



Alarms

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Introduction

This document explains how to configure and use alarms in an HMI project. Alarms are used to notify machines operators of important safety information such as motor overtemperature and E-Stop status. Email and SMS notifications may also be linked to the alarms to notify supervisors and other team members affected by the alarm.

Alarm Definition

This section describes how to add and configure alarm resources in an HMI project.

Alarm

An alarm resource consists of the alarm itself as well as one or more alarm thresholds. To add an alarm, right-click on the *Alarms* section of the project resources and select *Add a new Alarm*. Assign a descriptive *Name* to the alarm. Next, browse for the Real Time DB variable that the alarm will be based off by clicking the ‘...’ button. Locate and select the variable in the *Tag Browser* window and select *OK*.

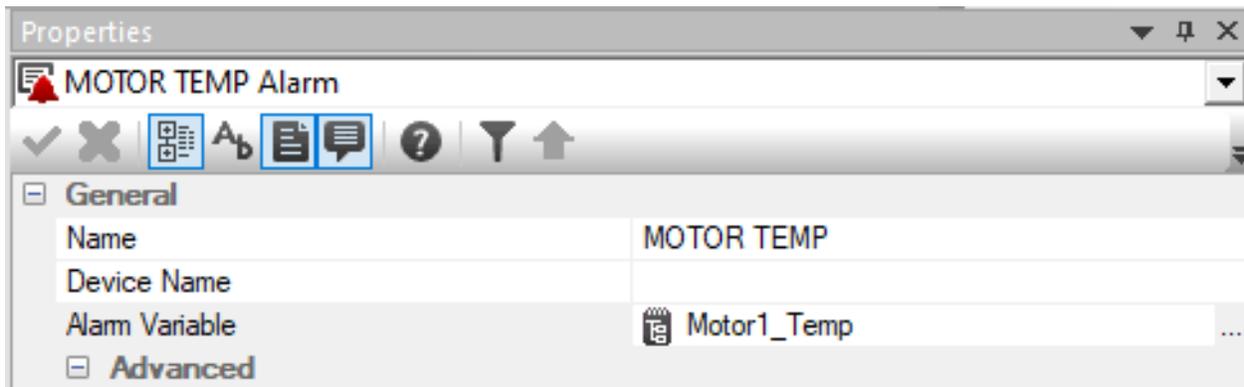


Fig. 1: Alarm Defined

Alarm Threshold

With the alarm variable defined, the value(s) of that variable that defines an alarm condition must be defined with an alarm threshold. Multiple alarm thresholds may be defined for a single alarm. To add a threshold to the alarm, right-click on the alarm and select *Add a new Alarm Threshold*. Assign a descriptive name to the threshold (e.g. “Motor #1 Warning Overtemp”). The *Threshold Name* is the default message that is displayed when the alarm is activated. To define a different message for the alarm, enter a string in the *Alarm Text* field. This can be in the form of a string table ID which can be browsed for with the ‘...’ button, or a simple text entry in the property’s field.

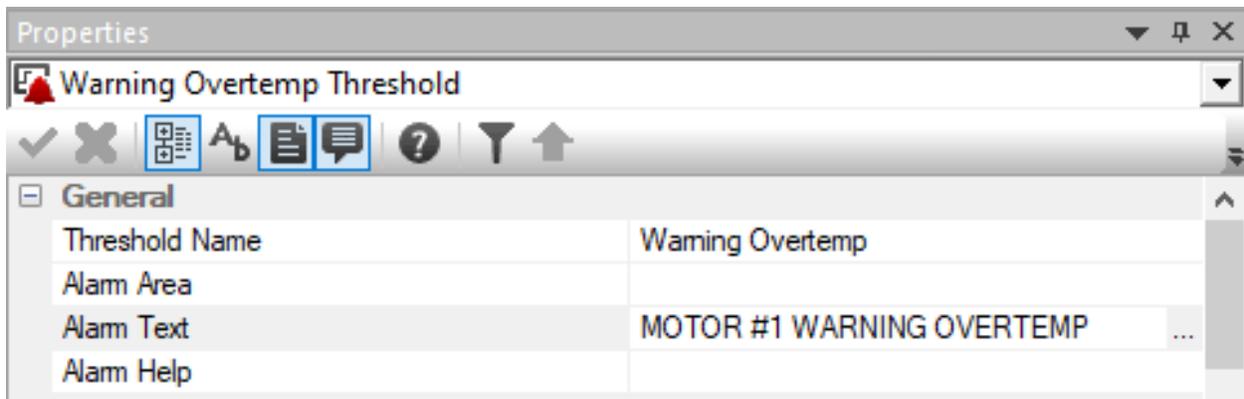


Fig. 2: Alarm Threshold Defined with Alarm Text

In the *Execution* properties of the threshold, define the value of the Real Time DB variable that defines the threshold. Select the *Activation Condition* that is appropriate for the alarm. This example uses an *Activation Value* of 75 with an *Activation Low Value* of 65 and an *Activation Condition* of “between” for the overtemp warning. This threshold is given the lowest *Severity* of 1.

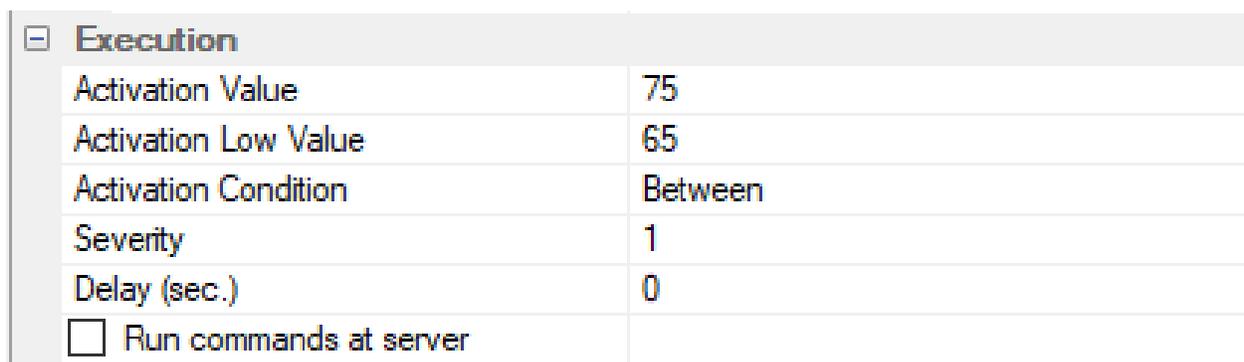


Fig. 3: Alarm Threshold Execution Properties

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A second alarm threshold is defined for the MOTOR TEMP alarm with an *Activation Value* of 75 and an *Activation Condition* of *major-equal*. This represents a critical overtemperature and is thus given a higher *Severity* of 2.

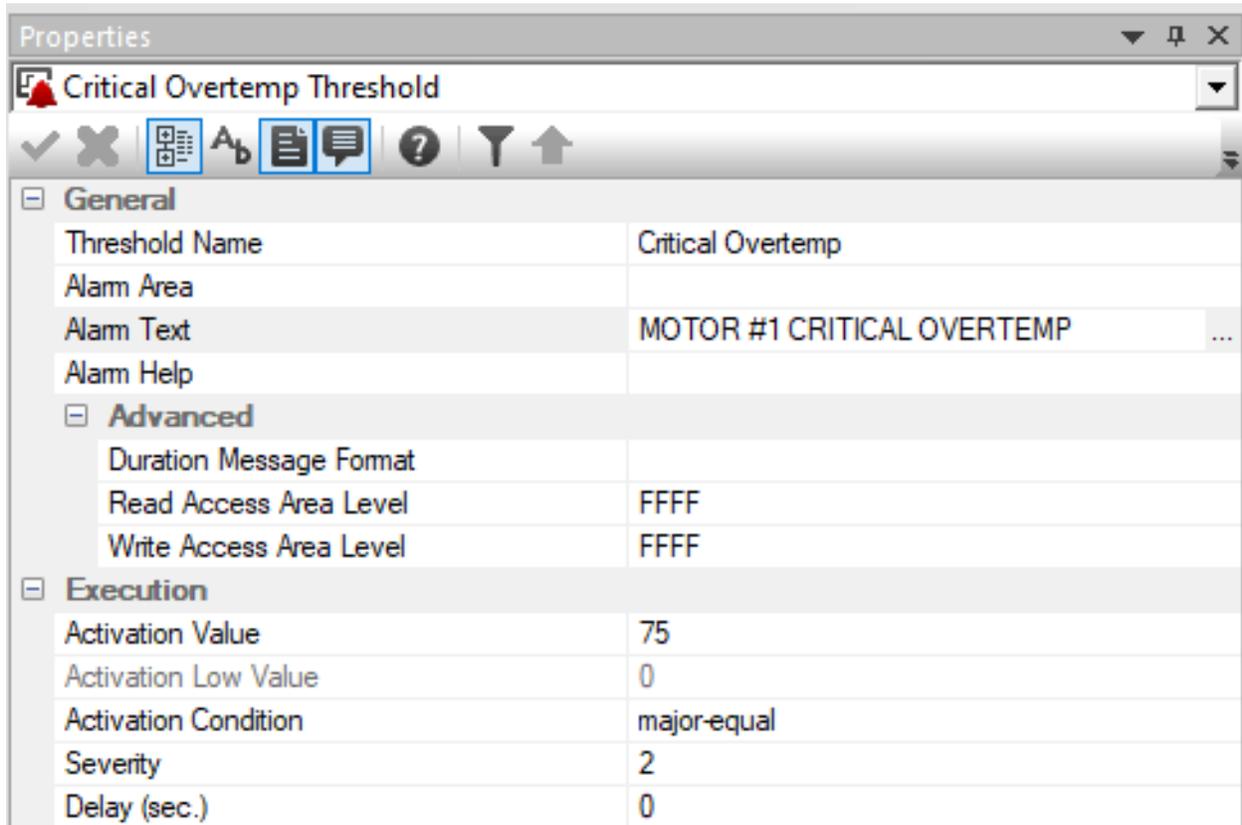


Fig. 4: Critical Overtemp Threshold Properties

Shown below is a complete list of possible activation conditions with descriptions from the COMBIVIS Studio HMI Online Help.

- Major-equal ('>=' means that the alarm activated when the variable value is equal or higher than the 'Value' property setting
- Minor-equal ('<=' means that alarm activates when the variable value is equal or lower than the 'Value' property setting
- Equal ('=' means that the alarm activates when the variable value is the same as the 'Value' property setting
- **"Rate Change Decrease"**: means that the alarm is active when the associated variable's value does not change to the quantity desired ("Activation Value" property) within the time set ("Delay (sec.);" property). The time count starts the moment the alarm is enabled with the "Enable Alarm Variable"
- **"Rate Change Increase"**: means that the alarm activates when the associated variable's variable does not change to the quantity desired (Activation Value" property) within the time set ("Delay (sec.);" property). The time count starts the moment the alarm is enabled with the "Enable Alarm Variable"
- **"Different (<>)"**: means that the alarm activated when the variable value is different from the one set in the "Activation value" (or "Threshold Variable Value") property
- **"Between"**: means that the alarm activates when the variable value is higher or equal to the value set in the "Activation low value" (or "Threshold Variable low Value") property, and less or equal to the value set in the "Activation value" (or "Threshold Variable Value") property.

Fig. 5: Activation Conditions for Alarm Thresholds

This *Severity* can optionally be used in the alarm banner and alarm window elements described in later sections to filter the alarms that are displayed to the operator.

Alarms as Templates

Alarm templates are used to create alarms for multiple Real Time DB variables through a single alarm resource. This is applicable in cases where would-be alarm thresholds are the same.

For this example, three E-Stop alarms will be handled by the same alarm resource. Three boolean E-Stop variables are created and linked to XAML Emergency elements from the Toolbox.

Next, a single alarm is defined named “ESTOP”. Unlike the previous alarm, no *Alarm Variable* will be defined. A threshold is then added to the alarm with an *Activation Value* of 1 and *Activation Condition* of equal. The E-Stop alarms will be triggered when their corresponding *Estop#* variable is set to one.

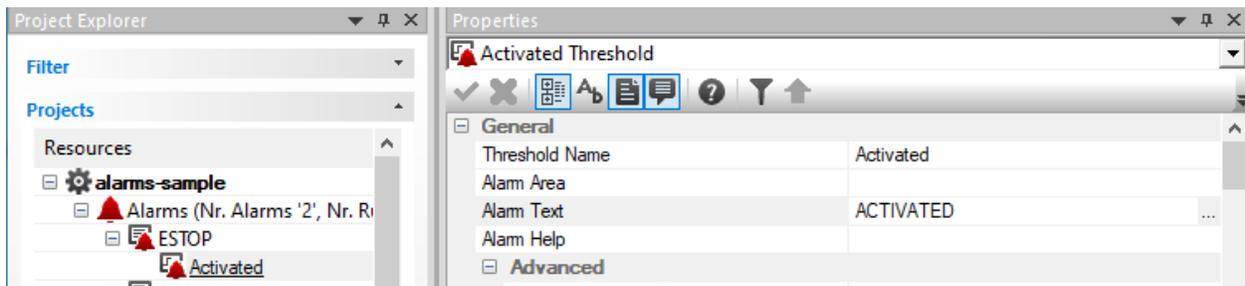


Fig. 6: Generic E-Stop Alarm Defined

In the *General* properties of the alarm threshold, an *Alarm Text* is defined, “ACTIVATED” in this case. By default, the *Alarm Description* displayed in the alarm window will be the name of the variable followed by the *Alarm Text* that is defined for the threshold. If the variable *Estop1* is linked to this threshold, the alarm description would be “Estop1 ACTIVATED”. Alternatively, a string ID may be defined in the string table that matches the name of the Real Time DB variable.

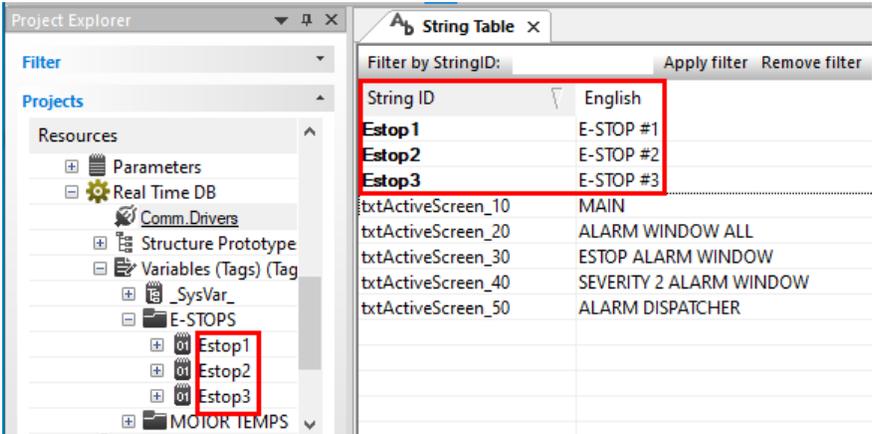


Fig. 7: Alarm Text in String Table

Now if the alarm associated to Estop1 is activated, “E-STOP #1 ACTIVATED” will be the associated alarm description. Finally, for each alarm variable in the Real Time DB that will follow the alarm template, right-click on the variable and choose *Associate an Alarm*. Then, double-click on the alarm template.

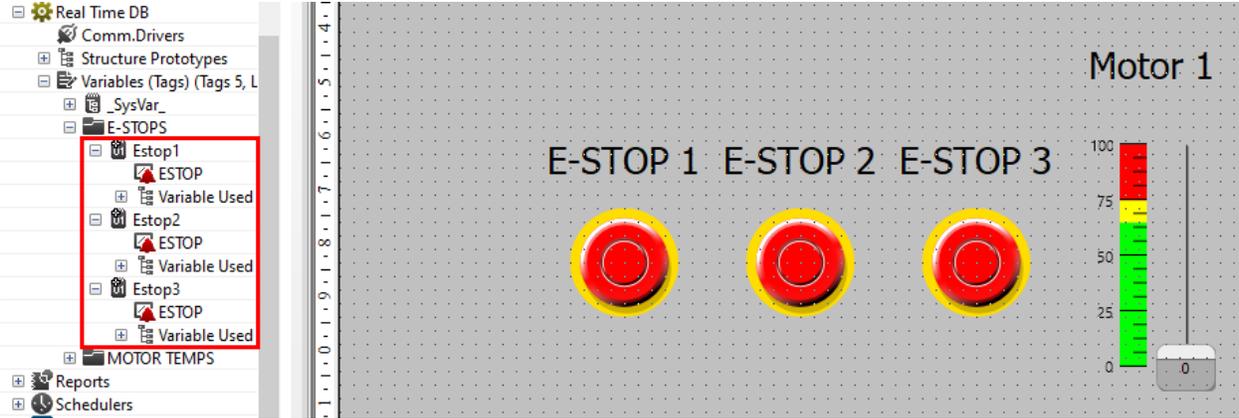


Fig. 8: Variables Associated to Alarm Template

Pictured below is the alarm window during runtime after all three E-Stop buttons have been pressed. An alarm appears for each alarm variable that was associated to the template. These alarms operate independently with their own respective *Alarm Description*, Ack/Reset commands, etc.. However, the alarms are all defined by the single alarm resource and threshold that was created.

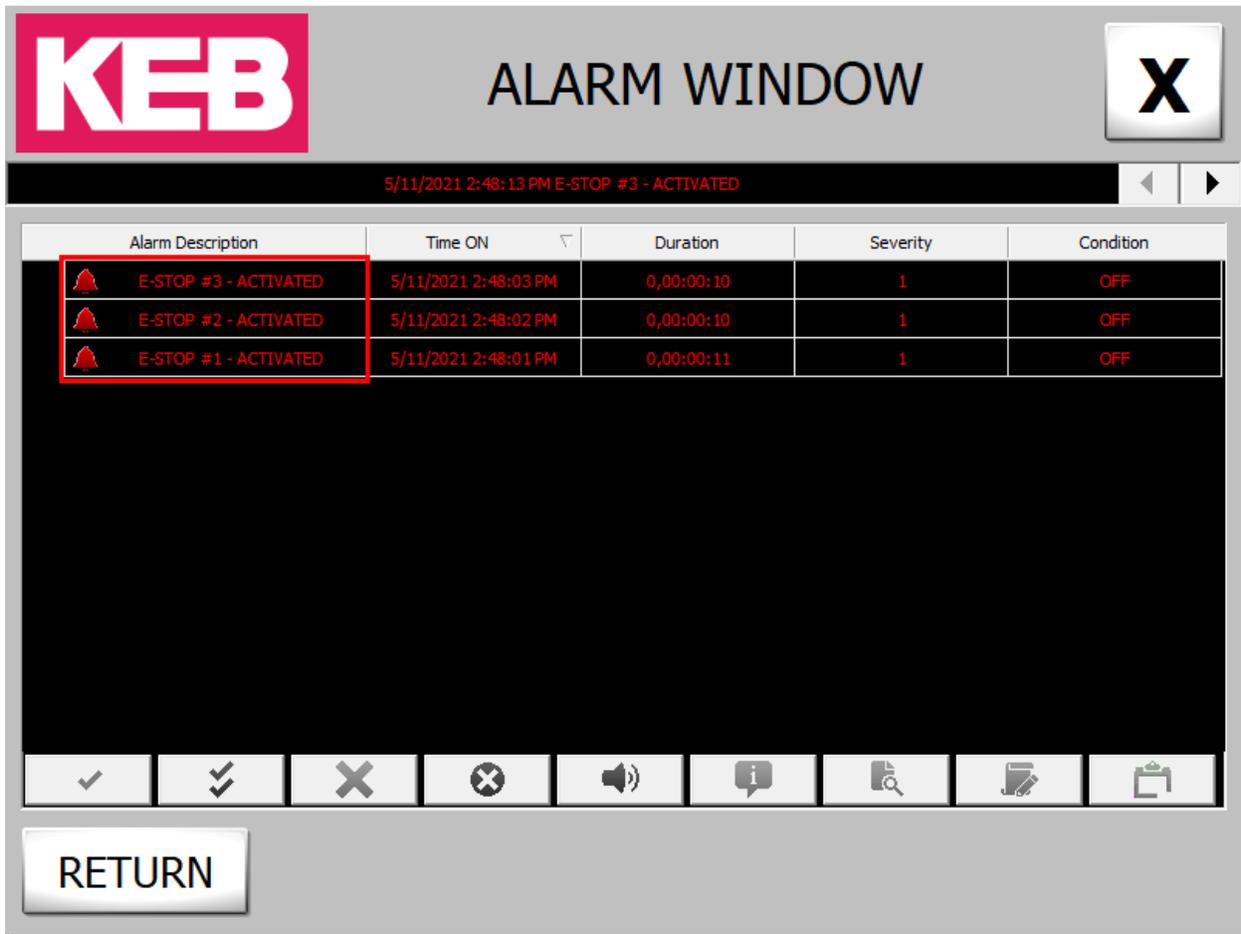


Fig. 9: Alarms from Template

Alarm Window

Alarm windows are used to display active alarms as well as handle their commands. To add an alarm window to a project, navigate to the *Toolbox > Advanced Objects > Alarm Window*. Click and drag this onto the screen. Alarm areas and/or alarm severity can be used to filter the alarms displayed by a single alarm window via the *Style* properties.



Fig. 10: Alarm Window with Graphic Buttons

By default, the alarm window uses graphic buttons to trigger alarm commands. To instead show descriptive text buttons, deselect the *Graphic Buttons* property in the *Style* properties of the alarm window.

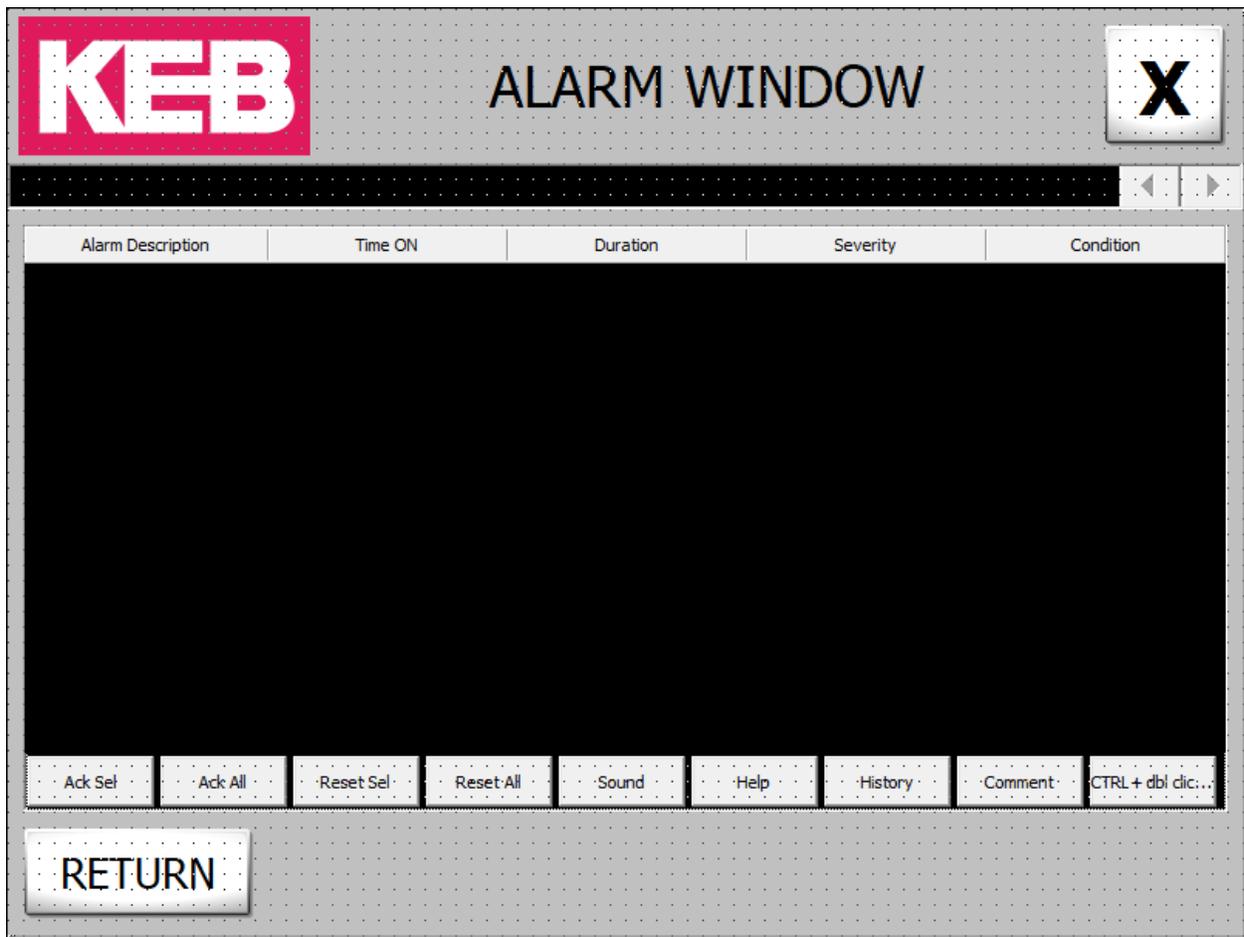


Fig. 11: Alarm Window with Text Buttons

Each of the buttons may also be removed from the window by deselcting their respective general *Style* properties (*Ack Sel Button*, **Ack all Button**, ...).

By default, five columns are displayed in the Alarm Window: (1) Alarm Description - displays the *Alarm Text* of the threshold (2) Time ON - displays the date and time that the threshold was last met (3) Duration - displays the length of time that the threshold was active in D,HH:MM:SS notation (blank if the threshold is currently active) (4) Severity - displays the *Severity* of the alarm threshold from the threshold's *Execution* properties (5) Condition - displays ON if the alarm threshold is active, OFF if it is not Additional columns are also available for display.

When an alarm is activated, it will be displayed in the window and blink (if the *Blink* threshold property is enabled).

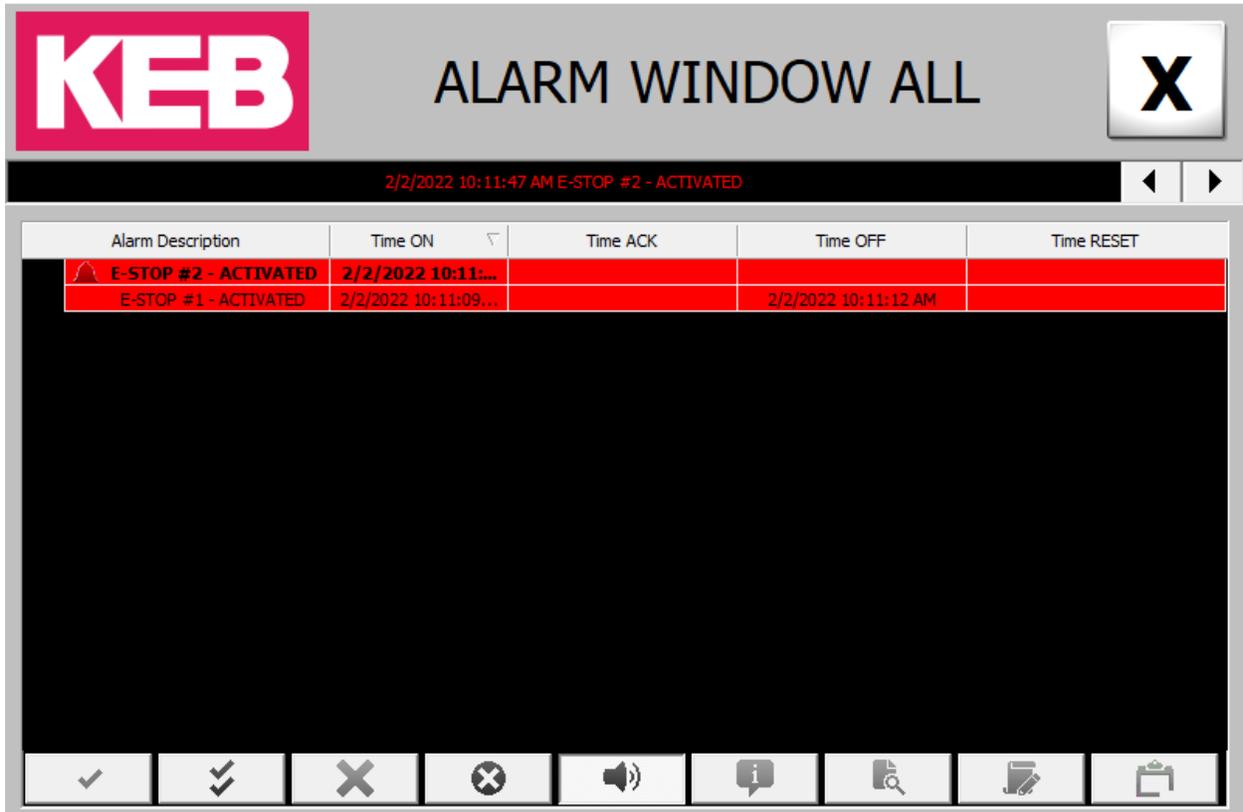


Fig. 12: Alarm Window with Alarms Displayed

If the alarm threshold is active, a red bell icon will appear next to the *Alarm Description*.

The *Time ON* column gives the date and time at which the alarm threshold was met. The *Duration* column displays how long the alarm threshold was active for if it no longer is.

Acknowledge and reset commands may be performed on single active alarms with the Ack Sel and Reset Sel buttons, respectively. Simply click on the alarm to be acknowledged or reset and select the appropriate button. Ack and reset commands may also be performed on all alarms in the window with the Ack All and Reset all command buttons.

Alarm Banner

Alarm banner elements are useful to display active alarm information in a small area of the HMI screen. By adding an alarm banner to a header (embedded screen), this alarm information may be displayed on all screens in the project. To include an alarm banner in a screen, simply click and drag the *Alarm Banner* element from the *Advanced Objects* in the Toolbox onto the screen.



Fig. 13: Alarm Banner

By default, all alarms that have been activated will be shown in the alarm banner. The alarms are displayed one at a time with horizontal spin buttons to navigate through the different alarms. The most recent alarm to be activated will be the default one displayed in the banner. Alarms that are active will have a blinking display.

Many properties are available for the banner including blink time, auto-scroll, severity level filters, etc. However, no further configuration is required for the element to perform its basic function.

Alarm Areas

Alarm areas are used to group alarms together for display in different alarm windows or banners. For example, a project may have a “Temperature” and an “E-Stop” alarm area that separate their temperature and emergency stop alarms into different viewing windows.

To add an alarm area to the project resources, right-click on *Alarms* and select *Add a new Alarm Area...* Assign a descriptive name and select *OK*. The alarm area will be displayed in the *Alarms* resources as a folder.

Alarm areas can be asserted at either the alarm level or the threshold level. To enforce at the alarm level, simply drag the alarms that will belong to the alarm area into the folder.

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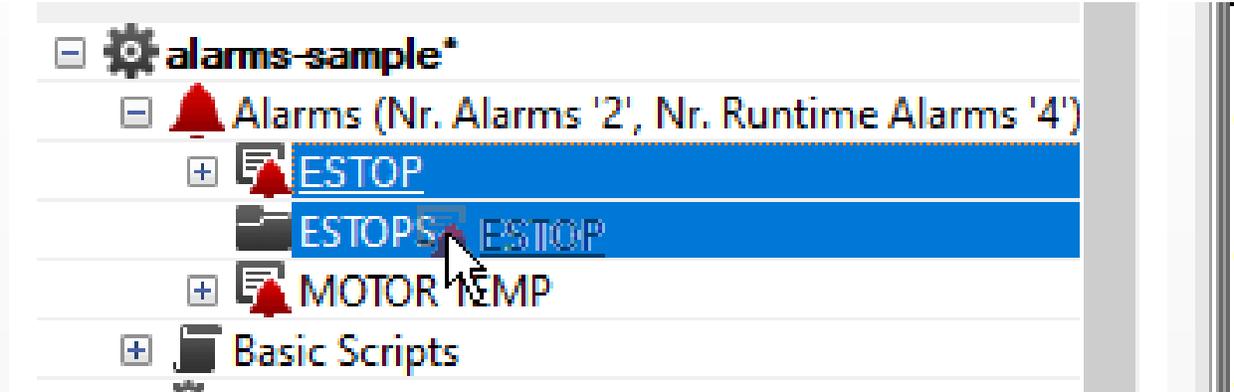


Fig. 14: Add Alarms to Alarm Area

To assert alarm areas at the threshold level, do not add the alarms to the alarm area folder. Instead, for each alarm threshold that will belong to the alarm area, locate the *Alarm Area* property in the *General* properties of the threshold and enter the name of the alarm area.

To apply the filter to an alarm window or alarm banner, locate *Area Filter* in the *Style > Advanced* properties. Click the drop-down arrow and select the alarm area filter that will filter the alarms to display.

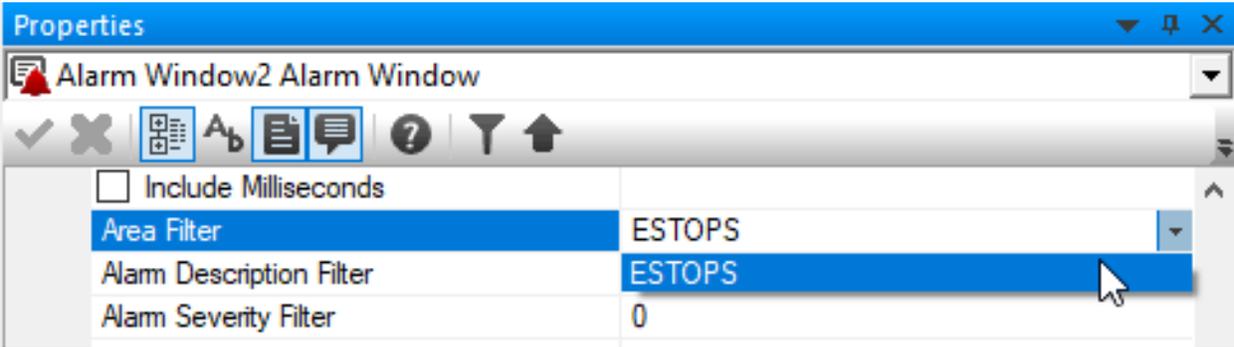


Fig. 15: Select Alarm Area for Alarm Window

Alarm Dispatcher

If the device running the HMI project has the Advanced HMI runtime, then the alarm dispatcher may be configured to send SMS and/or SMTP email alerts for alarms. All devices with the Advanced runtime may send SMTP email notifications. However, only cellular router devices with the Advanced runtime and an activated SIM card inserted and configured may send SMS notifications.

Alarm notifications are configured at the threshold level. Go to the *Alarm Notification* section of the threshold properties. Select the user(s) and/or user group(s) that will receive the notifications.

Select/deselect which alarm notifications should be sent for both Email and SMS (ON, ACK, RESET, OFF). For email notifications, files can be attached to the email notifications as well.

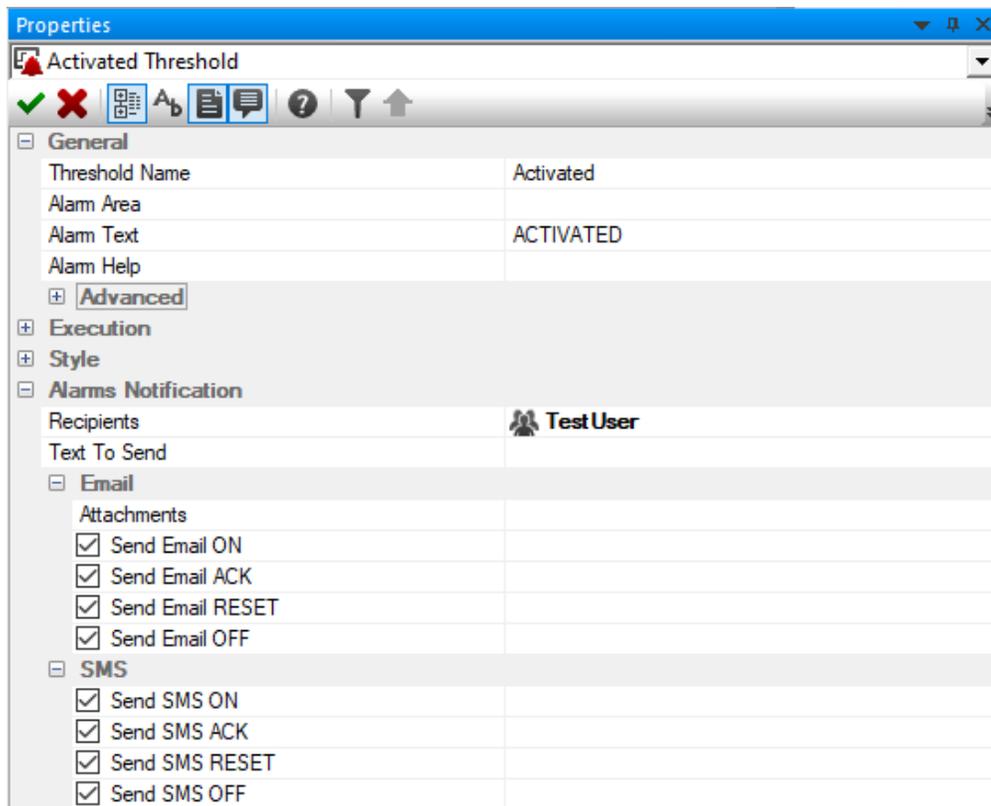


Fig. 16: Alarm Notification Settings for E-Stop Activated Threshold

If a user or user group is to receive alarm notifications, enter the user email and/or mobile phone number in the user properties.

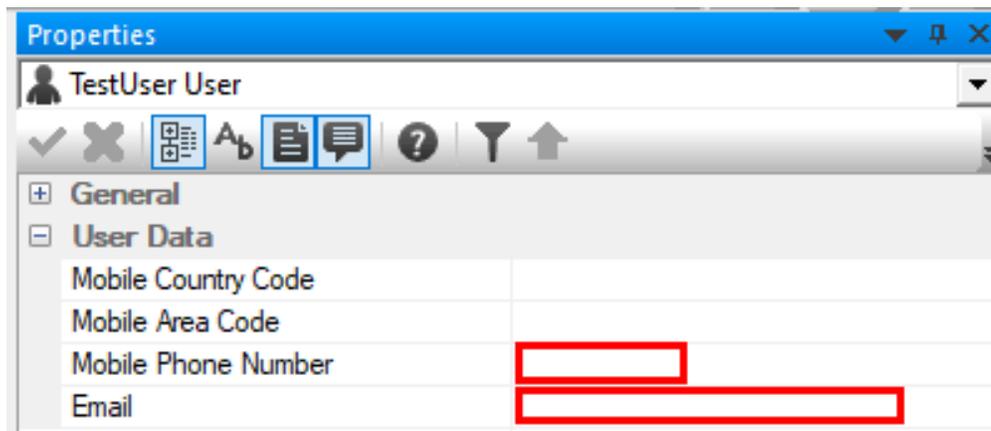


Fig. 17: Configure User Contact Information

The *Alarm Dispatcher* is the tool that handles the sending of alarm emails and SMS messages. To configure the Alarm Dispatcher, go to *Tools > Alarm Dispatcher*. Locate and select the *Plugin settings* icon.

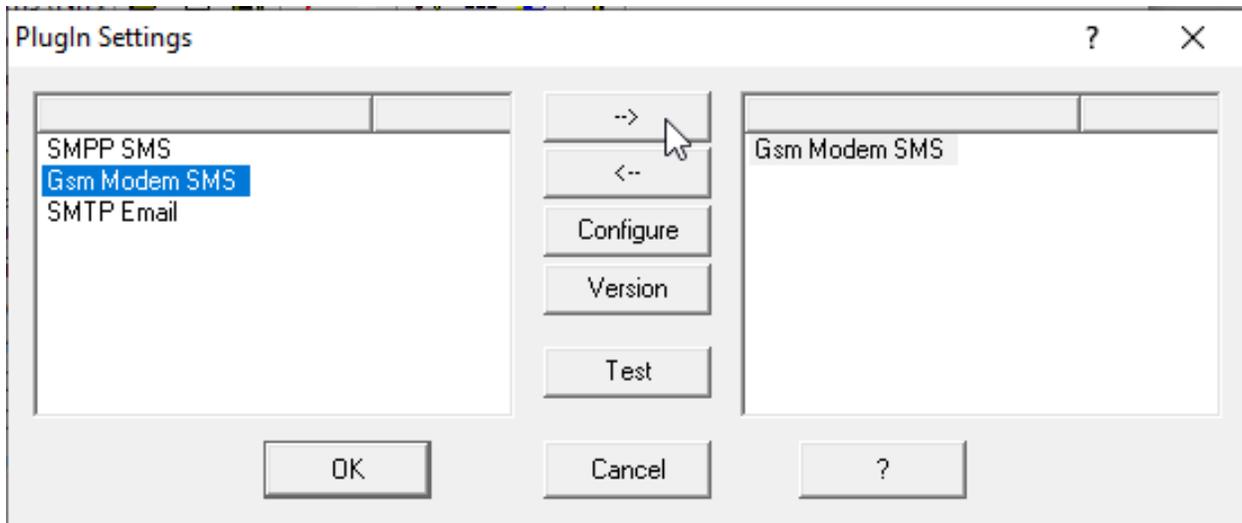


Fig. 18: Configure PlugIn Settings

The plugins being used are displayed on the right side of the window. Use the arrows to add or remove the plugins. To alter the settings of a plugin, select it on the right and select *Configure*.

If *Gsm Modem SMS* is used, no further configuration is required. However, some settings may optionally be changed pictured below.

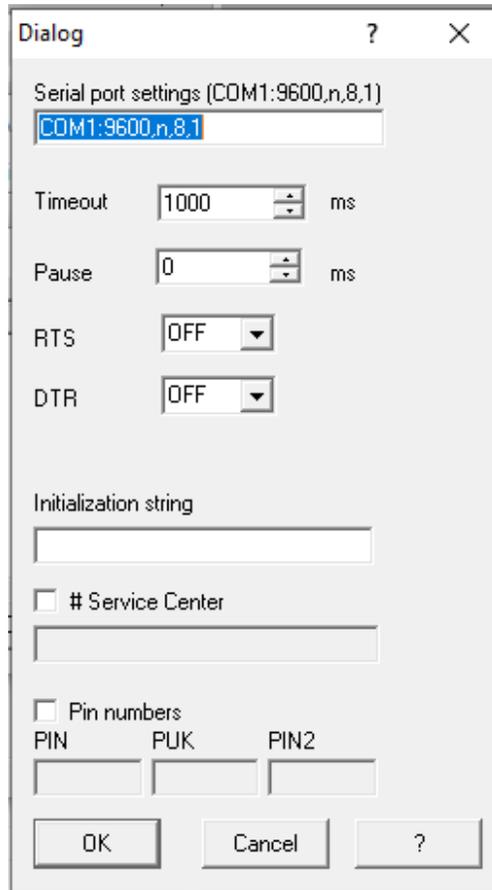


Fig. 19: Gsm Modem SMS Settings

If *SMTP Email* is used, the *Mail Settings*, *Security*, and *Authentication* settings must be configured for the SMTP server that will send out the alarm emails. For the example pictured below, a Gmail account was used with *LOGIN* authentication for the SMTP server.

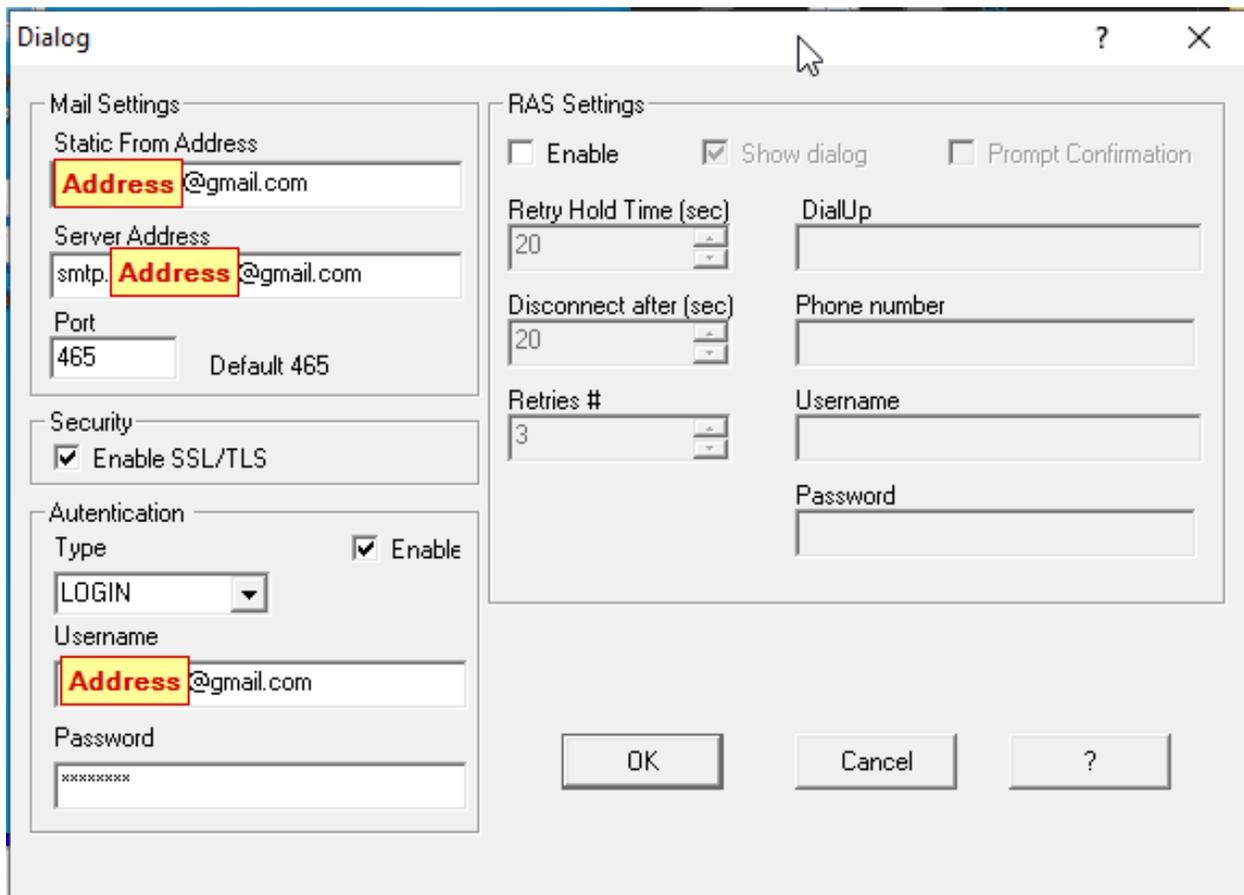


Fig. 20: SMTP Email Settings

Studio HMI allows the testing of the configured SMTP email settings by highlighting *SMTP Email* plugin and selecting *Test* from the *Plugin Settings* window. Enter the *Address* that will receive the email as well as a test *Subject* and *Message*. A *From* address is not required. Pictured below is a successful SMTP server test.

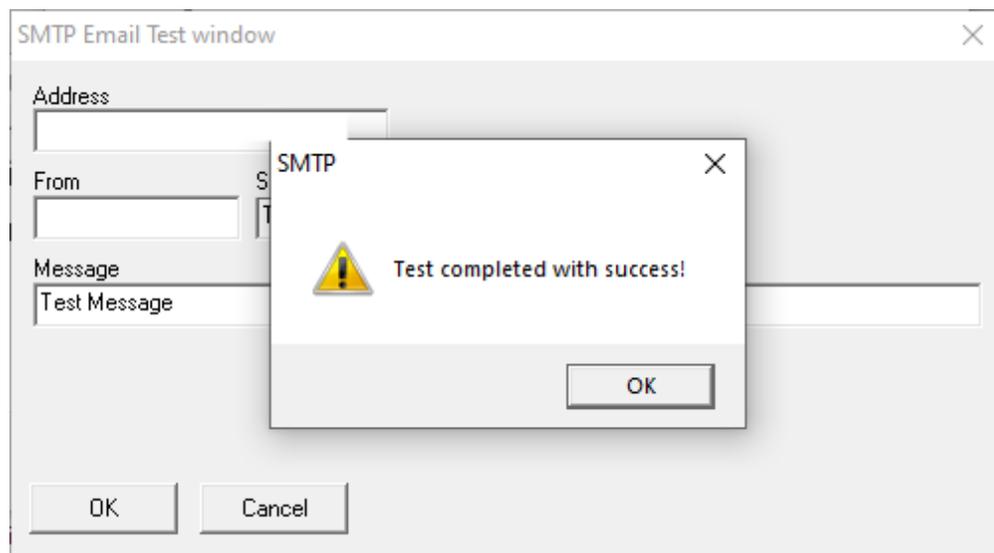


Fig. 21: SMTP Email Test

Check the email address that was supposed to receive the message. Depending on email settings, the message may be placed in the “junk” or “spam” folder.

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