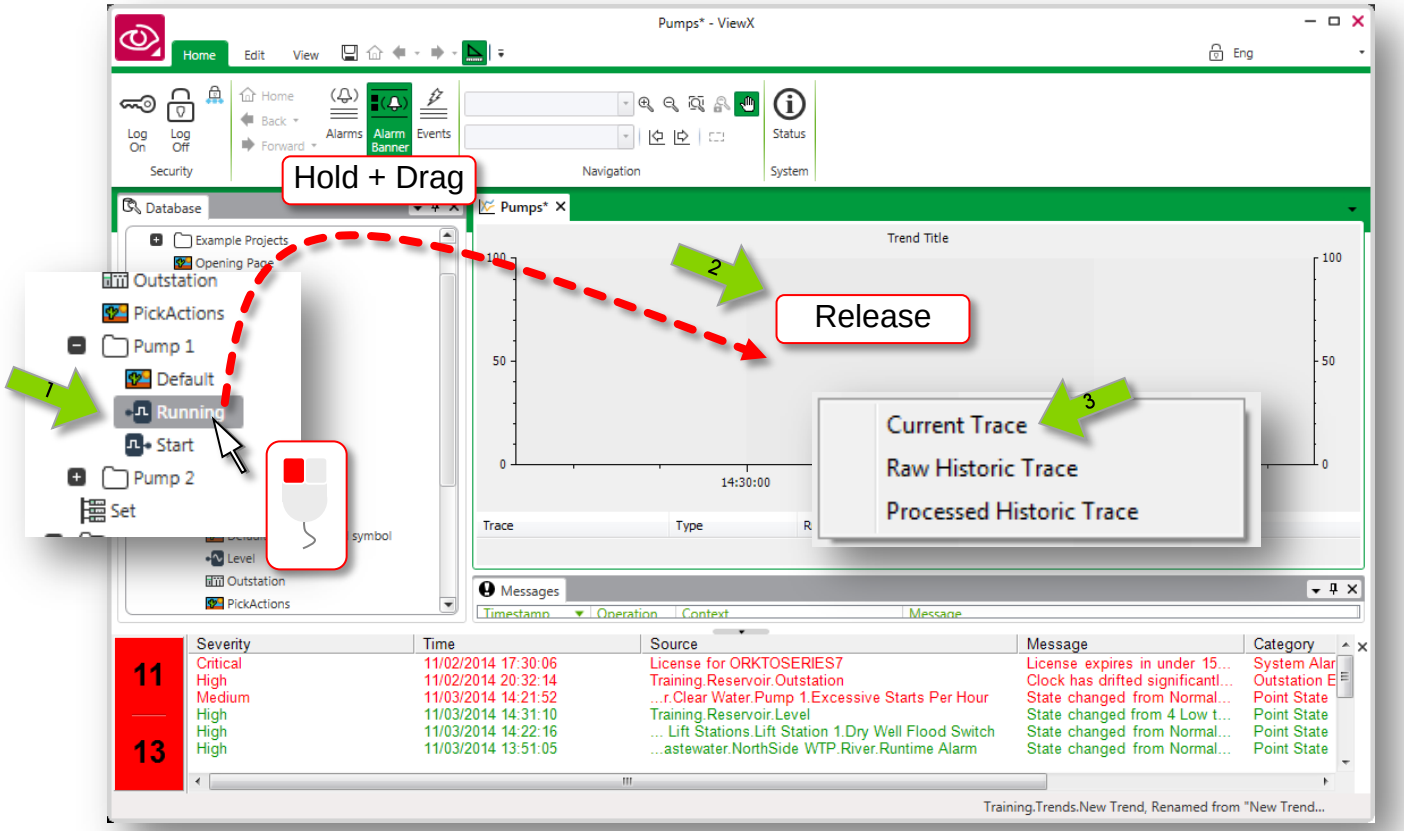
- Double click the **Pump** trends and go into **Design** mode.



Current Trace

Step by Step

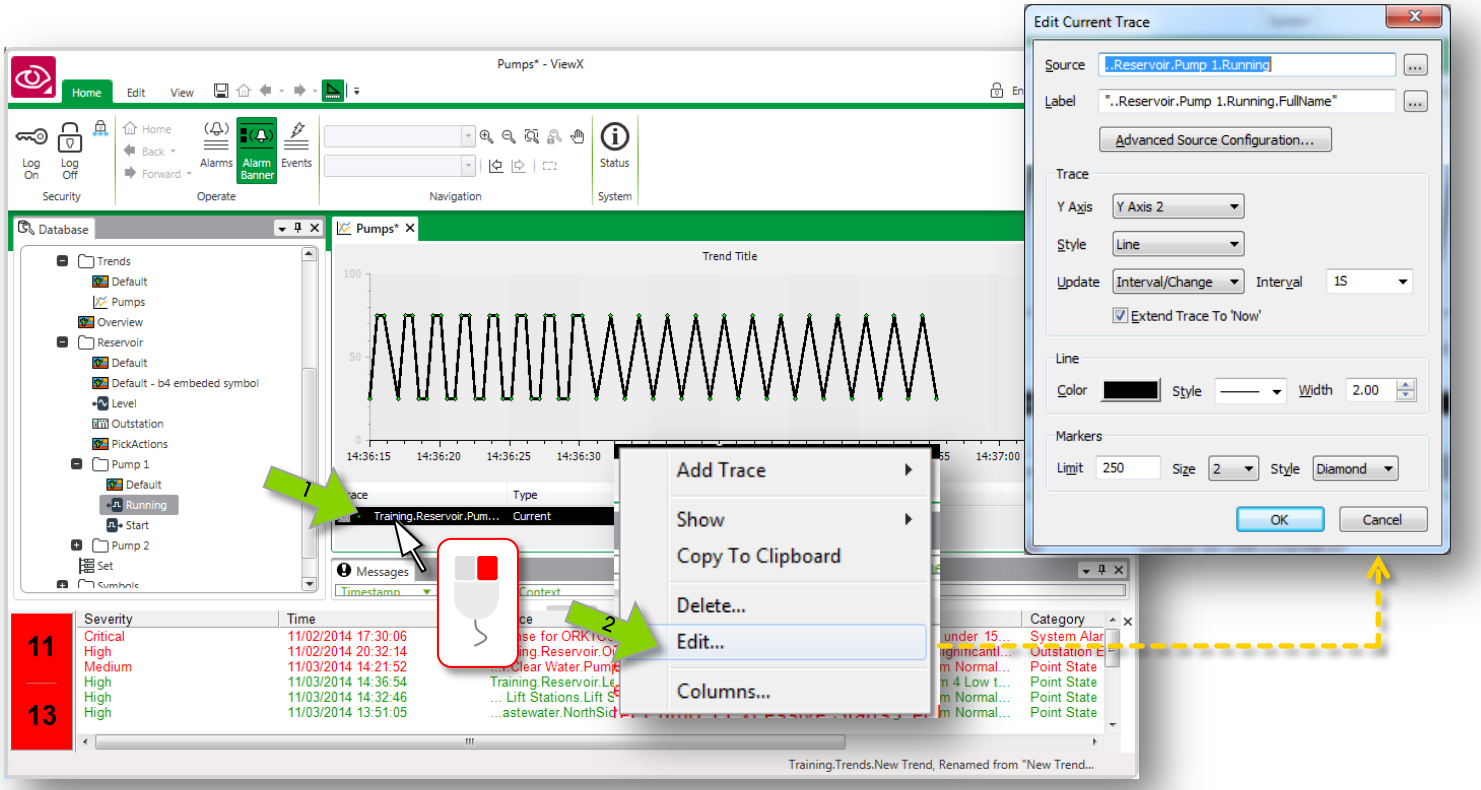
- Drag the **Pump 1 Running** point onto the page and select **Current Trace**.



Current Trace

Step by Step

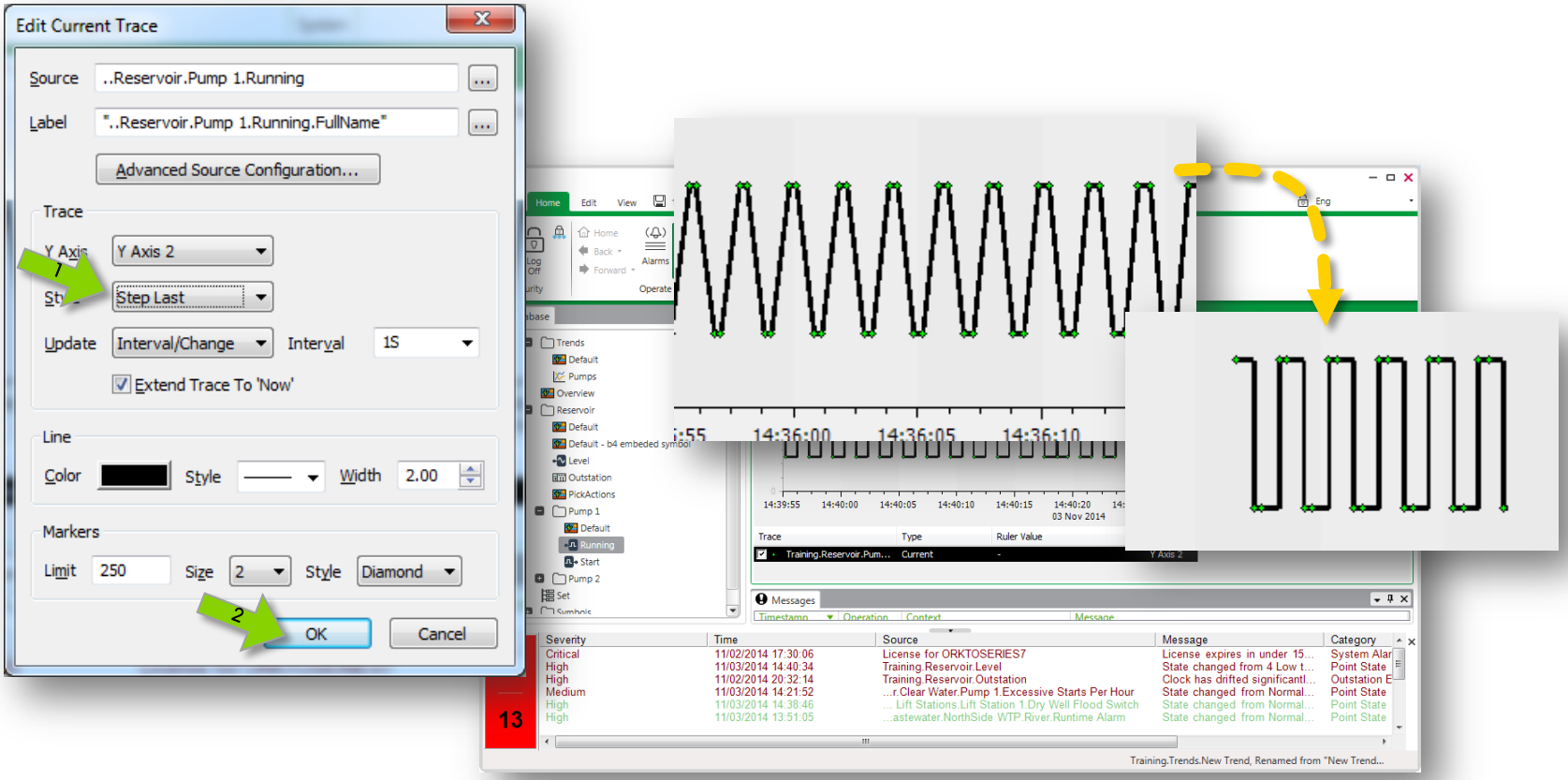
- A new trace of **Pump 1 Running** is now added to the trend. To edit its appearance, right click on the trend and select **Edit**.



Current Trace

Step by Step

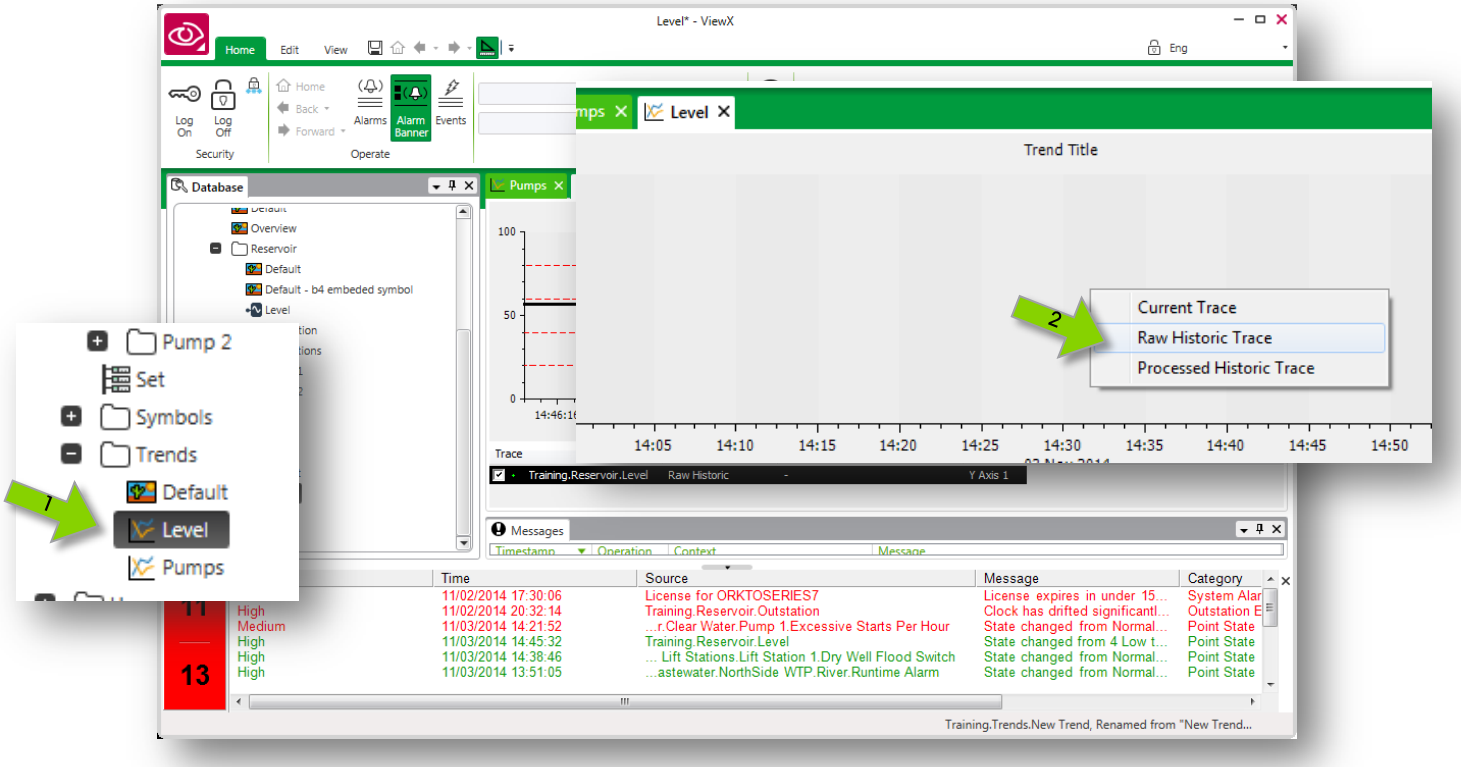
- Change the style of trace to **Step Last** and the click on **OK**. Notice the change in trend displayed.



Historic Trace

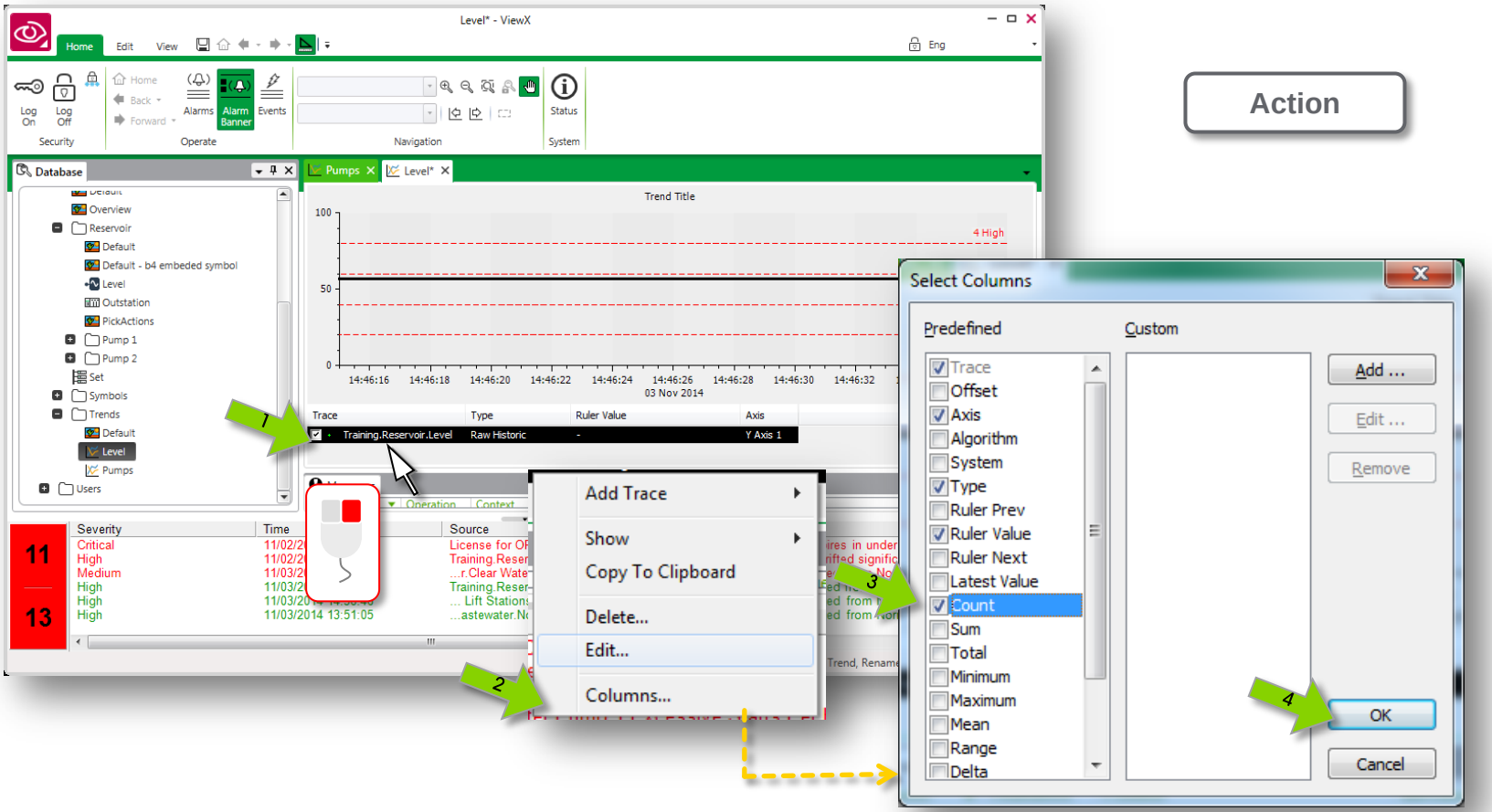
Action

- Create a new trend and call it **Level**.
- Now drag the **Reservoir Level** point into the page and this time select **Historic Trace**.



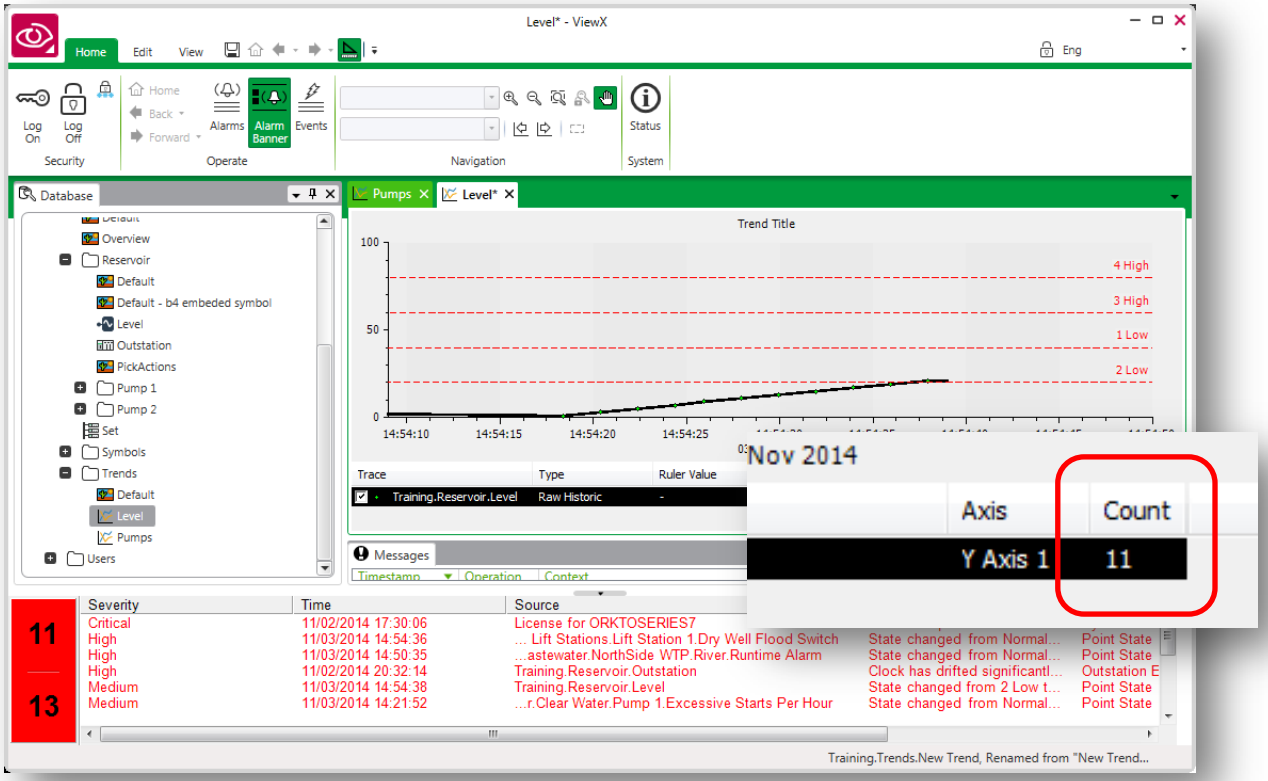
Historic Trace

- We will add further details to be shown. Right click on the trend and select **Columns**. Select **Count** and the **OK**.



Historic Trace

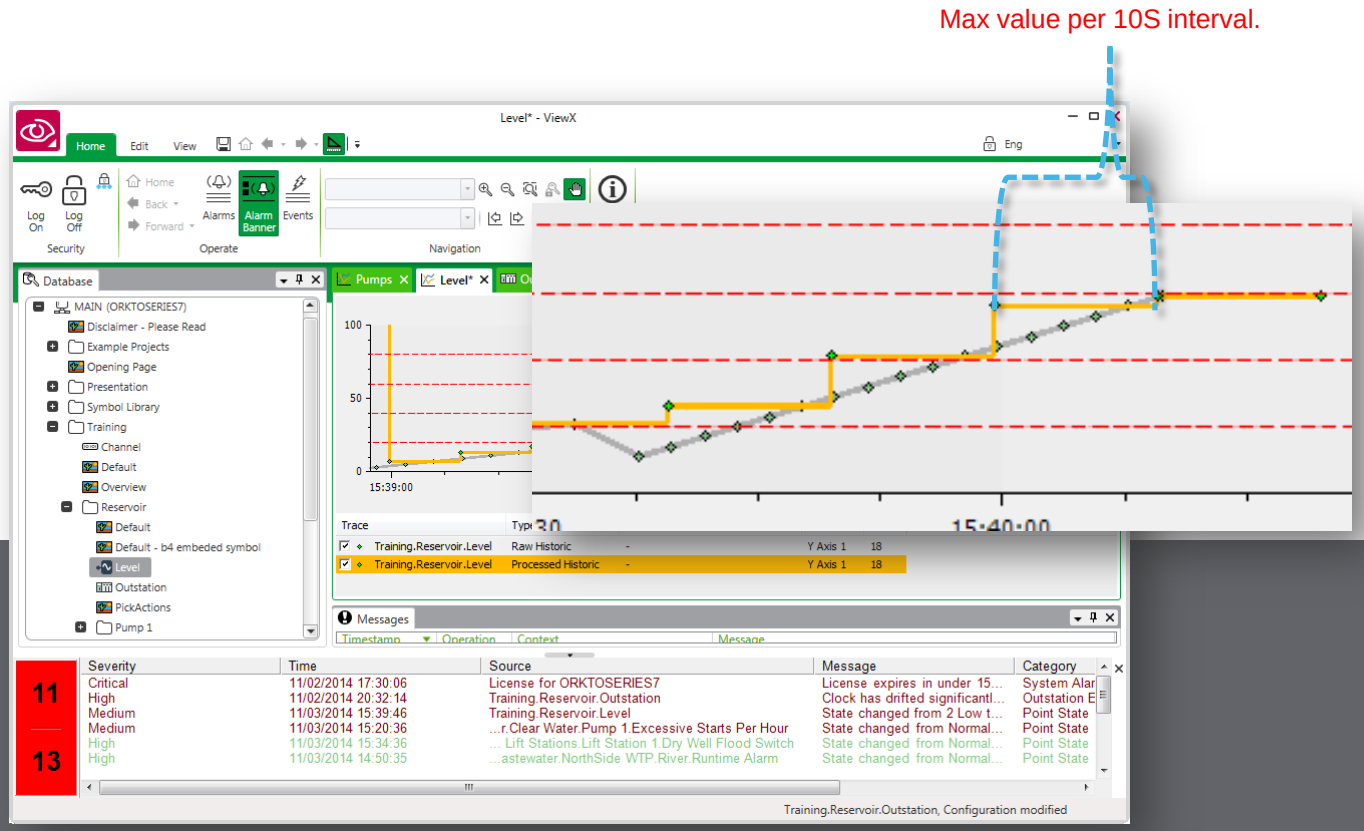
- Notice now that each time there is a detected change in analog values the count will increase by 1.



This count refers to the number of changes within the current span only, not the entire accumulated umber of changes.

Processed Historic Trends

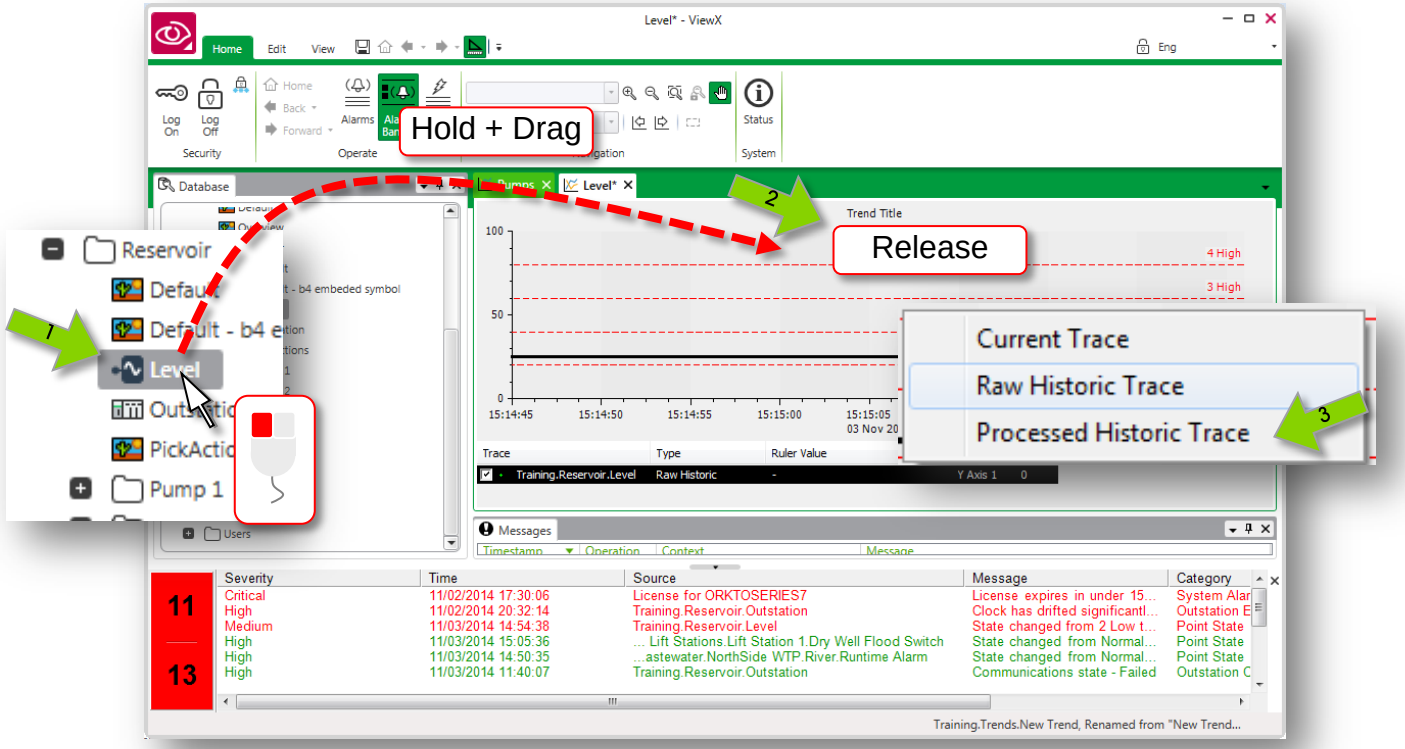
- The **ClearSCADA** historian enables users to perform calculations on raw historic data sets. A processed historic trace allows users to display the results of these calculations on a trend.



Processed Historic Trends

- Now drag the **Level** point into the same **Level** trend page and this time, select **Processed Historic Trace**.

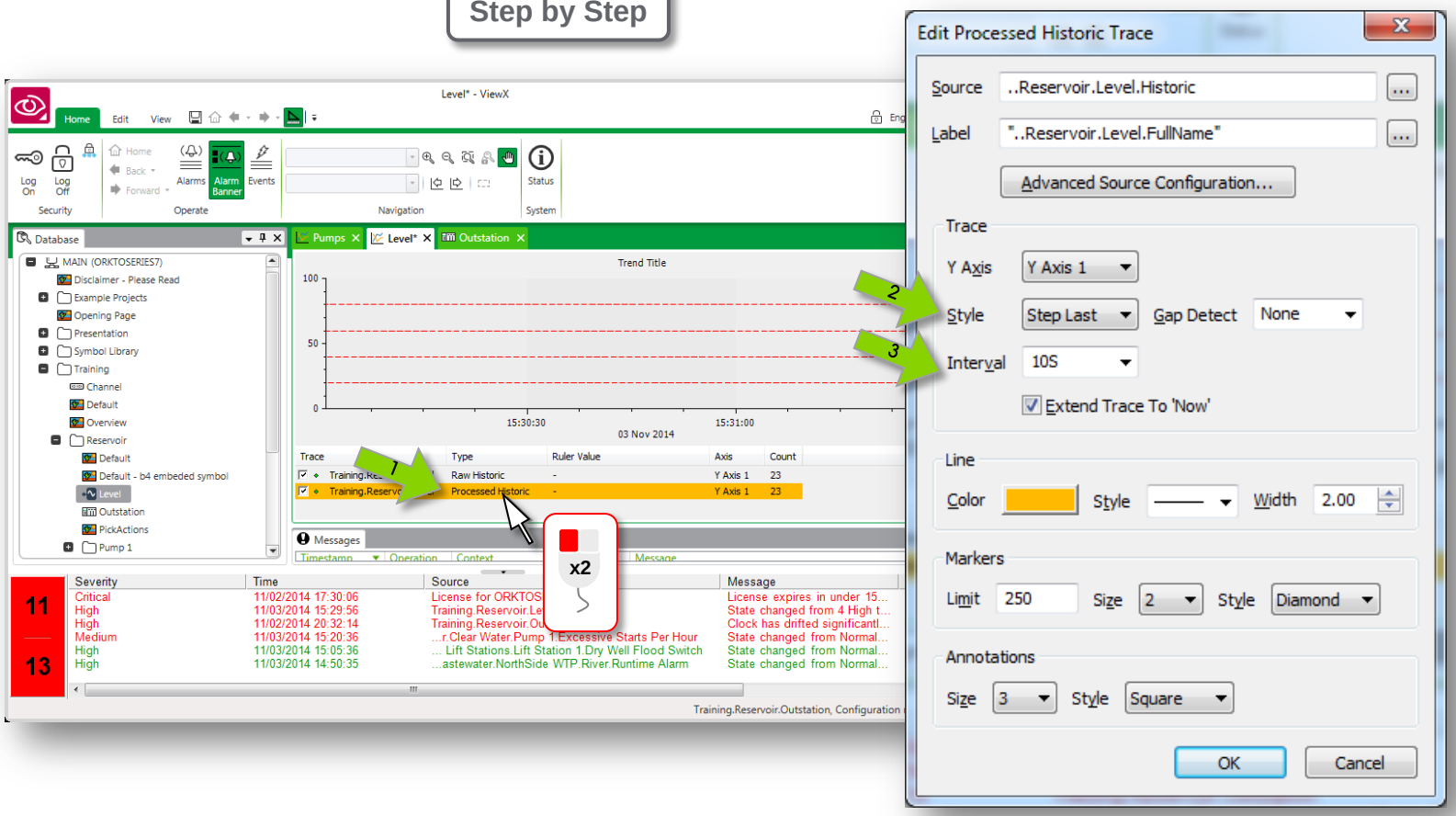
Step by Step



Processed Historic Trends

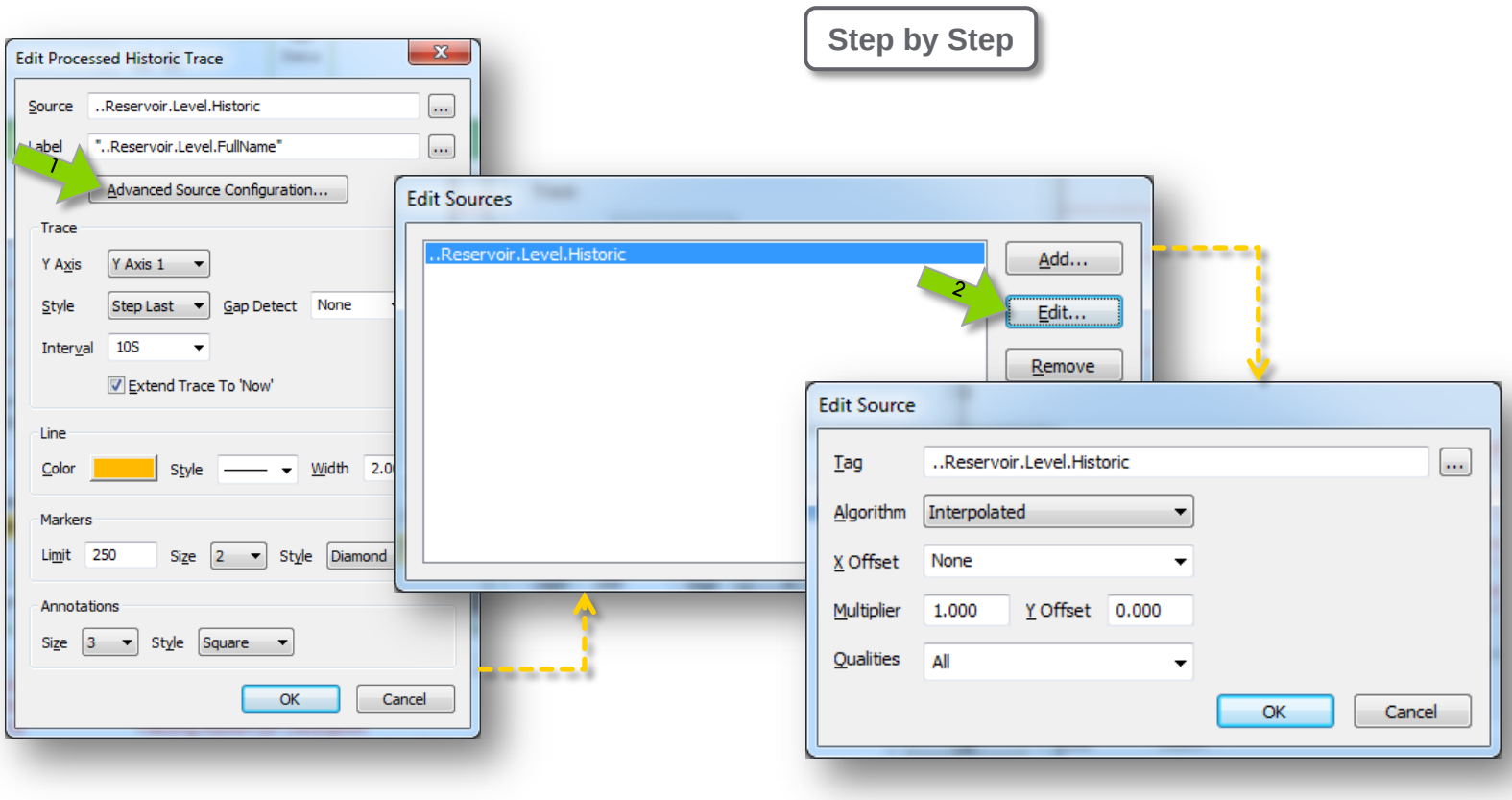
- Edit the second trace. Change the style to **Step Last**. Set the interval to **10S**.

Step by Step



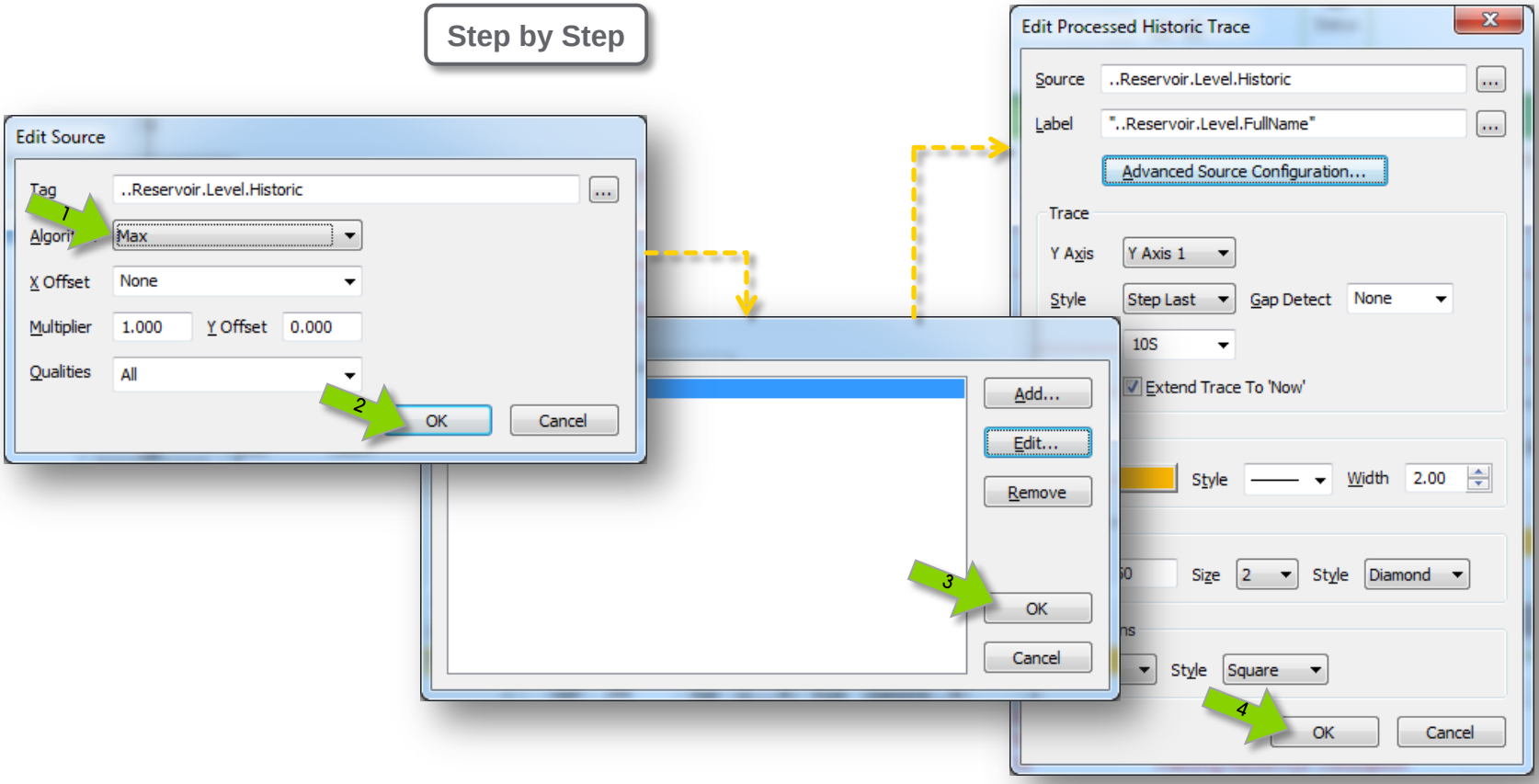
Processed Historic Trends

- Click on **Advance Source Configuration**. And then click **Edit**.



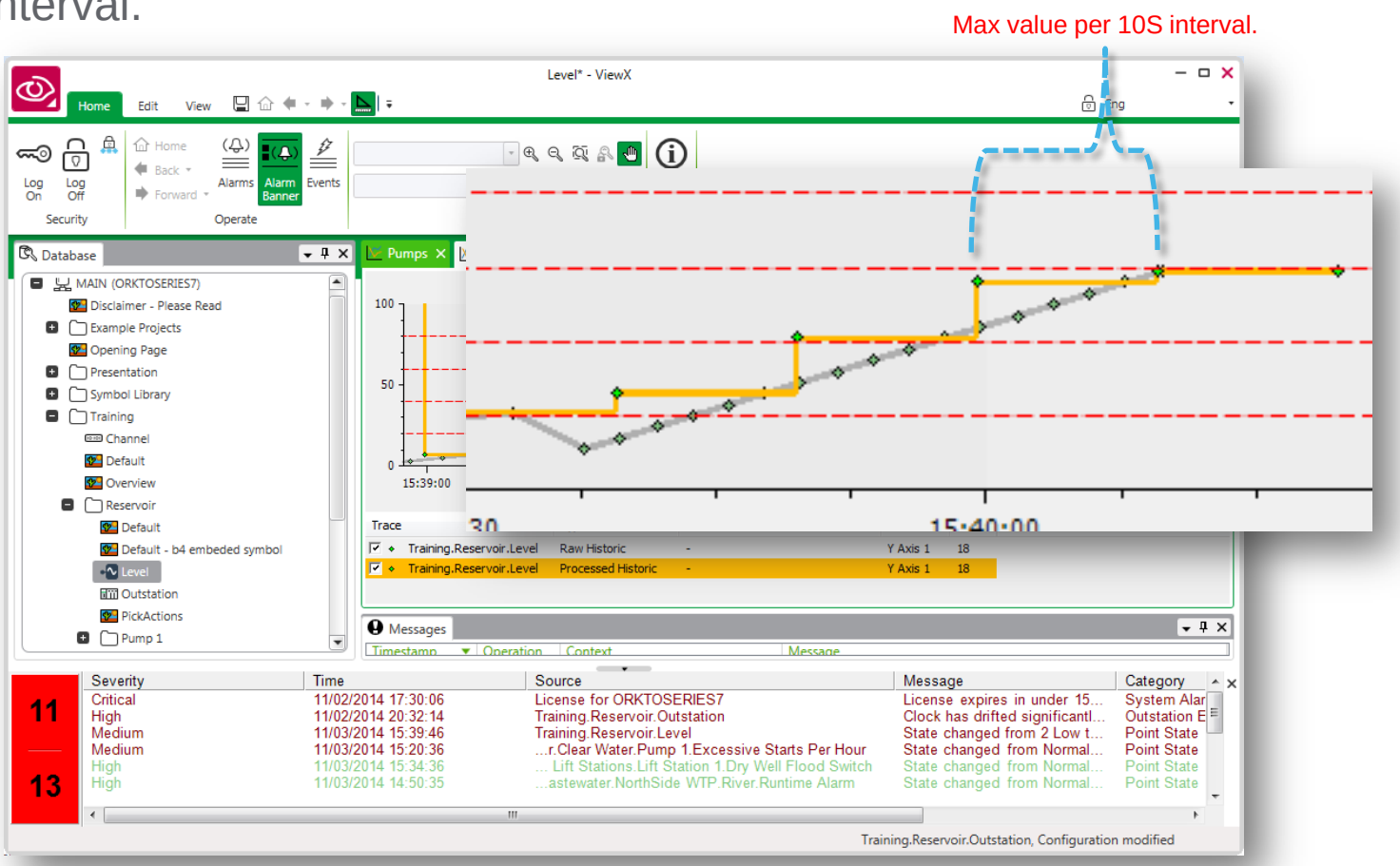
Processed Historic Trends

- Change the **Algorithm** to **Max** and the on **OKs**.



Processed Historic Trends

- Now the trace is display the max value of levels at every 10 seconds interval.



Templates and Instances

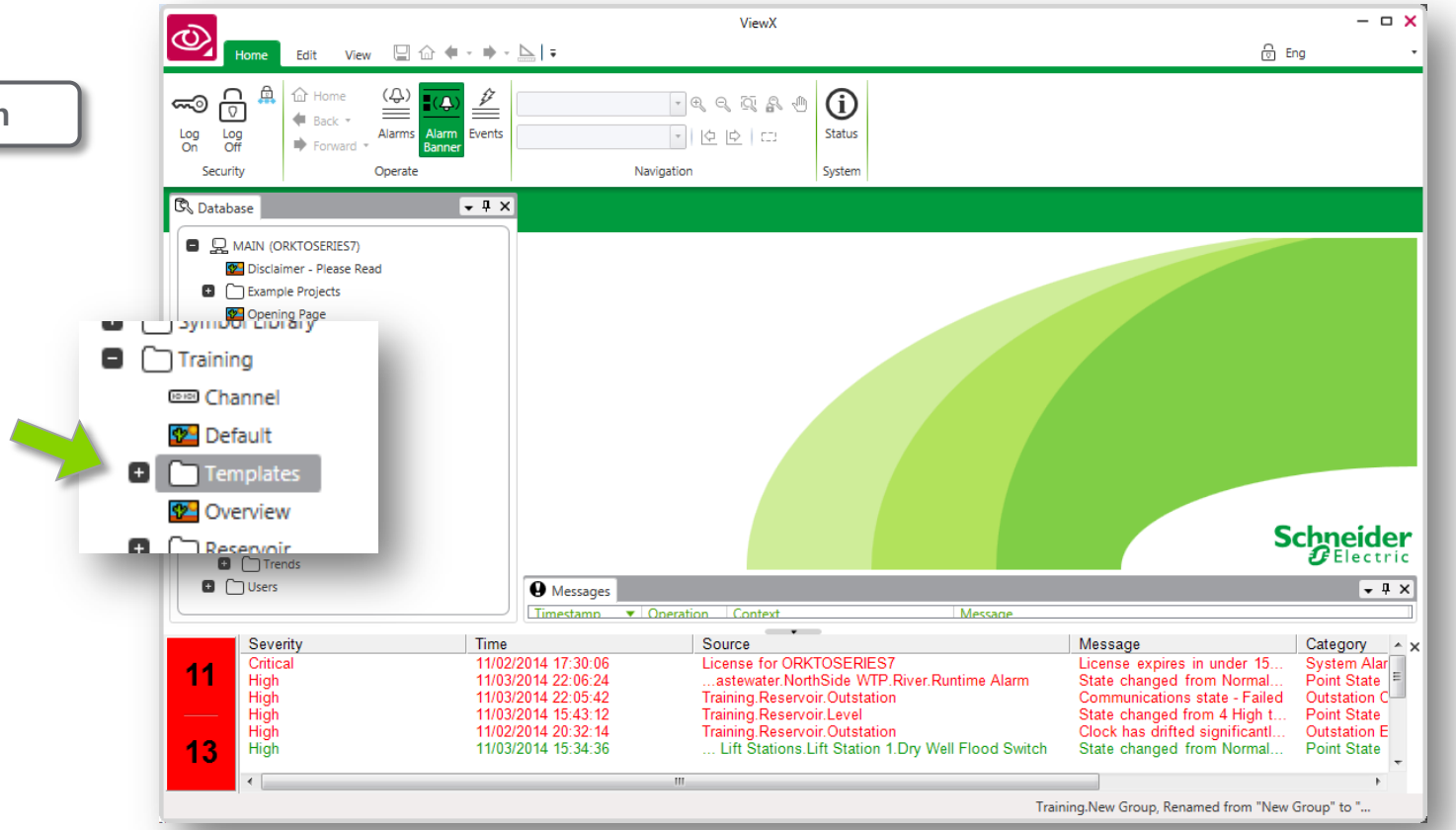
Section 6
Reusability

Confidential Property of Schneider Electric

Templates

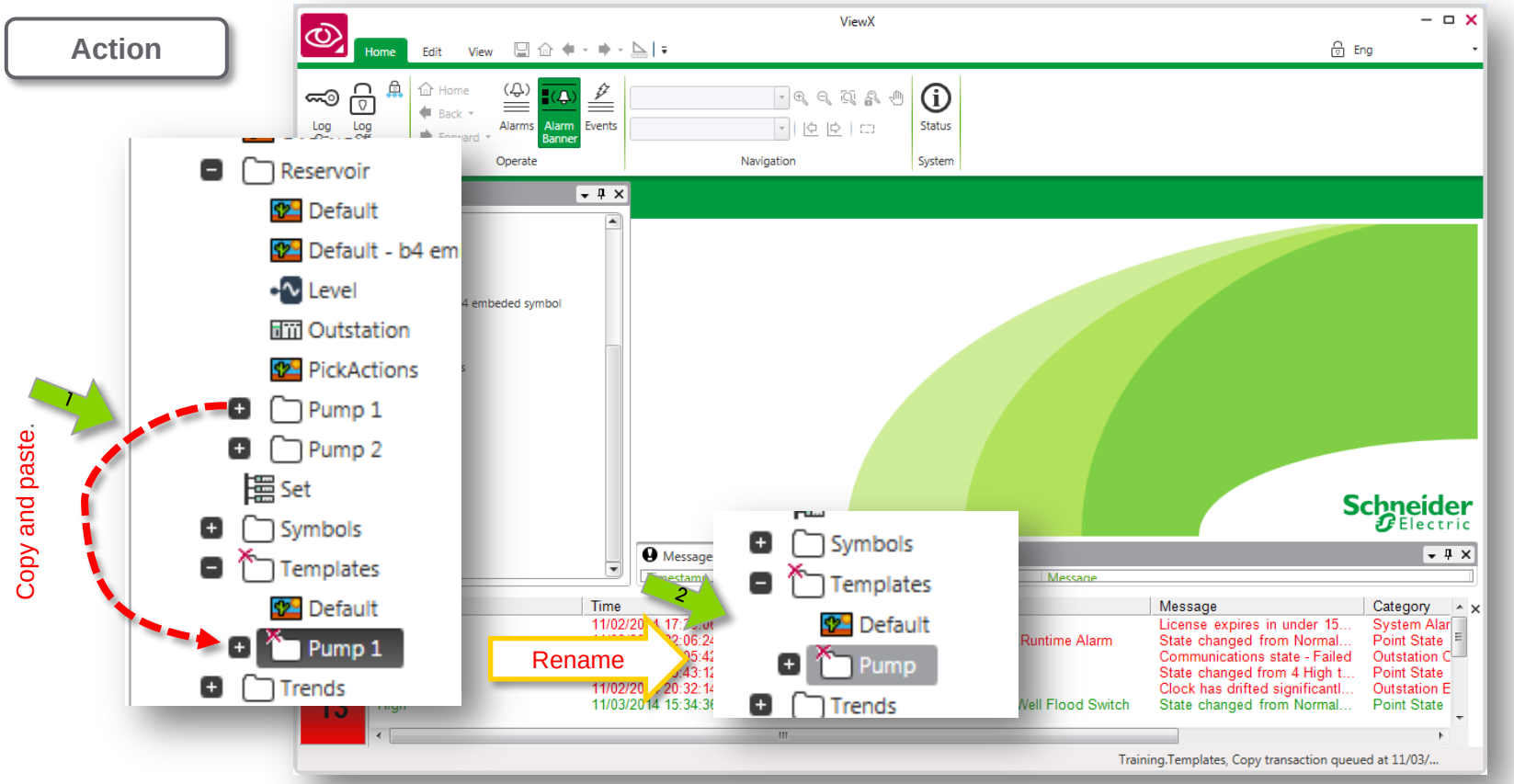
- Create a new group and name it **Templates**.

Action



Templates

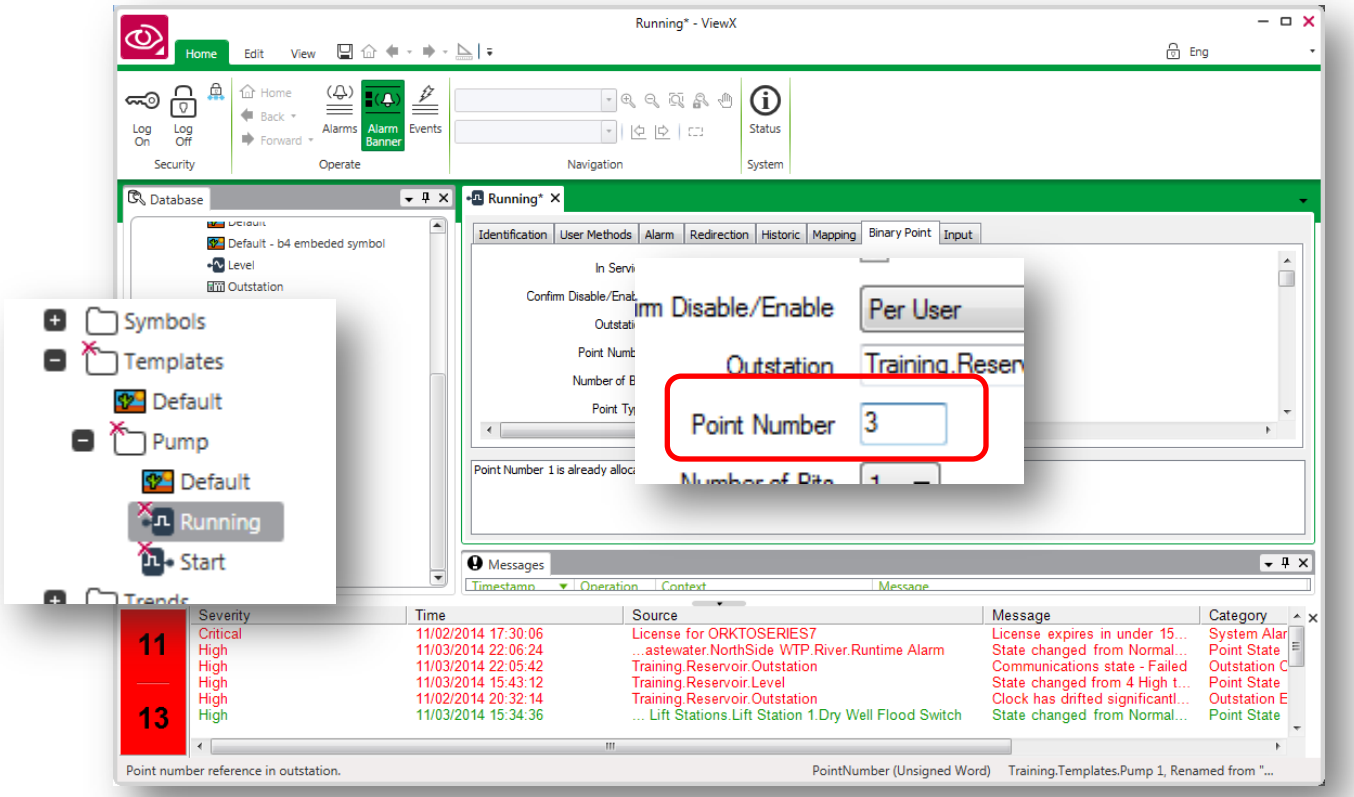
- Copy the **Pump 1 Group** and paste in in the **Templates** folder. Then rename it as **Pump**.



Templates

- Change the **Running** point number to **3**.

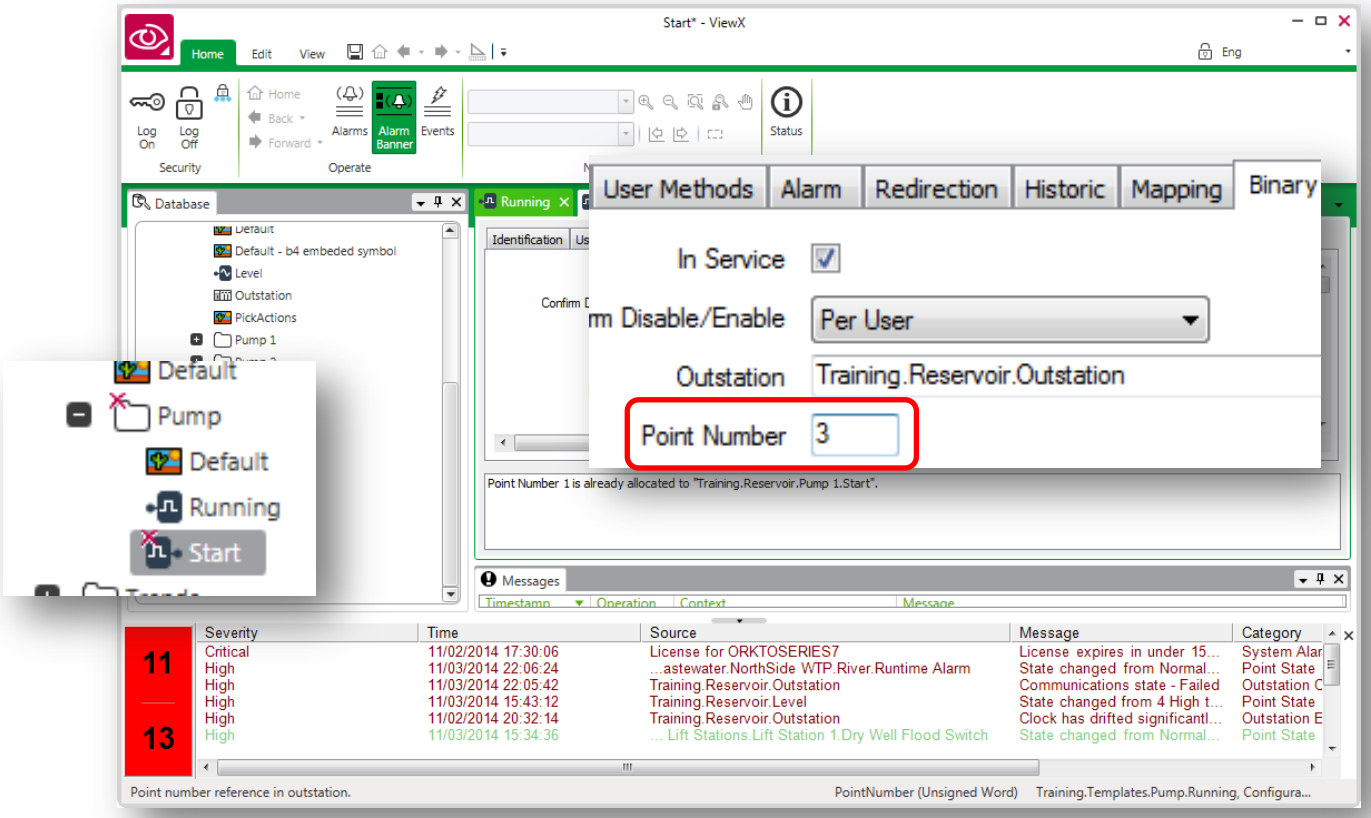
Action



Templates

- Change the **Start** point number to **3**.

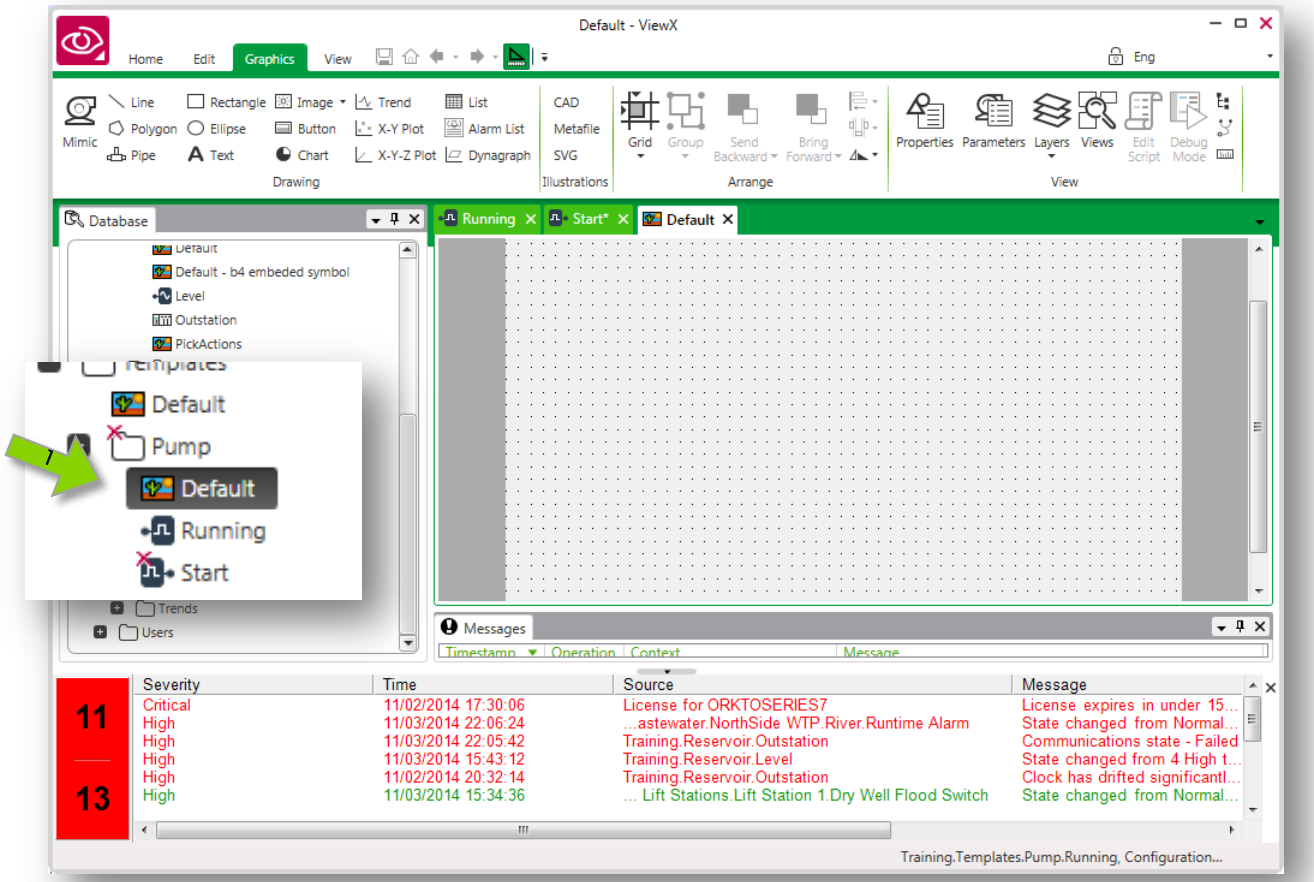
Action



Templates

- Open up the **Default** mimic in this folder.

Action

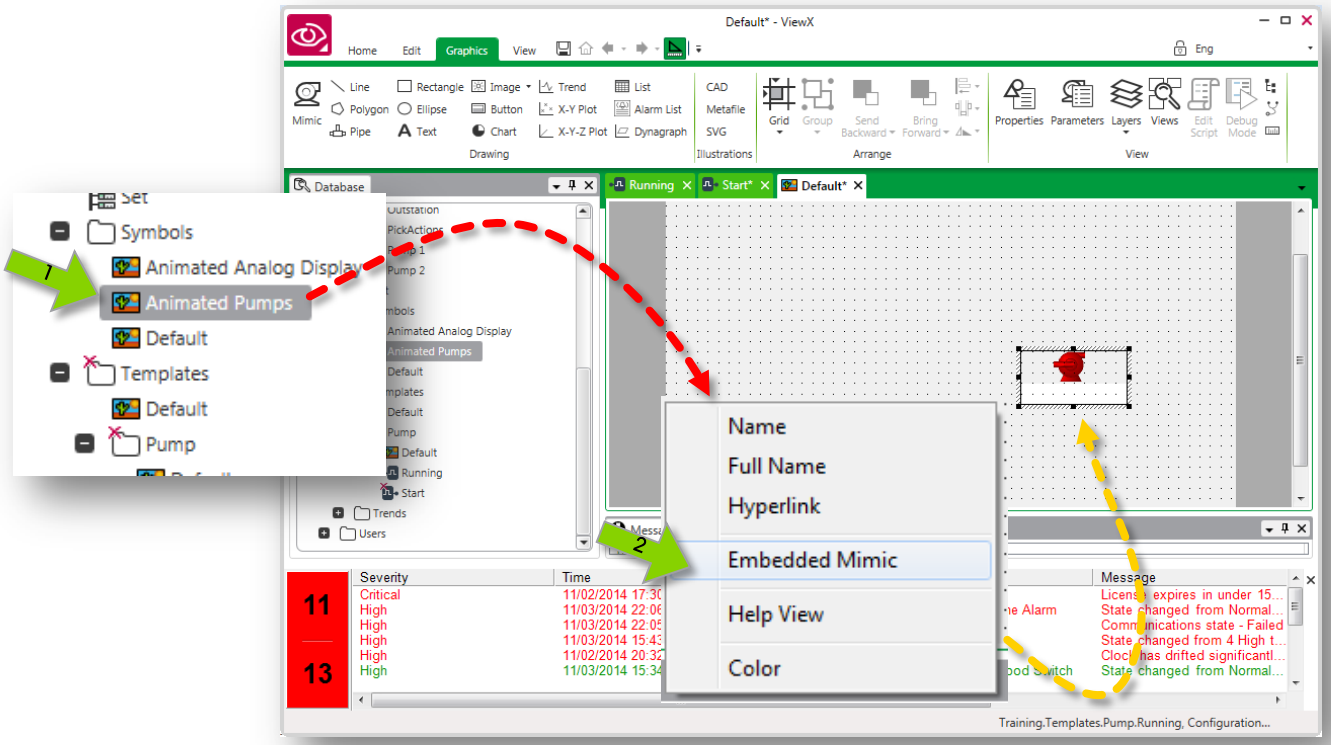


Confidential Property of Schneider Electric

Templates

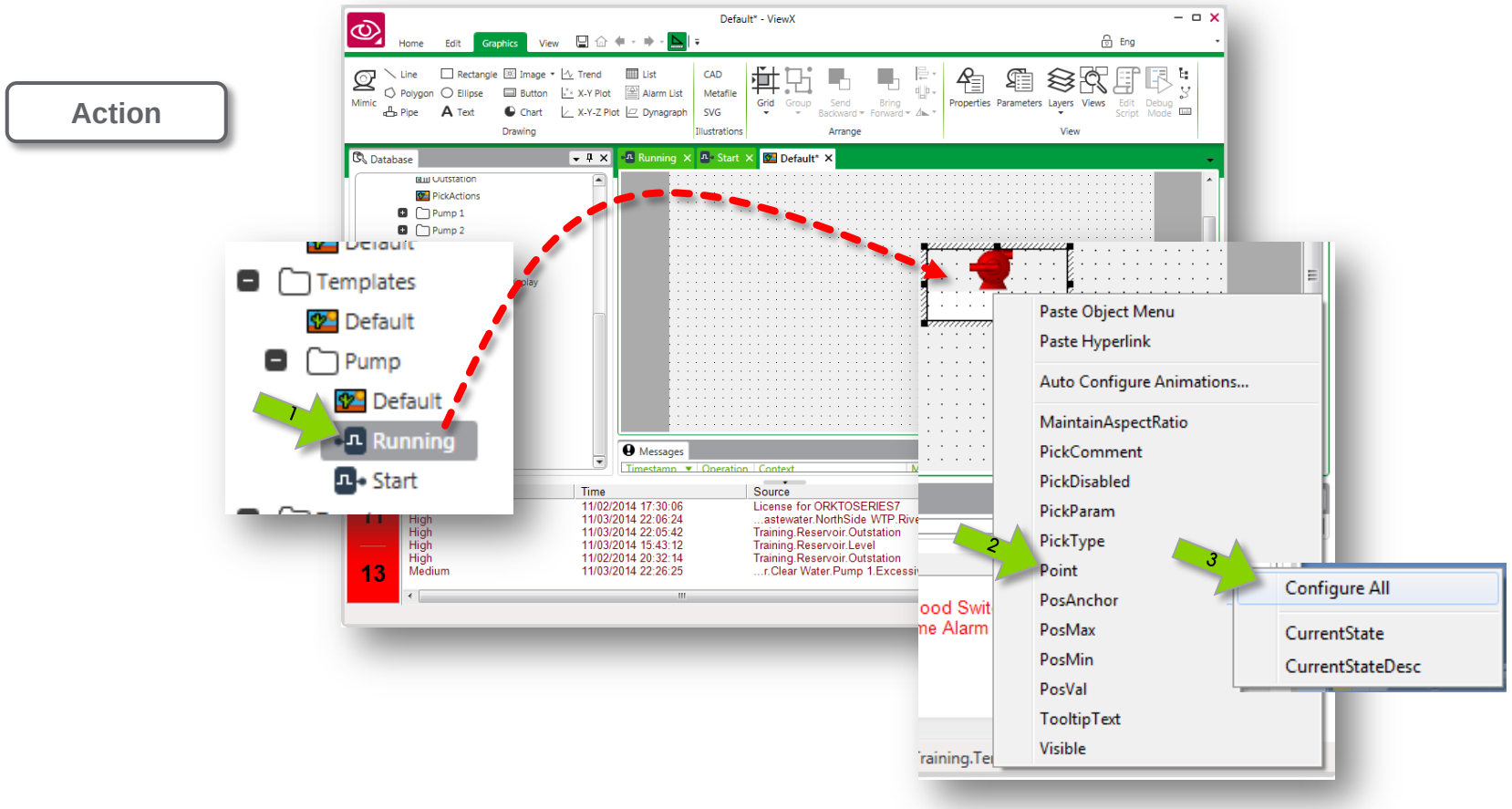
- Copy the **Animated Pump** mimic over and paste it as an **Embedded Mimic**.

Action



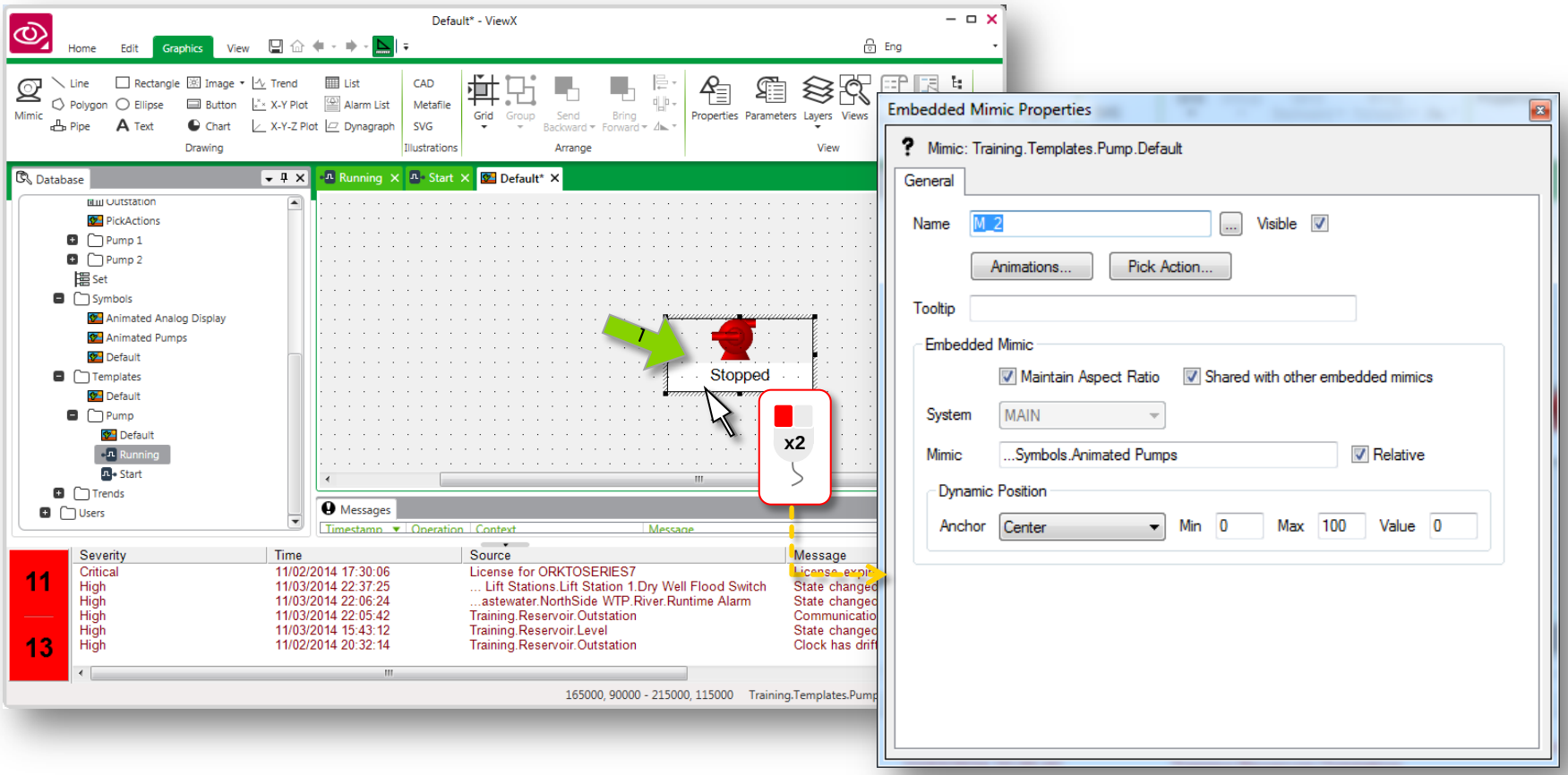
Templates

- Ties this to the **Running** point within the same folder.



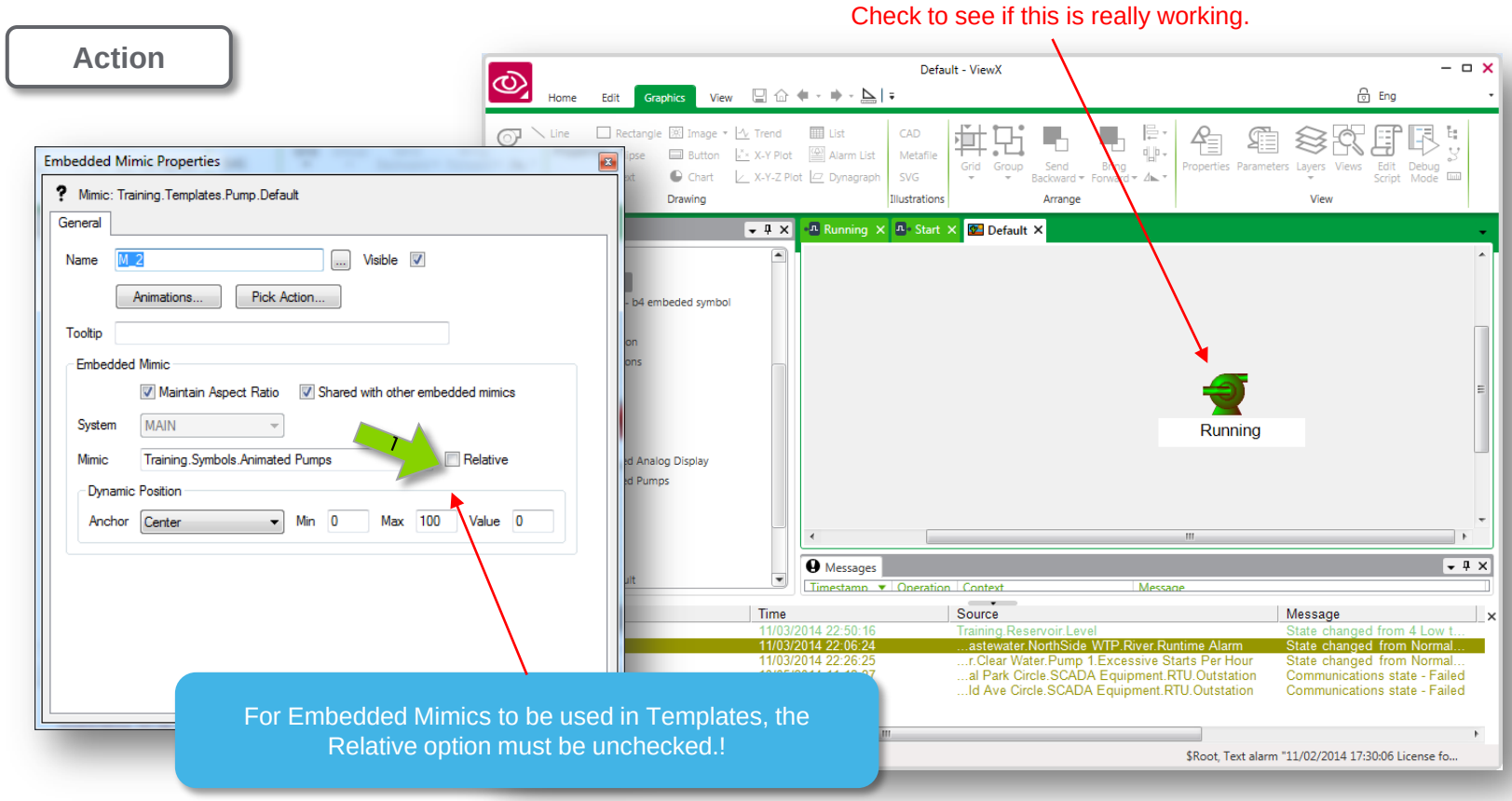
Templates

- Double click the pump to bring out the **Properties**.



Templates

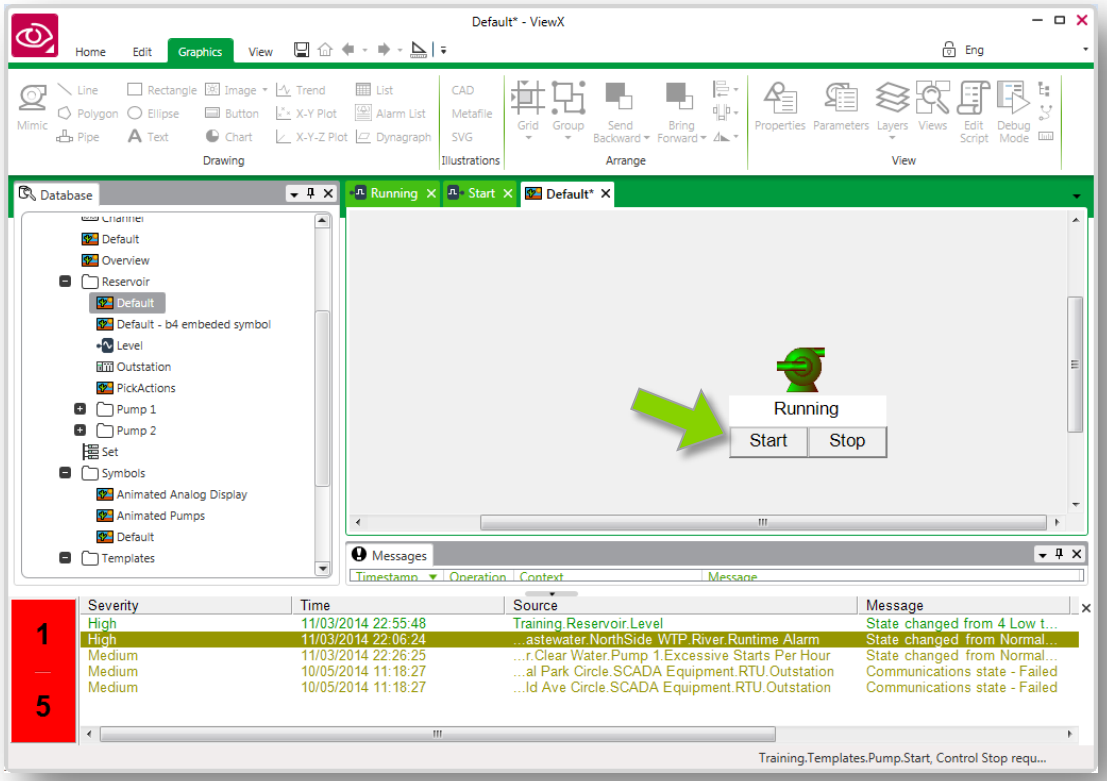
- Uncheck the **Relative** box. Put the mimic into **Run** mode an check that the mimic is working.



Templates

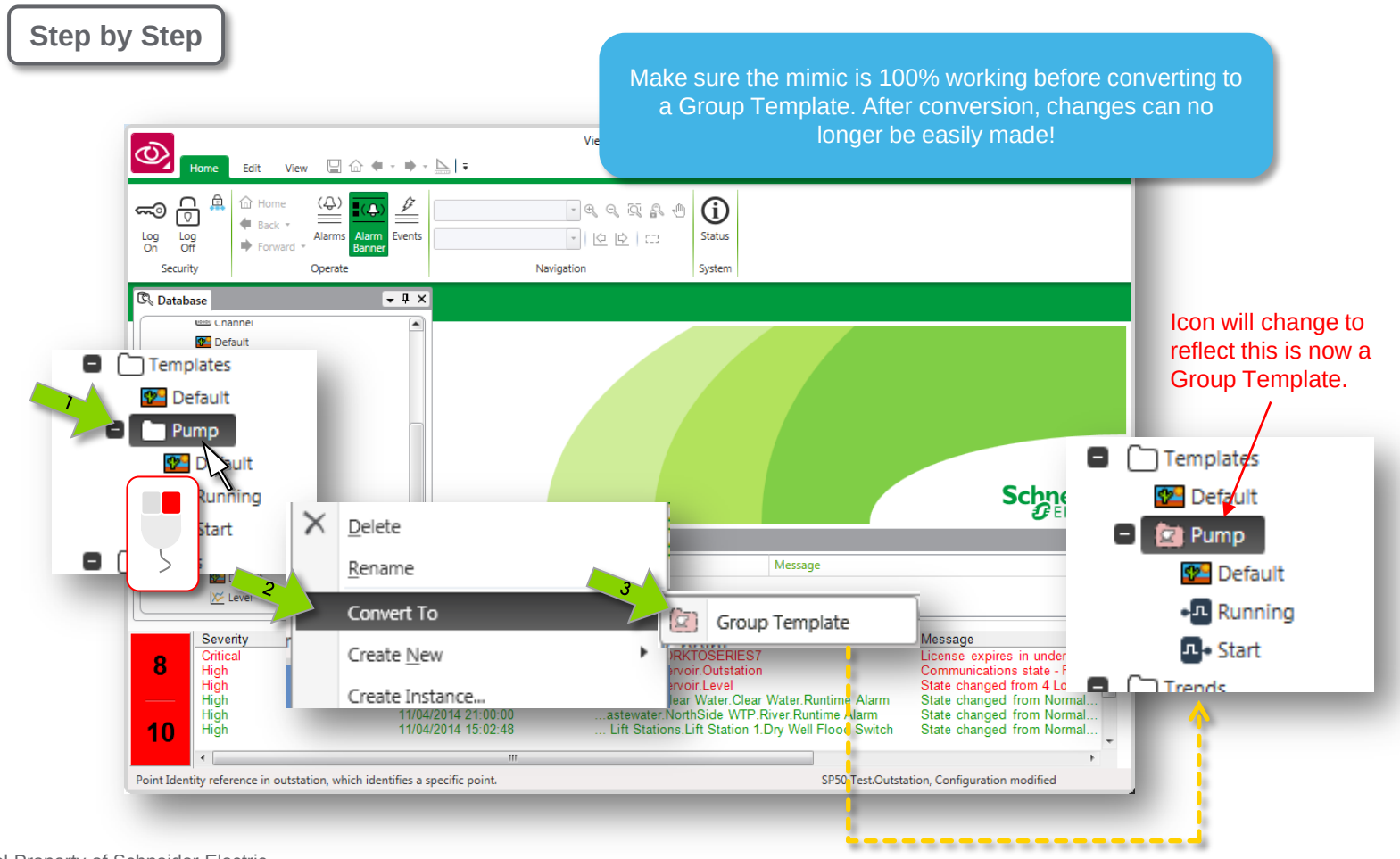
- Add **Start Stop** buttons and link them to control **Start** point in this same folder.

Action



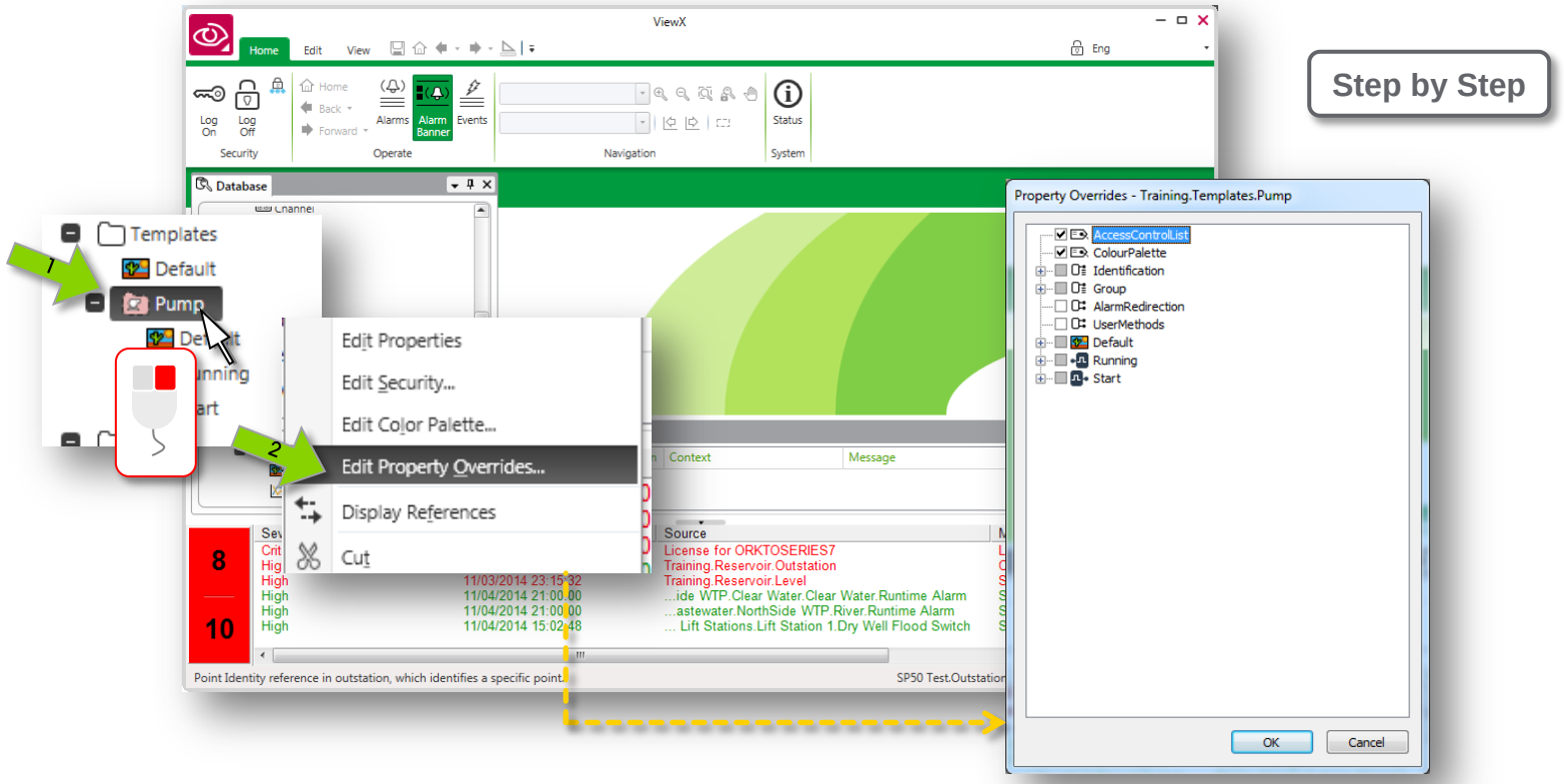
Templates

- After saving, next convert this into a **Group Template**.



Templates

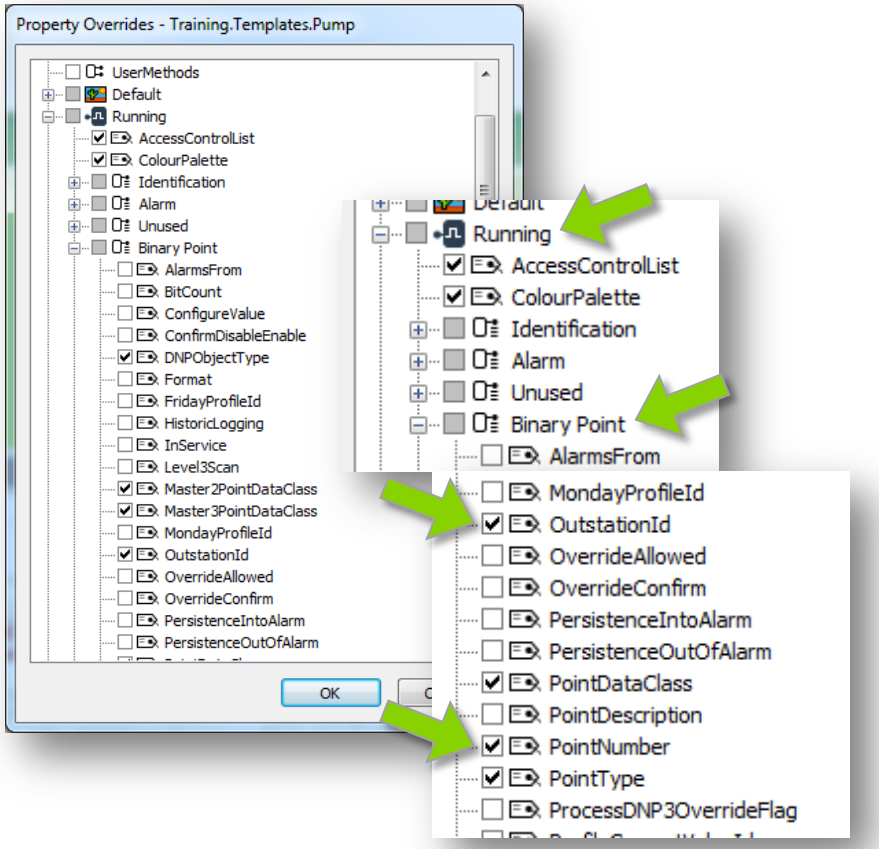
- We next need to set what settings in this templates can be changed when templates are turned into instances.
- Right click on the **Pump** and select **Edit Properties Override**.



Templates

- Make sure the **Running** point's **OutstationID** and **PointNumber** are checked. This means we can change the values of these properties in an instance of the template.

Action

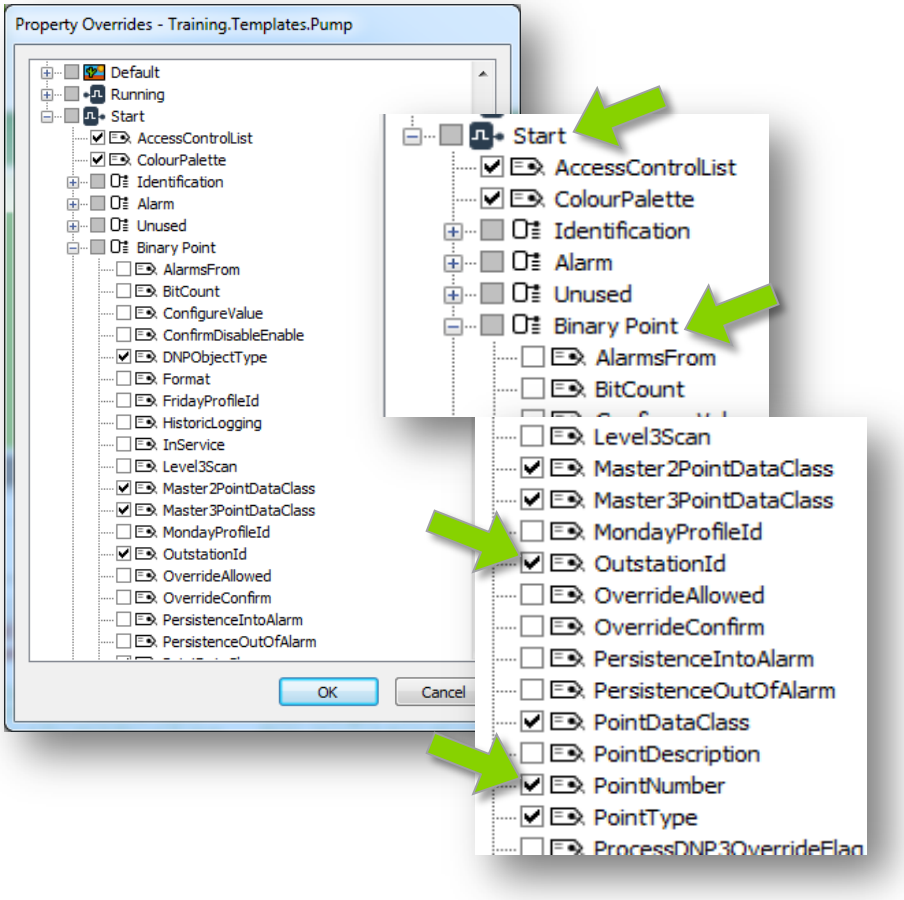


Confidential Property of Schneider Electric

Templates

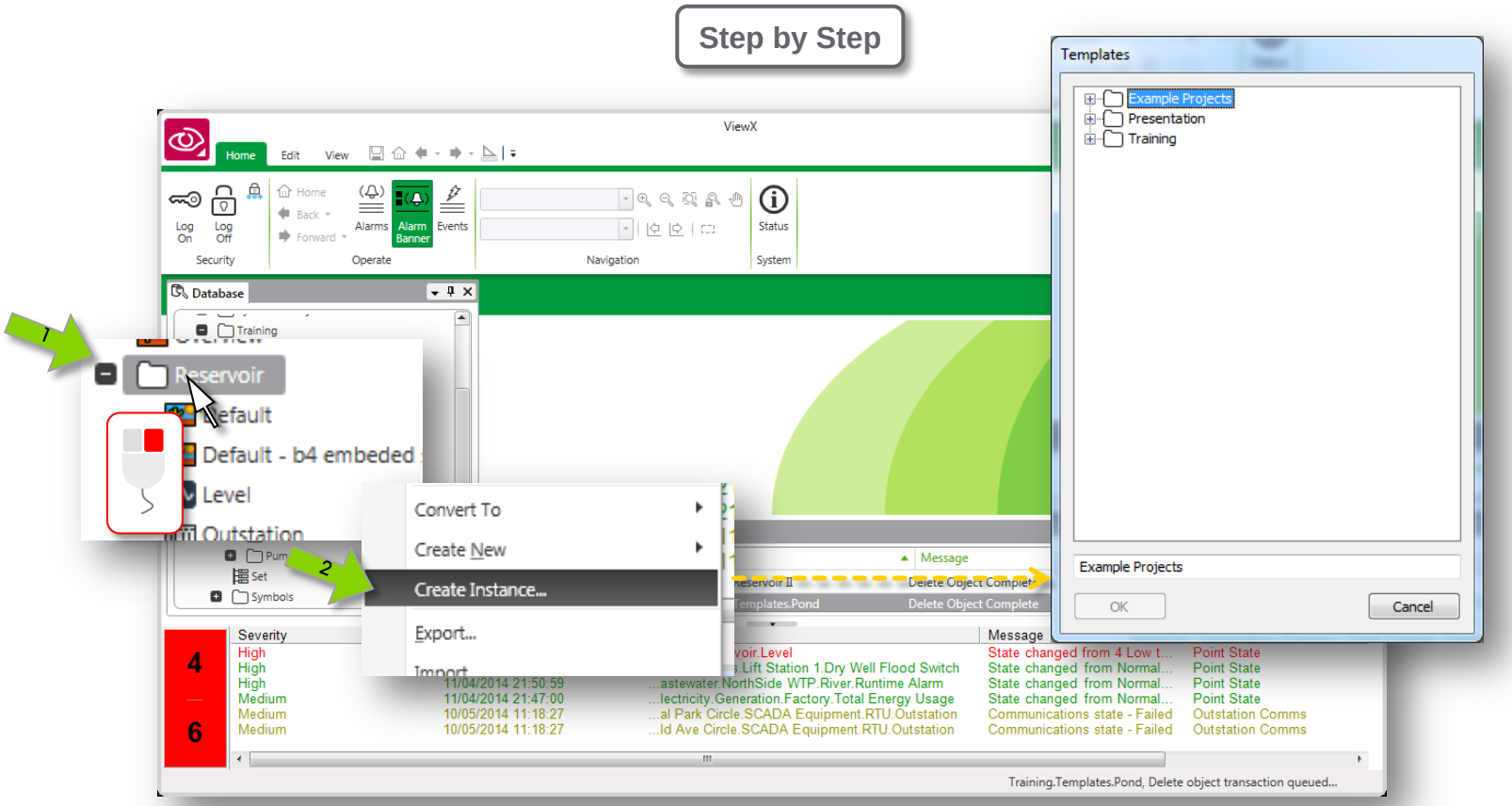
- Ensure that **Start** point's **OutstationID** and **PointNumber** are also checked.

Action



Instance

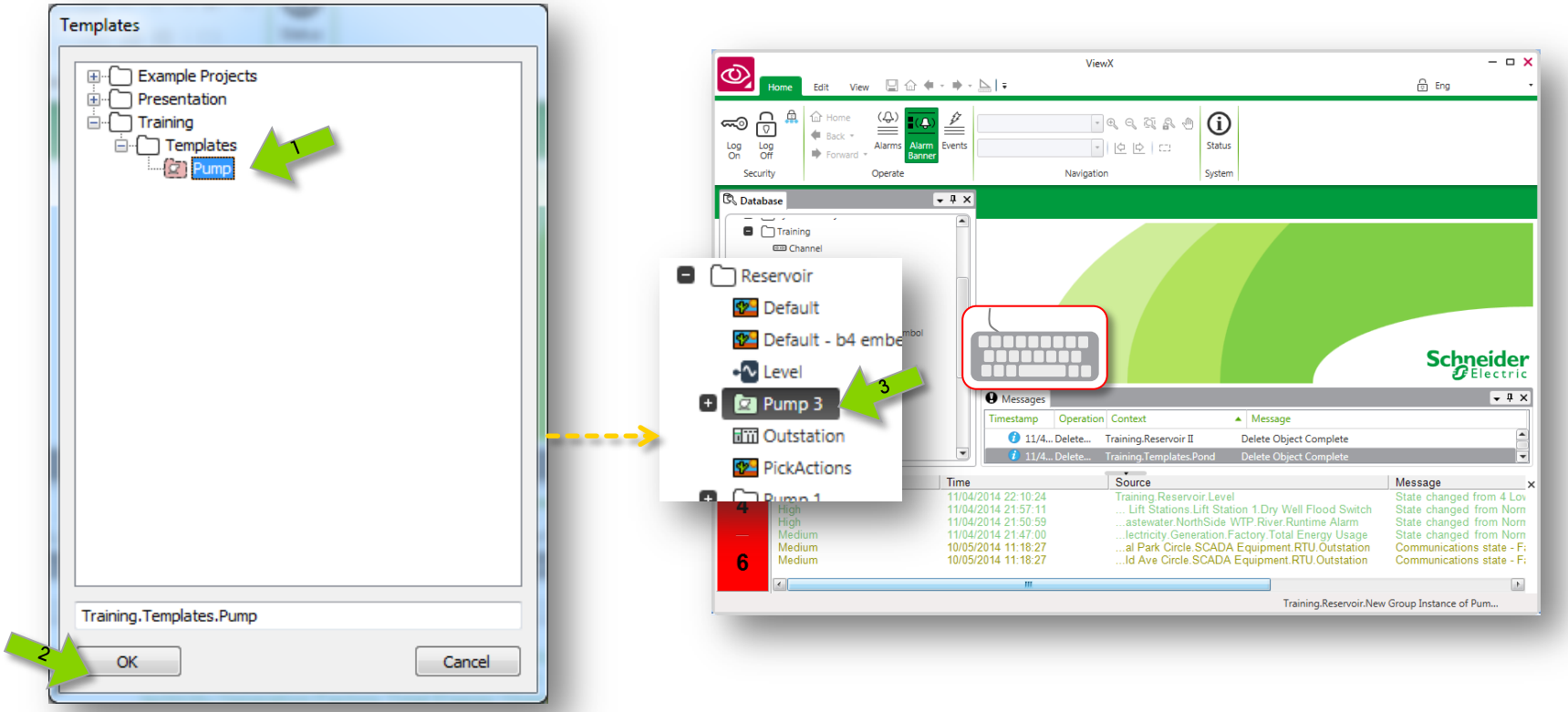
- We will next make use of this template to create a new **Pump 3** instance in the **Reservoir's** mimic. Right click on the **Reservoir** folder and then select **Create Instance**.



Instance

- Select the **Pump** template and then **OK**. Rename as **Pump 3**.

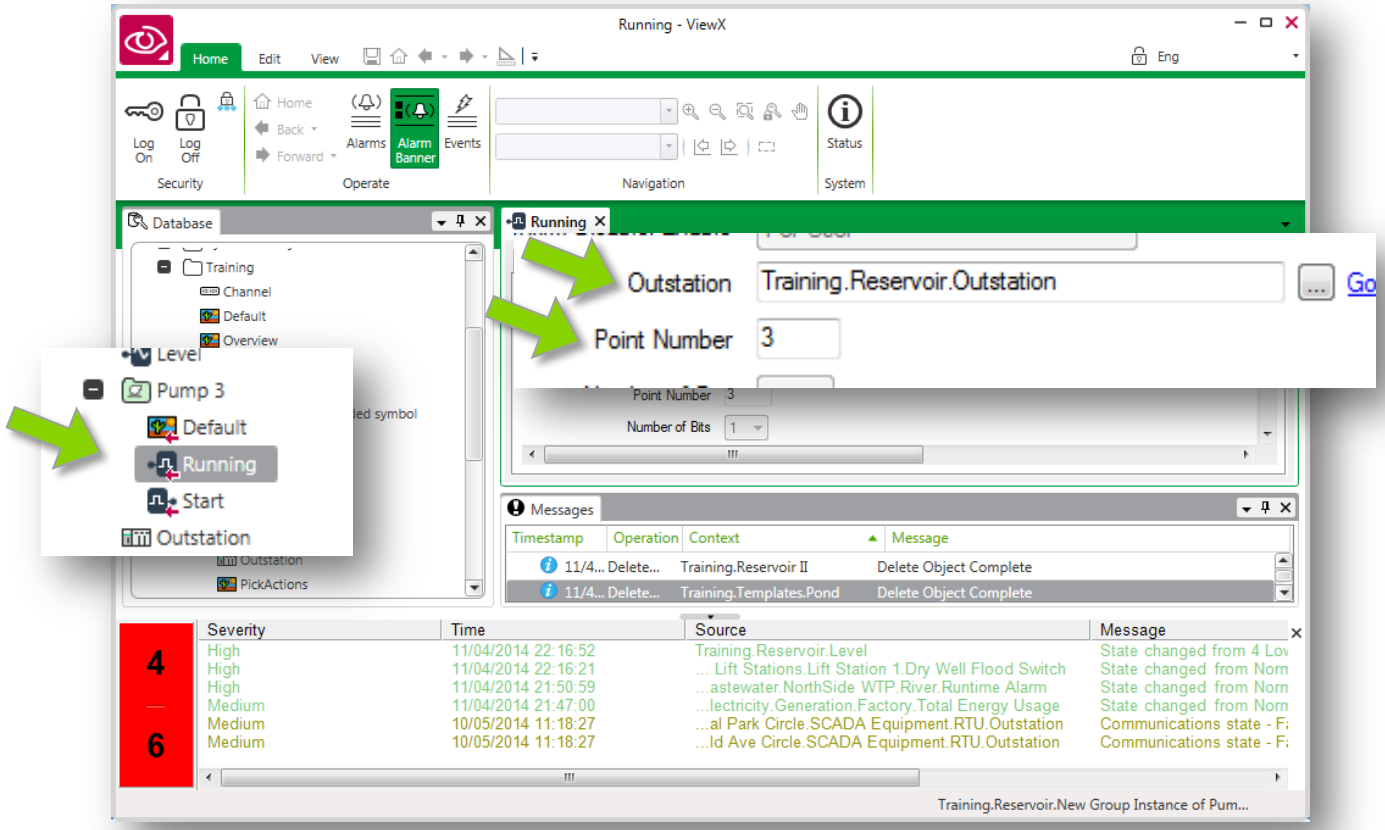
Step by Step



Instance

- Open up the **Pump 3 Properties** and observe that you can change the **Outstation** and the **Point Number** of the points in there.

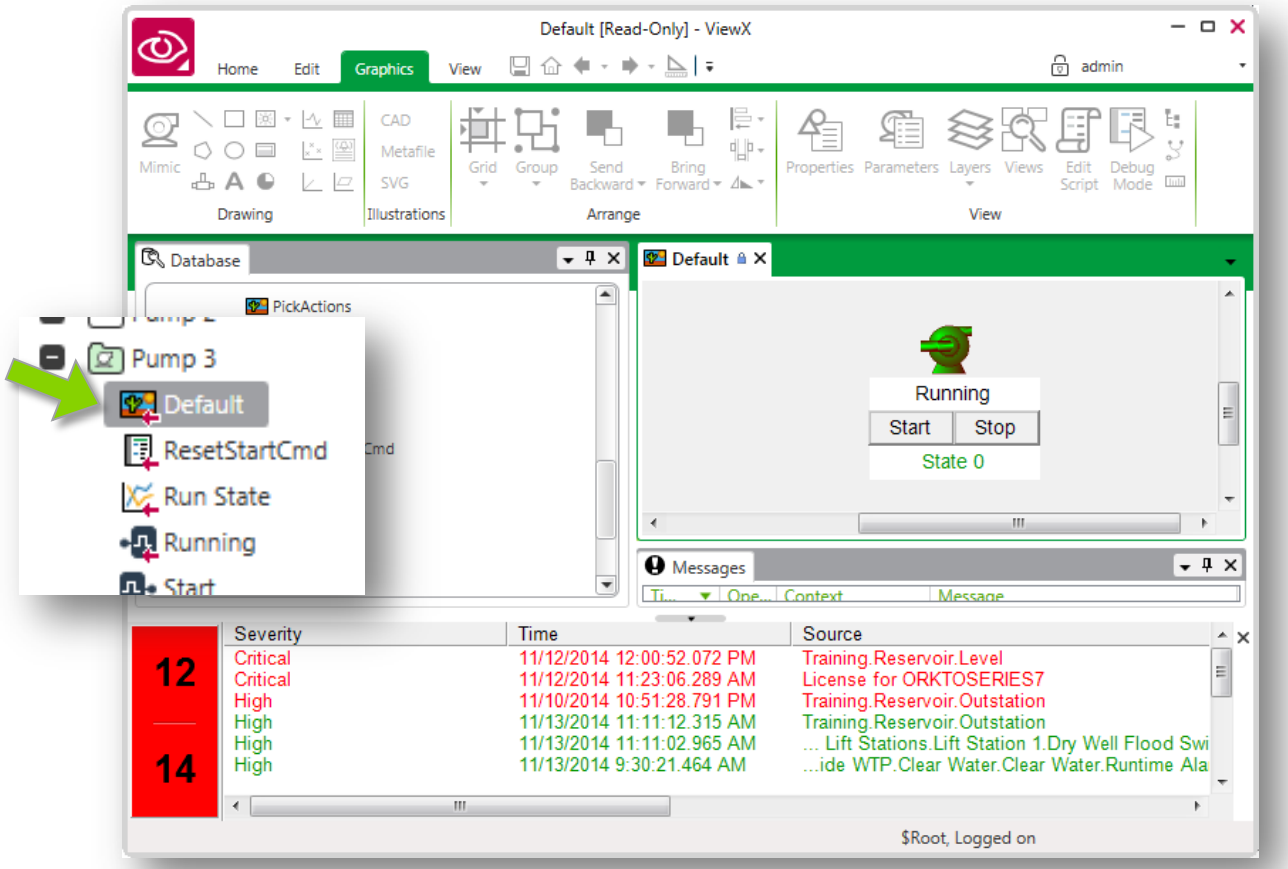
Action



Instance

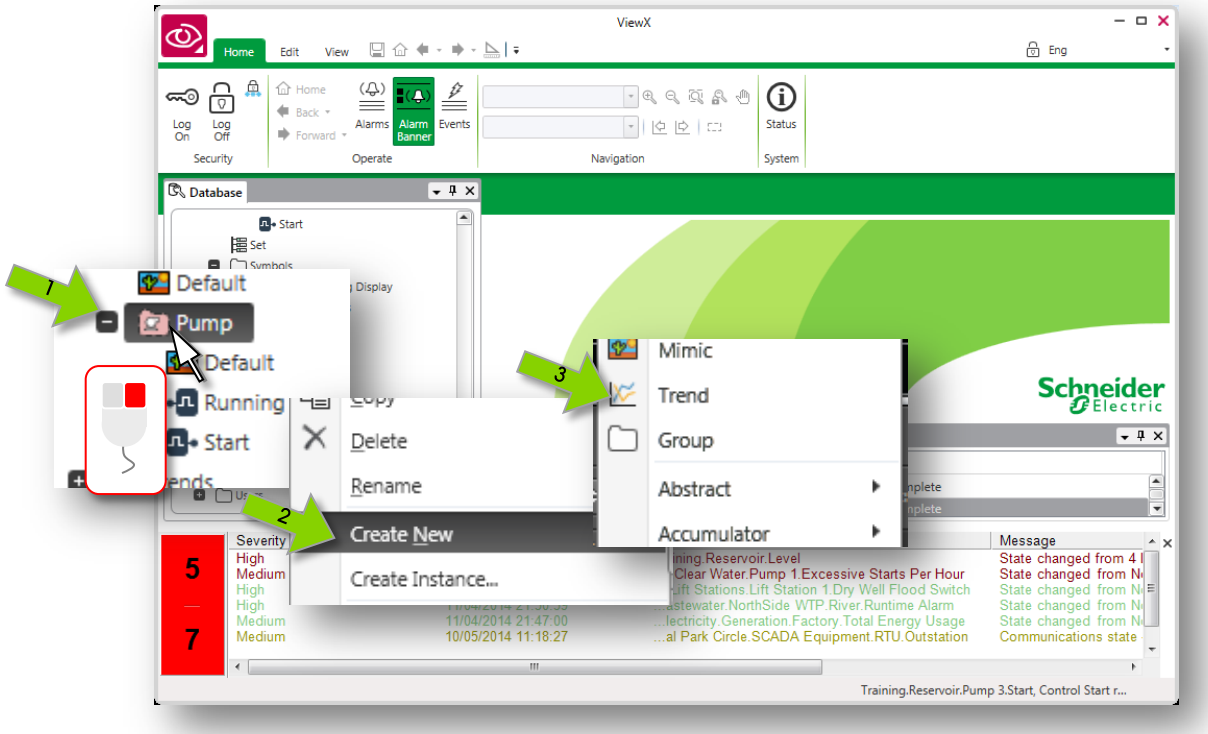
- Open the default mimic under **Pump 3** and observe that this mimic can now be used.

Action



Propagating Changes

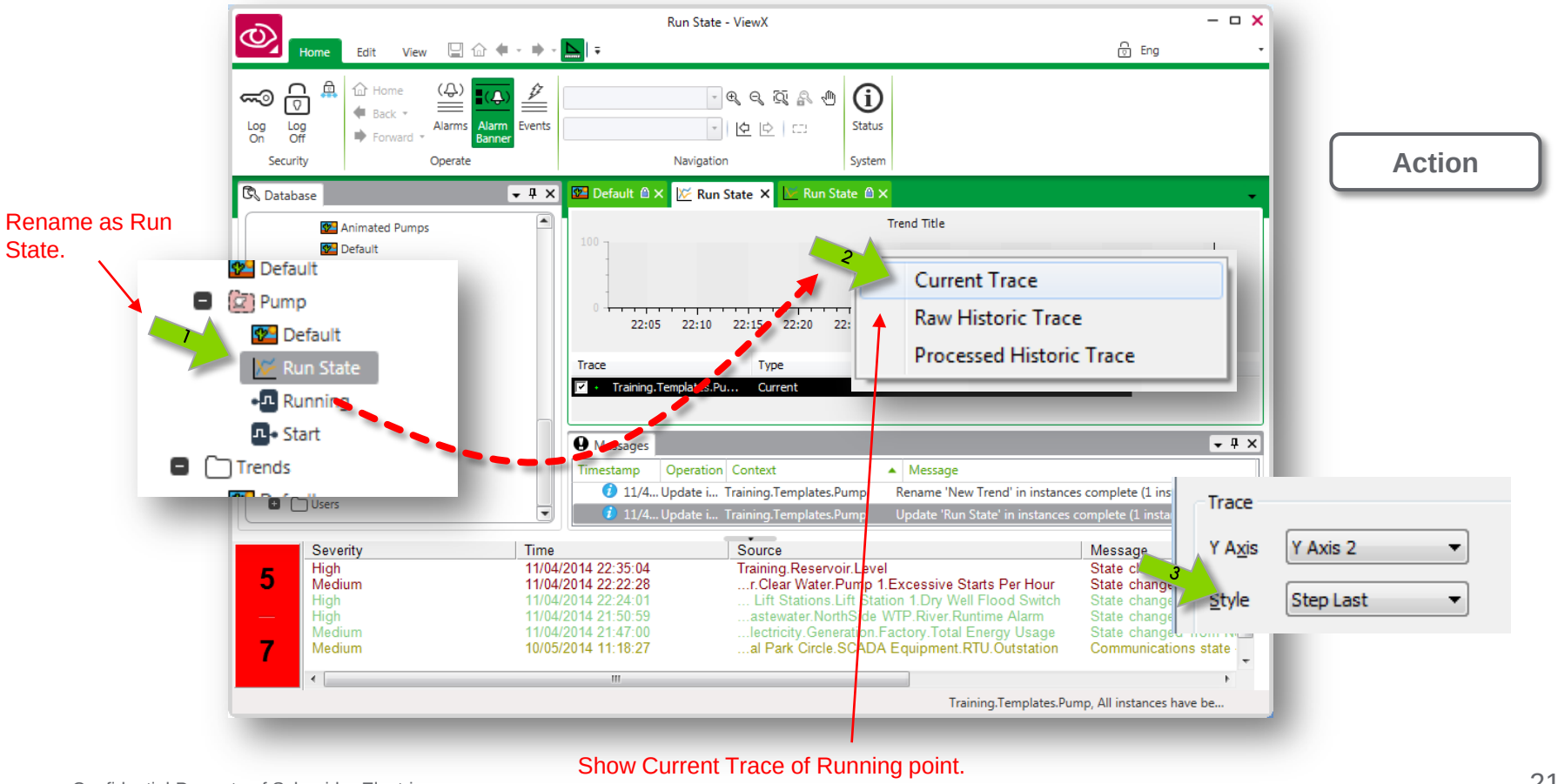
- Right click the **Pump** template and create a new **Trend**.



Step by Step

Propagating Changes

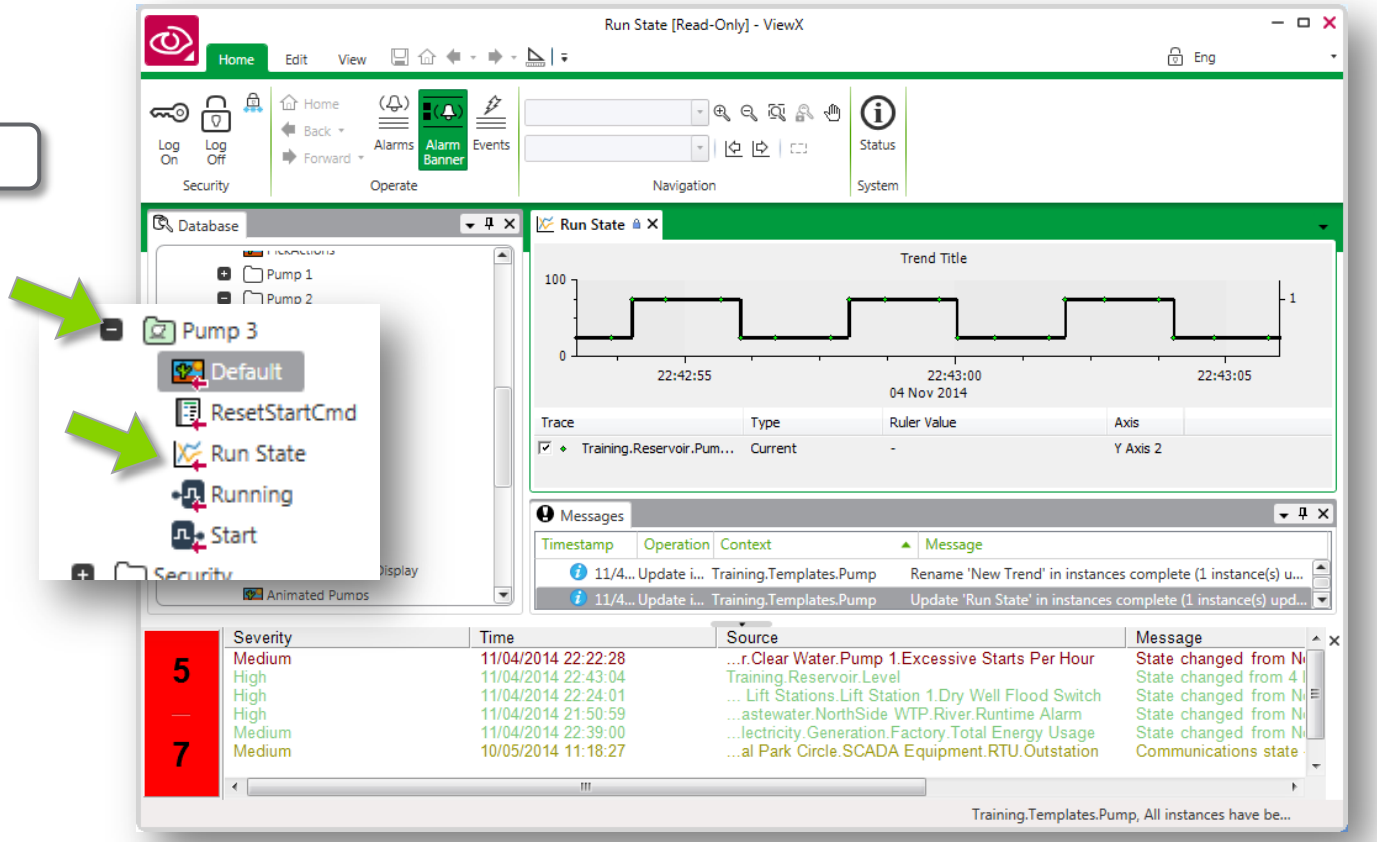
- Name this trend **Run State**. And configure it to show the **Running** point.
- Set the **Style** to **Step Last**. Save the template.



Propagating Changes

- Observe the **Pump 3** instance now. The changes are automatically propagated.

Action



Structured Text

Section 7

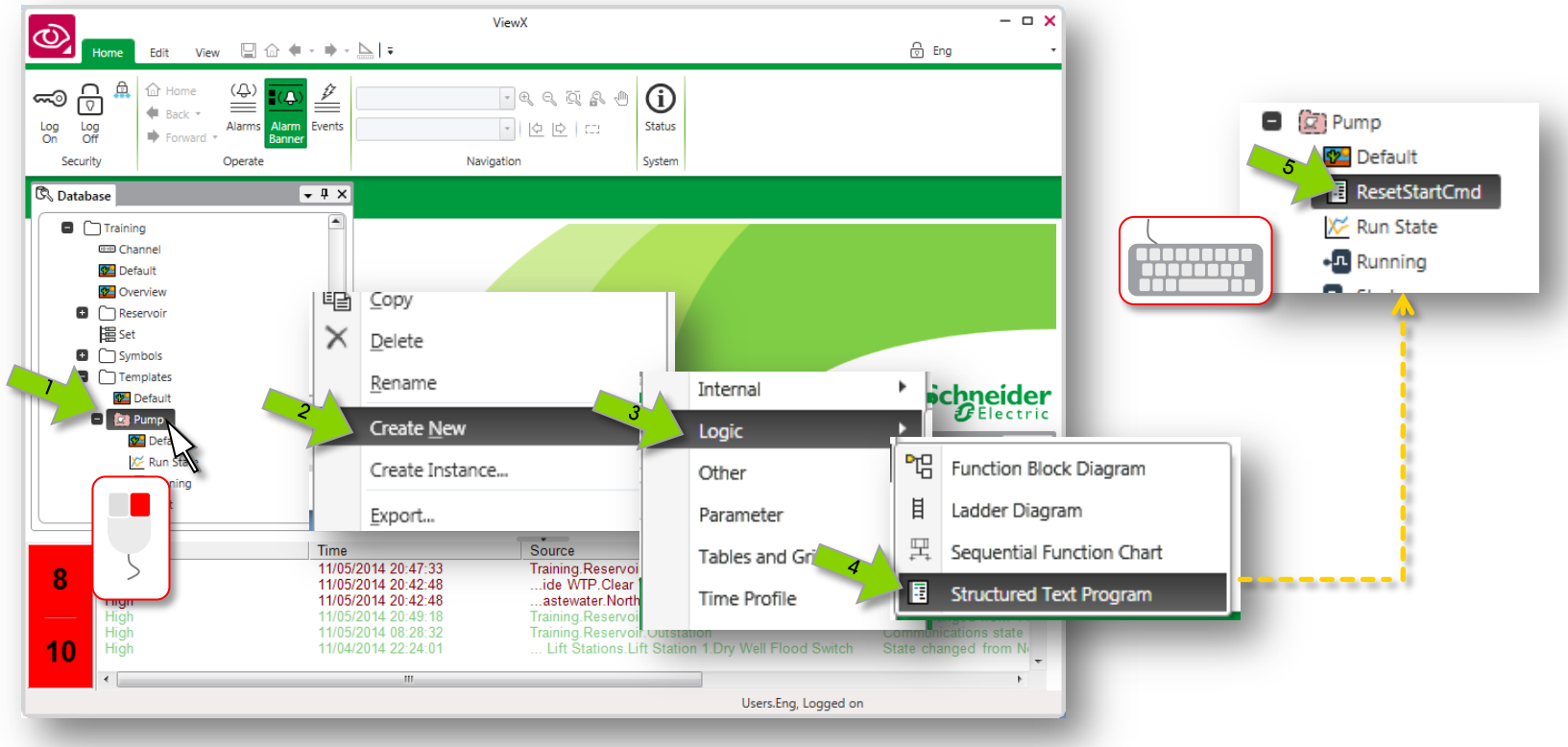
Logic Programming in ClearSCADA

Confidential Property of Schneider Electric

Structure Text Logic

- Within the **Pump** template, create a new **Structured Text** as shown.
- Name this ST **ResetStartCmd**.

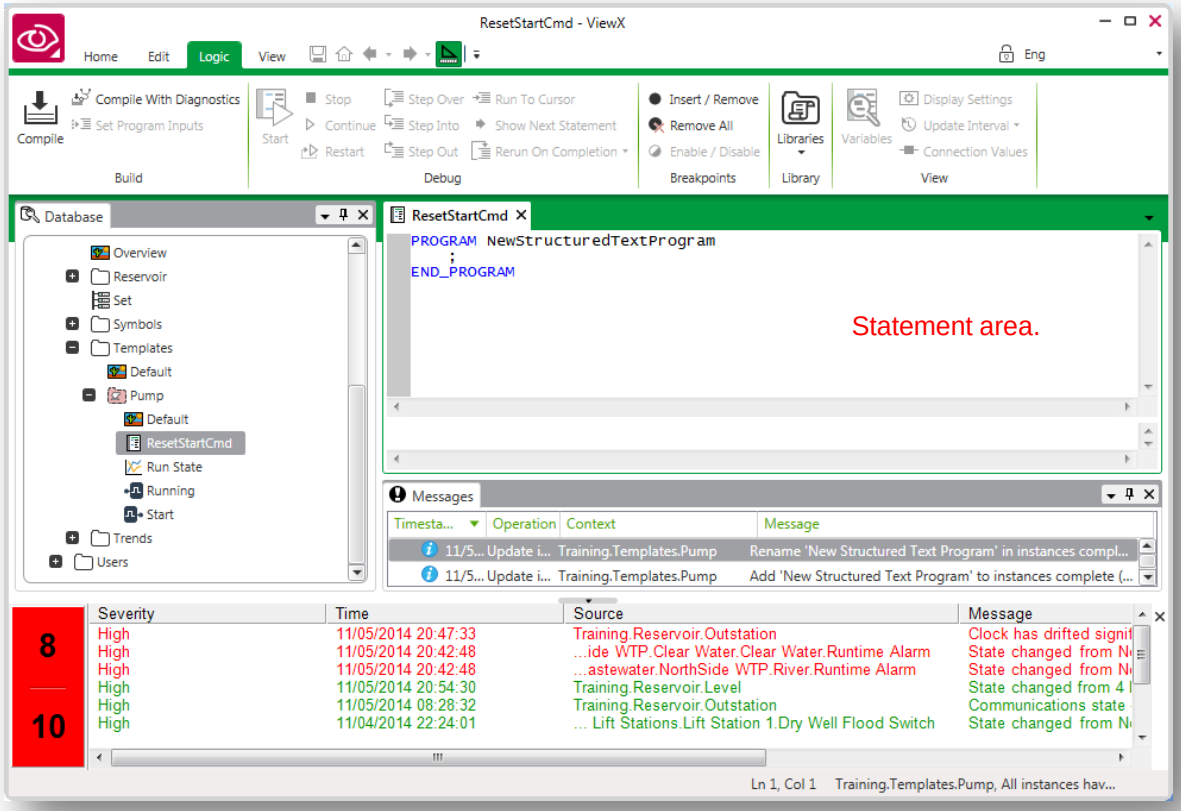
Step by Step



Structure Text Logic

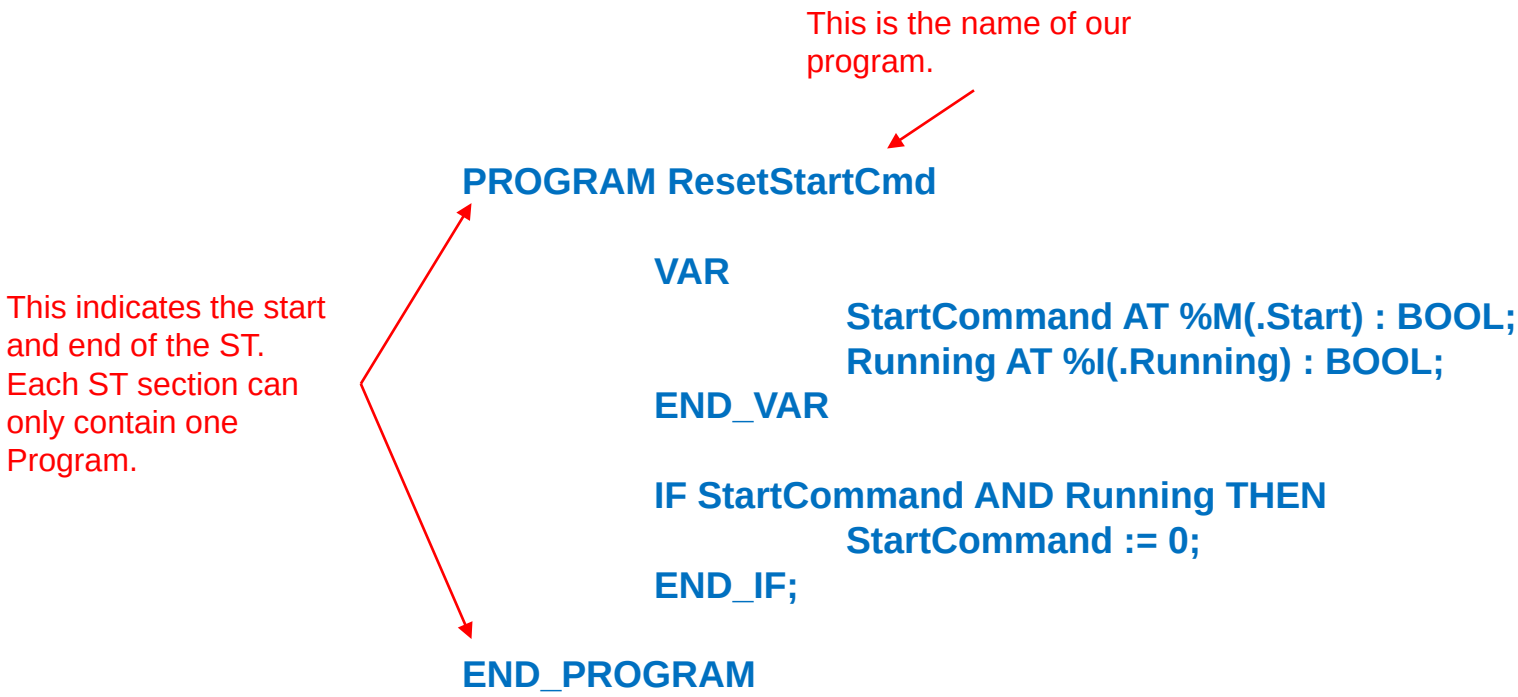
- Open the ST. This is where you will start writing your program.

Action



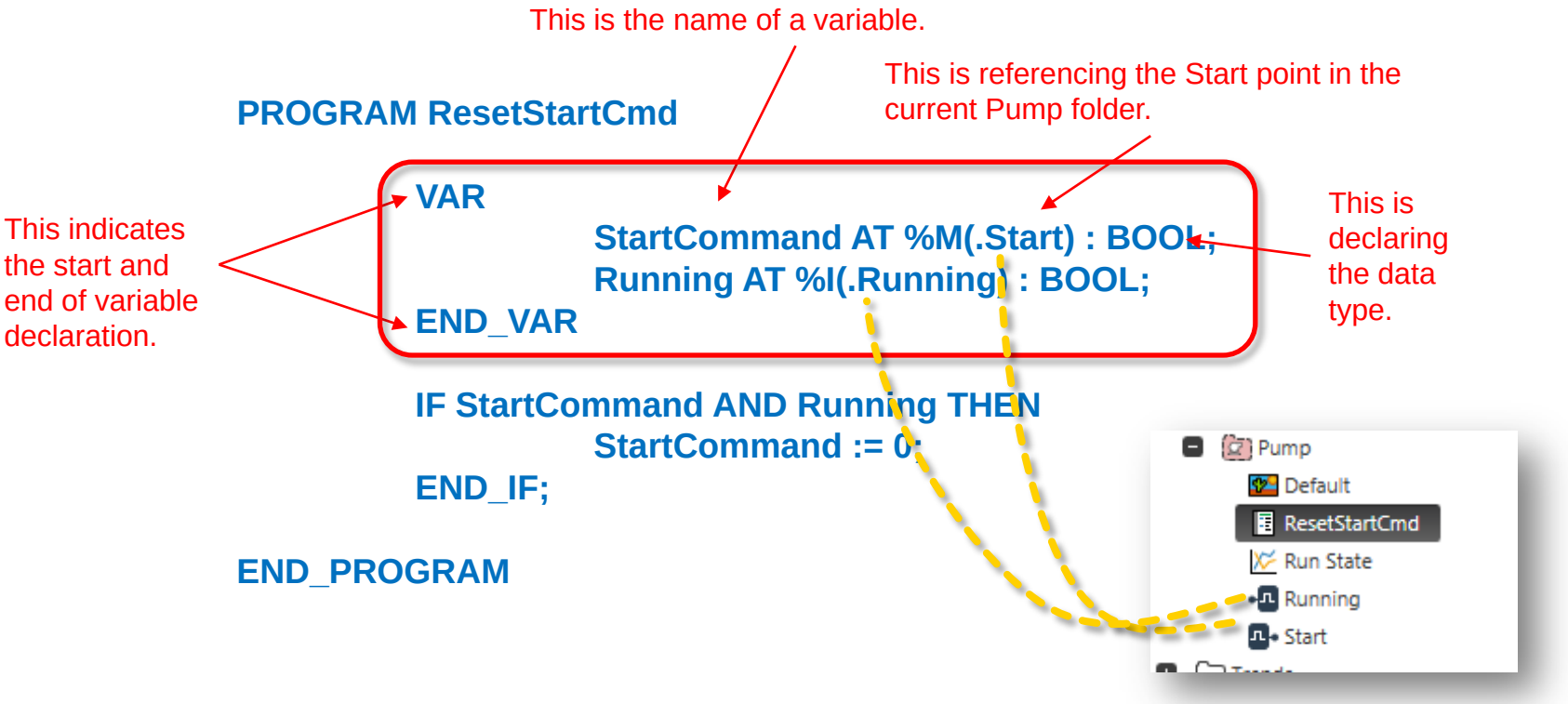
Structure Text Logic

- The following is a program which we will create. Lets go through the different parts of it.



Structure Text Logic

- This is where we declare variable and point to objects in which we want to reference.



Structure Text Logic

- Using the access type of the objects to be referenced are declared in the following way.

%I	Read Only
%Q	Write Only
%M	Read and Write

```
PROGRAM ResetStartCmd

        VAR
                StartCommand AT %M(.Start) : BOOL;
                Running AT %I(.Running) : BOOL;
        END_VAR

        IF StartCommand AND Running THEN
                StartCommand := 0;
        END_IF;

END_PROGRAM
```

Structure Text Logic

- And this is where the action takes place.

```
PROGRAM ResetStartCmd

        VAR
                StartCommand AT %M(.Start) : BOOL;
                Running AT %I(.Running) : BOOL;
        END_VAR

        IF StartCommand AND Running THEN
                StartCommand := 0;
        END_IF;

END_PROGRAM
```

Structure Text Logic

- Type the following into the ST section, replacing the default **NewStructuredTextProgram**.

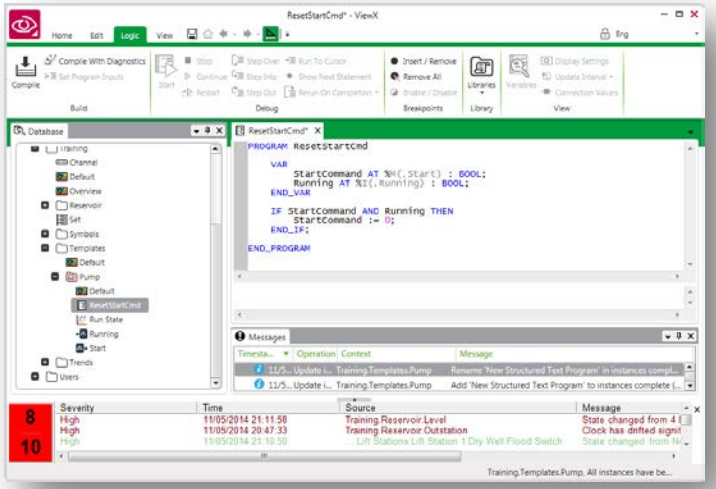
```
PROGRAM ResetStartCmd

        VAR
                StartCommand AT %M(.Start) : BOOL;
                Running AT %I(.Running) : BOOL;
        END_VAR

        IF StartCommand AND Running THEN
                StartCommand := 0;
        END_IF;

END_PROGRAM
```

Action

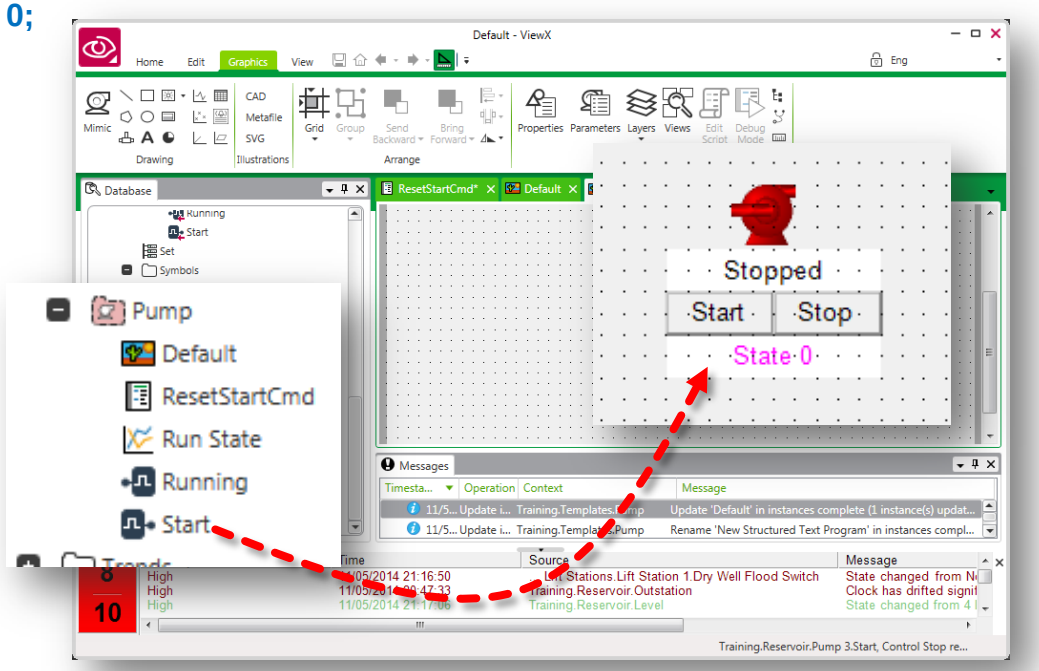


Structure Text Logic

- The ST is gong to reset the **Start** command of the pump is running. We need to bring the status of the Start command onto the mimic to show its state.
- Under the **Pump** template's **Default** mimic, add the state of the **Start** command to be shown. Remember to **Save**.

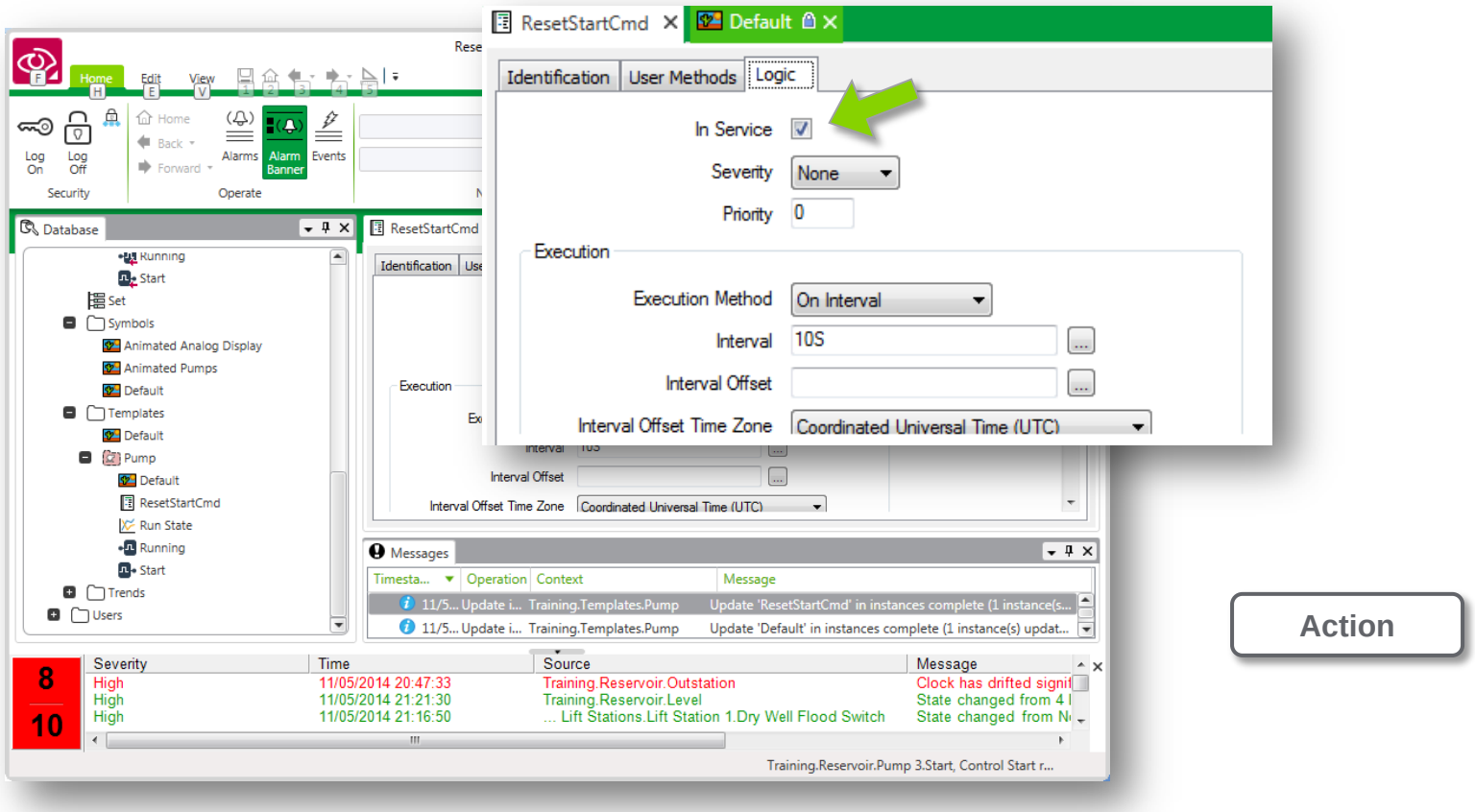
```
IF StartCommand AND Running THEN
        StartCommand := 0;
END_IF;
```

Action



Structure Text Logic

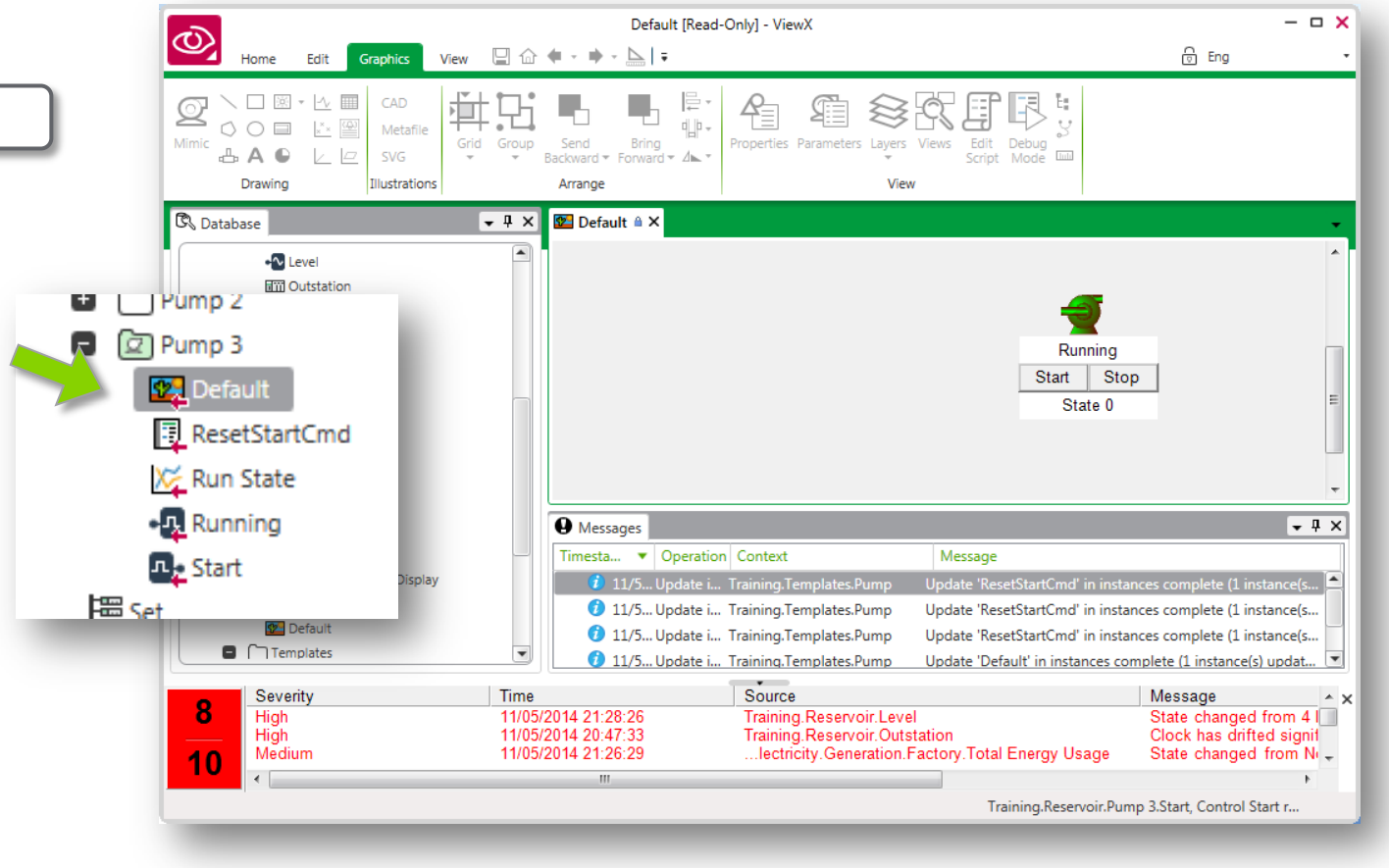
- Your ST although had been created, is not enabled yet. You need to put the ST into **Service**.



Structure Text Logic

- Now observe the **Pump 3** instance created previously.

Action



Security

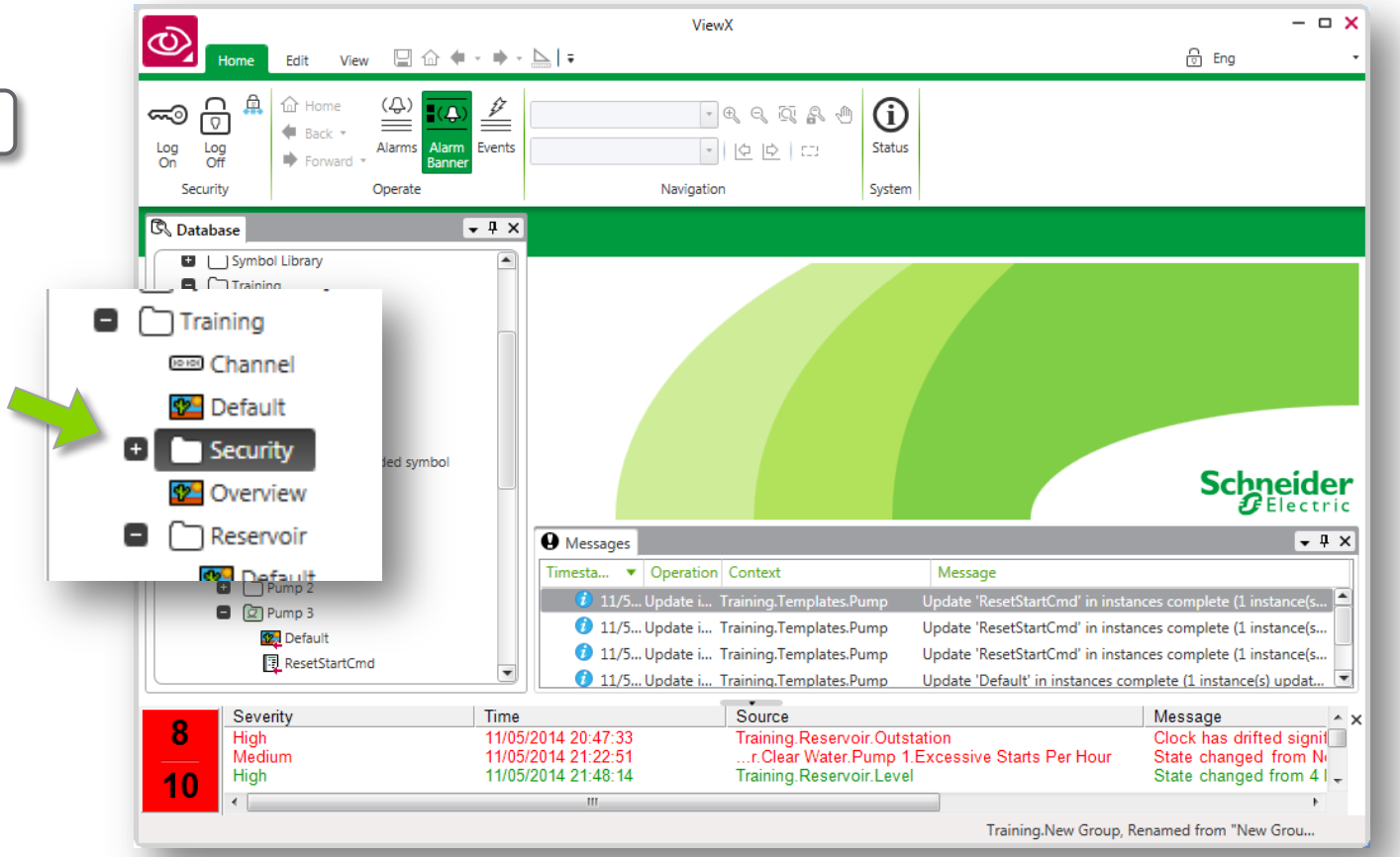
Section 8
User Rights and Such

Confidential Property of Schneider Electric

Security

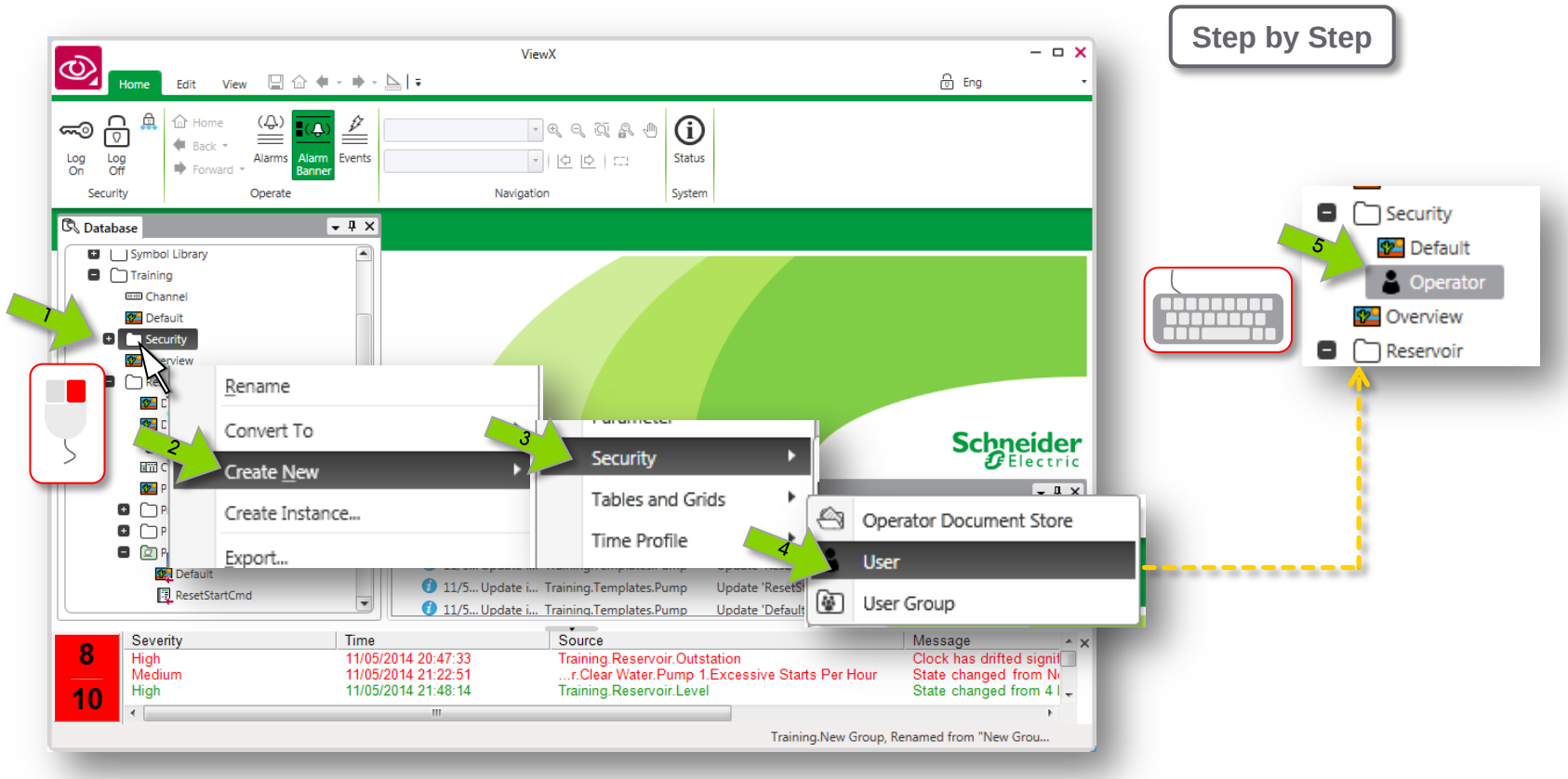
- Create a new **Group** and name it **Security**.

Action



Security

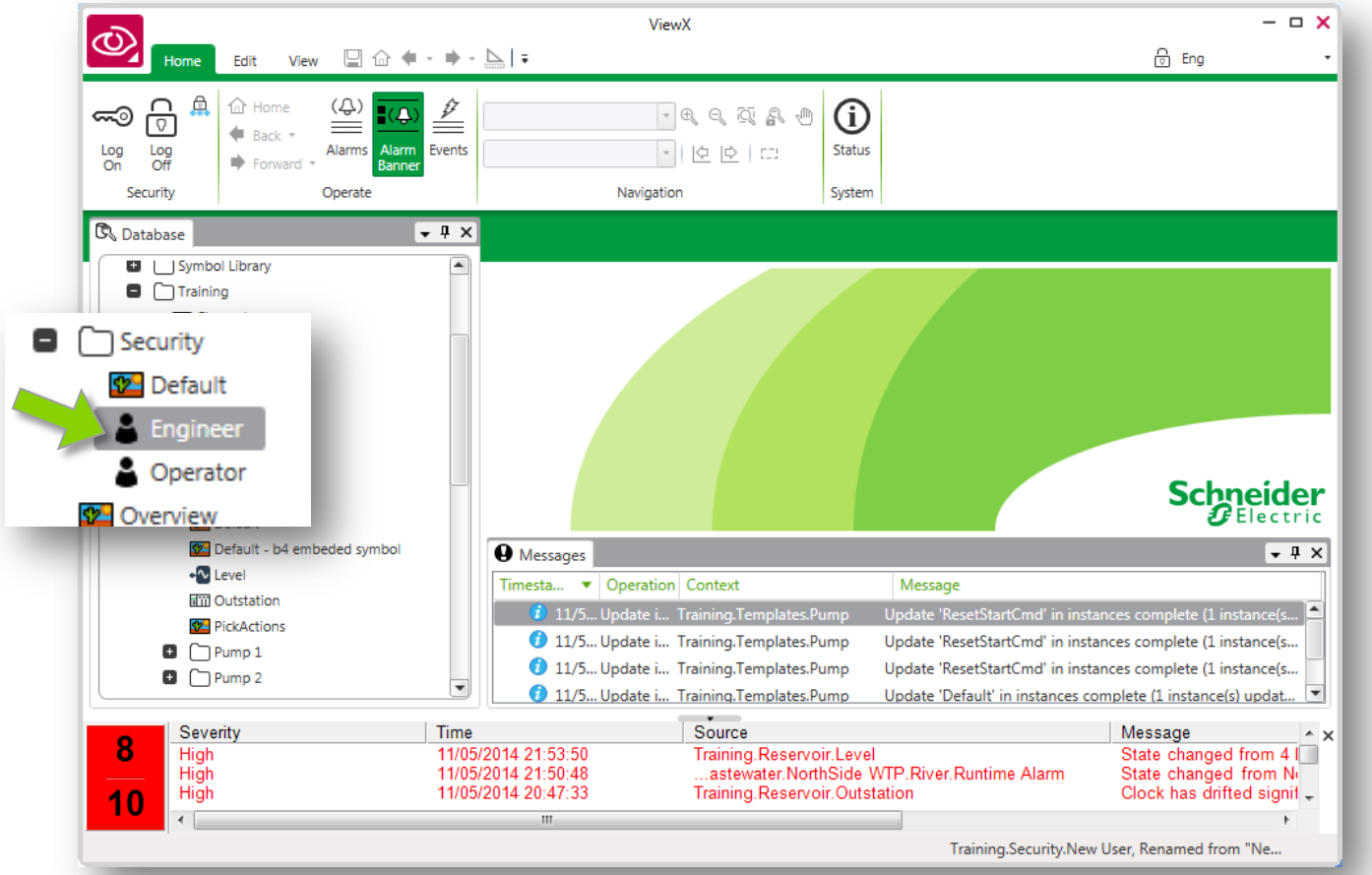
- To create users, perform the following. Name this user **Operator**.



Security

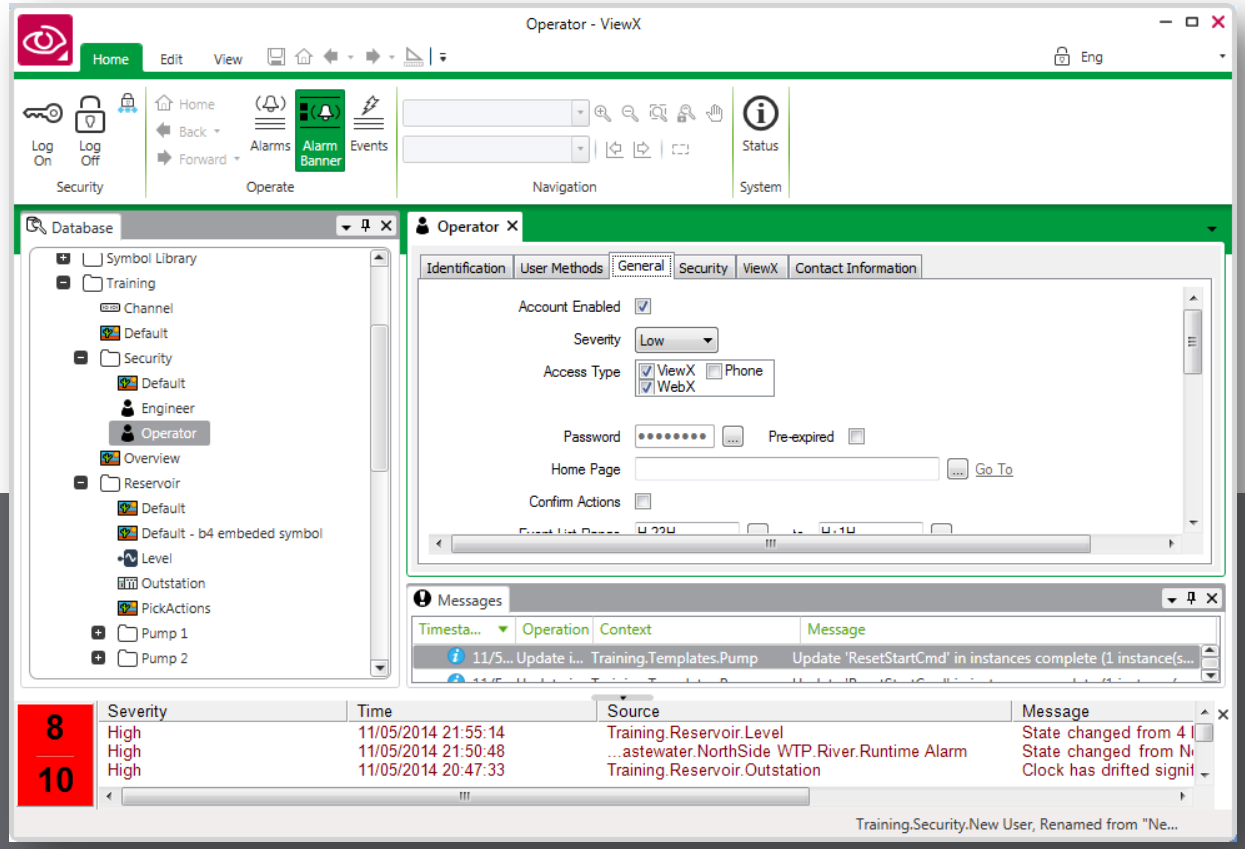
- Create another user and call it **Engineer**.

Action



Setting Operator's Rights

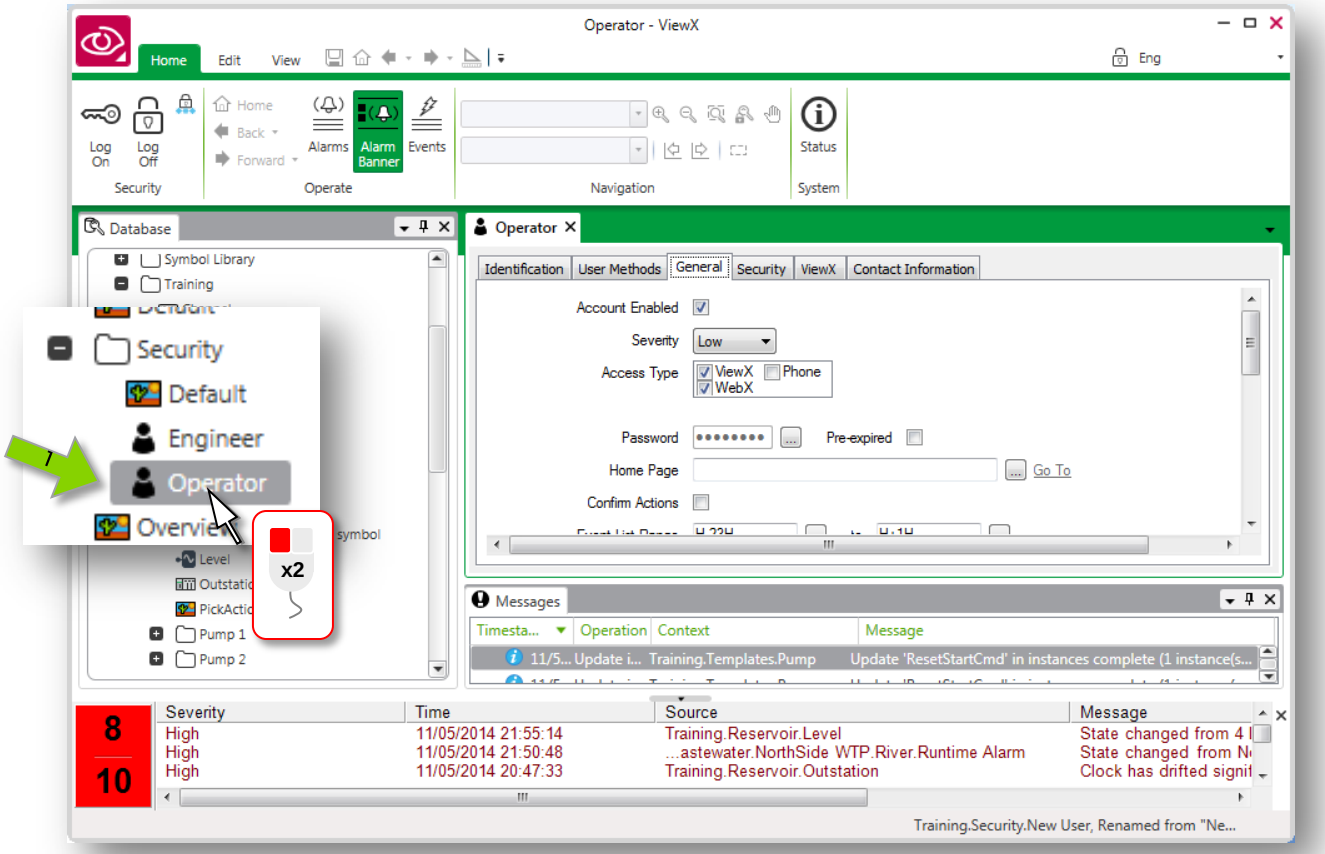
- We now have 2 users in the system. And we want the **Engineer** to have different privileges compared to the **Operator**. As with all objects in CS, user rights are set in the properties of the user object.



Security

- In order to set what users can do, open the user's properties.

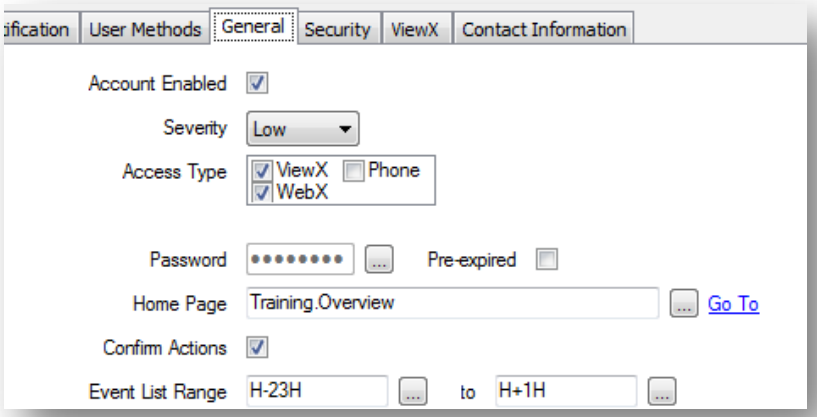
Step by Step

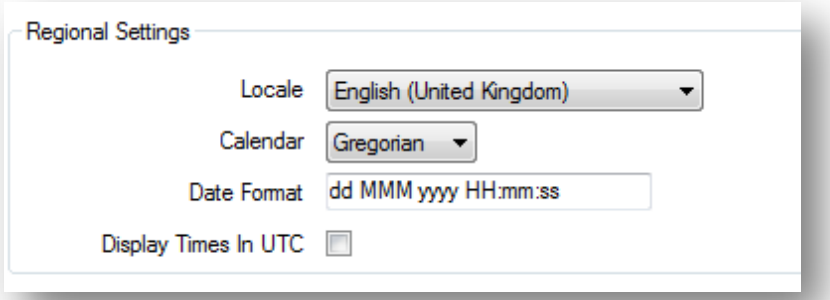


Security

- Lets set the **Operator's -> General** rights as follows.

Action

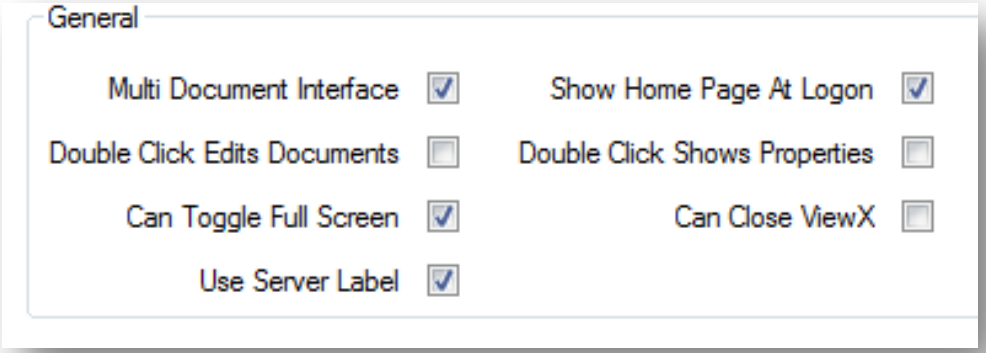




Tab	Section	Property	Operator
General	N/A	Home Page	Overview
		Confirm Actions	Yes
		Date Format	dd MMM yyyy HH:mm:ss
		Locale	English (United States)

Security

- Lets set the **Operator's -> ViewX -> General** rights as follows.

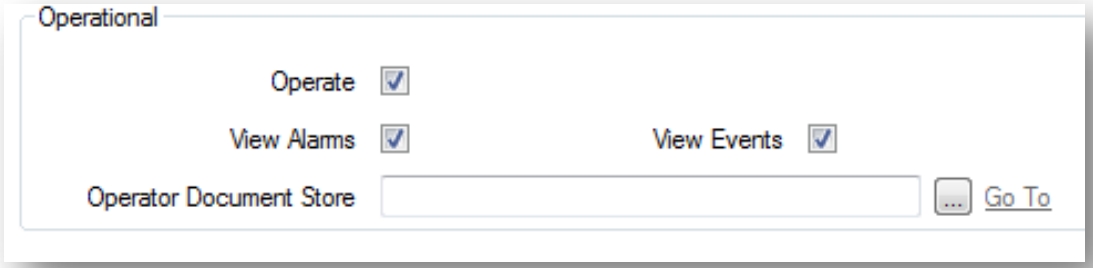


Action

Tab	Section	Property	Operator
ViewX	General	Multi Document Interface	Yes
		Show Home Page At Logon	Yes
		Can Close ViewX	No
		Double-click Edits Documents	No
		Double-click Shows Properties	No

Security

- Lets set the **Operator's -> ViewX -> Operational** rights as follows.

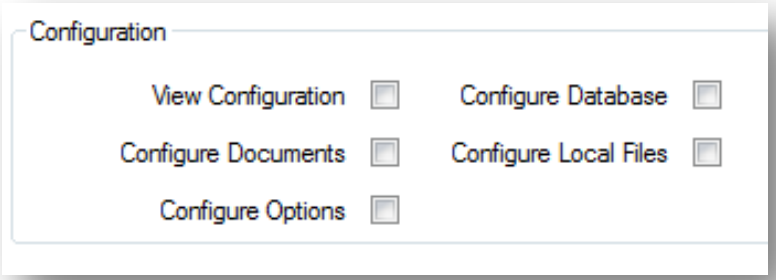


Action

Tab	Section	Property	Operator
ViewX	Operational	Operate	Yes
		View Alarms	Yes
		View Events	Yes
		Operator Document Store	-

Security

- Lets set the **Operator's -> ViewX -> Configuration** rights as follows.

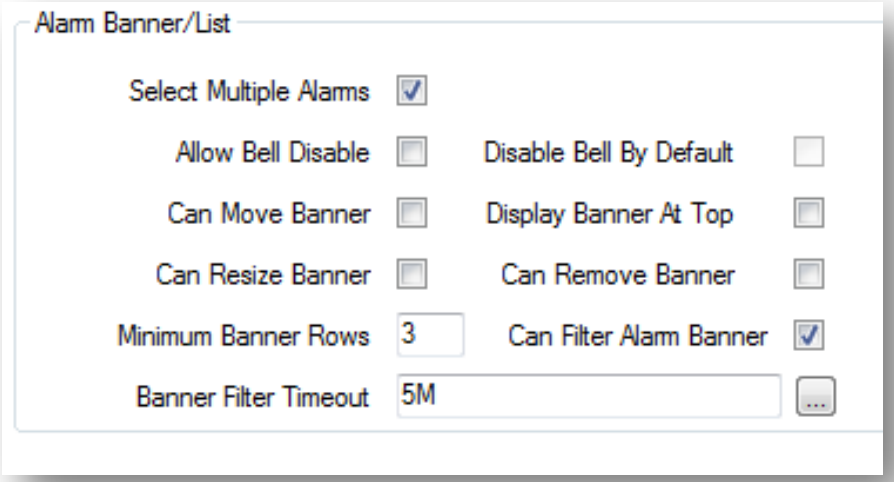


Action

Tab	Section	Property	Operator
ViewX	Configuration	View Configuration	No
		Configure Database	No
		Configure Options	No
		Configure Documents	No
		Configure Local Files	No

Security

- Lets set the **Operator's -> ViewX -> Alarm Banner** rights as follows.



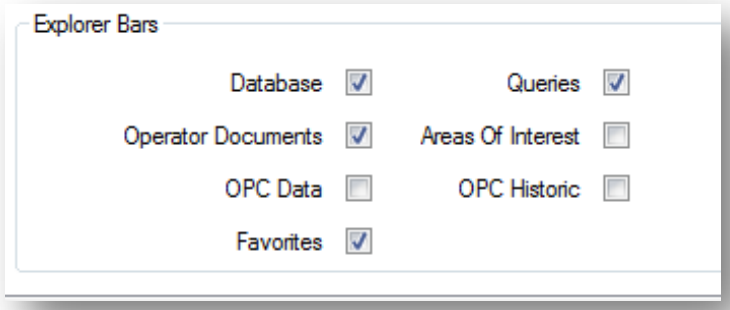
Action

Tab	Section	Property	Operator
ViewX	Alarm Banner / List	Allow Bell Disable	No
		Disable Bell By Default	No
		Can Move Banner	No
		Can Resize Banner	No
		Can Remove Banner	No
		Banner Filter Timeout	5M

Confidential Property of Schneider Electric

Security

- Lets set the **Operator's -> ViewX -> Explorer Bars** rights as follows.

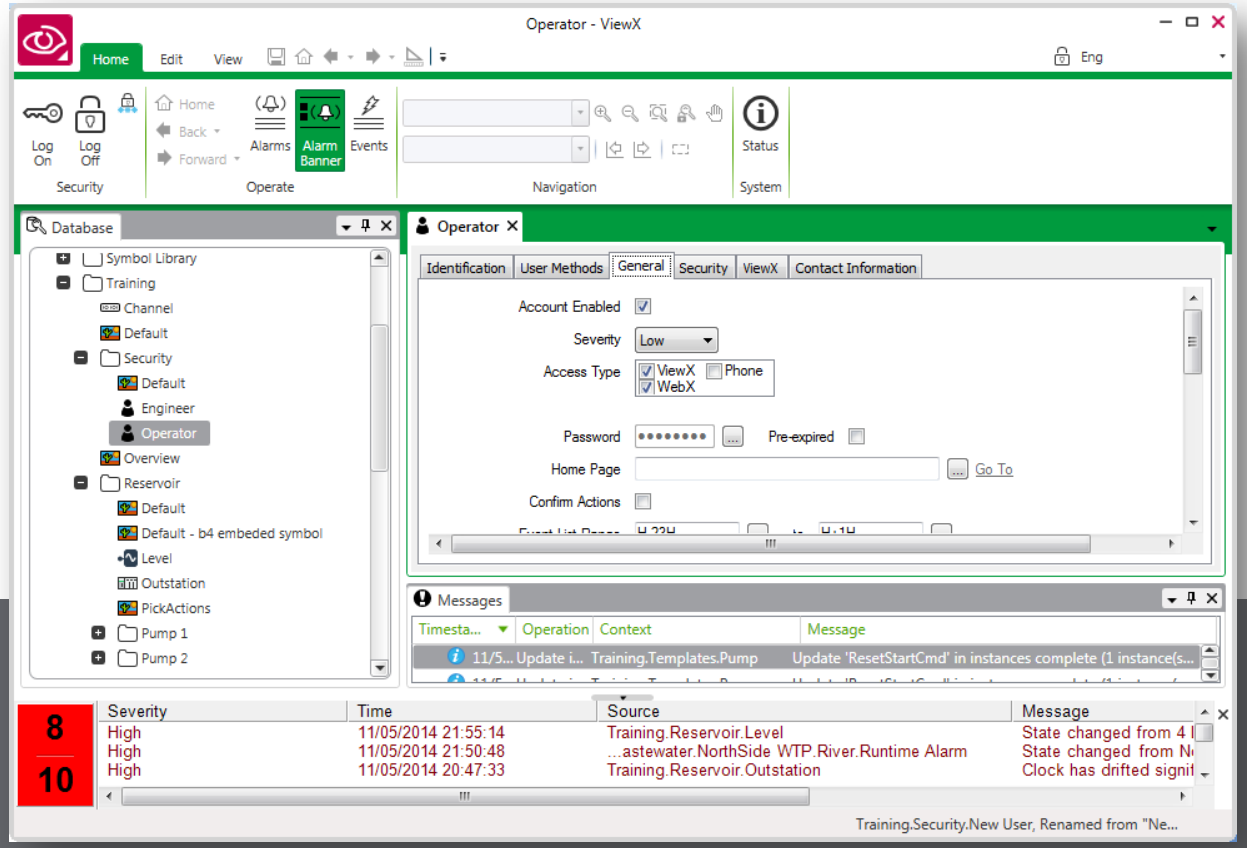


Action

Tab	Section	Property	Operator
ViewX	Explorer Bars	Database	Yes
		Operator Documents	Yes
		OPC Data	No
		Favorites	Yes
		Queries	Yes
		Area of Interest	No
		OPC Historic	No

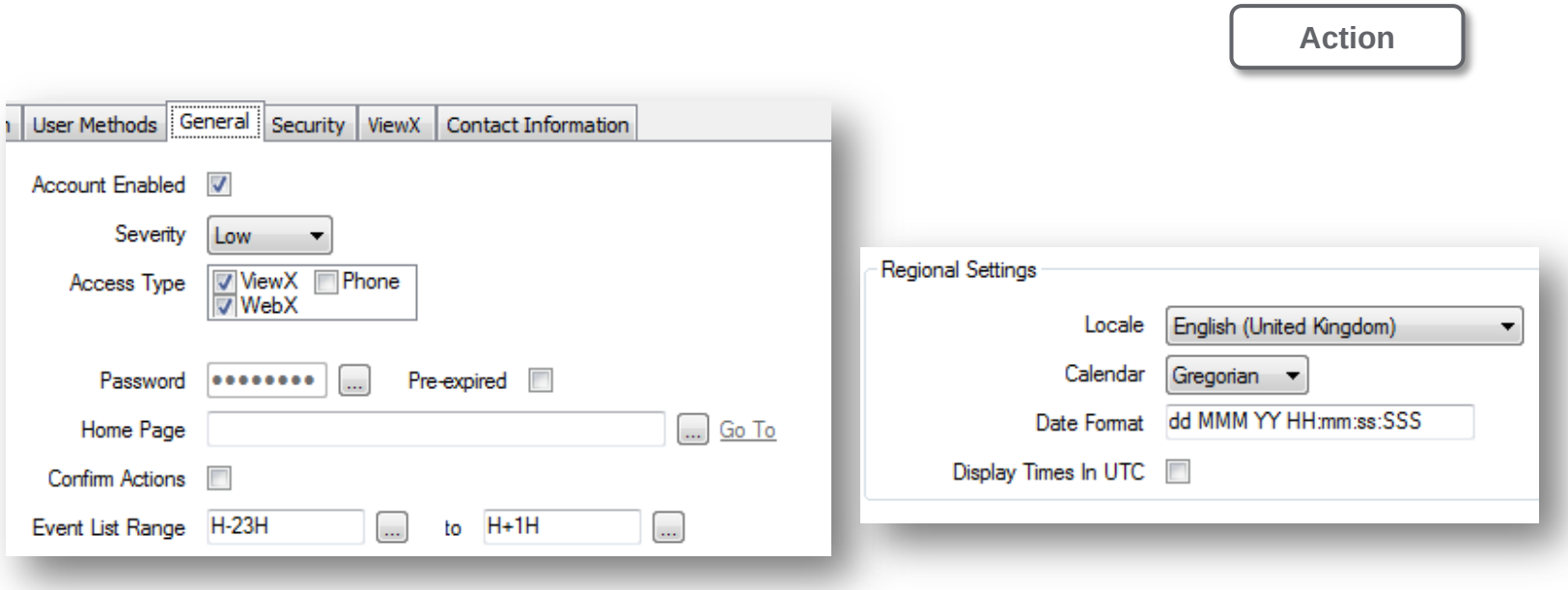
Setting Engineer's Rights

- And now the following section is for setting up the Engineer's rights.



Security

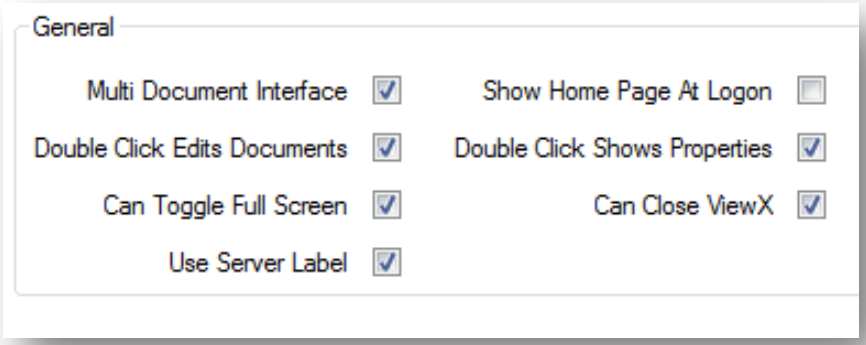
- Lets set the **Engineer's -> General** rights as follows.



Tab	Section	Property	Engineer
General	N/A	Home Page	-
		Confirm Actions	No
		Date Format	dd MMM YY HH:mm:ss.SSS
		Locale	English

Security

- Lets set the **Engineer's -> ViewX -> General** rights as follows.

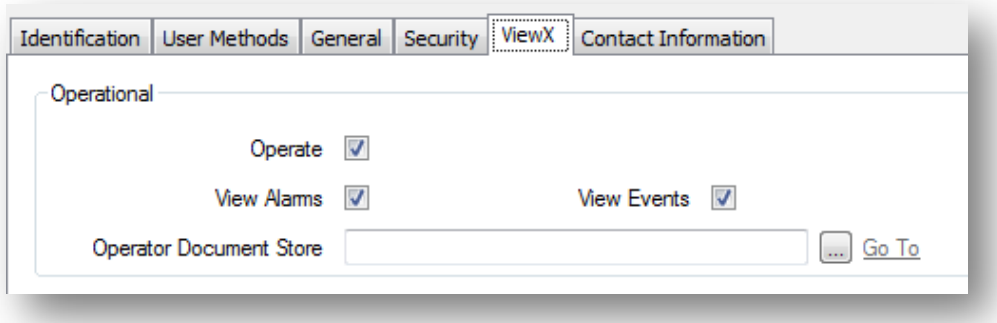


Action

Tab	Section	Property	Engineer
ViewX	General	Multi Document Interface	Yes
		Show Home Page At Logon	No
		Can Close ViewX	Yes
		Double-click Edits Documents	Yes
		Double-click Shows Properties	Yes

Security

- Lets set the **Engineer's -> ViewX -> Operational** rights as follows.

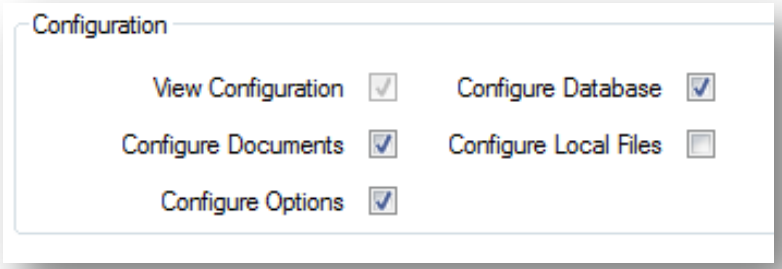


Action

Tab	Section	Property	Engineer
ViewX	Operational	Operate	Yes
		View Alarms	Yes
		View Events	Yes
		Operator Document Store	-

Security

- Lets set the **Engineer's -> ViewX -> Configuration** rights as follows.

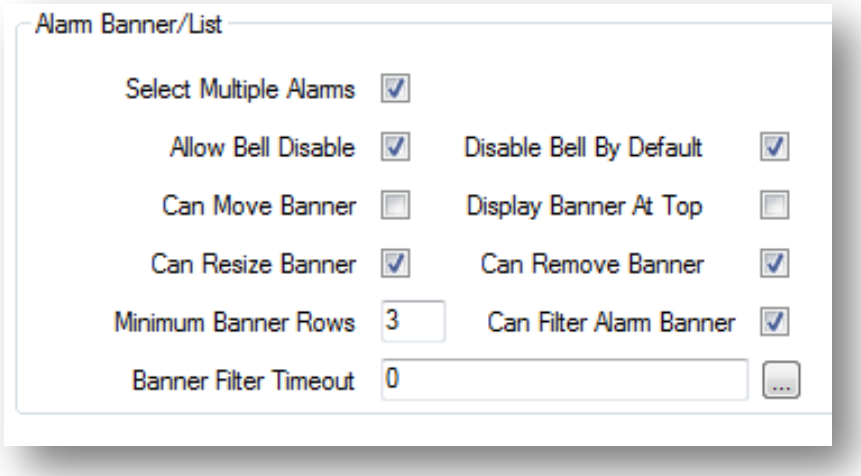


Action

Tab	Section	Property	Engineer
ViewX	Configuration	View Configuration	Yes
		Configure Database	Yes
		Configure Options	Yes
		Configure Documents	Yes
		Configure Local Files	No

Security

- Lets set the **Engineer's -> ViewX -> Alarm Banner** rights as follows.

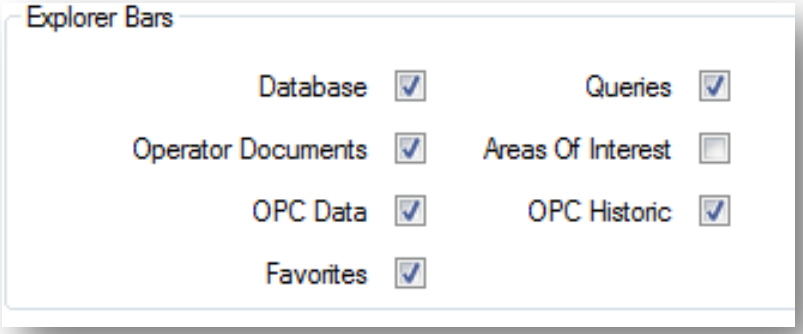


Action

Tab	Section	Property	Engineer
ViewX	Alarm Banner / List	Allow Bell Disable	Yes
		Disable Bell By Default	Yes
		Can Move Banner	No
		Can Resize Banner	Yes
		Can Remove Banner	Yes
		Banner Filter Timeout	0

Security

- Lets set the **Engineer's -> ViewX -> Explorer Bars** rights as follows.

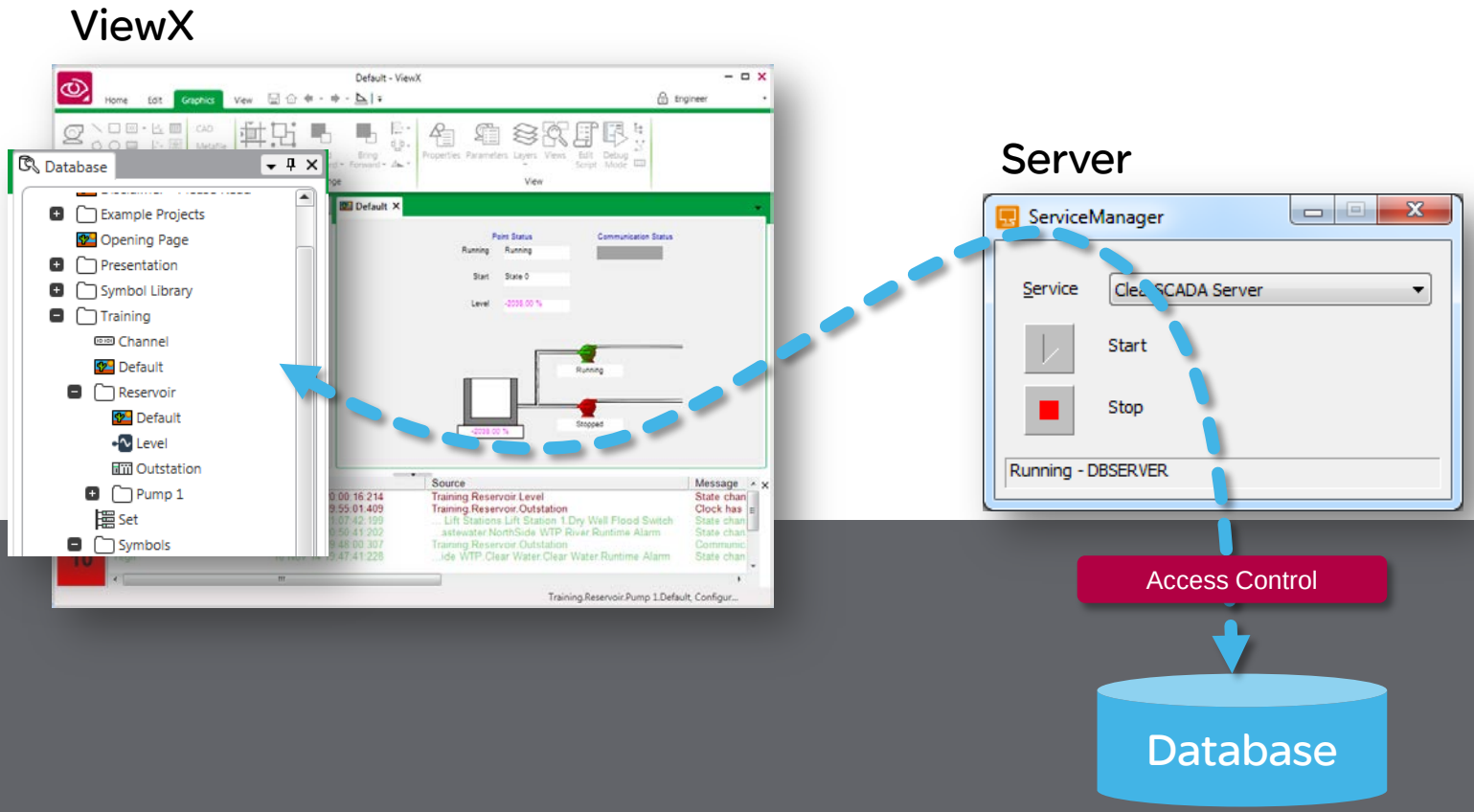


Action

Tab	Section	Property	Engineer
ViewX	Explorer Bars	Database	Yes
		Operator Documents	Yes
		OPC Data	Yes
		Favorites	Yes
		Queries	Yes
		Area of Interest	No
		OPC Historic	Yes

Database Security

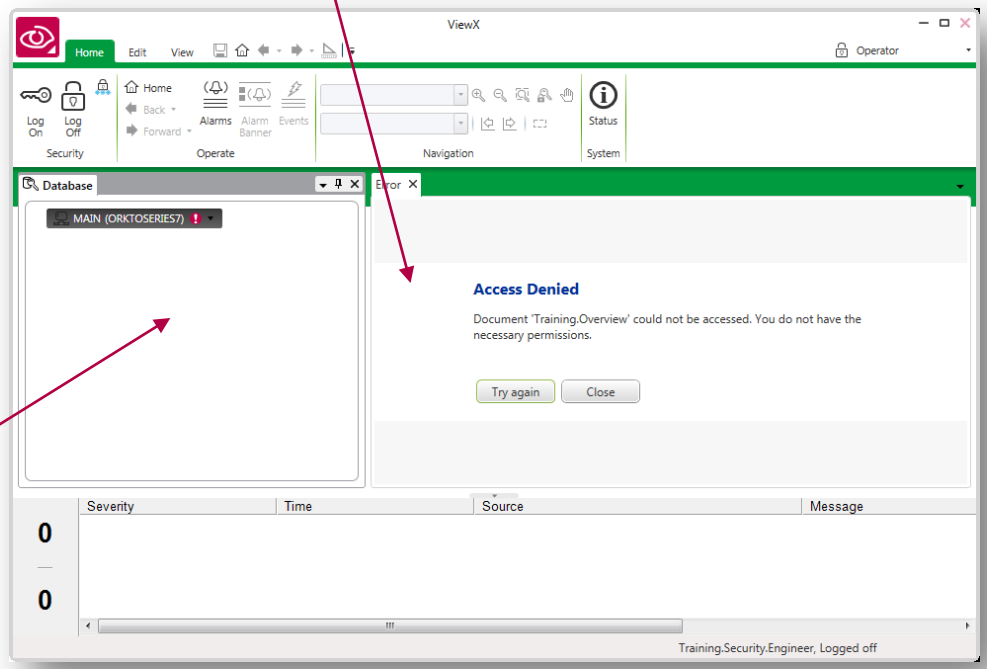
- The CS database is protected by default. Only users are “allowed” to access the database can engineer the system via **ViewX**.



Security

- Next log on as **Operator**. You can no longer see the database. In fact, you cannot see nor do anything at all. Same when you login as **Engineer**.

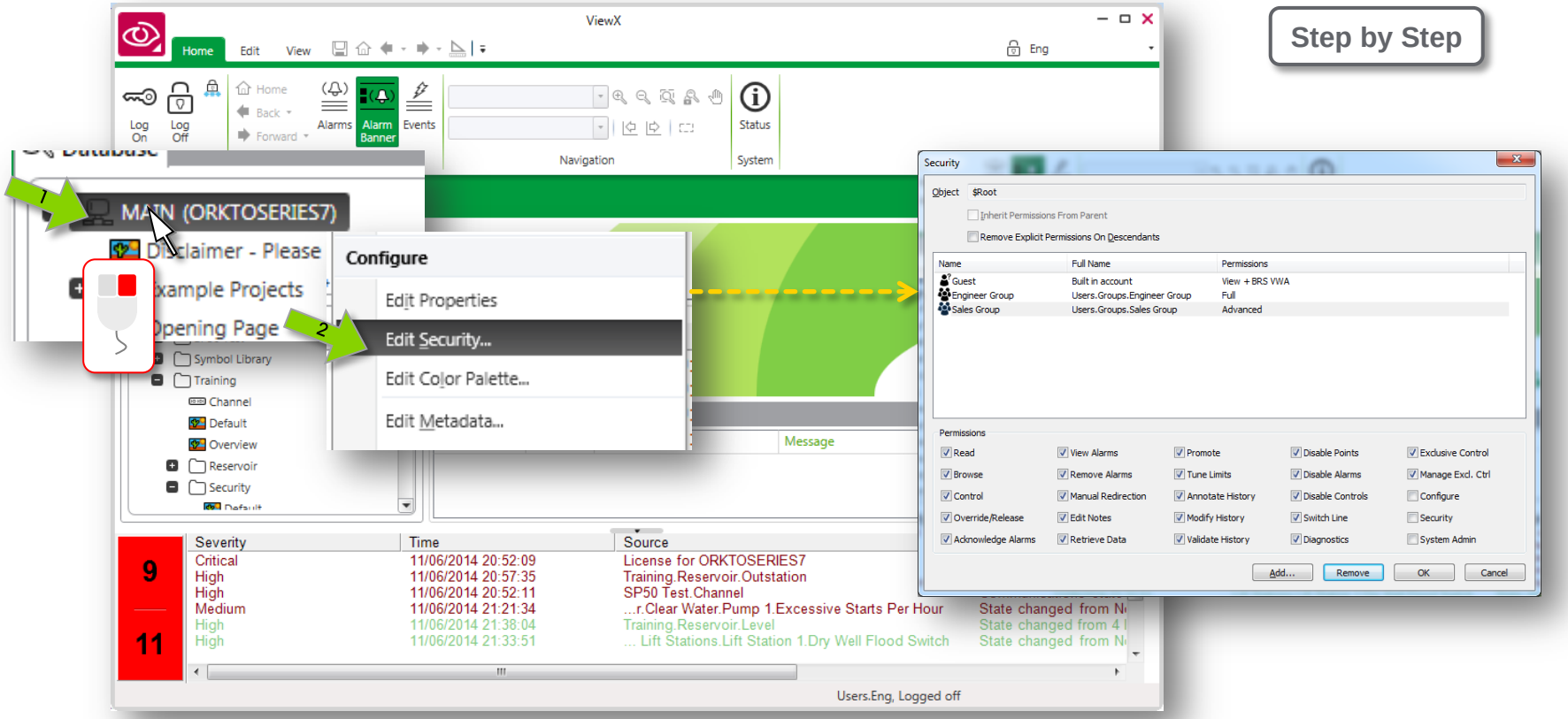
Training.Overview should be shown, but not. This is because the security settings for the page itself has not been set.



Access denies to database.

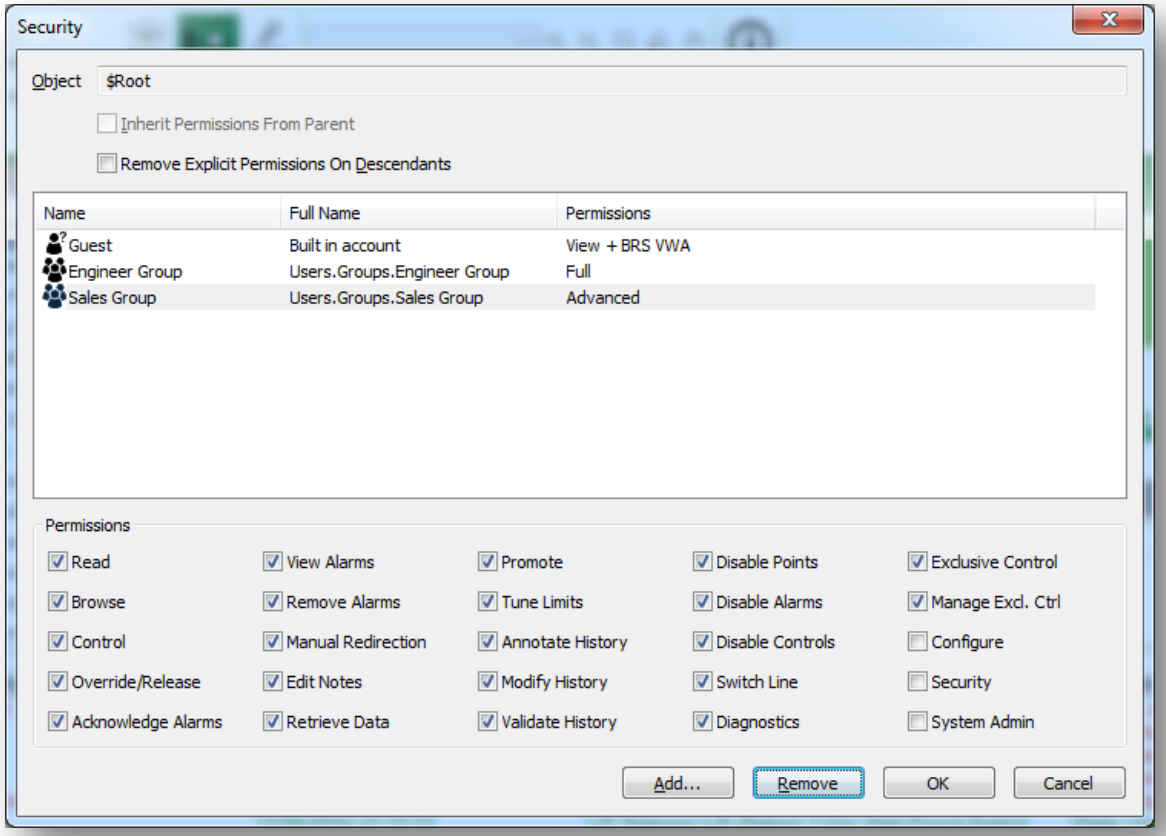
Security

- Log back in as **Eng** and things shall be explained. Right click on the root folder and select **Edit Security**.



Security

- Notice that your newly created users are not here, nor belong to any groups that are here at all. And this is the cause.

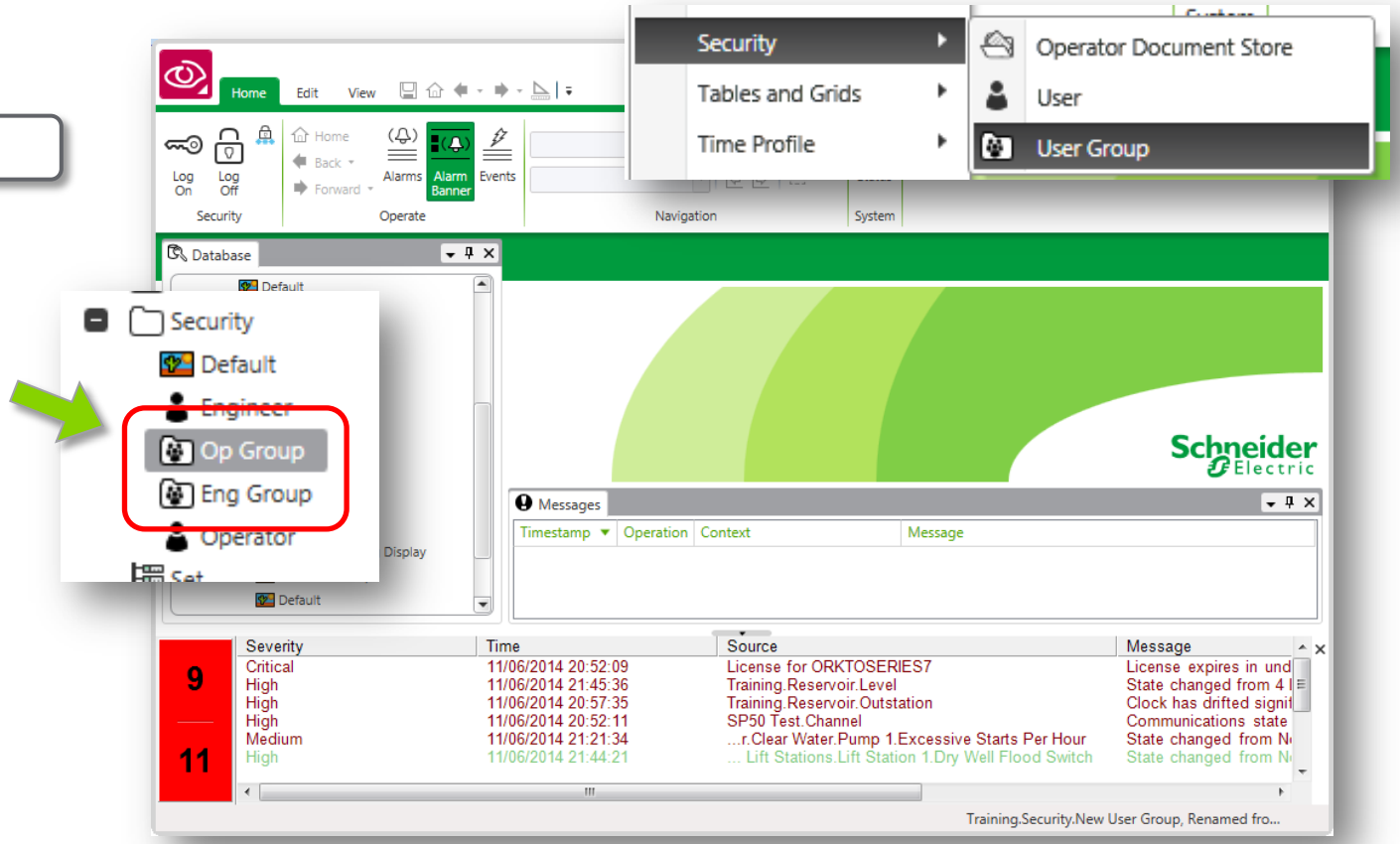


Security

- Create 2 **User Groups** under the **Security** folder calling them **Op Group** and **Eng Group**.

Action

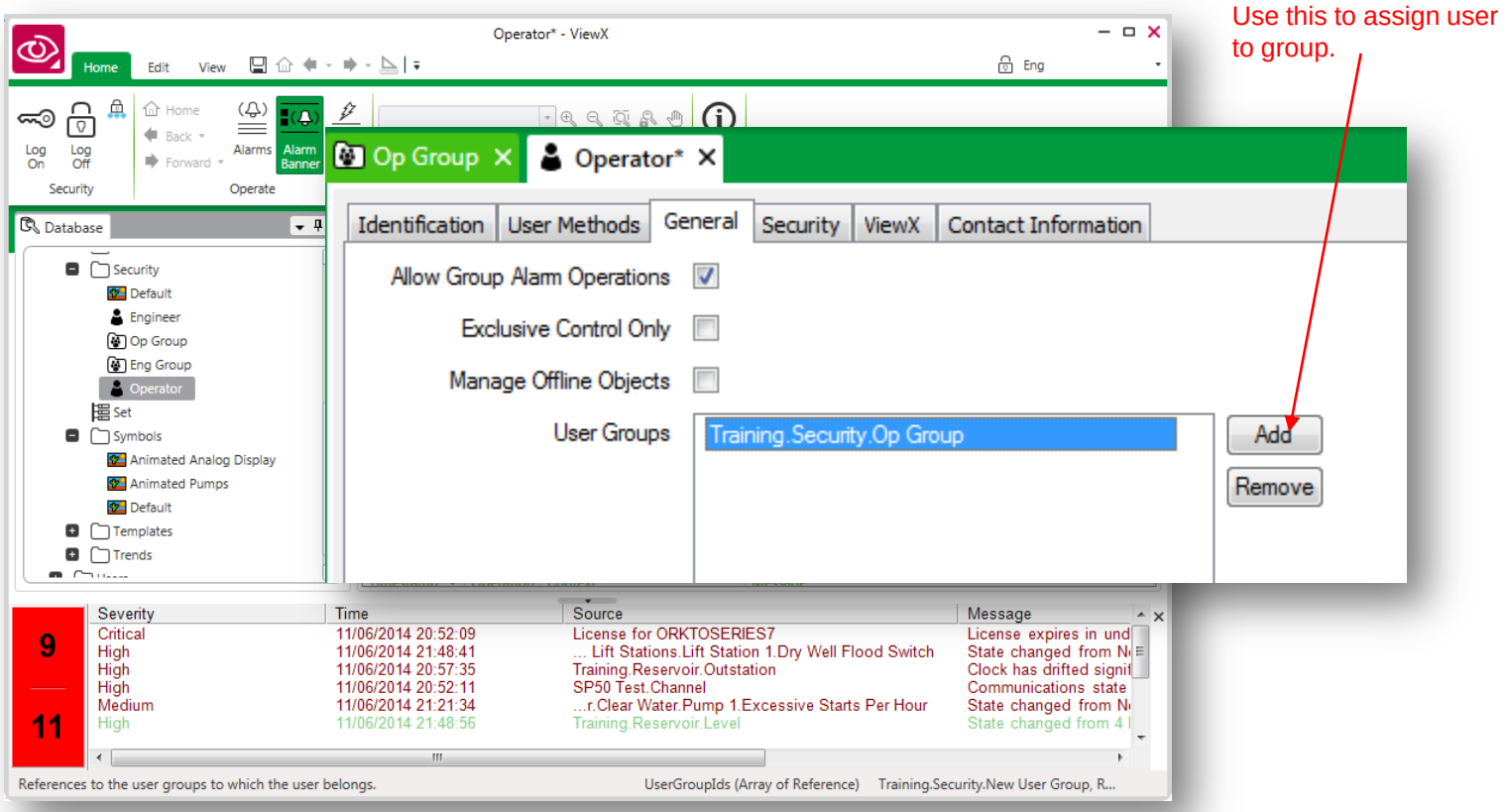
This is what you select in order to create User Groups.



Security

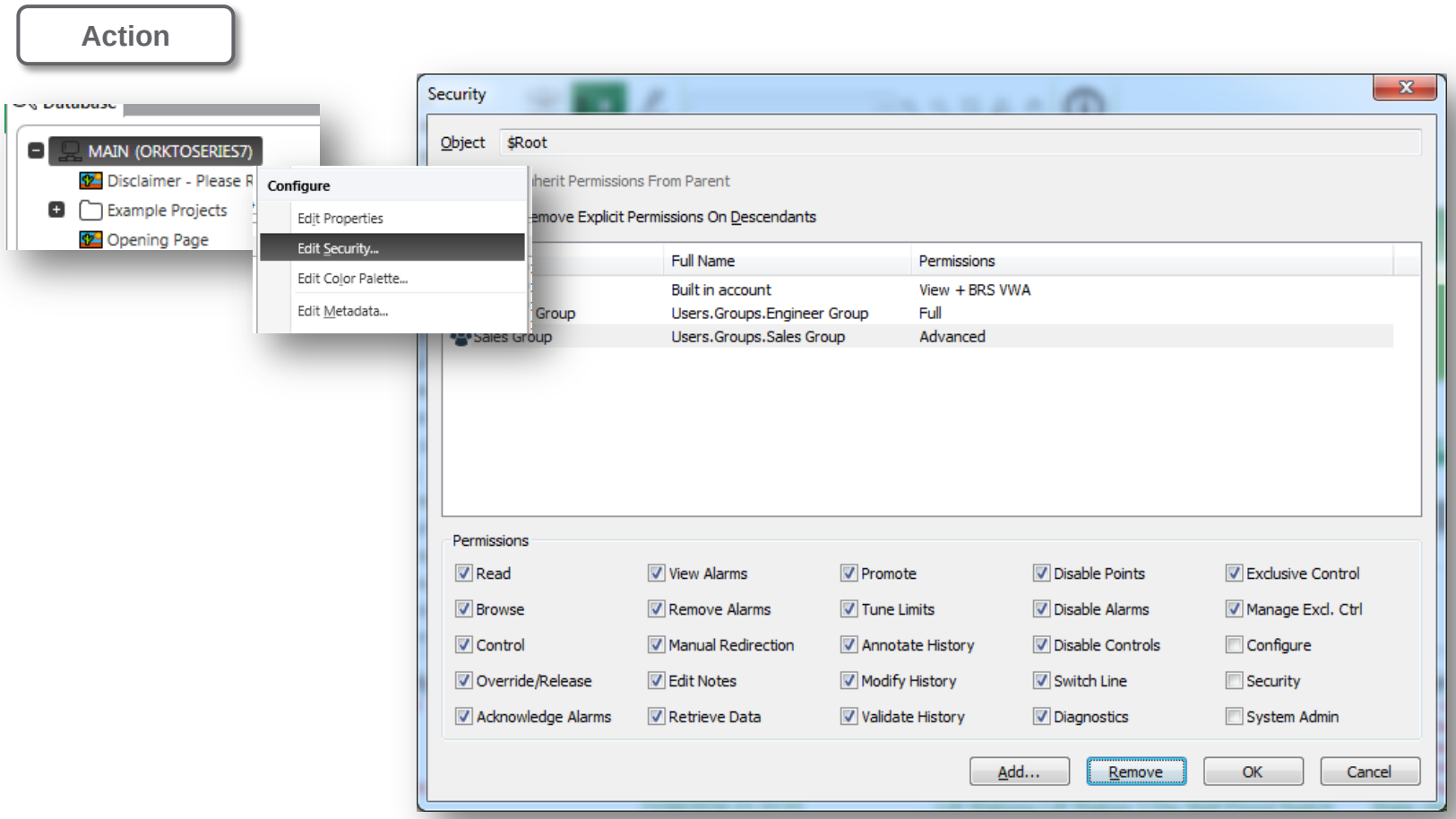
- Then assign **Operator** to **Op Group** and **Engineer** to **Eng Group**.

Action



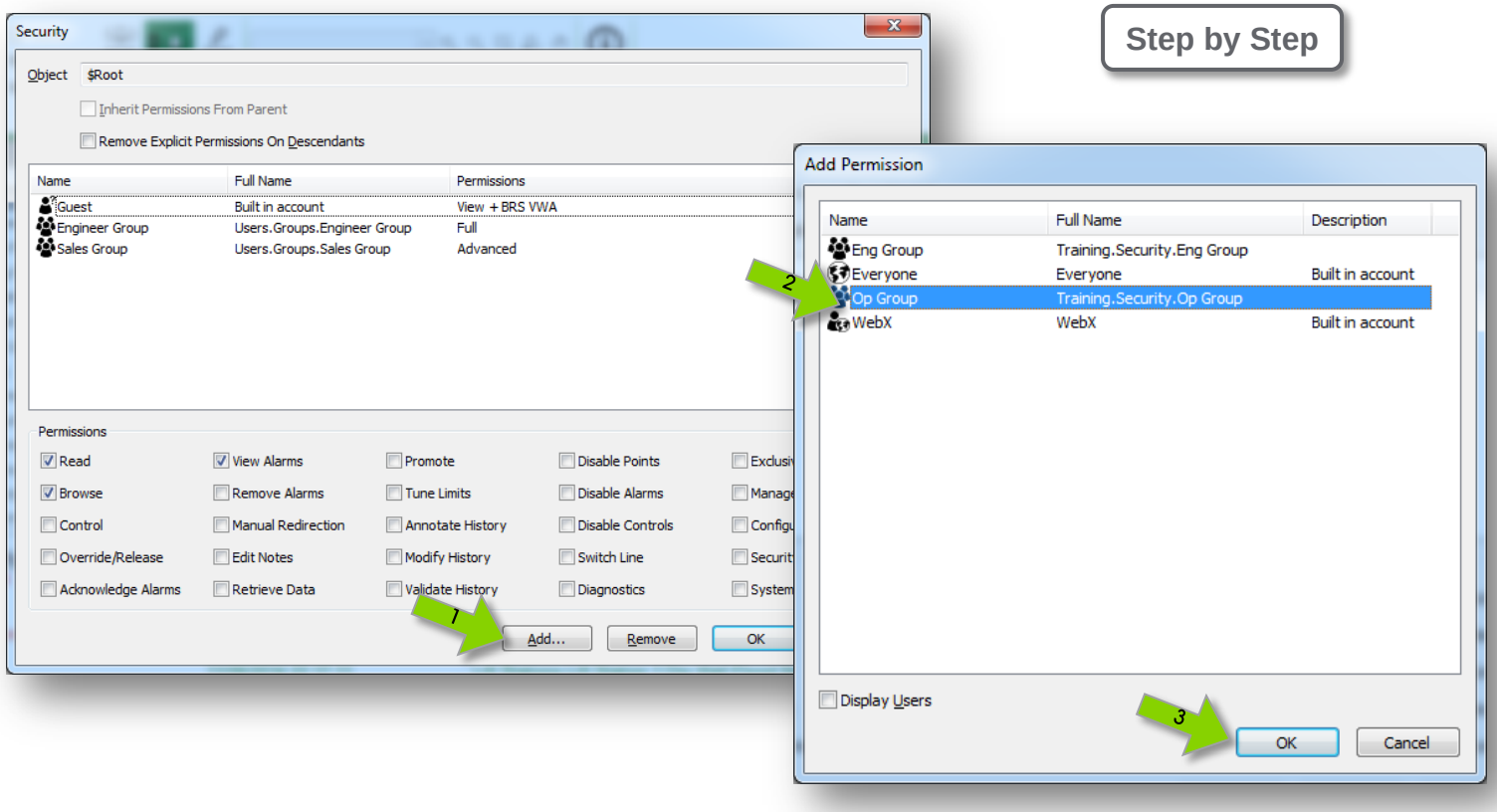
Security

- Go back to the root folder and open up the security settings as before.



Security

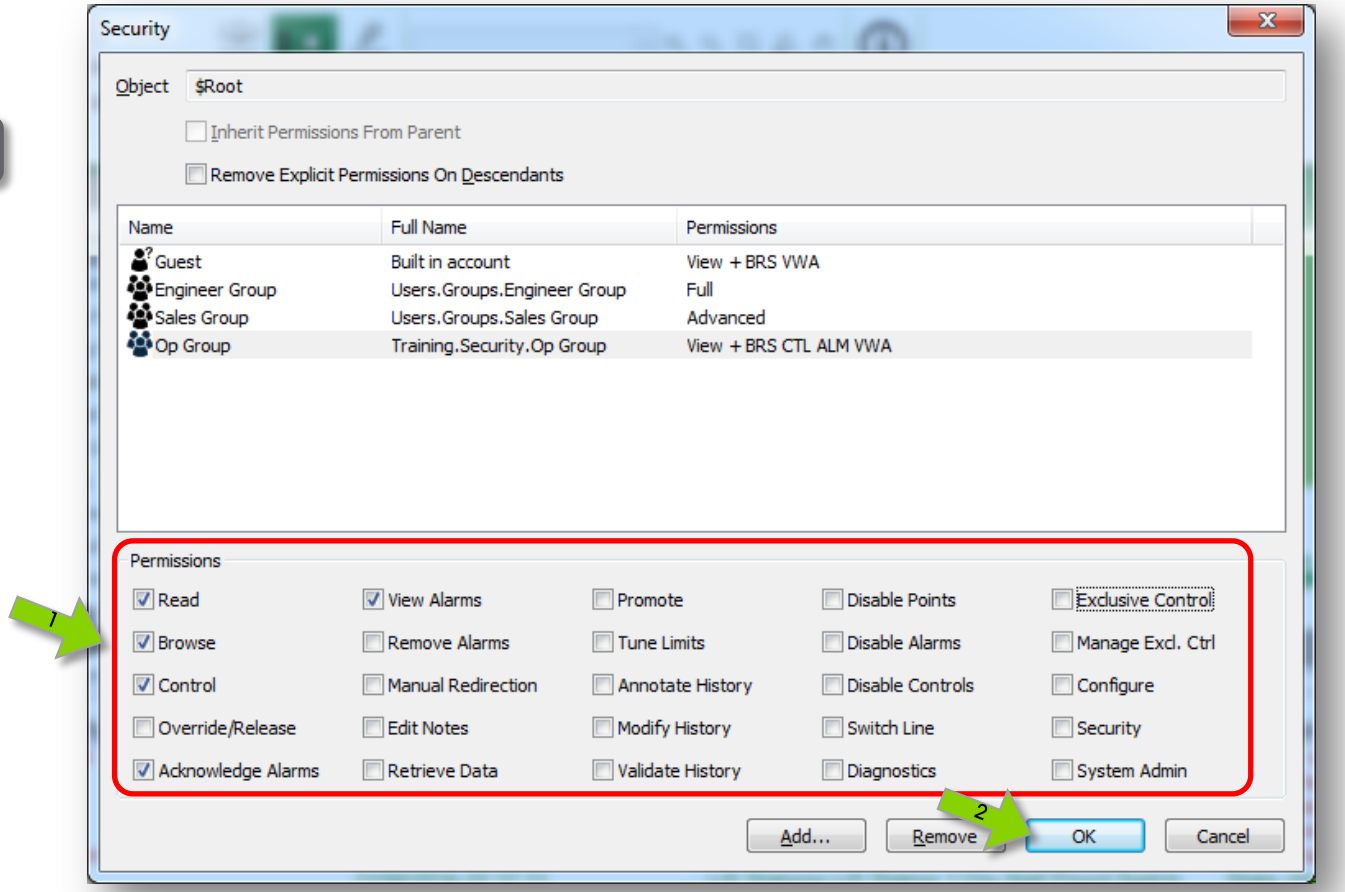
- Go back to the root folder and open up the security settings as before.
- Add the **Op Group** and the **OK**.



Security

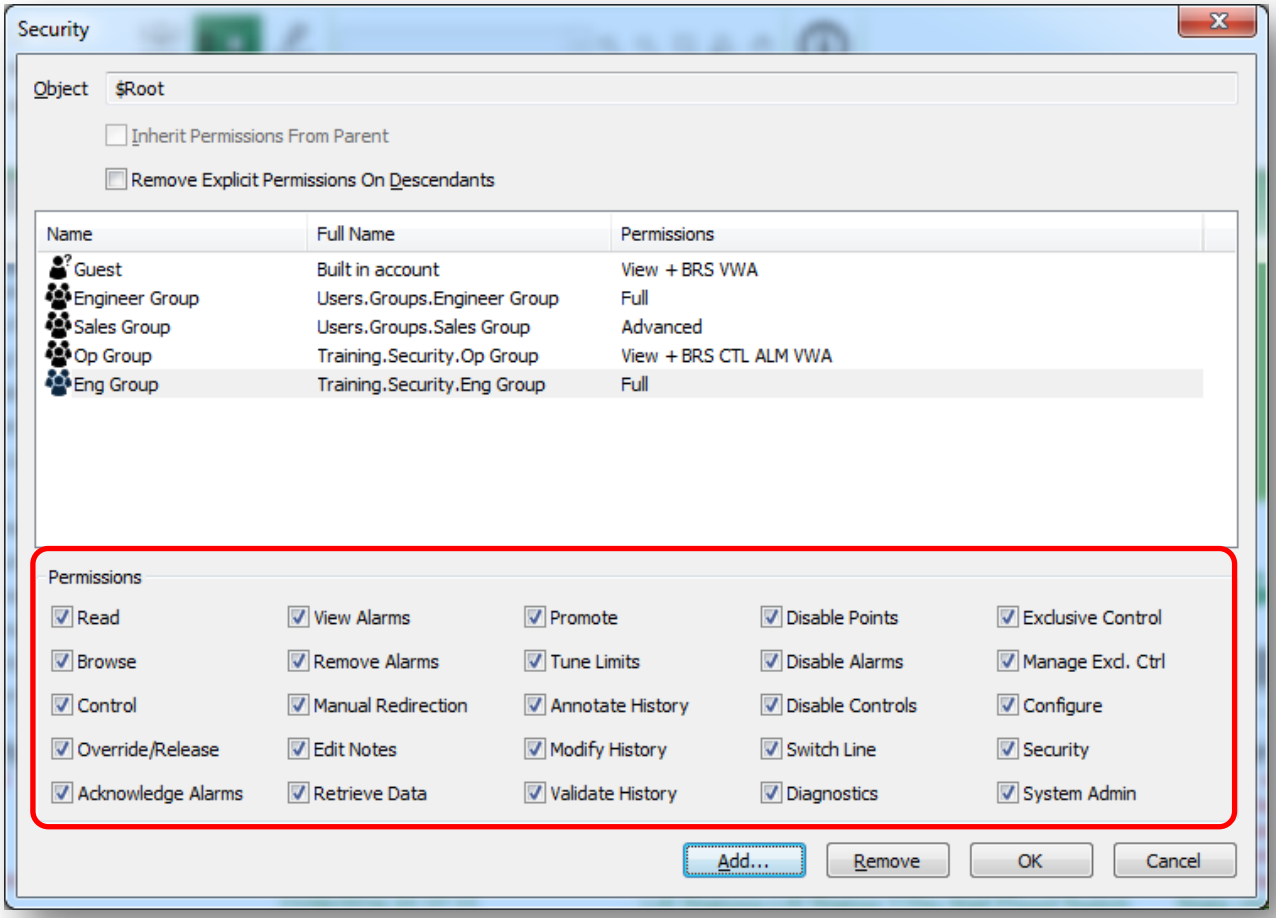
- Select only the following permissions and then on **OK**.

Step by Step



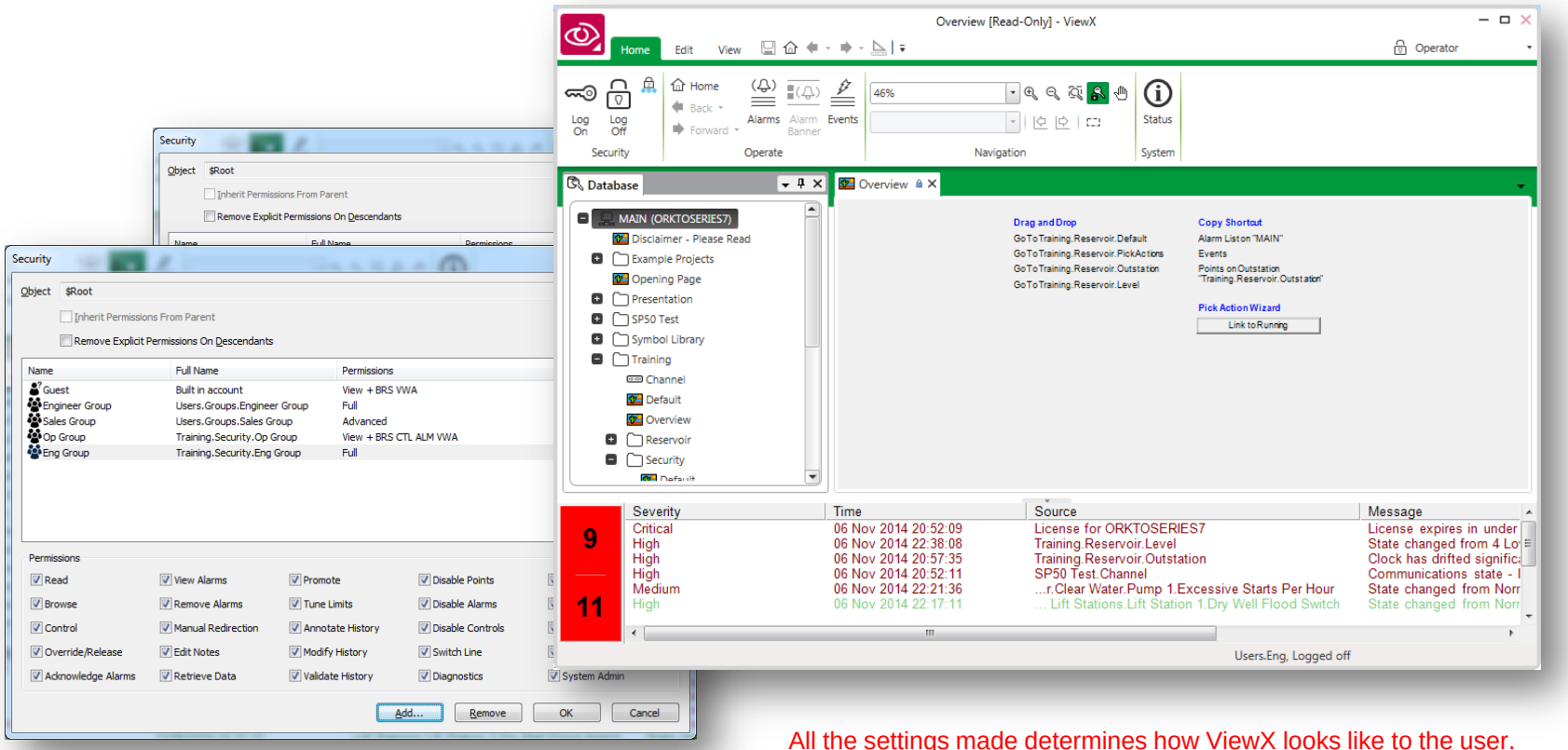
Security

- Next add the **Eng Group** and give this group full access.



Security

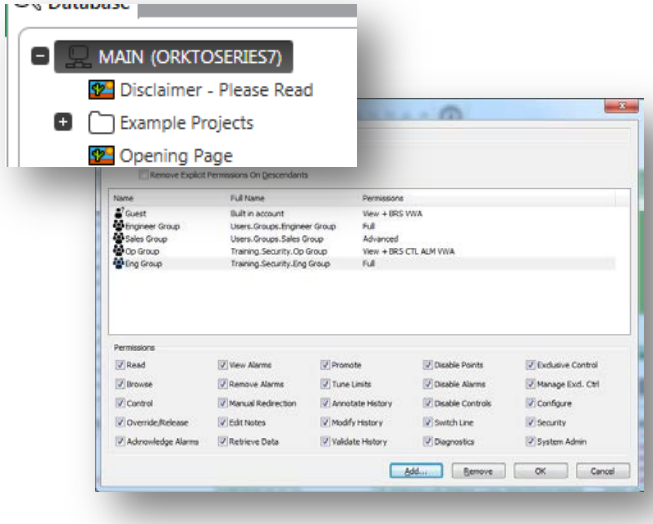
- Log in as **Operator** and then as **Engineer**. Observe the difference.

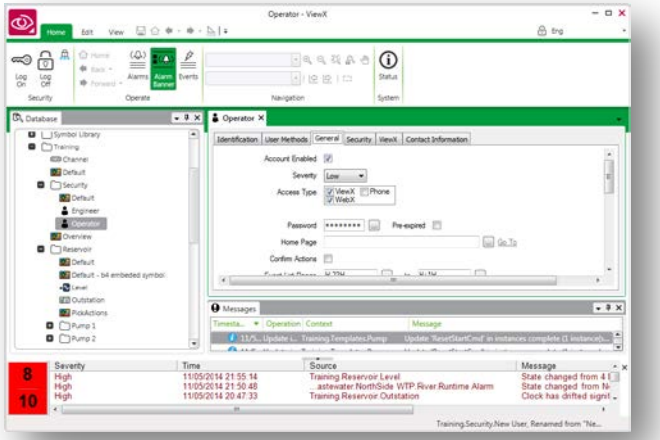


All the settings made determines how ViewX looks like to the user.

Security

- In brief, there are 2 locations where what the user can and cannot see or do are set. One is in the database root folder settings, the other is in the user properties itself.





Document Stores

Section 9

Where you store Trends

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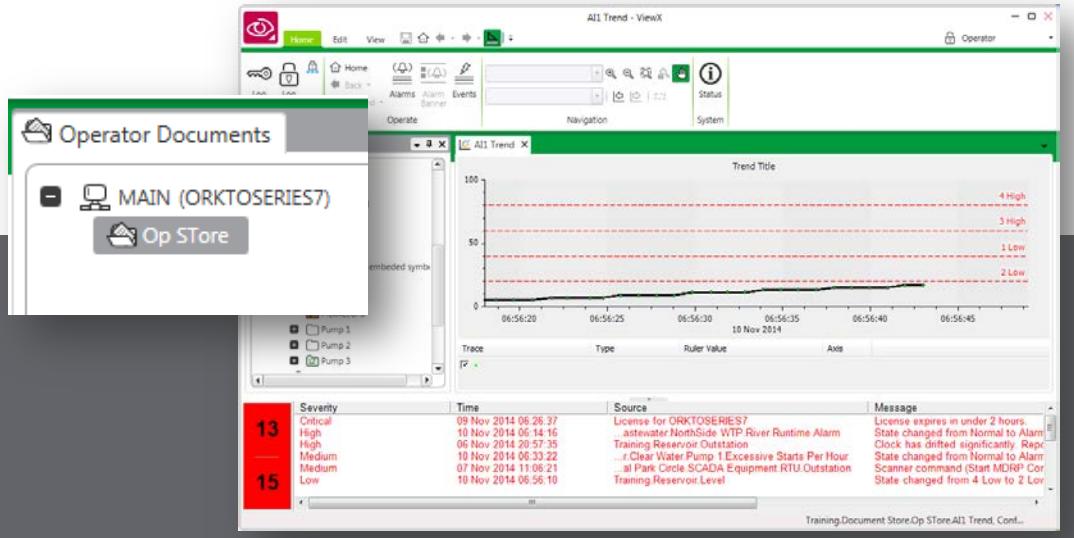
Document Stores for Trends

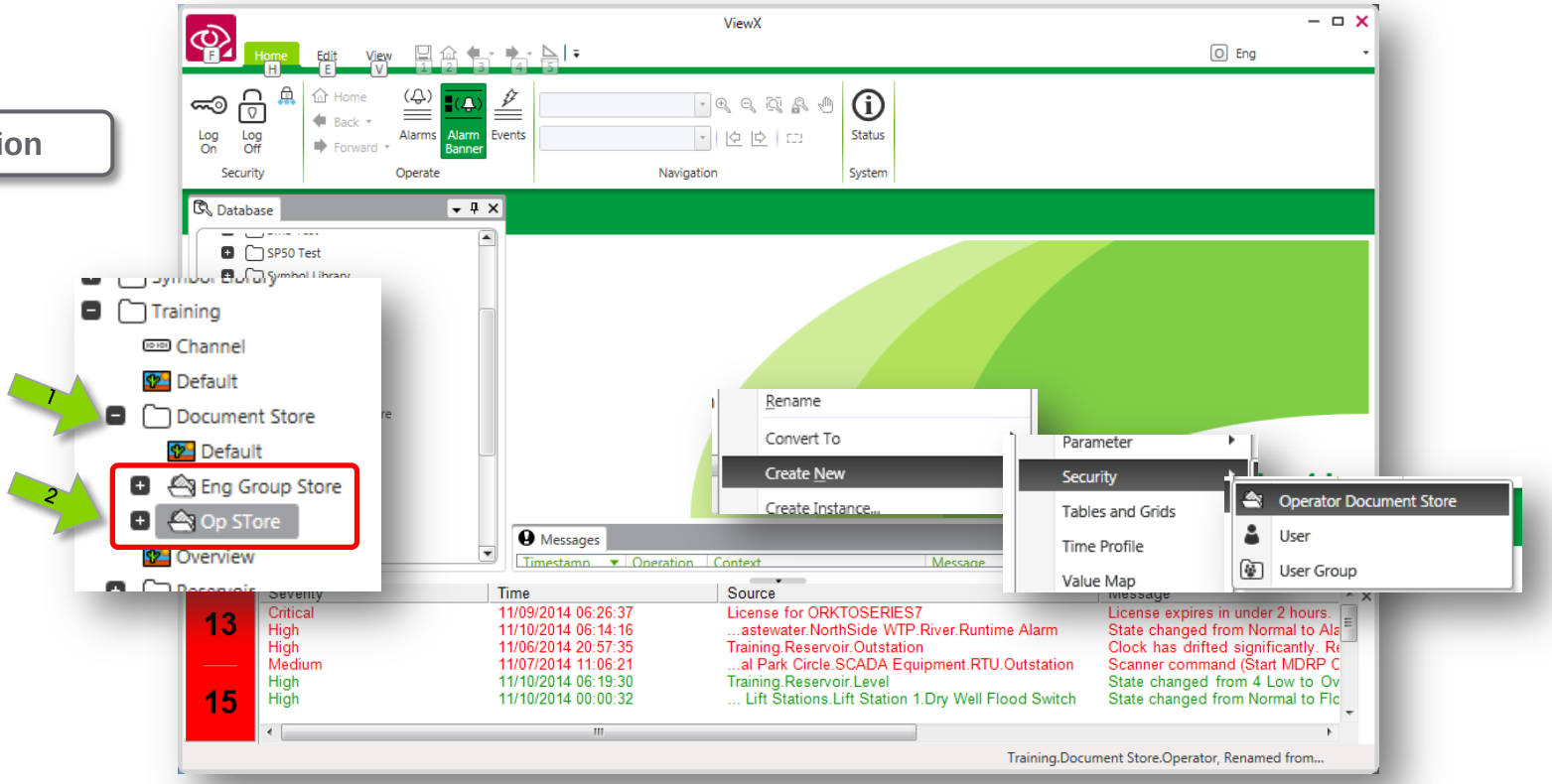
- In most systems, operator level users do not have permission to configure the database, so they are not able to create or modify trends. Trends are a key operation tool, so operator level users do need to create them. **ClearSCADA** uses operator document stores to allows users without configuration options enabled in their user profile to create and modify trends within their user profile.
- Stores can be both group based or individual based.



Document Store

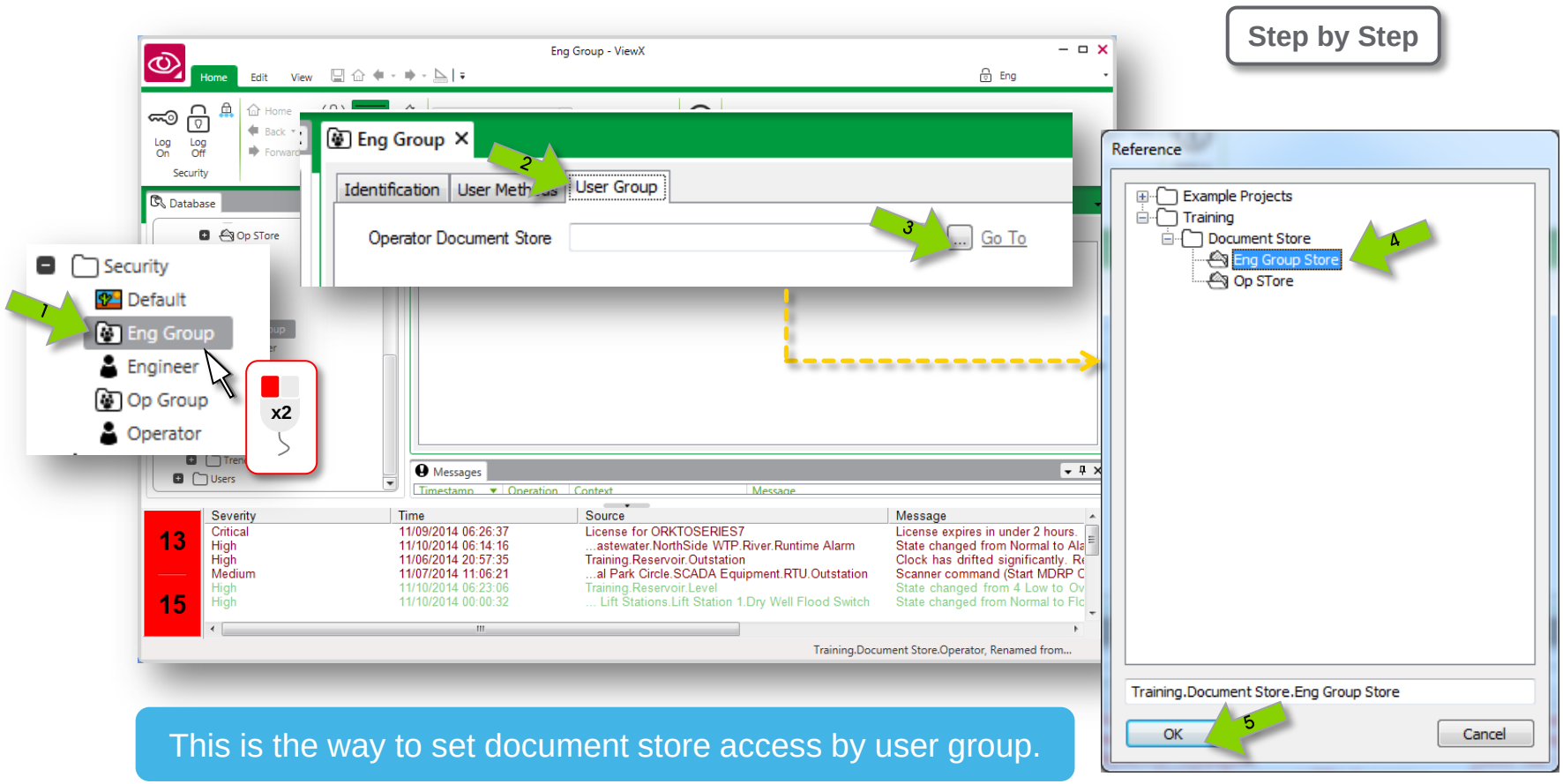
- Create a group and called it **Document Store**.
- In **Document Store**, create 2 **Operator Document Store** and name them **Eng Group Store** and **Op Store.**

Action



Document Store

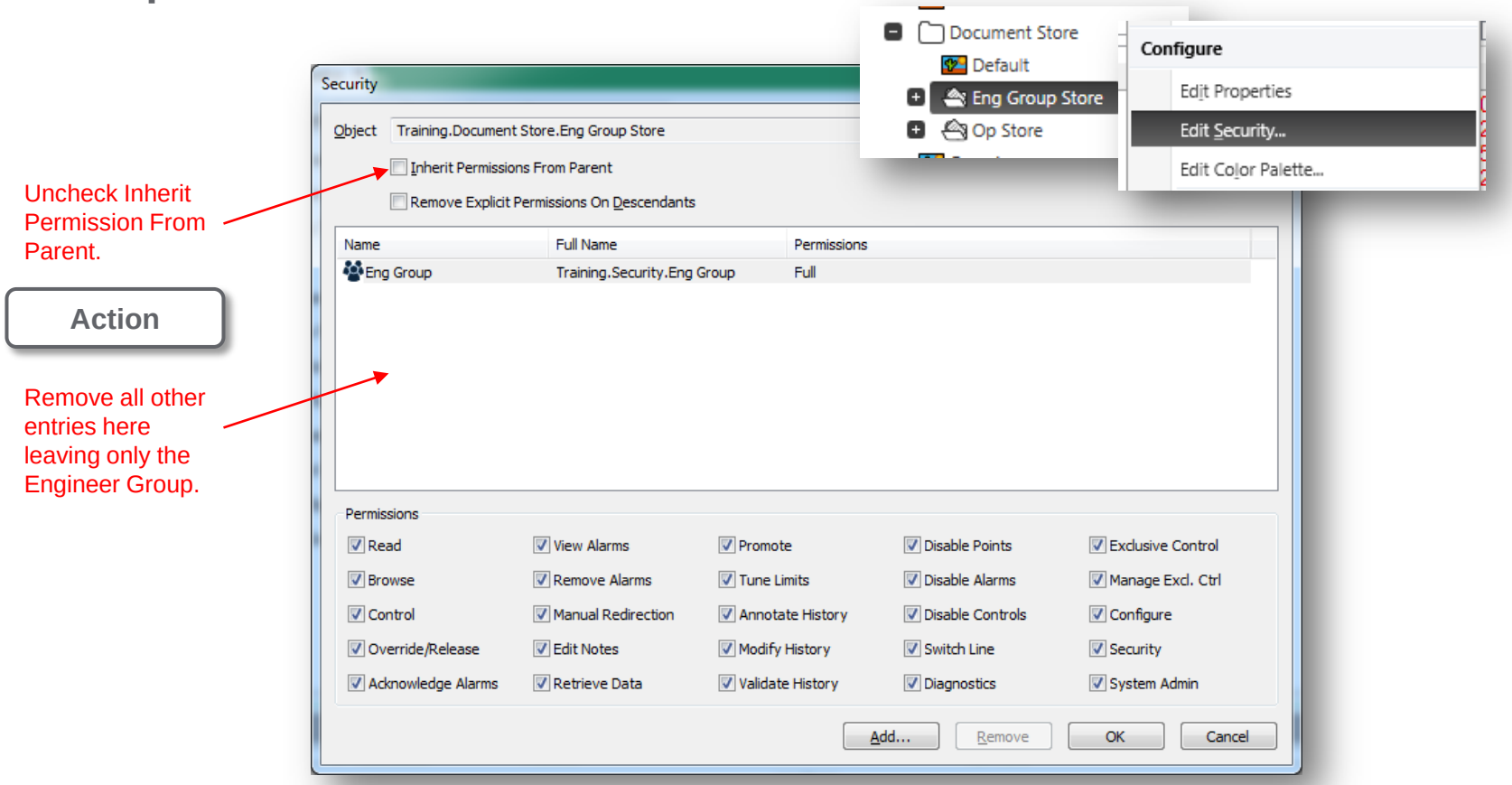
- We will now set the engineer's to be able to access the **Eng Group Store**.



This is the way to set document store access by user group.

Document Store

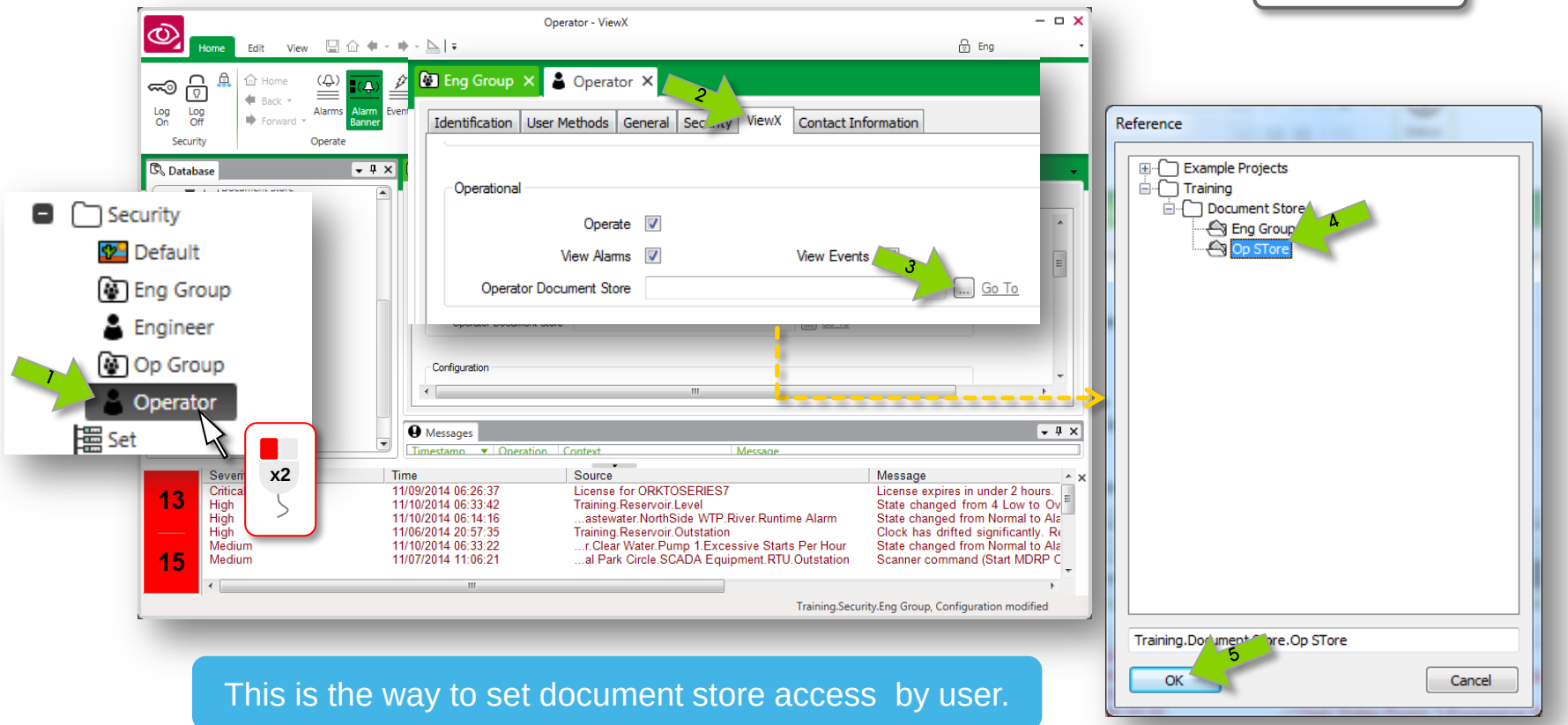
- The folder permissions for the **Eng Group Store** next needed to be set. Edit the security settings of that folder to allow ONLY the **Engineer Group** to have full access.



Document Store

- Next set the user **Operator** individually to have access to the **Op Store** as per below.

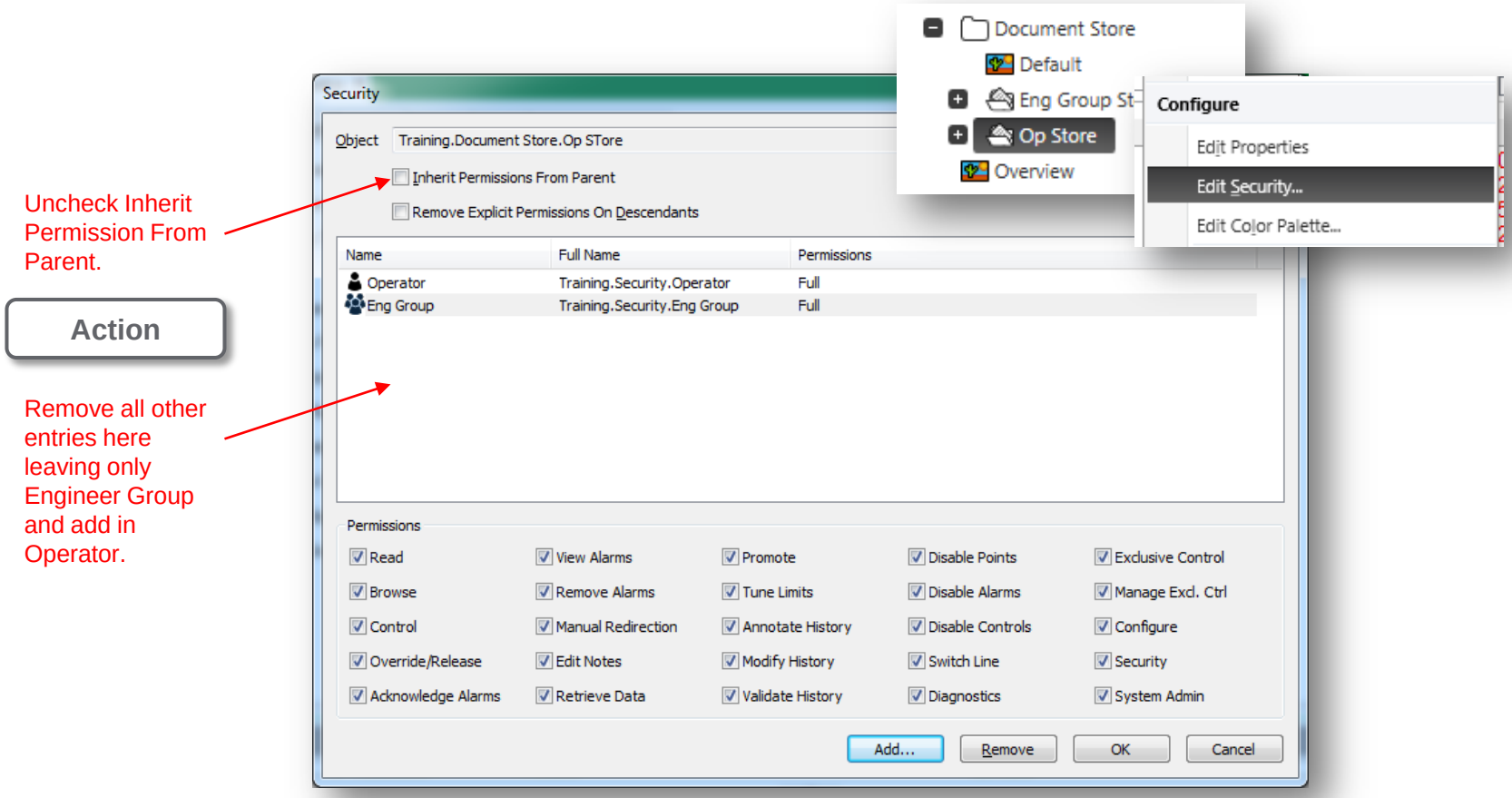
Step by Step



This is the way to set document store access by user.

Document Store

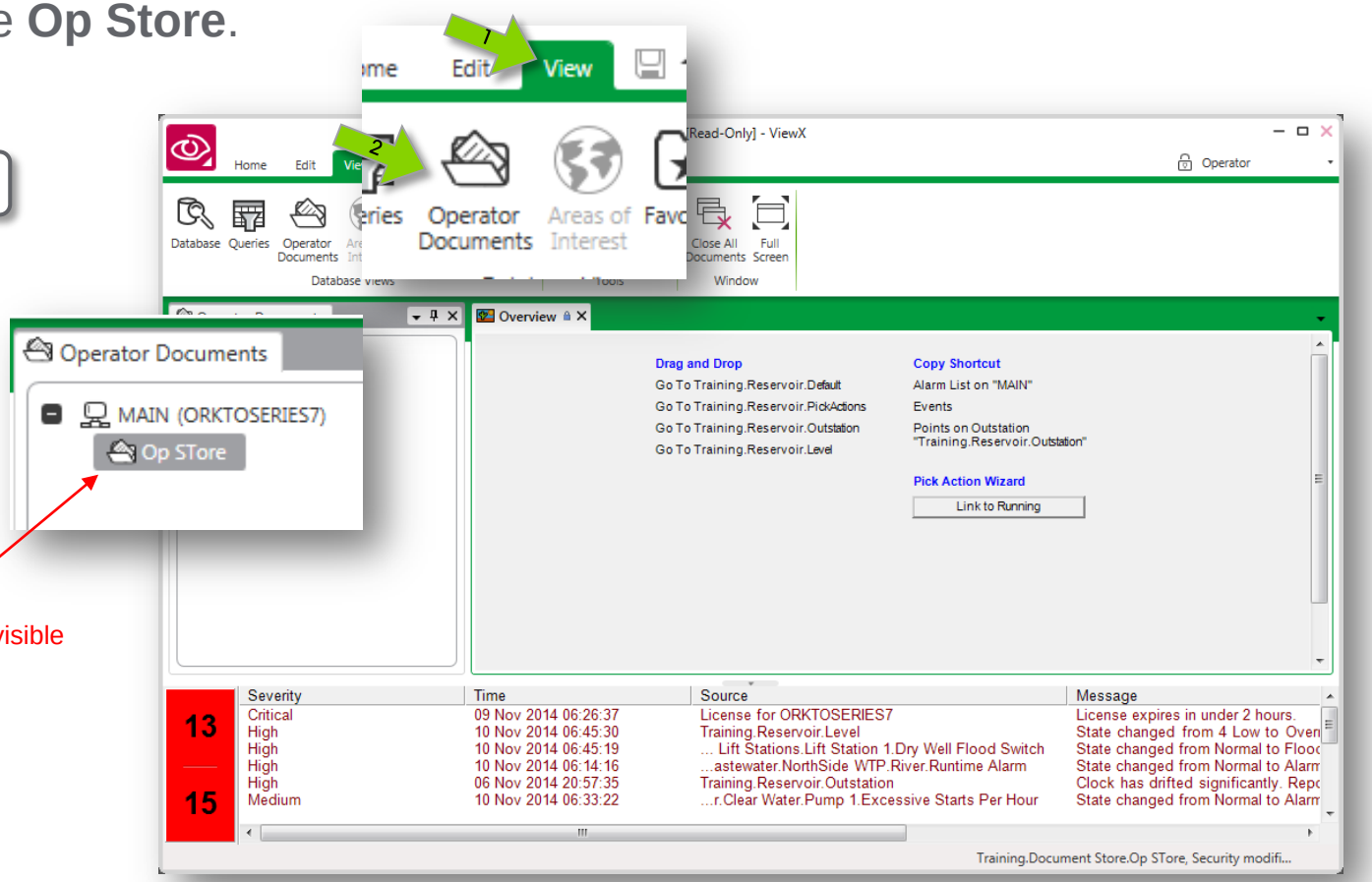
- The folder permissions for the **Op Store** next needed to be set. We will allow **Engineers** to come in as well. Therefore set up as shown.



Using the Store

- Log on as **Operator**.
- Then click on **View** tab and then on **Operator Documents**. You can now only see **Op Store**.

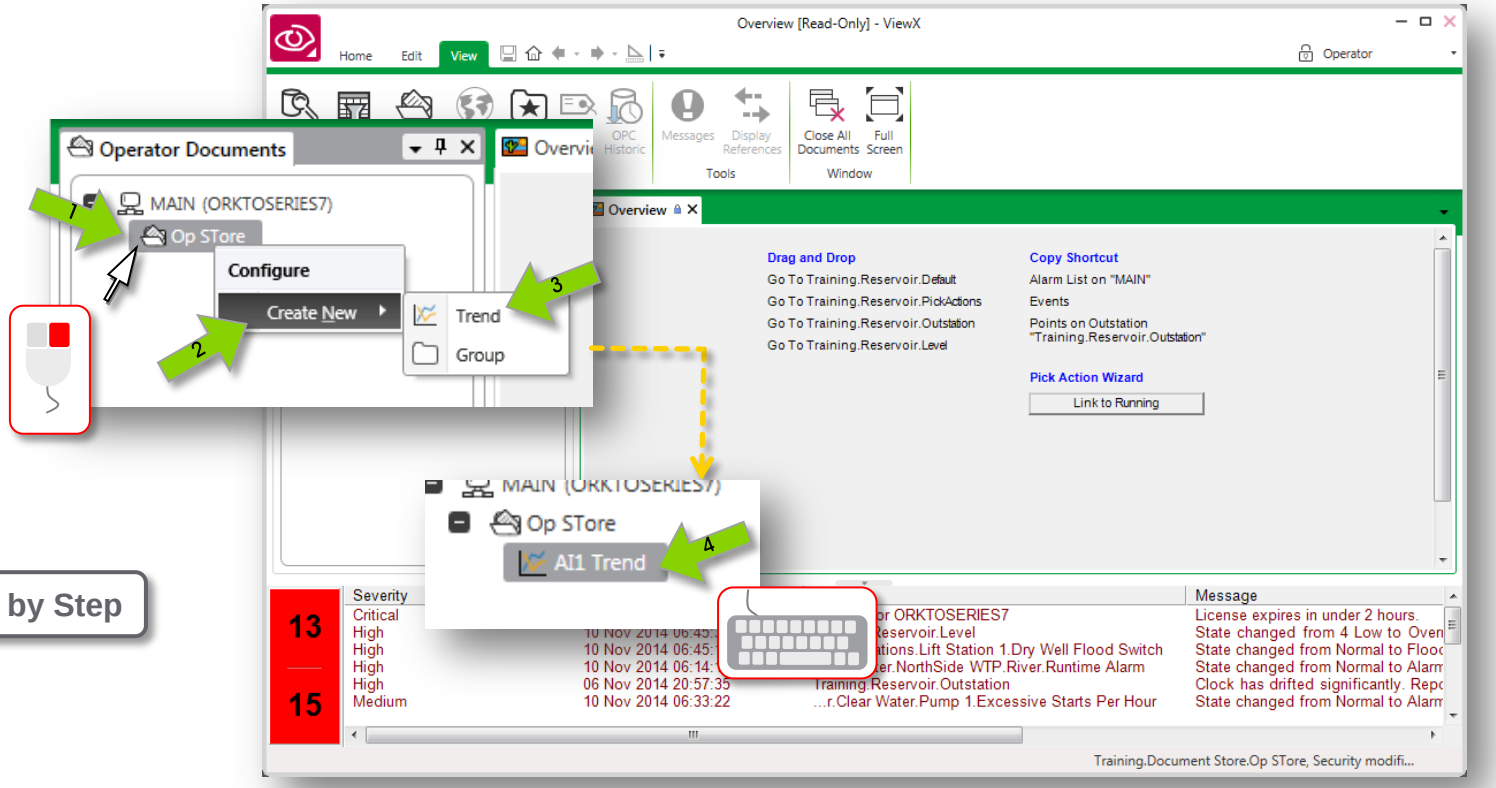
Action



Only Op Store is visible to the operator.

Using the Store

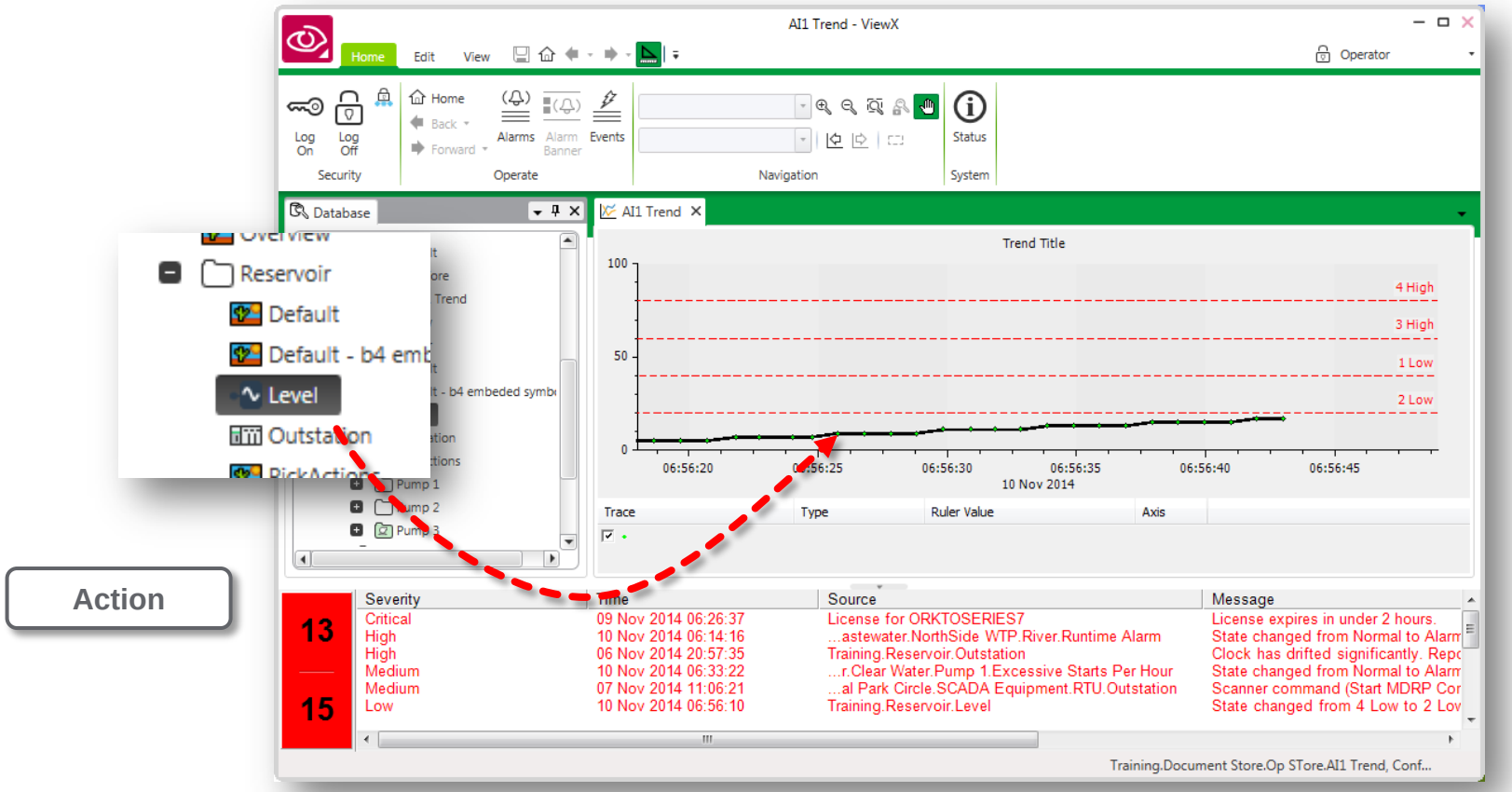
- Create a new trend as follows. Name this trend **AI1 Trend**.



Step by Step

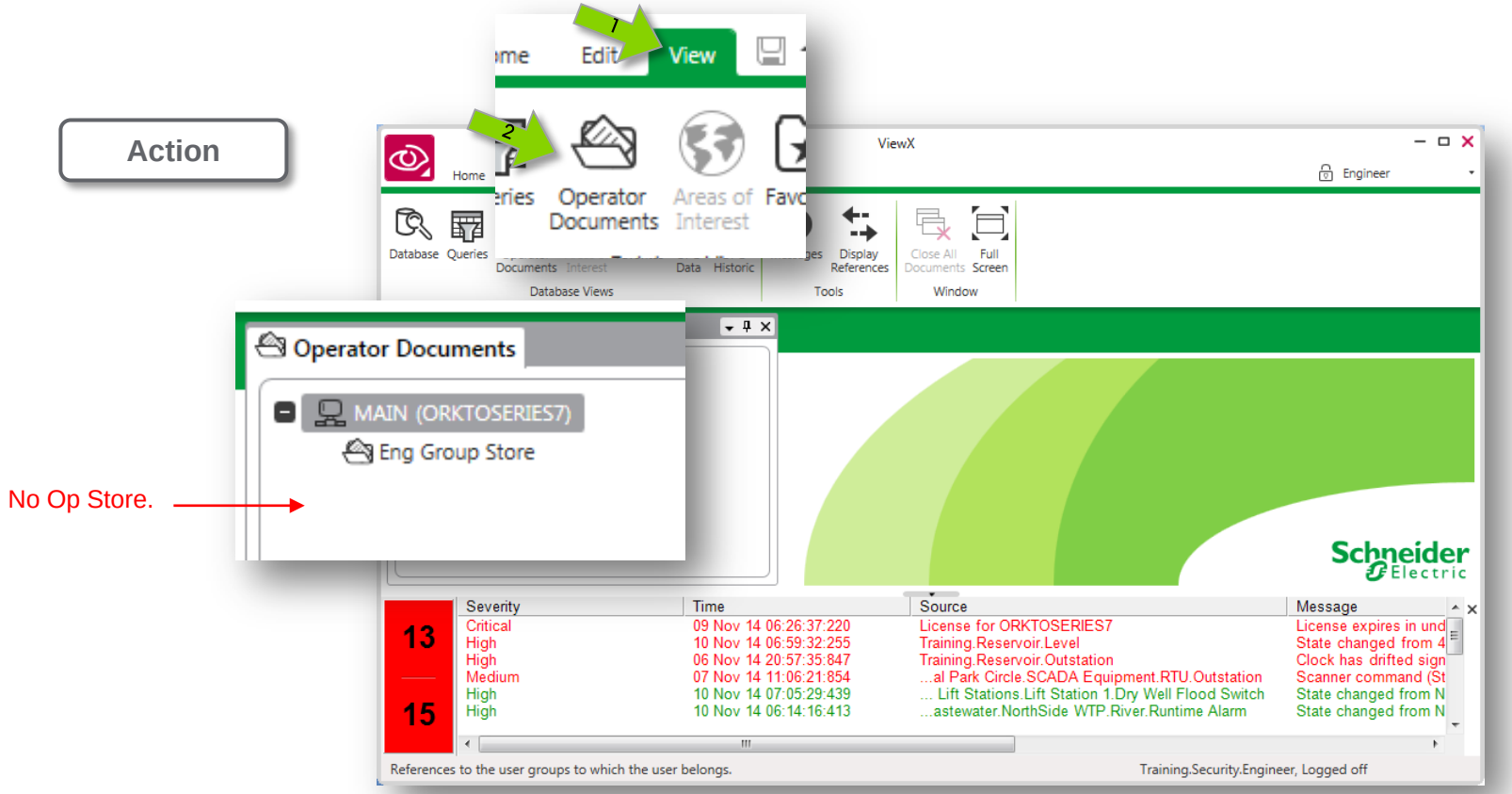
Using the Store

- Make sure the trend is in **Design** mode, drag the **Reservoir's Level** point into this trend. Then **Save**.



Using the Store

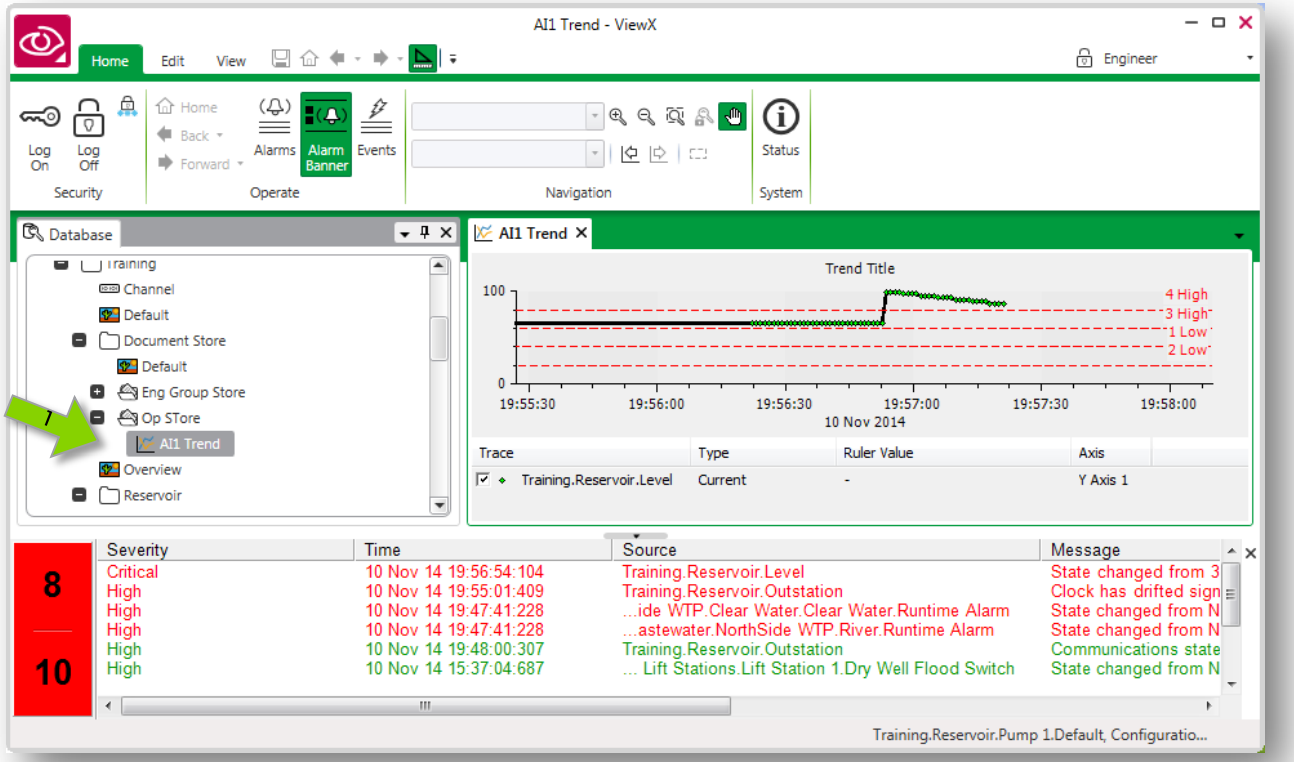
- Log out and then log in as **Engineer**. Observe that you WOULD THINK THAT YOU can also access **OP Store** and do stuffs with it in addition to the **Eng Group Store**. But not.



Using the Store

- In order for **Engineers** to access the **OP Store**, you need to do it from the **Database** pane.

Action



WebX

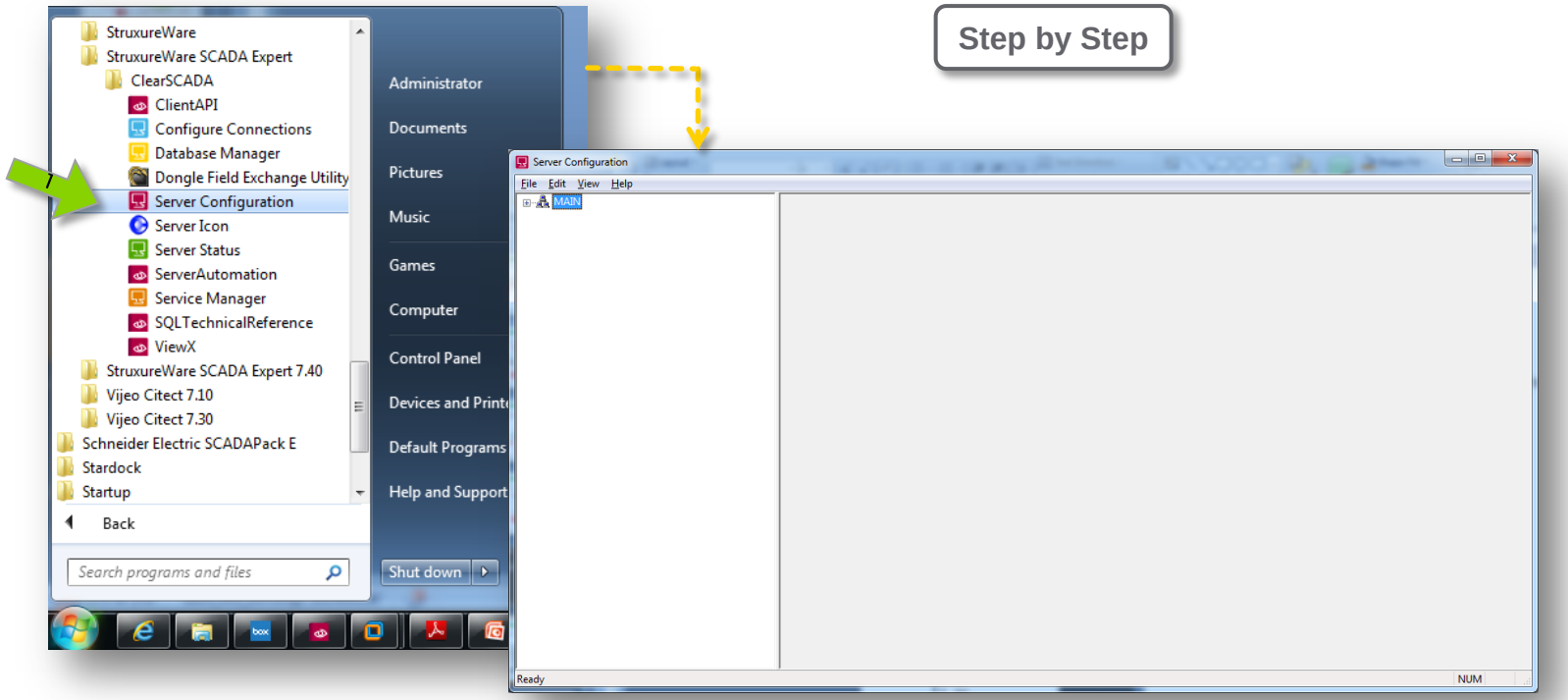
Section 10

WebX is the Web version of ViewX Client

Confidential Property of Schneider Electric

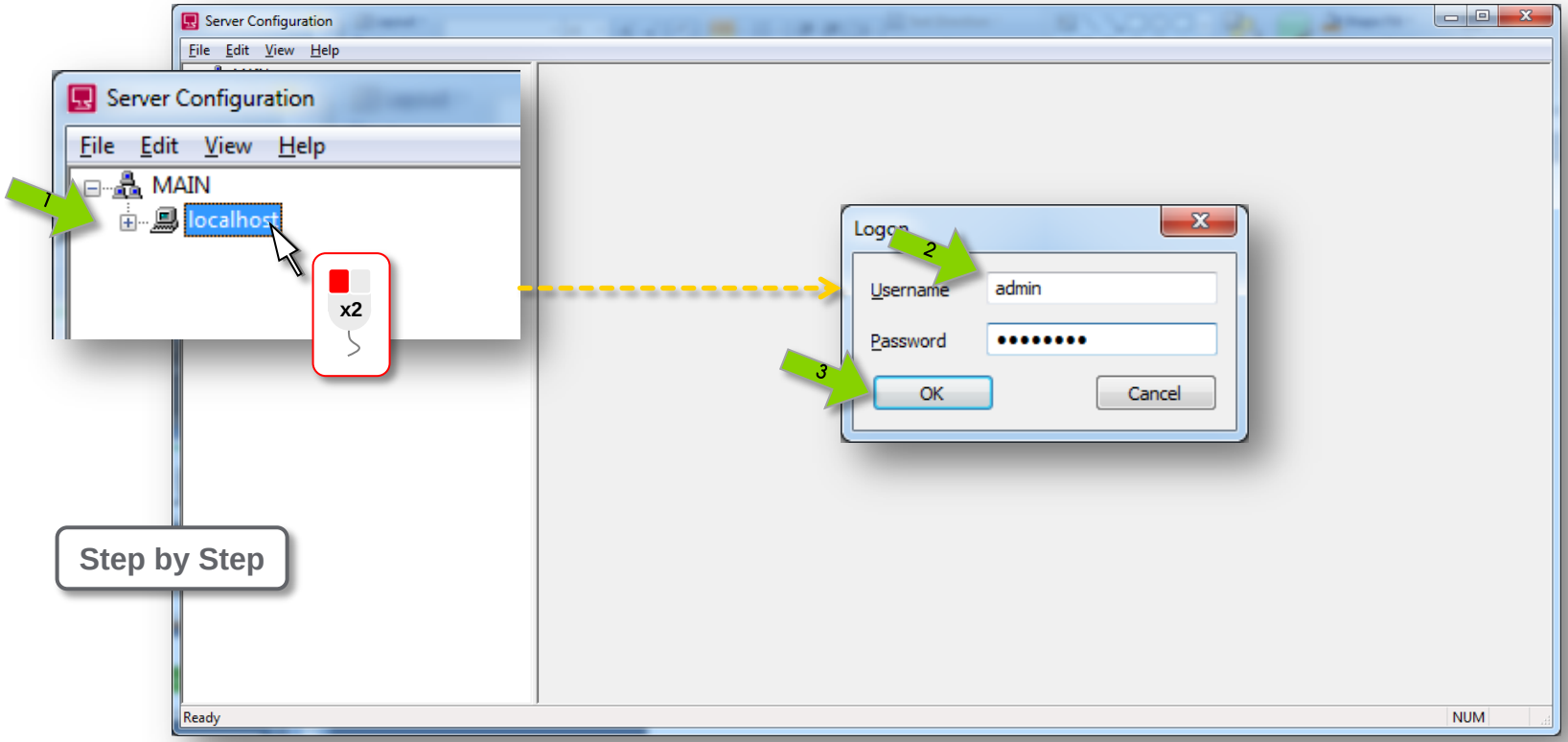
Checking the Web Port

- Launch the **Server Configuration** tool.



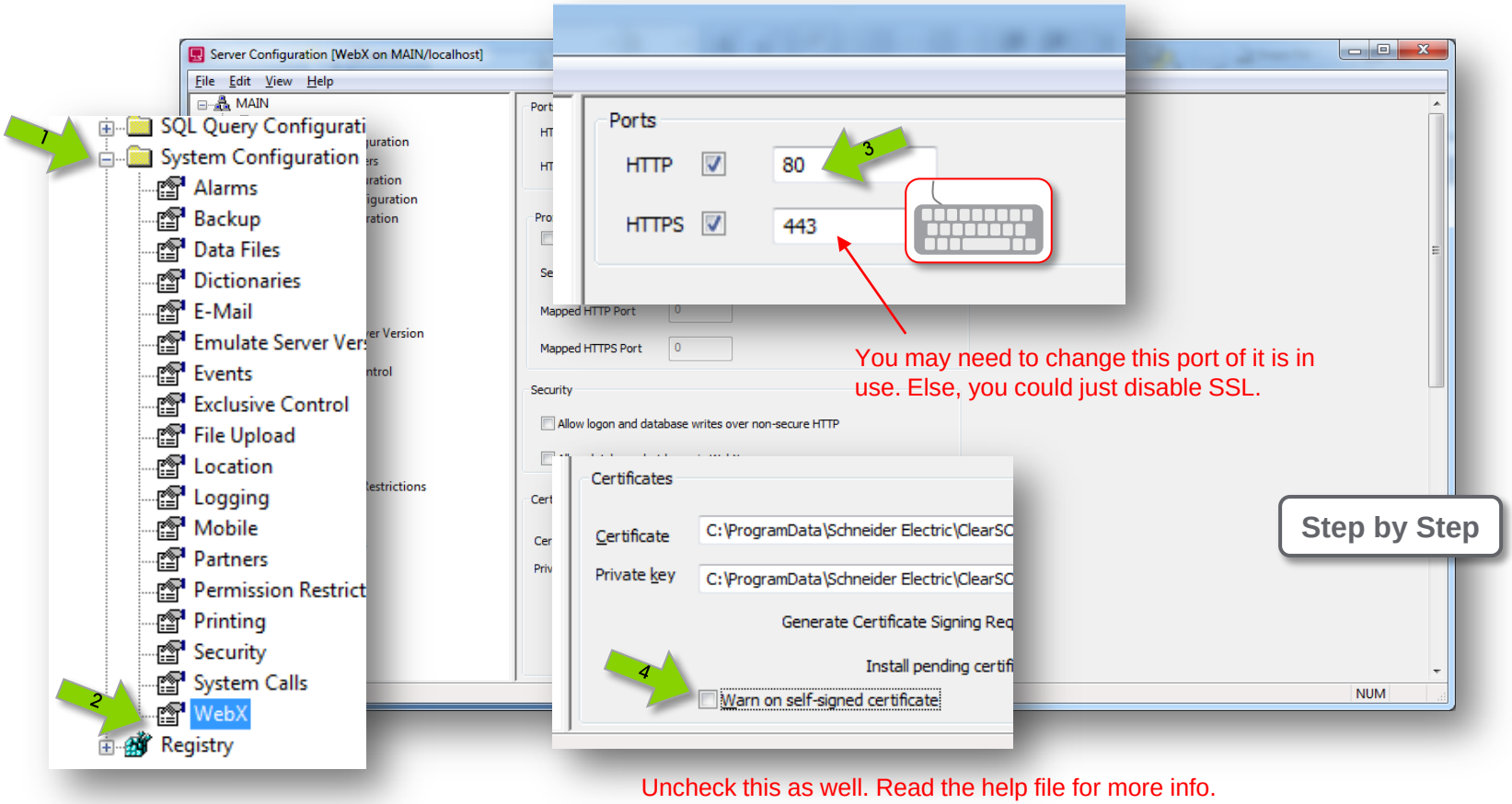
Checking the Web Port

- Double click on the **MAIN -> localhost** item and then login as the super admin user.



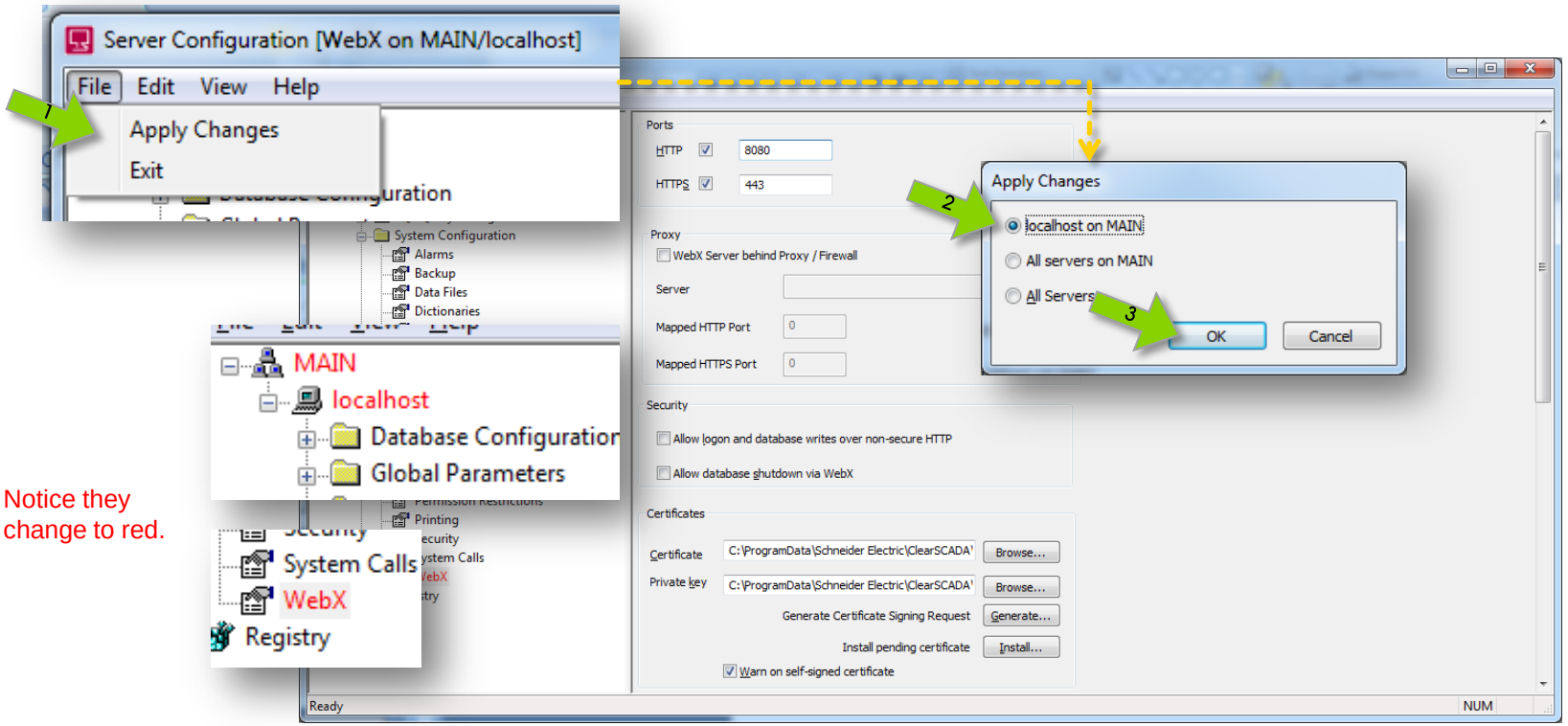
Checking the Web Port

- Change the port 80 to some other port of your IIS or some other program had already taken up that port. Use **8080** as an example.



Checking the Web Port

- Once you had set the port to some other value, tree items will turn read indicating changes had been made. You need to **Apply Changes**.



Checking the Web Port

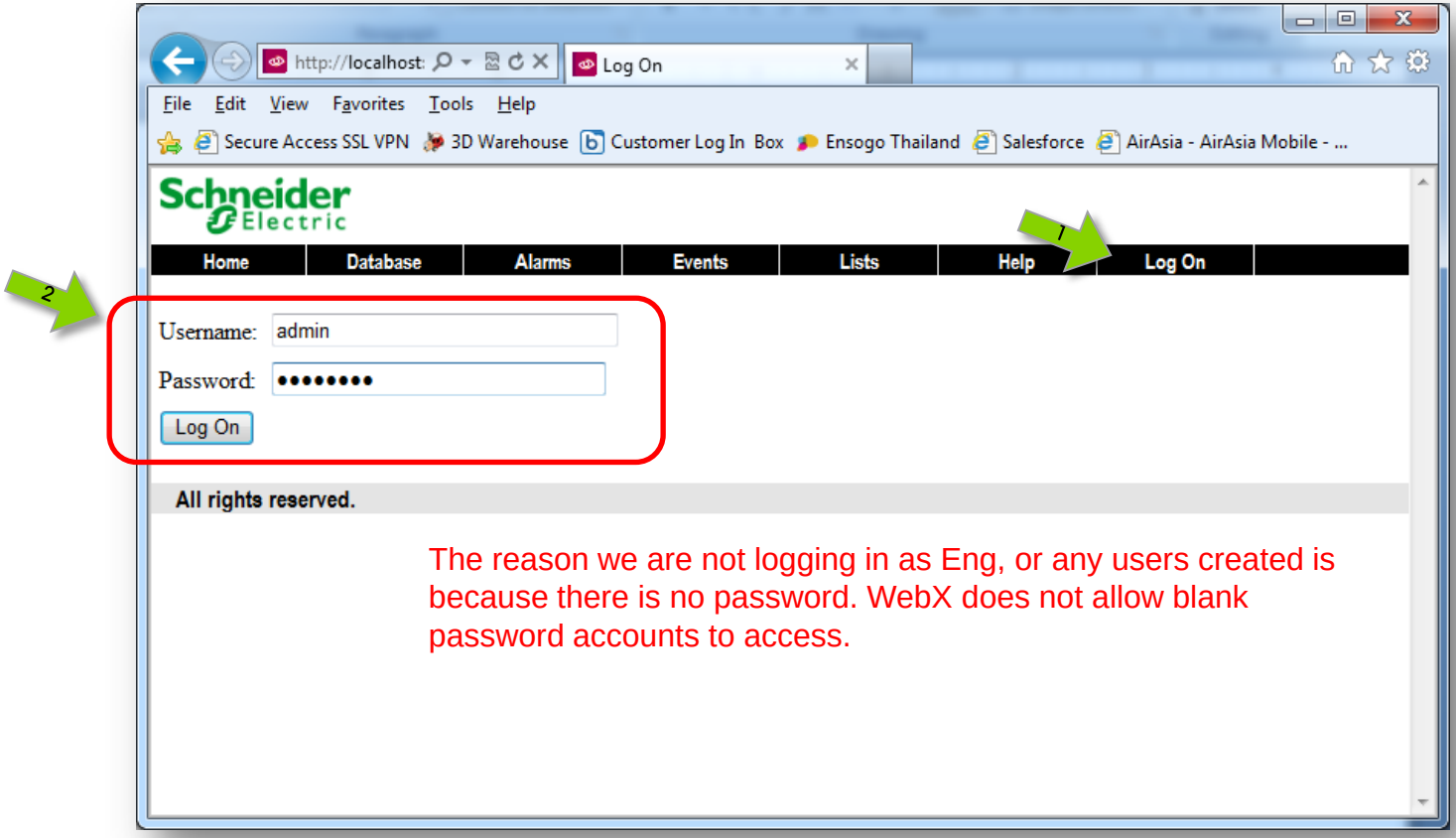
- Launch IE and then enter http://localhost:8080 (we are going on the assumption you had changed the port to 8080).

Action

Checking the Web Port

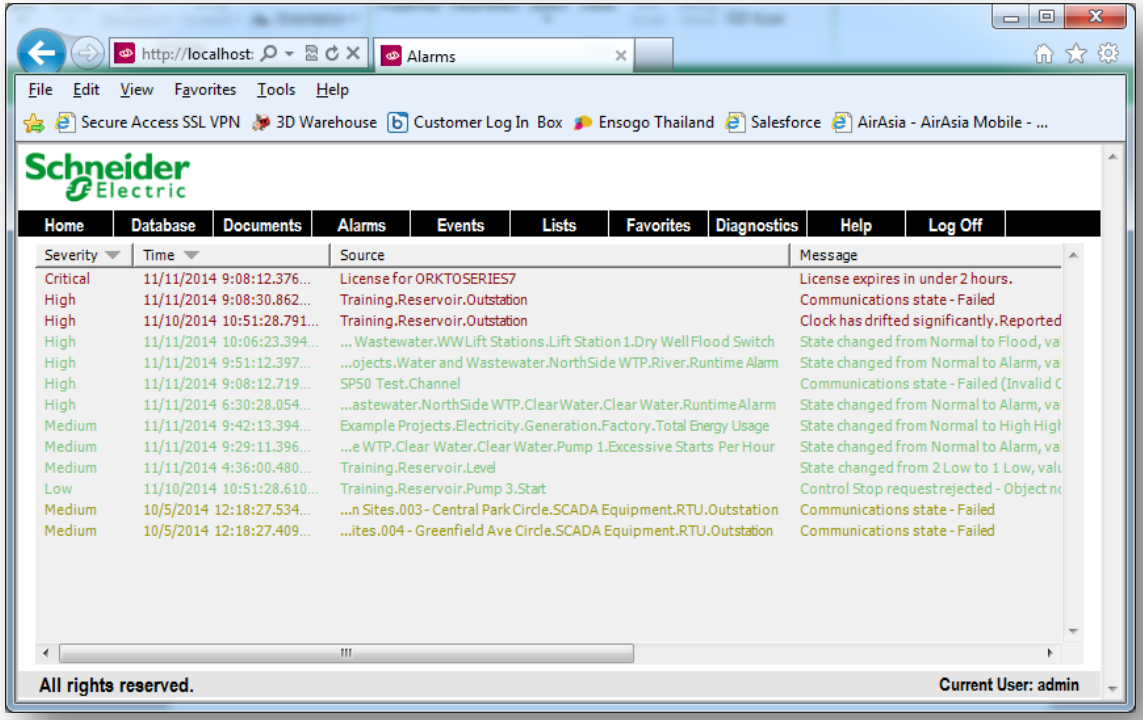
- Log on as the super admin.

Action



Checking the Web Port

- The **WebX** client allows the user to perform most functions as the **ViewX** clients, except for engineering. Explore the various tabs and see the similarities and differences.



You are now Competent

> From now on, refer to the ClearSCADA Level 1 Training Manual release 4.01, Chapter 13 onwards for the more advance aspects of what ClearSCADA can be configured to do.

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Thank you!

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